

The moderating role of reported earnings quality on the relationship between intellectual capital disclosure and return on assets of listed non-financial companies on the Nigerian exchange

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Abstract

This study examined the effect of intellectual capital (IC) disclosure on return on assets (ROA) of non-financial firms listed on the Nigerian Exchange Group (NGX), with reported earnings quality as a moderating variable. The study employed panel data sourced from the annual reports and accounts of 75 purposively selected non-financial firms across ten sectors of the NGX over the period 2010 to 2024, yielding 1,125 firm-years observations. IC disclosure was decomposed into human capital disclosure index (HCDI), structural capital disclosure index (SCDI), and relational capital disclosure index (RCDI), while reported earnings quality (REQ) was proxied through the Modified Jones Model. ROA served as the dependent variable, with firm size and firm age included as control variables. Data were analysed using the system Generalised Method of Moments estimator, which was adopted on the grounds of its robustness to non-normality, heteroscedasticity, endogeneity, and unobserved firm-level heterogeneity inherent in the panel structure. The results revealed that RCDI exerts a significant positive effect on ROA, while HCDI and SCDI recorded significant negative effects in the baseline specification. REQ directly and positively influences ROA, and significantly moderates the relationship between HCDI and ROA, as well as between RCDI and ROA, though its moderating effect on SCDI is insignificant. The study concludes that IC has a significant effect on ROA. It recommends that firms prioritise verifiable relational capital disclosures and strengthen earnings quality through robust internal controls to improve asset utilisation and operational profitability.

Keywords: Intellectual Capital Disclosure; Return on Assets; Reported Earnings Quality; Nigerian Exchange Group

1. Introduction

Corporate survival and competitive positioning in the contemporary knowledge economy have become increasingly dependent on the capacity of firms to identify, manage, and communicate their intangible resource endowments to stakeholders (Mohammad et al., 2022; Yuliusman et al., 2022). Unlike the industrial era, where physical assets constituted the primary drivers of profitability, firms today derive the bulk of their competitive advantage from knowledge-based resources — employee expertise, organisational processes, and stakeholder relationships — that are neither captured in conventional balance sheets nor adequately reflected in traditional performance assessments (Vitolla et al., 2019; Astuti et al., 2020). This structural shift has created a widening gap between the market value and book value of firms, a gap increasingly attributed to unrecorded intellectual capital whose informational deficit exposes stakeholders to avoidable risks in resource allocation and investment decisions (Rieg & Vanini, 2023; Vainini & Rieg, 2019).

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The voluntary disclosure of intellectual capital (IC) has therefore assumed strategic urgency as a mechanism for bridging this informational gap. When firms disclose information about their human capital, structural capital, and relational capital, they transmit signals that enable external stakeholders to more accurately assess operational efficiency, managerial quality, and future earnings potential (Keter et al., 2024; Luthfiani & Suryani, 2022). This informational function is directly relevant to return on assets (ROA) — a fundamental accounting-based measure of how efficiently management deploys the firm's asset base to generate profit. Where IC disclosures are credible and substantive, they reduce information asymmetry, lower the cost of accessing resources, and position firms to utilise their assets more productively, with measurable implications for ROA (Astuti et al., 2020; Hersugondo et al., 2021). Among non-financial firms listed on the Nigerian Exchange Group (NGX), however, ROA performance has remained irregular and inconsistent, raising questions about the adequacy of current asset utilisation strategies and the informational quality of disclosures made to capital market participants (Hermawan et al., 2022; Solikhah et al., 2020).

A critical but underexplored dimension of this relationship is the role of reported earnings quality as a conditioning factor. The capacity of intellectual capital disclosures to improve ROA is not unconditional, it depends substantially on the reliability of the financial reporting environment within which such disclosures are made. Where earnings quality is low, voluntary disclosures lose their credibility as performance signals, and stakeholders are unable to distinguish genuine operational strength from opportunistic narrative reporting (Putra & Ratnadi, 2021; Yuliusman et al., 2022). Conversely, high earnings quality reinforces the informational value of intellectual capital disclosures by confirming that the operational claims embedded in voluntary reports are consistent with verifiable financial outcomes. This moderating dynamic is particularly consequential in Nigeria, where enforcement of financial reporting standards is institutionally constrained and investor confidence in disclosed information remains fragile (Onyekwelu & Uche, 2014; Uzonwanne, 2021).

