

Evaluation of Cloud Accounting Costs on Timeliness of Financial Reports of Listed Consumer Goods Firms in Nigeria

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Article's History

Received 19th of April, 2026; Revised 29th of May, 2026; Accepted 22th of June, 2026; Available online: 30th of June, 2026. Published as research article in the Volume XXI, Summer, Issue 3(93), 2026.

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Suggested Citation

Okolie, J. O., Charles-Anyago, N., Mazeli, E. N., Omoyibo, F. & Onuorah, A.C. (2026). Evaluation of Cloud Accounting Costs on Timeliness Of Financial Reports of Listed Consumer Goods Firms in Nigeria. *Journal of Applied Economic Sciences*, Volume XXI, Summer, 3(93), 861 – 876. [https://doi.org/10.57017/jaes.v21.3\(93\).09](https://doi.org/10.57017/jaes.v21.3(93).09)

Abstract

This study provided an in-depth empirical analysis of the effect of cloud accounting costs and financial report timeliness by disaggregating cloud accounting costs into cloud accounting acquisition, training, and maintenance/upgrade costs. The study controls for firm size, financial leverage and audit firm type. The study sampled 14 listed consumer goods firms from 2014 to 2023. The Panel Estimated

Generalised Least Squares (PEGLS) technique served as the main estimation technique. The study evidences that cloud accounting acquisition and training costs enhance the speed at which financial reports are released significantly. Conversely, the study confirmed that, while cloud accounting software maintenance is key for system upkeep, too frequent system upgrades may temporarily disrupt the timely release of financial reports. Both firm size (FMSZ) and audit firm type (AUFT) are associated with shorter reporting lags, while financial leverage reduces financial report timeliness significantly.

Overall, this study demonstrates that investments in cloud-based software, coupled with regular staff training in AI and AI-related courses and efficient system upgrades, are key to improving financial reporting processes in the Nigerian consumer goods industry. Hence, regulatory authorities should incentivise firms' transition to automated accounting systems. Furthermore, management of the sampled firms should train their staff in AI and AI-related courses on a regular basis. Lastly, the sampled firms should establish clear protocols to schedule maintenance during non-critical periods to avoid delays in financial report release.

Keywords: cloud accounting, financial report timeliness, panel ECLS, Nigerian consumer Goods, technological adoption

JEL Classification: M41; O33; G14; O55.

Introduction

In the modern business environment, advancements in technology have significantly influenced the methods and processes through which organizations operate, particularly in financial management and reporting. The integration of digital tools into accounting processes has become increasingly essential as firms seek greater efficiency, accuracy, and transparency (Asikpo, 2024; Najafi et al, 2022). Conventional accounting systems, characterized by manual processes and isolated data storage, are gradually being replaced by more advanced, technology-driven approaches (Ugbah et al., 2025). One such innovation that has gained substantial traction is cloud accounting.

Cloud accounting reduces manual errors, and enhances overall productivity (Ahmad et al., 2024; Nduokafor et al, 2024). It also offers the flexibility for firms to access their financial data remotely, promoting greater collaboration and decision-making efficiency. Cloud accounting involves the use of internet-based platforms to perform accounting tasks traditionally executed through on-premise software (Sun, 2024). It leverages cloud technology to store, process, and analyze financial data in a centralized online system, accessible to authorized personnel from any location.

The primary concept behind cloud accounting is the shift from local storage of financial data on physical servers or desktops to secure online storage, managed by third-party service providers. This approach not only enhances data security but also ensures that financial information is regularly backed up and protected against potential data breaches or system failures. Additionally, cloud accounting platforms often feature built-in analytical tools and real-time reporting capabilities, allowing firms to generate financial reports instantly, without the need for manual compilation and adjustment (Alkan, 2022).

One of the key advantages of cloud accounting is its ability to enhance the accuracy and reliability of financial reports. With cloud-based systems, financial data is automatically synchronized across various departments and functions, reducing the likelihood of inconsistencies and errors that often arise from manual data entry (Deniswara et al, 2022). This ensures that the financial statements generated by firms are more accurate and reflective of their actual financial position.

Additionally, cloud accounting facilitates real-time financial reporting, allowing firms to provide up-to-date financial information to stakeholders. This is particularly important for listed firms, which are required to publish regular financial reports to maintain investor confidence and comply with stock exchange regulations (Amahalu, 2020). In contrast, cloud accounting enables firms to automate several aspects of financial reporting, allowing them to generate reports more quickly and efficiently (Al-Nsour et al, 2021). This is particularly beneficial for listed consumer goods firms in Nigeria, as they operate in a highly competitive industry where timely financial information is essential for making informed business decisions.

