INTELLECTUAL CAPITAL AND EARNINGS PREDICTABILITY

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Abstract
This study investigated the relationship between intellectual capital efficiency (ICE) and earnings predictability (ENPRED) of insurance firms in Nigeria. The study used three dimensions of ICE, human capital efficiency (HCE), structural capital efficiency (SCE) and capital employed efficiency (CEE), and obtained data from a sample of twelve firms over nine years, 2012 – 2020. Regression analysis was used to explore the relationship between ICE components and ENPRED. Results showed that human capital efficiency (HCE) has a significant and positive relationship with earnings predictability, but the other ICE components were not significantly associated with earnings predictability. The results support the view that human capital constitutes a valuable resource which should be efficiently utilised to achieve more predictable earnings and survive in the knowledge economy. The findings have implications for insurance firms as they should constantly seek to enhance their human capital efficiencies to sustain competiveness and achieve more effective insurance penetration in Nigeria. More efficient investments in structural capital and capital employed will help the industry to reap greater benefits of IC investments.

Key words: Intellectual capital, human capital efficiency, structural capital efficiency, capital employed efficiency, earnings predictability

INTRODUCTION

The Nigerian Insurance Act requires every insurance firm to prepare and file its annual audited financial statements with its regulator, the National Insurance Commission. One of the key information in the audited financial statements of a corporate entity is earnings. Information on earnings and its components measure the financial performance of an entity, periodically. Accordingly, there is so much interest on this information by shareholders and other financial statement users. Security analysts, for instance, often evaluate earnings information and forecast future performance based on available earnings data (Deegan & Unerman, 2011). The widespread attention on earnings information by various stakeholders motivates management to show keen interest on the components of earnings. Investigations of accounting scandals in different parts of the world have revealed that reported earnings in those cases did not reflect the underlying economic circumstances of the firm. In other words, the reported earnings were unreliable and users of the affected financial statements were misled in their decision making. This resulted in great losses thereby generating concern about the quality of earnings reported in the financial statements. Thus, while information about earnings and its component is essential, the quality of corporate earnings is very important.

Managers exercise considerable discretion in measuring and reporting earnings, and this arises because standard setters permit heterogeneity in accounting choices. The exercise of this discretion may vitiate the quality of earnings reported by firms. Generally, earnings quality is enhanced when earnings information reflect the economic reality of the reporting firm, and it provides detailed content to enable informed decision making by stakeholders (Dechow & Schrand, 2004; Dechow, Ge & Schrand, 2010). One of the most popular accounting-based attributes of earnings is earnings predictability (Francis et al., 2004). The quality of earnings reported by insurance firms is very important, not only for the usefulness of such numbers in decision making, but also because the insurance industry in Nigeria suffers from credibility problems.

A large body of empirical research has been conducted to ascertain factors that determine earnings quality. The studies found several determinants of earnings quality which include
national characteristics, corporate governance practices, firm characteristics, industry characteristics, accounting standards, capital market incentives, regulatory motivations and contracting motivations (Ali & Hwang, 2002; Gaver & Paterson, 1999; Olaoye & Adewumi, 2020; Theophillus & Salawu,. 2018). Given the relevance of intellectual capital in driving successful competition in a knowledge-based economy, an evolving line of research focuses on how intellectual capital is associated with earnings quality. Intellectual capital refers to knowledge, tact, skills, creativity, expertise and experience of workforce (Chen et al. 2004; Goh, 2005). Studies using Nigerian data to examine the association between intellectual capital (IC) and earnings quality (EQ) are rare. A large number of IC studies in the field of accounting in Nigeria focus on the association between IC and financial performance (Akintoye, Adegbie & Bello, 2022; Ebirien, Chukwu & Nwaba, 2023; Ousama, Hammami & Abdulkarim, 2020). The current study therefore fills gap in literature.

LITERATURE REVIEW
Conceptual review
Intellectual capital
Intellectual capital is the value of a company's knowledge, skills, business training, or any proprietary information that may provide the company with a competitive advantage. Intellectual capital (IC) is an intangible asset (Hall, 1993). It is also referred to as knowledge assets (Teece, 1998) because of its relevance in the knowledge economy. IC is made up of three dimensions – human capital, structural capital and capital employed (Pulic, 1998).

