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# DOES ESG DISCLOSURE MATTER FOR INTELLECTUAL CAPITAL AND FIRM PERFORMANCE IN DEVELOPING COUNTRIES?

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**Abstract:** The objective of this study is to determine the influence of Environmental, Social, and Governance (ESG) disclosures on the relationship between Intellectual Capital (IC) and corporate performance. Data on various variables were gathered from companies in eight emerging countries from 2015 to 2022. The Modified Value-Added Intellectual Capital (MVAIC) model was utilised to measure IC, whereas company performance was evaluated using three indicators: Return On Assets (ROA), Return On Equity (ROE), and Tobin's Q. The results indicated a positive association between ROA, ROE, and each IC component. Moreover, the impact of ESG disclosure on this association was found to be significant, but only for ROA and ROE. These findings implied that both ESG and intellectual capital had a noteworthy influence on company performance. This indicated that while intellectual capital positively influenced financial outcomes, the presence of strong ESG practices could enhance this relationship. In other words, firms that effectively disclosed their ESG efforts were likely to see a pronounced positive effect of their IC on ROA and ROE. However, the study did not find a significant moderating effect of ESG disclosure on other performance measures such as Tobin's Q.

Keywords: ESG disclosure, intellectual capital, developing countries, MVAIC.

## Introduction

The transformation from a traditional industrial background to a knowledge-based economy to promote exceptional entrepreneurship has become a highly debated subject in recent times. As a result, the transition from a production to knowledge-based economy has led to an increased focus on intangible assets, specifically Intellectual Capital (IC), as opposed to tangible resources (Bhattu-Babajee & Seetanah, 2021; Uslu, 2022). In contrast to tangible assets, IC is not explicitly disclosed on the balance sheet; yet, it has a substantial influence in enhancing corporate performance (Ahmad, 2023).

The correlation between firm performance and intellectual capital holds significant importance, particularly in the context of organisations endeavouring to find innovative strategies in sustaining and advancing their commercial operations (Saddam *et al*., 2022). The studies by Dosso and Vezzani (2019) and Dalwai and Salehi (2021) have explored novel strategies for generating value in a competitive market by considering intangible assets and prominent economic resources. Furthermore, Nelson (2020) has observed that the evaluation of sustainability in corporate decision-making has broadened to encompass Environmental, Social, and Governance (ESG) performance. Prior research has established that the disclosure of ESG information has a favourable influence on the financial performance of companies (Daugaard & Ding, 2022).

In 2021, Wagner (2020) conducted a study which documented an increase in the acknowledgement of ESG issues in response to the COVID-19 epidemic and its accompanying social justice movement. Consequently, there has been an increased level of anticipation from both customers and investors towards firms, including financial institutions, to

incorporate ESG concepts into diverse facets of their operations, encompassing supply chains, talent management, and other pivotal business domains.

Moreover, in terms of assessing accountability, ESG provides a broader spectrum of measurable indicators in comparison to corporate social responsibility. These indicators encompass a wider range of factors such as sustainability, ethics, and corporate governance concerns. Moreover, investors are progressively integrating ESG considerations into their evaluation of corporate performance for the purpose of making investment decisions, acknowledging its relevance as a non-financial determinant (Agostini & Nosella, 2017; Nelson, 2020). This study seeks to examine the impact of ESG factors as a moderating variable on the relationship between intellectual capital and company performance.

The consideration of ESG disclosure is contingent upon the firms' reporting of ESG scores. Based on the available information, it appears that the empirical study conducted by Pulino *et al*. (2022) is the sole comparable investigation within this particular field. The study conducted by the researchers examined the direct correlation between ESG disclosure and business performance specifically among Italian firms. Furthermore, they recommended expanding the sample size to include a cross-country analysis. Therefore, this study aims to focus on the roles of the ESG as a moderator in between intellectual capital and firm performance in the emerging countries. ESG is important because socially conscious investors now use its criteria to evaluate potential investments.

In order to achieve the research objective, data was collected from Refinitiv Eikon and Datastream, two financial platforms that provide time-series data, news, and business analytics, from 2015 to 2022. This work provides a significant contribution to the extant knowledge through two distinct avenues. The researchers are not solely focused on the direct association between IC and corporate success. The researcher presented a more comprehensive examination of the impact of ESG disclosure on the relationship between IC and company performance. Furthermore, this analysis incorporated accounting-based performance factors such as ROA and ROE, as well as market-based performance measure Tobin's Q, in accordance with prior research.