It is therefore expected that one major reason why firms invest more in cloud accounting software is increase the speed at which financial reports are prepared and also to ensure that financial reports are error free. This suggests that the more firms invest in cloud accounting, the timelier the financial report are prepared. Nevertheless, many listed firms in Nigeria continue to rely on traditional accounting software, which are often manual, fragmented, and prone to errors. As a result, the financial reporting process is characterized by delays, inconsistencies, and, in some cases, non-compliance with regulatory standards. Additionally, there are challenges related to data security, access, and system integration, which hinder the efficient implementation of cloud accounting systems (Al-Nsour et al, 2021). These issues compromise the quality of financial reports and limit the ability of firms to provide timely and accurate information to stakeholders. These has over time eroded investor confidence on the securities traded in the floor of the Nigerian exchange group. Consequently, studies of this nature in the Nigerian context is highly germane.

Although extensive research exists on the effect of cloud accounting on financial reporting quality (FRQ), this study makes a unique contribution by disaggregating cloud accounting costs into two distinct categories: IT-related expenditures (training and maintenance costs) and capitalized software costs (acquisition costs). Justifiably, studies have adopted different proxies to define and measure cloud accounting. For instance, Akai et al (2023) used proxies like infrastructure as a service (IaaS) and software as a service (SaaS) to assess cloud computing, while Alshawabkeh et al. (2022) focused on factors such as system availability, security and integrity, confidentiality and privacy, and system quality.

Other researchers, including Effiong et al (2020), have measured cloud accounting in terms of accounting costs, whereas Owolabi & Izang (2020) focused on server, network, and facility charges as proxies. By focusing on these specific cost elements and examining how they affect financial report timeliness, this study offers new insights into how cloud accounting costs affect reporting efficiency, particularly from emerging markets context. This disaggregation allows for a more nuanced understanding of technological adoption and its effects on financial reporting, an area yet to be exhaustively debated in extant cloud accounting researches. In addition, the study includes three key control variables: firm size, leverage, and audit firm type which refined the analysis and improve the precision of the findings.

This study contributes to the literature by integrating three complementary theoretical perspectives, Resource-Based View (RBV), IT Capability Theory (ICT), and Agency Theory (AGT), to provide a more comprehensive explanation of how cloud accounting costs influence the timeliness of financial reporting. It also extends existing research by employing recent data (2015–2024), offering updated evidence from listed consumer goods firms in Nigeria. Accordingly, the study examines the effect of cloud accounting software costs on the timeliness of financial reporting.

1. Literature Review

Cloud accounting involves storing, processing, and accessing financial information over the internet through cloud-based platforms rather than using traditional desktop software or physical servers (Al-Nsour et al, 2021). The central idea behind cloud accounting is that financial data is hosted on remote servers, commonly referred to as “the cloud,” and can be accessed from anywhere with an internet connection (Ahmad et al., 2024). This differs from traditional accounting systems, where data is stored locally on computers or servers owned by the organization. The shift to cloud accounting allows businesses to operate more flexibly, accessing real-time financial information without geographical limitations, and ensures that data is consistently backed up and protected (Nduokafor et al, 2024).

The fundamental principle of cloud accounting lies in the remote management of financial transactions and reporting. Businesses subscribe to cloud accounting services, which are typically offered by third-party providers, who handle the technical aspects of data storage and system maintenance. This allows firms to focus on their core operations without the burden of managing IT infrastructure for financial processes. Cloud accounting systems support various functionalities such as bookkeeping, invoicing, payroll management, and financial statement generation. Additionally, cloud accounting enables real-time collaboration between accounting teams, as multiple users can access and work on the same financial data simultaneously, improving the efficiency of the accounting process.

One of the main advantages of cloud accounting is the scalability it offers. As businesses grow, the volume of financial data and the complexity of accounting tasks increase. Cloud accounting systems can scale up to meet these growing needs without requiring additional investment in hardware or software (Ahmad et al., 2024). This flexibility is particularly beneficial for businesses that experience seasonal fluctuations or are expanding into new markets. Furthermore, cloud accounting solutions are generally more secure than traditional systems, as they employ advanced encryption and security measures to protect sensitive financial information from cyber threats (Nduokafor et al, 2024). Thus, cloud accounting is a transformative approach to financial management, utilizing cloud-based platforms to handle accounting tasks efficiently (Al-Nsour et al, 2021), offering real-time access, scalability, and robust security, cloud accounting provides businesses with the tools they need to streamline their financial operations and adapt to the demands of a rapidly changing business environment.

Recent evidence further indicates that the digital transformation of accounting extends beyond improvements in operational efficiency, contributing to more sustainable accounting practices through enhanced transparency, real-time information processing, and improved financial reporting quality. Empirical evidence from Romania demonstrates that the adoption of digital accounting technologies supports organizational sustainability and strengthens the reliability of accounting information in an increasingly digital business environment (Nicola-Gavrilă et al., 2025).