Human Capital has been described as the basis of intellectual capital, and it includes factors such as knowledge, skills, capabilities and attitudes of employees, leading to improvement of client's expected performance and company's profitability. Each employee has a type of skills and knowledge which are an integral part of that employee's mind; if the knowledge and skills are not activated, the employee cannot be used to create value for the organization. Human capital is the key IC element as it is useful in harnessing organisational resources to increase productivity and sustain competitiveness (Chen et al., 2004; Stewart, 1997).

Structural capital on the other hand, represents organizational values that are necessary for an establishment to continue its activities and that support the human capital. It is defined as all resources linked to the external relationships of the firm – with customers, suppliers or partners in research and development. It comprises that part of human and structural capital involved in the company's relations with stakeholders (investors, creditors, customers, suppliers), plus the

perceptions that they hold about the company. Examples of this are image, customer loyalty, customer satisfaction, links with suppliers, commercial power, negotiating capacity with financial entities and environmental activities (Odoemenam, 2022).

Capital employed refers to financial and non-financial assets deployed by an entity to assist its value creating process. These assets provide a capital base that assists successful business competiveness. Two dimensions of IC that extensively recognised in the literature are human capital and structural capital. Pulic (1998) proposed an IC measurement model that combine capital employed with the other two IC dimensions. The model, value added intellectual coefficient (VAIC), evaluates how efficiently an entity has utilised its IC. The IC components in VAIC model are human capital efficiency (HCE), structural capital efficiency (SCE) and capital employed efficiency (CEE) (Pulic, 1998, 2000).

Earnings predictability
Earnings predictability (ENPRED) is an earnings quality measure which refers to the ability of earnings to predict itself. Frances et al. (2004) argues that ENPRED is associated with relevance, a fundamental characteristic of financial information. When earning is predictable, analysts are able to make more accurate forecasts. ENPRED is therefore a valuable indicator of earnings quality (EQ) for business analysts. Managers are usually concerned with the issue of ENPRED as less predictable earnings may result in higher cost of capital (Affleck-Graves, Callahan & Chipalkatti (2002).

There are different measures of ENPRED, including measures based on analysts' forecasts and time series models. ENPRED can also be measured as the square root of the error variance from earnings persistence model (Francis et al., 2004). "Large (small) values of predictability imply less (more) predictable earnings" (Francis et al., 2004, p.979). This later approach is the ENPRED measure used in this study. Earnings with low volatility are associated with high persistence, while earnings with high volatility offer very low reliable predictability (Dichev & Tang, 2009).

Theoretical framework
The resource based theory (RBT) explains that the resources of a firm that are valuable, rare, difficult to imitate or substitute assist the firm to gain and sustain competitive advantage (Barney, 1991). Intellectual capital (IC) helps a firm to create value which is needed to survive competition, and sustain desirable performance. Therefore IC falls within the realm of these valuable resources that scale up and sustain organisational performance in the highly competitive and turbulent market modern businesses are exposed to. Several studies have shown that IC is directly and positively associated with profitability and market value (Poh, Kilicman & Ibrahim, 2018; Tran & Vo, 2020). This means that efficiency in the use of IC will enhance the earnings of an entity, and very likely the quality of its earnings. A positive relationship has been reported between earnings quality and some IC components in Jordan (Sowaity, 2022).

Empirical review and hypotheses development
Human capital efficiency and earnings predictability
Investment in intellectual capital (IC) accelerates value creation (Clarke, Seng & Whiting, 2011), growth in revenue (Ahangar, 2011) and improvement in financial and operating performance (Anuonye, 2015; Ebirien et al., 2023; Kamath, 2015).

Several studies have shown that intellectual capital (IC) has a positive effect on earnings quality (Azizi et al., 2013; Dumay & Tull, 2007; Parast, Delkhak & Jamshidi, 2013; Sarea & Alansari, 2016; Taheri et al., 2013). While some studies report their findings based on IC as a composite variable, other studies looked at the association between IC components an EQ. One IC component that has attracted so much research attention is human capital efficiency (HCE). This is possibly because human capital is regarded as the core of intellectual capital that drives the other IC components. Several studies have documented a positive relationship between HCE and various dimensions of EQ such as earnings predictability (Asadollahi et al., 2013), asymmetric cost behaviour (Yang, 2019), and other measures of earnings quality (Khajayi, Ghadirian-Arani & Fattahi-Nafchi, 2016). In a study on the relationship between IC and EQ, Demerjian et al. (2013) reported that managerial ability is associated with lower numbers of subsequent restatements, accrual quality, reduced errors in provisions for bad debts and increased earnings persistence. Of the three dimensions of IC, Darabi, Rad and Ghadiri (2012) found significant relationship only between HCE and EQ. This discussion leads to the following hypothesis.