The findings indicate that the financial success of a corporation is influenced not just by its IC, but also by its ESG policies. Therefore, the present study incorporated ESG factors as a moderating variable in the relationship between IC and company performance. According to Zhao *et al*. (2018), investors in developing nations tend to prioritise the notion of ESG investment to a greater extent compared to investors in developed countries. Moreover, a majority of the research conducted on IC has been mostly concentrated in developed nations, with emphasis on the banking sector (Oppong & Pattanayak, 2019; Xu *et al*., 2022). This study seeks to investigate the context of developing countries. There is a scarcity of research examining the relationship between intellectual capital and developing countries, as well as emerging markets, as evidenced by the works of Anifowose *et al*. (2018) and Dey and Faruq (2019).

Therefore, our work has the potential to address this existing vacuum in literature. These findings suggest policymakers should promote the integration of intellectual capital with ESG factors in corporate practices, especially in developing countries, to enhance firm performance and attract investment. Encouraging research and development on intellectual capital, particularly using models like MVAIC, can help close knowledge gaps and support sustainable business practices. Lastly, policies fostering ESG investment can further strengthen the competitive advantage of corporations in emerging markets, ensuring alignment with global business standard.

In addition, this research utilises the Modified model of Value-Added Intellectual Capital (MVAIC) due to its novelty and limited

usage among scholars (Tran & Vo Duc, 2020). MVAIC is the best model for measuring IC as it includes relational capital. Thus, this study will be using the recent measurement that will be providing a more accurate result. In addition, Mohtar *et al*. (2015) recommended that intellectual capital studies be required. It is still new in the global business environment and increasing competitive advantage (Maryam *et al*., 2016). Correspondingly, research on IC is still fragmented, far from conclusive, and inconsistent results (Eid, 2018; Xu *et al*., 2022). Hence, studies on this matter are crucial to be conducted.

## Literature Review

Barney (1991) identified human capital, physical capital, and structural capital as intangible resources, which together constitute IC. Warnier *et al*. (2013) emphasised that the Resource-Based View (RBV) theory may offer valuable insights into the influence of intangible resources on company performance. Recognising this significance, numerous studies have employed the RBV theory to examine the relationship between IC and firm performance, including works by Chen *et al*. (2005), Zéghal and Maaloul (2010), Hejazi *et al*. (2016), Nadeem *et al*. (2016), Nhon *et al*. (2020), Öner *et al*. (2021) and Bhattacharjee and Akter (2022). Peteraf and Barney (2003) viewed each IC resource more specifically, making it a mid-range approach.

Furthermore, an intellectual capital-based view (ICV) takes into account the three resources—human capital, structural capital, and physical capital—that have been previously connected to a company's competitive advantage in a methodical and focused manner (Reed *et al*., 2006). After much review, scholars have concurred that ICV directly addresses knowledge generated and maintained in three capital components, namely Human Capital (HC), Structural Capital (SC), and Relational Capital (RC) (Wright *et al*., 1994; Edvinsson, 1997).

Popogbe and Adeosun (2022) defined HC as the collective attributes of knowledge, competency, skills, and capacities possessed by individuals within an organisation. Relational capital pertains to the information that is interconnected with the external environment, encompassing factors such as customer loyalty, happiness, suppliers, and external shareholders (Eid, 2018). Structural capital pertains to the organisational systems and structures within a corporation that facilitate and enhance employee performance (Bontis, 1998).

The significance of IC in the contemporary economy, which is driven by knowledge, cannot be overstated, as it directly impacts company performance. Based on a number of empirical studies, it has been observed that there exists a positive correlation between market value and intellectual capital performance (Bontis, 1998; Sardo & Serrasqueiro, 2018). The current body of literature predominantly centres on publicly traded corporations situated in industrialised economies such as the United States, as well as certain European nations (Forte *et al*., 2017; Sardo & Serrasqueiro, 2018). However, few studies examine companies in developing countries like Pakistan and India (Sing & Narwal, 2015; Ahmad & Ahmed, 2016).

The studies have frequently reported the positive effect of IC on firm performance in almost all countries. According to the findings of Nadeem *et al*. (2018), there exists a significant positive relationship between the efficiency of all IC components and its constituent elements, the ROA and ROE of publicly traded companies in Australia. Forte *et al*. (2017) found a positive correlation between intellectual capital and tangibility, leverage, and profitability among Italian listed enterprises.

Furthermore, Nimtrakoon (2015) discovered a substantial positive correlation between market capitalisation and intellectual disclosure in Malaysian listed companies, as well as across five Asean countries. In a similar vein, Eid (2018) discovered that there exists no statistically significant correlation between IC and the success of listed firms in Bahrain. The study by Xu *et al*. (2022) demonstrated a strong and positive relationship between

information communication components and company performance. In Ahmad (2023) as well as Habib and Dalwi (2023), the examination of the relationship between IC and business performance was undertaken within the context of United States-based companies. The results indicated a significantly positive correlation between all components of IC and firm performance. However, each IC component may differently affect company performance. Therefore, it becomes necessary to investigate each component with company performance.