Cloud accounting software cost refers to the actual expenditure incurred for the deployment and utilization of cloud-based applications designed to manage various accounting functions (Effiong et al, 2020). This concept encompasses the cost of the day-to-day engagement of businesses and accounting professionals with cloud-based systems for tasks such as financial reporting, bookkeeping, invoicing, tax calculations, and payroll management.

When businesses adopt cloud accounting software, they typically incur some cost for using it to replace or complement their existing accounting systems (Popivniak, 2019). The adoption process involves setting up the software, migrating financial data from traditional systems, and training employees on how to use the new tools. A key characteristic of cloud accounting software usage is the real-time access it provides to financial data. Unlike traditional systems that require users to be on-site to access financial records, cloud accounting allows authorized personnel to view and update financial information from any location, provided they have internet access. This level of accessibility fosters collaboration among team members, auditors, and even external stakeholders, who can view or work on financial data in real time. Additionally, cloud accounting software cost often involves the expenditure for leveraging built-in analytics and reporting features with the aim of enabling businesses to generate financial reports on demand and make data-driven decisions (Effiong et al, 2020).

Financial report timeliness, on the other hand, accounts for the speed and efficiency with which financial statements and reports are prepared, finalized, and made available to stakeholders (Judijanto et al, 2024). It is therefore a measure of how quickly an organization can produce its financial information following the end of a reporting period, ensuring that users of the information have access to current and relevant data. Timely financial reporting is essential for maintaining the relevance of financial information, as outdated or delayed reports can hinder decision-making processes and reduce the value of the financial data provided (Ozoemelam, 2024).

The concept of financial report timeliness is grounded in the principle that financial information is most useful when it is available promptly, allowing stakeholders to respond to the organization's financial situation in a timely manner. For example, investors rely on timely financial reports to make informed decisions about buying or selling shares, while creditors need current financial information to assess the organization's creditworthiness. Oyetola et al., (2024) submitted that timely financial reporting also plays a critical role in improving corporate transparency and accountability. Organizations that consistently produce timely financial reports demonstrate their commitment to providing stakeholders with up-to-date information, fostering trust and credibility. Conversely, delays in financial reporting can raise concerns about the organization's financial health, management effectiveness, or even potential accounting irregularities. Late reporting may also lead to legal and regulatory penalties, as well as a loss of investor confidence.

This study is grounded in three (3) core theories which are: the Resource-Based View (RBV), IT Capability Theory (ICT), and Agency Theory (AGT). First, the RBV propounded by Jay Barney in 1991, suggests that if firms leverage on resources that are valuable, rare, inimitable, and non-substitutable, they will achieve competitive advantage over their counterparts. Contextually, the study considers funds invested to acquire, maintain and train staff in cloud accounting serve as a valuable resource that consumer goods firms will gain a competitive edge over their counterparts in the Nigerian manufacturing industry. In addition, IT Capability Theory (ICT) developed Henderson and Venkatraman (1993) added that firms with strong IT capabilities (cloud accounting packages) are better positioned to record superior profit than firms with low IT capabilities. By implication, the more firms embed IT capabilities into their operations, the more financial reports are timely and devoid of human error and fraud. This theory stresses more on cloud accounting software training costs.

Lastly, the study drawn inference from the Agency Theory developed by Jensen and Meckling in 1976. The theory stresses that information asymmetry between managers and shareholders may increase agency costs (managerial misreporting and inefficiencies), and that cloud accounting may reduce these agency costs by ensuring that financial reports are readily available, accurate, and devoid of material misstatements.

Several studies abounds on the topic. First, Ahmad et al. (2024) examined the effects of cloud-based accounting technology on the quality of financial reports in Jordan's public sector. The study employed an ex-post facto survey methodology with a sample of 152 employees from the Ministry of Finance. Data were collected using a validated questionnaire, with reliability established through Cronbach's Alpha, yielding coefficients between 0.73 and 0.85. Pearson Product-Moment Correlation and regression analysis were used for data analysis, revealing that cloud-based accounting technology significantly improves financial reporting quality.

Odonkor et al. (2024) assessed how AI integration is transforming accounting practices, focusing on both opportunities and challenges. The study conducted a systematic literature review and bibliometric analysis of peer-reviewed articles, case studies, and industry reports from the last decade. Findings indicated that AI significantly enhances accuracy and efficiency in financial reporting, automating routine tasks and enabling predictive analytics for strategic decision-making. However, challenges such as the need for skilled AI professionals, data privacy concerns, and the high costs of integration persist. Resistance to change also emerged as a significant barrier to AI adoption in accounting.