Although the relationship between IC and firm performance has attracted considerable scholarly attention, significant gaps remain unresolved. Theoretically, most existing studies operationalise intellectual capital through efficiency-based indices derived from the Value-Added Intellectual Coefficient (VAIC) framework, such as those by Fadillah and Noormansyah (2023), Awotomilusi et al. (2022), and Xu et al. (2023), rather than examining disclosure per se as the variable of interest. This conflation of intellectual capital efficiency with intellectual capital disclosure leaves the specific informational pathway through which voluntary disclosure affects accounting-based performance metrics largely untested. Empirically, studies such as Aji et al. (2024), Keter et al. (2024), and Salman (2022) have contributed findings across diverse institutional contexts, yet yield conflicting results that signal the need for further inquiry, particularly in emerging market settings (Mohammad et al., 2022; Yuliusman, 2022). Contextually, the moderating role of earnings quality in the intellectual capital disclosure–ROA relationship has received minimal empirical attention. The capacity of intellectual capital disclosures to improve ROA is contingent on the reliability of reported earnings, as low earnings quality undermines stakeholder confidence in disclosed information and diminishes its value relevance (Putra & Ratnadi, 2021). Few study within the Nigerian non-financial sector has constructed and tested an empirical model that simultaneously examines intellectual capital disclosure and reported earnings quality as joint determinants of ROA within a single panel framework. This study addresses these gaps by evaluating the effect of intellectual capital disclosure on the ROA of non-financial firms listed on the NGX, and by determining how reported earnings quality moderates this relationship. The findings are intended to generate empirically robust and practically relevant evidence for corporate managers, investors, and policymakers in Nigeria and comparable emerging market economies.

2. Literature Review

2.1. Conceptual Review

2.1.1. Return on Assets

Return on assets (ROA) is an exceptional measure of financial performance in the academic literature. According to Wang (2008), ROA is the strength of the organisations in terms of how well they are able to generate profits to ensure sustainable values. It is assessing the entity's power in terms of asset utilisation (Akkas & Asutay, 2022). It indicates how much of the company's profit is attributed to its assets or better still, the efficiency with which the company create earnings from its assets (Sameer, 2021). The ROA is a financial or accounting metric that represented the efficiency of the management of an organisation in the use of its assets to either reduce its cost or increase its revenue to improve its profitability (Akkas & Asutay, 2022). It is a part of corporate governance which is the efficiency of management of a business (Purwanto, 2018). The implication is that the higher the ROA, the better the proficiency of the management in asset usage to generate profit (Mamun, 2021). According to Hull and Rothenberg (2008), ROA is a measure of the amount of profit an entity makes when it uses all of its assets and resources to generate the profit during a particular period of time. A healthy ROA does NOT indicate a positive investor perception of an organisation – it does, however,

show the utilisation of effective, outcome-focused approaches, and the mobilisation and application of both physical and intellectual resources of an organisation. Hence, the efficient human capital, competent structural capacity, and good customer relations will be able to harvest a good ROA (Kianto et al, 2018). The ROA used in this study is seen as the profit which can be generated from every unit of currency which is invested in fixed assets by an entity. It reflects the power and vitality of a company's assets to produce profits for the company. It is an index which is unique to measure the operational performance of a company.

2.1.2. Intellectual Capital Disclosure

With the shift from an industrial to a knowledge-oriented economy, the role of intangible assets in creating sustainable value to the firm has grown over time relative to tangible assets, thus making intangible assets more important than tangible assets (Mahmoud & Bsoul, 2022; Mohammad et al., 2022). Essentially, there is the intellectual capital (IC), which is generally the knowledge-based resources that are held within an organisation. While no single definition exists, IC has been described as intangible, knowledge-based and hard to measure and replicate (Mehralian et al., 2012). Early works by Stewart (1997) defined IC as the sum of employees' skills, experience, and knowledge as organisational assets, and Brooking (1996) and Edvinsson and Malone (1997) added the notion of infrastructure, processes, and the difference between market value and book value. Later research considers IC to include the skills of workers, organisational systems, innovation capabilities, and relational networks that, together, contribute to competitive advantage and firm performance (Tayyem & Al-Mawali, 2020; Bontis, 2001; Ni & Cheng, 2020). In this sense, Intangible Capital (IC) is the intangible resource base that is the source of value creation and value retention in contemporary economies.