H₁ *Human capital efficiency enhances earnings predictability in the insurance industry in Nigeria*

Structural capital efficiency and earnings predictability
The evidence from studies on the effect of structural capital on earnings quality is mixed. Khajayi et al. (2016) examined the relationship between ICE components and a comprehensive measure of EQ in Iran and reported that SCE has a positive effect on EQ. Contrarily, Asadollahi et al. (2013) who investigated the effect of ICE on earnings predictability reported that SCE is negatively associated with EQ. In further inconsistency in research evidence, Vakilifard and Rasouli (2013) who investigated IC – income smoothing relationship reported an insignificant relationship between ICE and EQ. Darabi et al. (2012) also reported insignificant relationship between IC and EQ. Arising from this discussion; the second hypothesis is as follows.

H₂ *The relationship between structural capital efficiency and earnings predictability is insignificant in the insurance industry in Nigeria*

Capital employed efficiency and earnings predictability
Studies on the relationship between capital employed efficiency (CEE) and earnings quality have largely reported an insignificant relationship. Rachmawati (2020) evaluated the effect of ICE on real earnings management using data from Indonesia, but failed to document any significant relationship. Asadollahi et al. (2013) also reported an insignificant relationship between CEE and earnings predictability in 101 Iranian firms. Consistent with Asadollahi et al. (2013), Vakilifard and Rasouli (2013) reported an insignificant relationship between CEE and income smoothing. Darabi et al. (2012) also reported an insignificant relationship between CEE and EQ. Based on the discussions above, the third hypothesis is formulated as follows.

H₃ *The relationship between capital employed efficiency and earnings predictability is insignificant in the insurance industry in Nigeria*

METHODOLOGY
Research Design
This study investigated the relationship between intellectual capital components and earnings predictability of listed insurance firms in Nigeria. The study adopted the *ex-post facto* research design which uses data in existence at the time of the research.

Data on the two groups of variables (dependent and independent variables) were matched in the research. The matching of the observations from two groups is a feature of the ex post facto research design.

Population and sample
The insurance firms in the population are those listed in the Nigerian Exchange Group in 2012 to 2020. The Fact Book of the Exchange showed that twenty two firms were listed in the insurance sector within the period. Given the size of the population, the study adopted the census sampling approach which involves including all the observations in the sample. However, not all the insurance firms issued published financial statements on a timely basis in the period; accordingly, only firms with complete annual report data were included, and this resulted in a sample of 12 firms. With a study period of nine years, the study used 108 firm-year observations. The sample selection procedure is shown in Table 1.

Table 1 Procedure for sample selection

Description	No of Firms	Firm-Years obs
Insurance firms listed between 2012 to 2020	22 (twenty two)	234
Less delisted firms	2 (two)	18
	20 (twenty)	180
Less firms without complete data	8 (eight)	72
Number of firms in the sample	12 (twelve)	108

Source: Odoemenam (2022)

Data and model
Relevant data were extracted from the annual reports of sampled firms and analysed using the regression technique. Earnings predictability was modelled as a function of IC components and control variables. The econometric model used in the analysis is as follows:

$$ENPRED_{it} = \beta_0 + \beta_1 HCE_{jt} + \beta_2 CEE_{jt} + \beta_3 SCE_{it} + \beta_4 LEV_{jt} + \beta_5 ROA_{jt} + \beta_6 GRW_{jt} + E_{j,t}$$

Where for insurance firm j at year t, E is error term, β_0 = intercept, β_1 - β_6 are coefficients. The other notations are defined as in Table 2 below.