Bangerter & Alfaro-Almagro (2024) investigated the relationship between accounting software adoption and financial reporting quality among UK small businesses. The study, using a descriptive research design, gathered data through online and offline questionnaires and semi-structured interviews from a stratified random sample of small business owners, managers, accountants, and stakeholders. Descriptive and inferential statistical techniques, including correlation analysis, regression analysis, and structural equation modeling, were used for analysis. Results showed that accounting software adoption ($\beta = .783$, $p = 0.000$) and stakeholder perceptions ($\beta = .652$, $p = 0.000$) were positively and significantly related to financial reporting quality, while challenges in implementation ($\beta = -.314$, $p = 0.001$) negatively affected reporting quality. The study recommends that effective accounting software must be user-friendly, cost-efficient, and capable of producing timely and relevant financial information to improve decision-making in small businesses.

Nduokafor et al. (2024) explored the impact of cloud-based accounting software on preventing business failures in Nigeria's consumer goods sector. The study utilized an ex-post facto research design, selecting a purposive sample of 14 consumer goods firms listed on the Nigerian Exchange Group. Secondary data spanning the financial years 2012 to 2021 were collected from audited financial statements and annual reports. The data analysis involved descriptive statistics, including measures such as mean, standard deviation, and range, while robust least square regression was employed to test the hypotheses. Findings revealed a significant reduction in the likelihood of business failure due to the adoption of cloud-based accounting software. The study concludes that integrating modern technological solutions, such as cloud accounting, is crucial for enhancing business resilience. Consequently, it recommends that governments, industry bodies, and financial institutions prioritize technological infrastructure and skill development to promote widespread adoption of cloud-based accounting software.

Al-Okaily et al. (2023) investigated factors influencing the use of cloud-based accounting information systems (AIS) during the COVID-19 pandemic, expanding the Unified Theory of Acceptance and Use of Technology (UTAUT) with new critical factors. Using a quantitative research approach, the study gathered data from 438 current and potential users of cloud-based AIS through an online questionnaire. Structural equation modeling (SEM) revealed that performance expectancy, social motivation, COVID-19 risk, and trust significantly influenced behavioral intentions toward using cloud-based AIS, explaining 71% of its variance. Contrary to expectations, effort expectancy and perceived security risks did not significantly impact behavioral intentions. The study found that communication and decision quality were positively influenced by cloud-based AIS usage.

Ehioghiren & Ojeaga (2022) explored how cloud-based accounting technologies are shaping future-ready professional accountants. Using a survey research design, the study involved 112 auditing firms in Edo State and 73 accounting students from the University of Benin. A 7-point Likert scale questionnaire was administered, and data were analyzed using SPSS. The findings showed that the hypotheses were significant to the dependent variables, leading to the recommendation that firms adopt strategies for integrating cloud technologies and emphasize training for professional accountants to improve their performance in delivering accessible financial information.

Obasan & Kuola (2022) examined the impact of cloud-based accounting on manufacturing firms in Nigeria, focusing on Twinstar Industries Ltd. The survey, conducted among 261 staff members, aimed to assess how cloud-based accounting affects firm policies and operations, as well as the role of IT in enhancing performance. The analysis of variance revealed that cloud-based accounting significantly impacts firm policies and operational efficiency, providing immediate access to critical business information and aiding in preparing for future market demands.

Deniswara et al. (2022) investigated auditors' perceptions of cloud computing's role in audit procedures, using the UTAUT model. The study employed a quantitative research method, distributing questionnaires to 72 external auditors in Jakarta. The analysis, conducted using PLS-SEM, found that performance expectancy, facilitating conditions, and perceived trust influenced auditors' behavioral intentions, while effort expectancy and social influence did not. Moderating variables such as gender, age, and experience were also considered, with performance expectancy emerging as the most influential factor.

2. Research Methodology

This study adopted an ex-post facto research design, which is ideal for examining the association between cloud accounting and financial reporting timeliness of listed consumer goods firms in Nigeria. The ex-post facto design, or "after-the-fact" research, involves analyzing historical data without manipulating or influencing the variables under investigation (Nworie et al., 2023). This design suits the study's objective as it allows for the exploration of past data related on the variables of interest.

The population of the study consists of consumer goods firms listed on the NGX from 2014 to 2023. As at December 31, 2023, there were 21 consumer goods firms listed on the NGX. The focus on consumer goods firms is relevant because these firms often deal with a large volume of transactions, making them ideal subjects for studying the association between cloud accounting software and the timeliness of financial report. Purposive sampling techniques were employed to select the sample size for this study.