On the basis of this, the concept of 'intellectual capital disclosure' (ICD) has arisen as an important tool that can be used to share these intangible resources with stakeholders. The former type of traditional financial statements (TFSS) usually only reports a portion of IC, leading to information asymmetry between the firm and external users. The qualitative and quantitative information on knowledge-based assets (employee expertise, innovation processes, patents, brand value, customer relationships, etc.) is provided by ICD, meeting this need. Overall, the benefits of ICD are that it makes it easier for investors and other parties to assess the actual worth and growth prospects of a company. Nicolo et al. (2020) and Nhon et al. (2020) suggest that disclosure in IC is significant because it is firm-specific and hard to imitate, and thus important for signalling competitive strength. This increases market confidence, enhances the transparency of companies and facilitates effective use of resources.

Moreover, ICD has emerged as an important strategic reporting instrument in an innovation-centric and technologically driven business world. Research has shown that such disclosure of intellectual capital has a positive effect on the organisation's performance, such as productivity, profitability and the organisation's market valuation (Al-Amosh, 2021; Dang et al., 2022). It also maps on the increasing trend of non-financial reporting, as the stakeholders are interested in understanding the use of knowledge resources for sustainable performance of companies (Keter et al., 2024; Diana et al., 2024; Tiwari, 2020). ICD in practice usually takes the form of three key components, namely human capital, structural capital and relational capital (Salman & Abogun, 2023; Niyas & Kavida, 2020). Human capital disclosure emphasises employees' skills and competencies, structural capital disclosure emphasizes on organizational processes, systems and intellectual property, and relational capital disclosure captures external relationships with customers and partners.

2.1.3. Reported Earnings Quality

Financial reporting integrity is the extent to which reported earnings faithfully represent the economic performance of a firm, and is one of the key measures of earnings quality that we report (Bortoluzzo et al., 2024). A key measure of earnings quality that we report is reported earnings quality (REQ), which, broadly speaking, measures the degree of financial reporting integrity, that is, the extent to which reported earnings faithfully represent the economic performance of the firm. The literature has focused on REQ as a complex and complex measure of the credibility, sustainability and informativeness of accounting numbers, rather than a one-dimensional measure (Ugur et al. 2022). Penman and Zhang (2002) refer to it as the "breadth and depth of the earnings statement's coverage of actual and prospective performance of the firm," and Driedel and Jorion (2002) and Dechow and Dichev (2002) base it on the level of true cash flows. Schipper and Vincent (2003) build upon this by highlighting the usefulness and informativeness of earnings to outsiders. The concept of high-quality earnings is defined by Lo (2008) as earnings that are sustainable, recurring, and earned without opportunistic accrual manipulation, and by Ewert and Wagenhofer (2015) as the quality of the information reflected in the earnings, which decreases as fair value measurements and estimates become more complex.

The relation between earnings quality and the relevance of the disclosure of IC as a moderating factor is the anchoring effect of earnings quality as a credibility factor in voluntary reporting. Since most of the information relating to intellectual capital is non-mandatory and qualitative, the ability of this information to affect investors' decisions

depends on the quality and reliability of the financial statements presented with it. The relationship between IC disclosure and REQ puts in play a moderation effect, namely that when earnings quality is high, it is easier to strengthen the relationship between IC disclosure and firm value, while when earnings quality is low, it is more difficult to strengthen this relationship, making it strategically insignificant (Yuliusman 2022). There is therefore a clear link between IC disclosures and their strategic assertions, and consistent and transparent financial reporting is essentially serving as empirical proof of these strategic assertions (Nguyen et al., 2020).

2.2. Theoretical Framework

The signalling theory, which is based on the information asymmetry problem that exists between the internal party and the external party of the firm, is based on the concept that a firm with superior quality will send a positive signal to the market through voluntary disclosure (Ross, 1977; Hartono, 2006). The theory assumes that the completeness/relevance/accuracy/timeliness of the information that a firm publishes has a materially significant effect on the investment and resource allocation decisions of external parties (Tandelilin, 2010). One such voluntary signal is IC disclosure, which creates a positive impression on the organisations as they are strong and transparent, whereas the absence of disclosure is interpreted by the investors as negative news (Keter et al., 2024; Puspitasari, 2017).