Table 2. Variable description and measurement

Variable Notations	Variable description and Measurement
Dependent variable	
ENPRED	Earnings predictability. Calculated as the square root of the estimated error variance obtained from earnings persistence model (SREEV). SREEV = $\sqrt{\sigma^2(E_{j,t})}$. Where $\sigma^2(E_{j,t})$ is the variance of the error term of firm j in year t. Variance measures the variability of the data set in the sample. Earnings with high volatility offer very low reliable predictability and vice versa (Dichev and Tang, 2009). Therefore, SREEV is an inverse proxy of ENPRED. Negative SREEV indicates positive earnings predictability.

Independent variables

HCE	Human capital efficiency; total of employees' expenses/value added
CEE	Capital employed efficiency. Value added divided by capital employed, where capital employed is the net book value of assets.
SCE	Structural capital efficiency. Structural capital divided by value added, where structural capital is value added minus total employees' expenses

Control variables

LEV	Leverage. Total liabilities divided by total assets
ROA	Return on assets. Profit before tax divided by total assets
GRW	Growth. Percentage change in gross premium from t-1 to t.

Source: Odoemenam (2022)

The study introduced control variables which are return on assets, leverage and growth opportunities. It selected the control variables based on prior studies which show that these variables are significant determinants of earnings **predictability** of firms.

Leverage
Leverage is an important firm characteristic. Firms with high leverage are potentially risky and likely to manipulate earnings (DeFond & Jiambalvo, 1994; Richardson et al., 2002). Richardson et al. (2002) examined the usefulness of accounting information in a sample that restated their annual earnings and provided evidence showing that leverage is a motivation for aggressive accounting policies.

Growth opportunities
Firms with high growth opportunities are likely to have efficient management and are constantly under great pressure to sustain the momentum. To sustain growth, managers of firms with high growth opportunities manage earnings thereby affecting earnings quality (Beatty et al. 2002; Degeorge et al., 1999).

RESULTS
Descriptive statistics
Descriptive statistics of the variables in the study are presented in Table 3. The minimum, maximum values and the standard deviation of each IC component indicate high variability in the data set. The minimum values of HCE, SCE and CEE are negative, while the maximum values are positive, indicating that some firms in the industry are utilizing their IC assets efficiently, while others are not. The mean value of HCE of 1.76 indicates that about 60% of the entire value added was applied on wages, salaries and other related costs. The maximum and mean values of SCE exceed those of CEE, and so is the variability of SCE. The mean value of leverage (LEV) of 0.56544 indicates that average liabilities in the industry exceed fifty percent of the average total assets in the industry. The maximum LEV value of 1.28360 suggests that liabilities exceed total assets in at least one firm in the sample; this is not a good financial position for an insurance firm. The mean ROA of 0.03238 indicates that profitability is generally poor in the industry.

Table 3   Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
ENPRED	108	0.02259	0.02689	0.00085	0.15129
HCE	108	1.75792	1.66093	-6.70257	5.74160
CEE	108	0.32361	1.07708	-1.24845	11.0700
SCE	108	0.39090	1.53204	-4.67128	12.6315
LEV	108	0.56544	0.26689	0.07291	1.28360
ROA	108	0.03238	0.10824	-0.21836	0.90627
GRW	108	0.13858	0.24797	-0.54966	1.18276

Source: Odoemenam (2022)

Table 4 presents the bivariate correlations of the variables in the study. None of the correlation coefficient is up to 50%, suggesting the absence of multicolinearity in the data set.

Bivariate correlations

Table 4 Correlation of variables in the study

	ENPRED	HCE	CEE	SCE	LEV	ROA	GRW
ENPRED	1.0000						
HCE	-0.0104	1.0000					
CEE	-0.0016	-0.3101*	1.0000				
SCE	0.0284	0.0281	0.0577	1.0000			
LEV	0.1956*	-0.1764	0.2134*	0.0059	1.0000		
ROA	0.3918*	0.4298*	-0.1204	0.0894	0.0655	1.0000	
GRW	-0.0129	0.1290	-0.2683*	-0.0604	-0.0939	0.0559	1.0000

* denotes 5% level of significance
Source**:** Odoemenam (2022)

Regression analyses results
Table 5 presents the regression results for hypotheses 1 to 3. The results are based on robust standard errors to overcome the problems of heteroscedasticity and autocorrelation.   The coefficient on HCE is negative, suggesting a negative relationship between HCE and SREEV, the inverse proxy for ENPRED. In other words, there is a positive relationship between HCE and earnings predictability (ENPRED). The relationship is significant at the 1 per cent level. Table 5 also shows the coefficient of CEE as negative but statistically insignificant. As with CEE, the coefficient of SCE is negative and insignificant. The coefficient of the three control variables in the study are also shown in the table. ROA has a significant relationship with ENPRED. However, growth (GRW) as well as leverage (LEV) has an insignificant relationship with earnings predictability (ENPRED). The overall model is significant, and the independent variables explain more than 20 per cent of the variations in earnings predictability.