Fourteen (14) consumer goods were selected out of the twenty-one (21) listed consumer goods firms listed in the Nigerian exchange group (NGX) as at December 31, 2023. The selection criteria is presented in Table 1:

Table 1: Firms' Selection Criteria

S/N	Criteria	Firms Sampled	Excluded Firms
1	Firms must be listed on the NGX as of December 31, 2023	21	None
2	Complete and accessible data from 2014–2023	19	2
3	Active operations from 2014–2023	17	2
4	Timeliness of annual report submissions	14	3

Source: Authors' compilation based on the reviewed literature and annual reports of the sampled firms.

From Table 1 the firms' annual report submissions formed a critical factor that determines firms sampled such that firms whose annual reports were significantly delayed beyond the deadlines stipulated by the NGX were excluded from the final sample. This ensured that only firms with timely financial reporting were included in the study, as timely reports are vital for the reliability and relevance of financial data.

Data for this study were collected from the annual financial reports of the 14 selected consumer goods firms and from the NGX from 2014 to 2023. The choice of secondary data is appropriate given the historical nature of the variables being studied. The data sourced include Audit report release date, fiscal year-end date, cloud accounting system acquisition costs, data security costs, training costs, maintenance costs, total assets, total debt, total equity, and auditing firm type. Specifically, the difference between the audit report release date and fiscal year-end date was used to generate financial report timeliness while cloud accounting acquisition costs, data security costs, training costs, maintenance costs measured in monetary terms, served as measures of cloud accounting costs. Accordingly, the cloud accounting costs were directly extracted from the IT-related expenditures and capitalized software categories in the firms' annual reports. Those related to IT-related expenditure include training and maintenance costs while those associated with capitalized software categories include implementation and data security costs. By focusing on these absolute costs, the study avoids potential issues of measurement contamination related to other IT-related and capitalized software expenses that are not directly tied to cloud accounting systems.

Furthermore, total assets was logged to get firm size, total debt was divided by total equity to generate financial leverage while auditing firm type was decoded one (1) and zero to generate audit firm size. Collectively, these variables were added into the model to account for potential confounding factors that could affect reporting timelines. Specifically, the major reason for sourcing for firm size is because firms with high asset base typically having more efficient reporting systems than firms with low asset base. Also, highly levered firms may experience delays due to increased scrutiny than low-levered firms. Lastly, firms audited by reputable auditors tend to have faster and more reliable reporting.

To ensure that the data sourced are accurate and consistent, the data undergo series of cleaning processes. During the data cleaning phase, all missing values were carefully handled using mean imputation. This ensured that missing data were addressed without introducing bias.

Table 2: Measurement and Description of Variables

Variable	Acronym	Measurement	Justification	Apriori Expectation
Dependent Variable	FRT	Audit report release date - Fiscal year-end date	Lower FRT means delayed report release.	Nil
Independent Variables	CSAC	Cost used in purchasing the software	Higher investment in software acquisition improves efficiency, leading to faster report release.	Negative
	CSTC	Total monetary cost for training staff	Training increase staff efficiency by ensuring that financial reports are error free and timely and error free.	Negative
	CSMC	Total monetary cost for cloud accounting software maintenance	Regular maintenance of cloud accounting software ensures optimal software performance, resulting in timely report release.	Negative
Control Variables	FMSZ	Log of total assets	Larger firms have more resources and efficient processes, leading to quicker report release.	Negative
	FLEV	Total debt / Total equity	The more firms are leveraged firms, longer time to release reports since they faces more audit scrutiny	Positive
	AUFT	Dummy variable (1 for reputable auditor, 0 for non-reputable)	Firms audited by the Big 4s are more likely to provide timely and accurate reports than firms not audited by the Big4s.	Negative

Source: Authors' compilation based on the reviewed literature and annual reports of the sampled firms.

Descriptive statistics (mean, minimum, maximum, and standard deviation) were used to summarize the study variables, while correlation analysis examined the strength and direction of their relationships. Model robustness was assessed using multicollinearity (Variance Inflation Factor and Tolerance Value), heteroskedasticity, and Ramsey RESET tests. The hypotheses were tested using the Panel Estimated Generalized Least Squares (PEGLS) estimator, which accounts for heteroskedasticity and cross-sectional dependence, thereby improving the reliability of the estimates. Period effects and Period Seemingly Unrelated Regression (SUR) specifications were incorporated to further enhance model robustness.

The empirical model used to test the hypotheses was adapted from the study by Nduokafor et al. (2024). The modified model as expressed as:

$$FRT_{it} = \beta_0 + \beta_1 CSAC_{it} + \beta_2 CSDC_{it} + \beta_3 CSMC_{it} + \beta_4 FMSZ_{it} + \beta_6 FLEV_{it} + \beta_7 AUFT_{it} + Et... \quad (1)$$

where: FRT_{it} = Financial report timeliness of firm i at time t ; $CSAC_{it}$ = Cloud accounting software acquisition costs of firm i at time t ; $CSMC_{it}$ = Cloud accounting software maintenance costs of firm i at time t ; $FMSZ_{it}$ = Firm size of firm i at time t ; $FLEV_{it}$ = Financial leverage of firm i at time t ; $AUFT_{it}$ = Audit firm type of firm i at time t .