This study uses the signalling theory as the theoretical approach, as it is directly used to explain the mechanism by which the disclosure of intellectual capital affects ROA. Intellectual capital, which is represented by human, structural and relational capital and represents the strategic leverage for productivity, profitability and sustainable market value (Mohammad et al., 2022; Szudrowicz, 2020; Al-Hajaya et al., 2019), is difficult to imitate and is thus the place where the strategic advantage lies, which makes the non-disclosure of such capital under traditional reporting requirements to be a material information gap that exposes stakeholders to avoidable decision-making risks. According to Keter et al. (2024) and Astuti et al. (2020), as well as Birindelli et al. (2020), IC disclosure can be proven to decrease information asymmetry, litigation risk, and reputational uncertainty, and enhance market confidence, which ultimately results in efficient asset utilisation and better ROA. The voluntary disclosure of IC is therefore more than a reporting requirement; it is a strategic message that contributes to the creation of firm value and competitive sustainability in a knowledge and technology-based economy.

2.3. I Empirical Review

The IC-ROA nexus has been a topic of much discussion within a variety of sectors and institutional settings. On the other hand, the study conducted in the European context by Ashraf et al. (2023) found that overall IC and human capital have a significant relationship with the ROA of hospitality companies in 18 countries, while during the period of the COVID-19 pandemic, the IC did not make a difference. Likewise, Sardo and Serrasqueiro (2018) found a significant positive correlation between ROI and Intellectual Capital Efficiency (ICE) of the listed non-financial companies in 14 countries from Western Europe during the period 2000 to 2012. The study conducted by Debnath et al. (2023) in Indian IT and fast-moving consumer goods firms supports these results with slight differences, such as the human and structural capital aspects of VAIC had positive and significant relationships with the ROA. Similarly, Tiwari (2020) found that the linear relationships between VAIC, MVAIC and ROA were significant in the Indian healthcare sector, with stable, identifying efficiencies being structural and capital employed, and that there was no sensitivity to political regime changes for IC performance. This finding was supported by the results of Niyas and Kavida (2020) in the case of Indian IT Multinational and Habib and Dalwai (2024) in the case of industrial firms of the GCC. Nadeem et al. (2017) expanded this to BRICS countries, where all three factors of VAIC – human, structural and capital employed efficiency – are found to be significant with respect to ROA in the case of Brazil, Russia, India, China, and South Africa. More recently, Xu et al. (2022) added a life-cycle element to their study, showing that the power of intellectual capital on ROA differs depending on the stage of the business, with more power from the broader component when the business is in its growth and maturity phases, and the narrower human capital dominance when the business is in its decline phase.

Awotomilusi et al. (2022) found a strong positive correlation between overall IC and the three components with ROA of NGX-listed consumer goods companies in the Nigerian and Gulf countries, respectively. The authors Chukwu and Nwachukwu (2021) have obtained mixed results for manufacturing companies in Nigeria, as they observed that capital employed, structural capital efficiencies and human capital efficiency have a positive and significant relationship, while human capital efficiency has a negative and significant relationship with ROA. Akkas and Asutay (2022) did not find a significant relationship between IC disclosure indices and ROA of all GCC banks, but found positive significant relationships between both the human and the relational capital disclosure indices with ROA at conventional banks and Islamic banks separately. In the case of Jordanian listed firms, Mahmoud and Bsoul (2022) found positive significant relationships (except for the relationship between relational capital and the firms), while Vishnu and Gupta (2014) found positive significant relationships for Indian pharmaceutical companies (except for the relationship between relational capital and the firms). However, Maditinos et al. (2011) did not find any statistically significant relationship

between VAIC components and ROA for the listed companies in Greece, which is one of the few exceptions in the literature.

3. Methodology

3.1. Research Design

The research design of this study is an *ex post facto* type of research design, which is the most suitable research design when the secondary data are obtained from past data without experimental manipulation. The cause-and-effect relationship of the research objectives, the use of longitudinal panel data from 2010 to 2024, and its proven capabilities in determining trends and relationships as relevant to business and finance research (Creswell & Creswell, 2023) support its adoption. The annual reports and accounts of sampled companies were used for the data.