Table 5   Regression Results

ENPRED	Coef.	Robust Std. Err.	T	p-value
HCE	-0.00316	0.0010876	-2.91	0.004
CEE	-0.00096	0.0009437	-1.02	0.311
SCE	-0.00011	0.0009814	-0.12	0.903
LEV	0.01389	0.0117993	1.18	0.242
ROA	0.11513	0.0233866	4.92	0.000
GRW	-0.00123	0.0060804	-0.20	0.840
cons	0.01711	0.0062940	2.72	0.008
Model Summary				
Number of obs	108			
F(6, 101)	5.08			
Prob > F	0.0001			
R-squared	0.2106			

Odoemenam (2022)

RESULTS AND DISCUSSIONS

The results in Table 5 show that HCE (human capital efficiency) is negatively and significantly related to SREEV (the proxy for earnings predictability). As stated above, SREEV (the square root of the estimated error variance) is an inverse indicator of ENPRED. When earnings volatility increases, earnings predictability decreases (Dichev & Tang, 2009). Accordingly, the significant, negative relationship between HCE and SREEV, indicates a significant positive relationship between HCE (human capital) and ENPRED (earnings predictability). Thus, hypothesis 1 is supported. This finding is consistent several prior studies that documented a positive relationship between HCE and earnings quality (Asadollahi et al., 2013; Darabi et al., 2012; Khajayi et al., 2016; Yang, 2019). A possible reason for this finding may be drawn from the nature of human capital which is the core element that drives IC efficiency. HC positively affects financial performance of corporate entities (Chukwu et al., 2019), and positively influences earnings **predictability** (Demerjian et al. (2013). Another potential reason may be the state of the insurance industry in Nigeria. Insurance penetration in Nigeria is less than one per cent of GDP possibly due to citizens' distrust and perceptions of opaque practices in the industry. To survive in the environment, insurance firms strive to maximise the use of knowledge assets to improve profitability and achieve earnings predictability.

The relationship between CEE (capital employed efficiency) and ENPRED (earnings predictability) is insignificant. Thus, there is insufficient evidence to reject the second hypothesis. Similarly, the relationship between SCE and ENPRED (earnings predictability) is insignificant, and this result supports the third hypothesis. These findings are supported by some prior studies on IC components and earnings **predictability** (Darabi et al. 2012; Vakilifard & Rasouli, 2013). A potential reason for these findings is that insurance firms have not made efficient investments in structural capital and capital employed. Profitability (ROA) in the industry is depressed – the descriptive statistics show that the average ROA in the industry is just three per cent; although ROA is significantly associated with earnings predictability. The low ROA may be explained by inadequate investment in structural capital (SCE) and capital employed (CEE).

CONCLUSION AND RECOMMENDATIONS

This research examined the relationship between earnings predictability (ENPRED) and IC components – human capital efficiency (HCE), structural capital efficiency (SCE) and capital employed efficiency (CEE), based on data extracted from twelve insurance firms over a period of nine years, 2012 – 2020. ENPRED was measured using an inverse indicator, the square root of the error variance from earnings persistence model. Results from the study based on regression analyses with robust standard errors, showed that human capital efficiency (HCE) was significantly associated with earnings predictability. This result is supported by the resource based theory (RBT) which explains that valuable resources can lead to competitive advantage, which can result to more predictable earnings. The other IC components, capital employed efficiency (CEE) and structural capital efficiency (SCE), did not significantly relate to earnings predictability. Therefore this study concludes that human capital efficiency (HCE) is significantly associated with earnings quality (ENPRED); SCE is insignificantly associated with earnings **predictability** (ENPRED); and there is no significant relationship between CEE and earnings **predictability** (ENPRED). To improve the relationship between SCE, CEE and earnings **predictability**, insurance firms should make more efficient investments in structural capital and capital employed.

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