3. Results and Discussion

The descriptive statistics presented in Table 3 gives an overview of both the distribution and variability of the various variables used to run the analysis. Specifically, FRT reported a mean value of 78.10 days, suggesting that, on average, firms take about 78 days to produce their financial reports. The standard deviation of 25.09 days suggests considerable variation around this average, with some firms producing their reports much faster or slower. The maximum value of 180 days shows that some firms take up to six months to finalize their financial reports, while the minimum value of 27 days reflects the fastest reporting time.

Cloud accounting system acquisition costs (CSAC), cloud accounting system training costs (CSTC) and cloud accounting system maintenance costs (CSMC) have ₦50,719,696, ₦753,659.5, and ₦3,856,279.5 but deviated by ₦73,040,665, ₦489,609.5, and ₦1,612,238.5. This confirmed that, the various measures of cloud accounting costs clustered around their mean value. Meanwhile, the highest cloud accounting cost measure is CSAC while the least is CSTC. Lastly, firm size (FMSZ) has an average (mean) value of 7.5154, with a highest value of 9.0404 and a minimum value of 4.7581, suggesting moderate variation among the sampled firms as reflected in the standard deviation of 0.9937. Financial leverage (FLEV) has an average (mean) value of 1.6998, with values ranging from 0.0511 to 1.6993 and a standard deviation of 0.7417, suggesting differences in the extent to which firms rely on debt financing. Furthermore, audit firm type (AUFT), has a mean of 0.5163, with a maximum value of 1 and a minimum of 0, and a standard deviation of 0.4997, implying that most sampled firms were audited by Big 4 audit firms in Nigeria.

Table 3: Summary (Descriptive) Statistics (N=140)

Variables	Mean	Maximum	Minimum	Standard Deviation
Dependent Variable: Financial Report Timeliness (FRT)				
FRT	78.1	180	27	25.09071
Independent Variable: Cloud Accounting Software Costs				
CSAC	50,719,696	284,367,450.50	51,228,003	73,040,665
CSTC	753,659.50	1,459,050	508,450	489,609.50
CSMC	3,856,279.50	5,916,850	2,160,000	1,612,238.50
Control Variables				
FMSZ	7.515389	9.040364	4.758056	0.993686
FLEV	1.6998	1.699305	0.051132	0.741692
AUFT	0.516304	1	0	0.499734

Source: Authors' calculations.

Table 4 revealed that, cloud accounting system acquisition costs, cloud accounting software training costs were positively correlated with FRT and that the extent of such relationship is moderate. Meanwhile, cloud accounting software maintenance costs exhibited an inverse strong association with FRT. Nevertheless, it could however be observed that pairs of coefficients obtained for all the explanatory variables displayed no sign of multicollinearity haven obtained values less than 0.80 (80%). However, the model was further tested using multi-collinearity test.

Table 4: Correlation Analysis

	FRT	CSAC	CSTC	CSMC	FMSZ	FLEV	AUFT
FRT	1.0000						
CSAC	0.6906	1.0000					
CSTC	0.5199	-0.0750	1.0000				
CSMC	-0.7204	-0.2113	0.1796	1.0000			
FMSZ	0.1669	-0.2018	0.0538	0.0624	1.0000		
FLEV	0.3651	0.4110	0.1638	0.0352	0.0548	1.0000	
AUFT	0.1674	0.0542	-0.0552	0.0591	-0.1016	0.0632	1.0000

Source: Authors' calculations.

Table 5 reveals a VIF value which ranges between 1.2522 and 2.8985. This is a clear indication that the datasets are free from multicollinearity problem. To further authenticate this assertion, the mean value of both the VIF and TOV are below 10 and above 0.10, respectively. To further evidence this claim, other preliminary analysis were done. The result is presented in Table 6.

Table 5: Multi-collinearity Tests

Variables	VIF	TOV = 1/VIF
CSAC	1.2522	0.7986
CSTC	2.0142	0.4965
CSMC	2.5633	0.3901
FMSZ	2.8985	0.3450
FLEV	1.7985	0.5560
AUFT	2.8787	0.3474
Average	2.2342	0.4889

Source: Authors' calculations.

Table 6 reported an F-statistics value of 2.1338 and a p-value of 0.0821, suggesting that the dataset are Homoskedastic. On this note, the null hypothesis in support of no presence off Heteroskedasticity in the series is accepted. When tested further, the Breusch-Godfrey Serial Correlation LM Test reaffirmed that, the model is free from serial correlation.