3.2. Population and Sample

The population includes 100 non-financial companies listed on 10 sectors of the Nigerian Exchange Group (NGX), as at 30th June, 2025. The financial services sector is excluded because of the complexity of the regulation of the firms within it and the unique reporting requirements. Using the uniform availability of data and completeness of data throughout the study period, a purposive sampling method was used that led to the selection of 75 companies in all ten sectors. Observations for any year between 2010 and 2024 were rejected for companies that had no data for those years. Table 1 shows the distribution of the population and sample by sector.

Table 1 Population and Sample Distribution by Sector

S/N	Sector	Population	Sample
1	Agriculture	5	4
2	Conglomerate	6	5
3	Construction & Real Estate	10	4
4	Consumer Goods	20	16
5	Health Care	7	6
6	ICT	8	4
7	Industrial Goods	12	10
8	Natural Resources	4	4
9	Oil & Gas	8	7
10	Services	20	15
Total	100	75	

Source: Nigerian Exchange (NGX) Website and Researcher's Compilation (2025)

3.3. Model Specification

The empirical model of this study was specified to examine the degree to which IC disclosure affects the ROA of non-financial firms listed on the NGX, and the extent to which reported earnings quality moderates this relationship. Following signalling theory, human capital disclosure (HCDI), structural capital disclosure (SCDI), and relational capital disclosure (RCDI) are expected to exert positive effects on ROA, as greater voluntary disclosure of IC reduces information asymmetry and strengthens stakeholder confidence in the firm's return-generating capacity. Reported earnings quality (REQ) is likewise expected to moderate this relationship on the grounds that high earnings quality reinforces the credibility of IC disclosures and amplifies their conversion into improved asset utilisation and financial performance (Keter et al., 2024). Firm size (FZ) and firm age (FA) are included as control variables. Hence, the functional representation of the model is specified as:

$$ROA_{it} = f(HCDI_{it}, SCDI_{it}, RCDI_{it}, REQ_{it}, FS_{it}, FA_{it},) \quad 1$$

The econometric form of the direct effect model is specified as:

$$ROA_{it} = \beta_0 + \beta_1 HCDI_{it} + \beta_2 SCDI_{it} + \beta_3 RCDI_{it} + \beta_4 FZ_{it} + \beta_5 FA_{it} + \mu_{it} \quad 2$$

To test the moderating role of reported earnings quality, the interaction terms between REQ and each intellectual capital disclosure component are introduced, yielding the moderated model:

$$ROA_{it} = \alpha_0 + \alpha_1 HCDI_{it} + \alpha_2 SCDI_{it} + \alpha_3 RCDI_{it} + \alpha_4 REQ_{it} + \alpha_5 (HCDI * REQ)_{it} + \alpha_6 (SCDI * REQ)_{it} + \alpha_7 (RCDI * REQ)_{it} + \alpha_8 FZ_{it} + \alpha_9 FA_{it} + \mu_{it} \quad 3$$

Where: β_0 and α_0 = constant term; β_{1-5} and α_{1-9} = coefficients of the respective variables;

Table 2 Variables Measurements

Variables	Symbol	Measurement
Return on Asset	ROA	$\frac{\text{Net income}}{\text{Total Asset}}$
Human Capital Disclosure Index	HCDI	$\frac{\text{No of HCDI disclosed}}{\text{Total No of possible HCDI}}$
Structural Capital Disclosure Index	SCDI	$\frac{\text{No of SCDI disclosed}}{\text{Total No of possible SCDI}}$
Relational Capital Disclosure Index	RCDI	$\frac{\text{No of RCDI disclosed}}{\text{Total No of possible RCDI}}$
Reported Earnings Quality	REQ	Discretionary Accruals estimated using the Modified Jones Model (Total Accruals – Non-Discretionary Accruals, scaled by Total Assets)
Firm Size	FZ	Natural Logarithm of Total Assets
Firm Age	FA	Log (Current year – year of listing on the NGX)

Source: Researcher's Compilation (2026)

3.4. Method of Data Analysis

Data were analysed using both descriptive and inferential statistics via the Stata statistical package. Descriptive statistics, specifically means and standard deviations, were computed for all the variables to characterise the distribution of the study data. Spearman rank correlation analysis was employed at the inferential level to explore the direction and strength of associations among intellectual capital disclosure components, reported earnings quality, and return on assets prior to regression estimation.

Preliminary diagnostic tests were conducted to ensure the robustness and reliability of the empirical results. These include multicollinearity assessment among explanatory variables and the Shapiro-Wilk normality test, the results of which confirmed that the study variables were not normally distributed. This finding, combined with the heteroscedasticity and distributional irregularities characteristic of firm-level panel data, justified the adoption of an estimation technique that does not rely on strict normality assumptions. Accordingly, the system Generalised Method of Moments (GMM) dynamic panel estimator was adopted, given its robustness to non-normality, heteroscedasticity, endogeneity, and unobserved firm-level heterogeneity, properties that make it particularly appropriate for the 75-firm, 15-year panel structure of this study.

4. Data Analysis and Presentation of Results

4.1. Descriptive Statistics

Table 3 Descriptive Statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max
ROA	1125	0.179	25.661	-378.940	176.270
HCDI	1125	0.334	0.193	0.000	1.000
SCDI	1125	0.270	0.161	0.000	0.710
RCDI	1125	0.388	0.203	0.000	1.000
REQ	1125	-0.444	1.574	-21.340	6.340
FAGE	1125	28.213	13.643	1.000	60.000
FS	1125	7.130	0.910	4.620	9.590

Source: Researcher's Computation (2026)

Table 3 presents the descriptive statistics for this study. The ROA records a positive mean of 0.179, indicating that sampled firms generate positive accounting returns on average. However, the large standard deviation and extreme minimum and maximum values reflect pronounced cross-firm and inter-temporal variability in profitability, attributable to macroeconomic instability, sectoral shocks, and heterogeneous operational efficiency, reinforcing the appropriateness of a dynamic panel estimation approach.

Among the intellectual capital disclosure indices, relational capital disclosure (RCDI) records the highest mean of 0.388, followed by human capital disclosure (HCDI) at 0.334 and structural capital disclosure (SCDI) at 0.270. These values collectively indicate that firms disclose, on average, less than 40% of the items captured across all three disclosure dimensions, with structural capital being the most under-reported. The wide dispersion across all three indices signals significant heterogeneity in disclosure behaviour among sampled firms.

Reported earnings quality (REQ) has a negative mean of -0.444 with substantial dispersion, indicating weak earnings quality across the sample and considerable variability in reporting integrity. Regarding the control variables, sampled firms average 28.213 years in age, reflecting a predominantly mature firm population, while the mean FS of 7.130 with modest variability confirms size differences without extreme disparity.

Table 4 Shapiro-Wilk Normality Test

Variable	Obs.	W	V	Z	Prob. > z
ROA	1,125	0.565	305.584	14.238	0.000
HCDI	1,125	0.926	51.889	9.826	0.000
SCDI	1,125	0.921	55.446	9.991	0.000
RCDI	1,125	0.986	9.538	5.612	0.000
REQ	1,125	0.579	295.288	14.153	0.000
FAGE	1,125	0.956	30.620	8.514	0.000
FS	1,125	0.992	5.659	4.313	0.000

Source: Researcher's Computation (2026)

The Shapiro-Wilk normality test results in Table 4 indicate that all study variables are non-normally distributed, with probability values of 0.000 across the board, indicating rejection of the null hypothesis of normality at the 1% significance level. For ROA, the non-normality is consistent with the skewness and extreme values typical of accounting-based performance indicators. The disclosure indices (HCDI, SCDI, RCDI) reflect the heterogeneous and clustered nature of voluntary reporting practices among sampled firms. The non-normality of REQ is attributable to variability in

managerial reporting discretion and firm-specific financial conditions, while that of FAGE and FS reflects structural differences in firm maturity and scale within the Nigerian non-financial sector. Collectively, these results justify the adoption of the system GMM estimator, which is robust to non-normality, heteroscedasticity, and distributional irregularities inherent in firm-level panel data.