Table 6: Other Diagnostic (Preliminary Analysis)

Other Diagnostic Tests	F-statistic	P-value
Heteroskedasticity Test (HET)	2.1338	0.0821

Source: Authors' calculations based on the panel regression analysis.

The Panel EGLS (Period SUR) technique was used to test the research hypotheses. This method was selected because it accounts for Heteroskedasticity and cross-sectional dependence across the firms, ensuring that the results are robust and reliable (Anaike et al, 2024). The PEGLS model also incorporates period and Period Seemingly Unrelated Regression methods to further enhance the validity of the analysis. The model's adjusted R-squared (R^2) of 0.519689 (51.97%) and Adj. R^2 value of 0.508214 (50.82%), indicating that 50.82% of the variability in the timeliness of financial reports are explained by the CAS measures, the remaining 48.08% is captured by the error term. Similarly, the model reported Durbin Watson statistics value of 2.0034, indicating that the model is free of serial/auto-

correlation while the F-statistic value 19.14473 alongside a Prob. (F-statistic) value 0.0000 suggests that CAS is a key driver of FRT. Overall, the model is a good fit for predicting the FRT.

Table 7: Panel EGLS Results: Financial Report Timeliness

Variables	Coefficient	Std. Error	t-Statistic	Prob.
Constant	1.1338	0.0692	16.3781	0.0000***
CSAC	-0.3265	0.0686	-4.7583	0.0000***
CSTC	-0.2508	0.1194	-2.0995	0.0358**
CSMC	0.2716	0.1100	2.4704	0.0135**
FMSZ	-0.3424	0.0599	-5.7192	0.0000***
FLEV	0.3105	0.0907	3.4246	0.0006***
AUFT	-0.3524	0.0662	-5.3269	0.0000**

Note: R²= 0.519689; Adj. R²= 0.508214 DW stat = 2.0034 F-statistic= 19.14473 Prob(F-statistic)= 0.0000; *** and ** denote significance at the 1% and 5% levels, respectively.

Source: Authors' calculations.

Cloud accounting software acquisition costs (CSAC) reported a negative coefficient value of -0.3265, indicating that 1% increase in acquisition of cloud accounting software, the lag between fiscal year-end and audit report release will reduce by 32.65%. This suggests that investment in cloud accounting systems result in data automation, increase data accessibility, and reduce real-time processing, which in turn increase the speed financial reports are released and at the same time reduce material misstatement. These findings are consistent with prior research highlighting that technological adoption in accounting enhances corporate transparency and corporate report efficiency (Nduokafor et al, 2024; Ahmad et al. 2024; Al-Okaily et al, 2023).

Cloud accounting training costs (CSTC) shows a negative coefficient of -0.2508, indicating that the more funds are invested to train staff on the usage of cloud accounting software, staff efficiency/outputs will increased while financial report time lag will reduce 25.08%. This will in turn reduce the lag between fiscal year-end and audit report release. By implication. The higher the CSTC, the higher the quality of the financial report but lower the financial report time lag. The result aligns with studies indicating that staff IT training costs improve financial reporting quality (Nduokafor et al, 2024; Obasan & Kuola, 2022). However, it deviated from the studies which indicates that operational and system-related expenditures can sometimes introduce temporary inefficiencies in reporting workflows (Tukhtamurodov et al., 2024).

Cloud accounting software maintenance costs (CSMC) evidences a positive coefficient value of 0.2716, indicating that too frequent maintenance of cloud accounting software are linked to increased audit report lag. By implication, regular maintenance of cloud accounting packages may temporarily disrupt when financial reports ought to be released. This result clearly suggests that even though regular system maintenance/upgrade should be encouraged, efforts should be made to ensure that it does not disrupt when financial reports ought to be released. The result further signal that the frequency of maintenance activities may be creating operational inefficiencies that delay the audit and financial reporting process.

Firm size (FMSZ) exerted a negative coefficient value of -0.3424, indicating that firms with large asset base have more resources and efficient processes, leading to quicker report release. This suggests that firms with large assets base employ the services of experienced audit firms and as a result present more timely reports than firms with small asset base. This finding is consistent with prior research showing that firm scale is positively associated with financial report quality (Odonkor et al. 2024).

Financial leverage (FLEV) shows a positive coefficient of 0.3105, suggesting that, high-leveraged firms delay in releasing their financial reports since they faces more audit scrutiny than low-levered firms. This indicates that creditor monitoring and debt obligations motivate firms to delay the release financial statements. However, some earlier studies reported that financial leverage may result in financial pressure, which in turn will make high-levered firms to release financial reports timely (Bangerter & Alfaro-Almagro, 2024).