Table 5 Spearman Rank Correlation Matrix

Variables	ROA	HCDI	SCDI	RCDI	REQ	FAGE	FS
ROA	1.000						
HCDI	0.210	1.000					
SCDI	0.188	0.784	1.000				
RCDI	0.135	0.482	0.724	1.000			
REQ	-0.025	-0.038	-0.001	0.085	1.000		
FAGE	0.003	0.166	0.224	0.121	-0.015	1.000	
FS	0.233	0.428	0.466	0.368	-0.168	0.110	1.000

Source: Researcher's Computation (2026)

The Spearman rank correlation results in Table 5 reveal that all IC disclosure indices are positively associated with ROA, HCDI (0.210), SCDI (0.188), and RCDI (0.135), indicating that firms with higher levels of voluntary IC disclosure tend to record stronger accounting returns, consistent with signalling theory predictions. REQ records a weak negative association with ROA (-0.025). Firm size (FS) exhibits a moderate positive association with ROA (0.233), while firm age (FAGE) shows a negligible relationship (0.003), indicating that scale rather than maturity is the more relevant control characteristic in this sample.

Among the explanatory variables, high associations are observed between HCDI and SCDI (0.784) and between SCDI and RCDI (0.724), reflecting the co-movement of disclosure practices across IC dimensions. Whilst these coefficients are relatively elevated, they remain within acceptable bounds for panel regression analysis and do not constitute evidence of severe multicollinearity. FS is also moderately associated with all three disclosure indices (0.428, 0.466, 0.368), confirming that larger firms tend to disclose more intellectual capital information. REQ shows weak associations with all disclosure components, with the largest being a modest positive correlation with RCDI (0.085). In all, the correlation coefficients are weak to moderate in magnitude, and the absence of severe multicollinearity is further confirmed by the Variance Inflation Factor diagnostics presented in the subsequent section.

4.2. System Generalised Method of Moments Panel Result

Table 6 Result of System Generalised Method of Moments Panel Analysis

Dependent Variable: ROA		
Variables	Without Moderation	With Moderation
L.ROA	0.565*** (0.000)	0.459*** (0.000)
HCDI	-22.109*** (0.000)	-18.362*** (0.000)
SCDI	-8.858*** (0.000)	-19.280*** (0.000)
RCDI	12.164*** (0.000)	4.969*** (0.000)
REQ	—	17.343*** (0.000)
REQ×HCDI	—	-12.259*** (0.000)
REQ×SCDI	—	-1.617 (0.169)
REQ×RCDI	—	-5.500*** (0.000)
FAGE	-1.324*** (0.000)	-0.485*** (0.000)
FS	43.658*** (0.000)	35.492*** (0.000)
Intercept	-268.768*** (0.000)	-226.086*** (0.000)
Observations	1,150	1,050
No. of IVs	9	9
Hansen Test	5.02 {0.000}	1.22 {0.509}
AR(1)	-1.68 {0.000}	-5.72 {0.000}
AR(2)	0.74 {0.529}	0.22 {0.882}
VIF	2.13	
No. of Groups	75	75

Notes: p-values in parentheses; {} denotes test statistics for post-estimation diagnostics. *** p<0.01, ** p<0.05

Source: Researcher's Computation (2026)

Table 6 presents the system GMM estimates for the effect of intellectual capital disclosure on ROA, without and with the moderating role of reported earnings quality. The lagged dependent variable (L.ROA) is positive and significant in both specifications (0.459 and 0.565 respectively), confirming the dynamic persistence of firm profitability and validating the adoption of the GMM estimator. The Hansen test is insignificant in the moderated model ($p = 0.509$), confirming instrument validity, while AR(1) is significant and AR(2) insignificant in both specifications — satisfying the standard conditions for system GMM consistency. VIF values below 3.0 confirm the absence of multicollinearity concerns.

In the baseline model, HCDI (−22.109) SCDI (−8.858), and RCDI (12.164) are negative and statistically significant, showing that human capital and structural capital disclosures negatively affect ROA, while relational capital disclosure has a positive effect. Firm size (FS) is positive and significant (43.658), while firm age (FAGE) is negative and significant (−1.324), indicating that larger firms perform better in terms of ROA, while older firms tend to record lower profitability.

In model with moderation, HCDI (−18.362), SCDI (−19.280), and RCDI (4.969) remain negative and significant, although the magnitude and direction of effects vary compared to the non-moderated model. REQ is positive and significant (17.343), indicating that higher earnings quality independently enhances ROA. The interaction terms show mixed moderating effects: REQ×HCDI is negative and significant (−12.259), REQ×RCDI is also negative and significant (−5.500), while REQ×SCDI is negative but statistically insignificant (−1.617). These results indicate that reported earnings quality does not uniformly strengthen the relationship between intellectual capital disclosure and ROA but instead reduces the marginal effect of some disclosure components.

5. Discussion of Findings

The system GMM estimates confirm the dynamic persistence of firm profitability, as evidenced by the positive and significant lagged ROA coefficients of 0.459 and 0.565 in the baseline and moderated specifications, respectively. The Hansen test insignificance ($p = 0.509$) and the AR(1)/AR(2) pattern validate instrument validity and model consistency. In the baseline specification, human capital disclosure (HCDI) is negative and significant, indicating that voluntary disclosures relating to employee skills and workforce development do not translate into improved ROA under weak reporting credibility conditions, possibly because such disclosures are perceived as symbolic rather than substantive in the Nigerian institutional environment. This contrasts with Ashraf et al. (2023) and Awotomilusi et al. (2022) but aligns with Chukwu and Nwachukwu (2021) and Akkas and Asutay (2022), who documented conditional and negative effects of human capital on ROA in constrained institutional settings. Structural capital disclosure (SCDI) equally records a negative and significant coefficient, consistent with the proprietary cost hypothesis, whereby extensive disclosure of internal processes and systems may expose competitive intelligence to rivals, undermining the operational efficiency such structures are designed to deliver. This finding diverges from Debnath et al. (2023), Tiwari (2020), and Sardo and Serrasqueiro (2018), but accords with Maditinos et al. (2011), who documented unexpected intellectual capital–performance relationships in institutionally constrained environments. In contrast, relational capital disclosure (RCDI) is positive and significant, indicating that disclosures relating to customer relationships, supplier networks, and strategic partnerships reduce information asymmetry and improve asset utilization, consistent with signalling theory and corroborated by Akkas and Asutay (2022), Awotomilusi et al. (2022), and Nadeem et al. (2017).

The introduction of reported earnings quality and its interaction terms depicts that the direct effect of REQ on ROA is positive and significant (17.343), consistent with Keter et al. (2024) and Putra and Ratnadi (2021), who affirmed that high-quality earnings more faithfully reflect economic performance and support efficient asset utilisation. The REQ×HCDI interaction is negative and significant (−12.259), indicating that as earnings quality improves, the marginal ROA contribution of human capital disclosure diminishes, grounded in the signalling theory argument that credible financial statements substitute for softer narrative disclosures, rendering additional human capital information less incrementally valuable. Similarly, REQ×RCDI is negative and significant (−5.500), suggesting that high earnings quality reduces the incremental operational value of relational capital narratives, which are inherently subjective and difficult to verify independently. REQ×SCDI, however, is statistically insignificant (−1.617, $p = 0.169$), confirming that structural capital disclosure retains consistent performance relevance independent of earnings quality conditions, corroborating Tiwari (2020), Debnath et al. (2023), and Sardo and Serrasqueiro (2018).

6. Conclusion and Recommendation

This study provides empirical evidence on the relationship between intellectual capital disclosure and ROA of non-financial firms listed on the NGX, with REQ as a moderating variable. The results indicate that relational capital disclosure constitutes a significant positive channel through which ROA is improved among sampled firms, thereby lending support to the signalling theory proposition that voluntary disclosure of stakeholder relationships reduces information asymmetry and enhances asset utilisation efficiency. Reported earnings quality equally emerged as a significant direct driver of ROA, confirming that credible financial reporting strengthens operational profitability independent of disclosure behaviour. However, the moderating interactions reveal that higher earnings quality attenuates the ROA contributions of both human capital and relational capital disclosures, while leaving structural capital disclosure effects unchanged.

Based on these findings, the study recommends that corporate managers of NGX-listed non-financial firms should prioritise the depth and verifiability of relational capital disclosures, particularly information relating to customer relationships, supplier networks, and strategic partnerships, as this dimension consistently translates into improved return on assets. Firms should equally invest in strengthening the quality of reported earnings through robust internal controls, sound accounting systems, and transparent accrual reporting practices, given that earnings quality directly and significantly improves ROA while also conditioning the value-relevance of intellectual capital disclosures. Regulators and standard-setters should consider promoting standardised and verifiable disclosure frameworks for relational capital in the Nigerian non-financial sector, so as to reduce narrative ambiguity and enable stakeholders to more accurately assess the return-generating capacity of listed firms.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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