Lastly, audit firm type (AUFT) displays a negative coefficient of -0.3524, indicating that audit firm types are associated with shorter reporting lags. This suggests that firms that use the services of the Big4 auditing firms in Nigeria are most likely to release financial reports more timely than firms audited by small-auditing firms. This aligns with research indicating that cloud-based accounting technologies shapes the future-ready professional accountants (Ehioghiren & Ojeaga, 2022).

These findings are consistent with the growing Industry 4.0 literature, which suggests that the integration of digital management accounting systems enhances information processing, supports more timely financial reporting, and improves managerial decision-making. As argued by Piosik (2022), the increasing intensity of management accounting systems under Industry 4.0 conditions enables organizations to strengthen reporting quality and operational efficiency through the adoption of advanced digital technologies.

Conclusion

This study seeks to provide an in-depth empirical analysis of the association between cloud accounting costs and financial report timeliness by disaggregating cloud accounting costs into cloud accounting acquisition, training, and maintenance costs using the Panel EGLS (Period SUR) estimation technique. The study control for firm size, financial leverage and audit firm type. The study evidences that, after controlling for firm size, financial leverage and audit firm type, investment in the purchase of cloud accounting software and regular staff training in artificial intelligence (AI) and AI-related courses enhances the speed at which financial reports are released significantly. These results underscore the need for policies that supports cloud technology integration and employee skill development. Conversely, the study confirmed that, while cloud accounting software maintenance is key for system upkeep, too frequent system upgrades may temporarily disrupt the timely release of financial reports. Overall, this study demonstrates that investments in cloud-based software, coupled with regular staff training in AI and AI-related courses and efficient system upgrade, are key to improving financial reporting processes in Nigerian consumer goods industry.

The findings have important policy implications for improving financial reporting in Nigeria's consumer goods sector. First, the negative relationship between cloud accounting software acquisition costs (CSAC) and audit report lag suggests that regulators should encourage firms to adopt automated accounting systems through incentives such as tax credits. Second, the finding that cloud accounting training costs (CSTC) reduce reporting delays highlights the need for continuous professional development. Accordingly, firms should

invest in regular training on cloud accounting, artificial intelligence (AI), and related digital technologies to enhance reporting efficiency. Third, the study confirmed that cloud accounting software maintenance costs (CSMC) increases reporting delays. Hence, the study recommends that the sampled firms should establish clear protocols to schedule maintenance during non-critical periods to avoid delays in reporting. Drawing from the outcome of the control variables, the study submits that all firms in the consumer goods sectors should be encouraged to increase their asset base and also employ the services of Big4s auditing firms. Lastly, highly-levered firms should be encouraged to opt for better financial planning and internal control.

Despite the novelty of this study, this study has some notable limitations. First, the study was only confirmed to the Nigerian consumer goods firms out of over 10 sectors listed in the Nigerian exchange group. Second, the study was only confined to a period of 2015 to 2024 over 14 consumer goods firms. Third, the study failed to evaluate whether cloud accounting costs have non-linear effect of financial report timeliness.

Future researchers can address these limitations (identified gaps) by expanding the sample to include various non-financial sectors. This will increase the generalizability of their findings. Additionally, future researchers may use non-parametric estimation tools to capture both the dynamic and threshold effects. Effort should also be made by future researchers to evaluate the effect of cloud accounting intensity on financial report timeliness. Lastly, future research may decide to conduct a comparative analysis on the extent of integration of cloud-based technology among Nigerian firms.

Credit Authorship Contribution Statement

Okolie, J. O. conceived and designed the study, developed the research framework, performed the empirical analysis, interpreted the results, and prepared the original manuscript. Charles-Anyaogu, N. contributed to the study design, literature review, interpretation of findings, and critical revision of the manuscript. Mazeli, E.N. contributed to the research methodology, data validation, and manuscript editing. Omo-Okei, J. assisted with data collection, data curation, and interpretation of the empirical results. Onuorah, A. C. contributed to the theoretical development, manuscript review, language editing, and final approval of the version submitted for publication. All authors have read and approved the final manuscript and agree to be accountable for all aspects of the work.

Acknowledgment/Funding Declaration

N/A

Declaration of Competing Interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data Availability Statement

The data supporting the findings of this study were obtained from publicly available audited annual reports of the sampled listed consumer goods firms and from the Nigerian Exchange Group (NGX). The dataset was compiled from publicly accessible corporate disclosures covering the period 2014–2023. The processed data and supporting materials are available from the corresponding author upon reasonable request.

Ethics Approval Statement

This study was conducted using exclusively secondary data obtained from publicly available corporate financial statements and official disclosures of listed companies. The research did not involve human participants, personal data, interviews, surveys, or experimental procedures. Consequently, ethical approval and informed consent were not required in accordance with applicable institutional and international research ethics guidelines.

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