Human Capital Efficiency (HCE) is one of the essential elements of intellectual capital. The effective and efficient use of human capital increases performance. Numerous empirical studies (Najibullah, 2005; Tan *et al*., 2007; Mondal & Ghosh, 2012; Joshi *et al*., 2013; Singh & Narwal, 2015; Ahmad & Ahmed, 2016; Hejazi *et al*., 2016; Sardo & Serrasqueiro, 2017; Ramírez *et al*., 2020; Rehman *et al*., 2021; Xu *et al*., 2022; Ahmad, 2023) have demonstrated a positive relationship between HCE and both accounting-based and market-based measures of firm performance. However, Tsai and Mutuc (2020) found a negative effect on company performance. A small number of studies such as Maditinos *et al*. (2011), Gruian (2011) and Anuonye (2015), reported the insignificant impact of HCE on an accounting-based measure of company performance. It may imply that inefficient human capital adversely affects the performance. Therefore, this study hypothesises as follows.

**H1:** HCE significantly increases firm performance

Structural Capital Efficiency (SCE) is another component of intellectual capital. Companies leverage advanced technologies to meet their objectives and maintain a competitive edge, necessitating the efficient management of their structural capital (Hsu & Wang, 2012). Studies by Ozkan *et al*. (2017), Ramírez *et al*. (2020), and Rehman *et al*. (2021) found a significant positive relationship between SCE, ROA, and Tobin's Q. Conversely, other empirical research, including studies by Tan *et al*. (2007), Mehri *et al*. (2013), Berzkalne and Zelgalve (2014), and Hejazi *et al*. (2016) identified a negative relationship between SCE and both market-based and accounting-based measures of firm performance. This implies that SCE may not play a crucial role in enhancing a company's productivity, profitability, or market valuation. Therefore, the following hypothesis is proposed:

**H2:** SCE significantly increases firm performance

Capital Employed Efficiency (CEE) is a crucial financial indicator, essential for measuring IC (Pulic, 1998; Choudhury, 2010). Onumah *et al*. (2020) highlighted that CEE reflected the capacity of shareholders' capital to generate value. Following HCE, CEE is recognised as one of the most significant contributors to firm performance (Nimtrakoon, 2015; Sardo & Serrasqueiro, 2017). It captures efficiencies that other components of IC may overlook (Sherif & Elsayed, 2016). According to the IC-based view, effectively utilising both tangible and intangible assets is key to enhancing company performance. Empirical studies, including those by Singh and Narwal (2015), Hejazi *et al*. (2016), Ahmad and Ahmed (2016), Sardo and Serrasqueiro (2017), and Majumder *et al*. (2021) had found a positive relationship between CEE and company performance while Britto *et al*. (2014) reported a negative relationship.

**H3:** CEE significantly increases firm performance

Relational Capital Efficiency (RCE) refers to the knowledge embedded in marketing channels and customer relationships, it plays a crucial role in transforming IC into market value (Chen *et al*., 2004). As a key component of IC, relational capital efficiency aids firms in achieving a competitive advantage (Singh & Narwal, 2015). Studies have shown mixed results regarding its impact on firm performance. Additionally, Soetanto and Liem (2019) and Xu and Li (2020) identified a significant negative relationship, whereas Sardo and Serrasqueiro (2017) reported a significantly

positive relationship. Nimtrakoon (2015) found no significant relationship between relational capital efficiency and company performance. Notably, other studies models have reported a positive relationship between relational capital and company performance (Scafarto *et al*., 2016; Ahmad, 2023).

**H4:** RCE significantly increases firm performance

According to the resource-based theory of the firm, strategic resources like IC are crucial for creating value and providing a competitive advantage (Barney, 1991). Reed *et al*. (2006) introduced the IC-based view, emphasising that IC is the primary strategic resource that generates value for firms. Proponents of the resource-based theory also argue that a firm's strategic resources positively influence its performance (Amit & Schoemaker, 1993). Consequently, all components of IC are vital for the growth and stability of firms. The MVAIC model represents the entirety of IC. Studies utilising the MVAIC model have generally found a significant and positive relationship between IC and company performance (Nimtrakoon, 2015; Sardo & Serrasqueiro, 2017), although Majumder *et al*. (2021) reported an insignificant relationship. Therefore, the following hypotheses are proposed:

**H5:** MVAIC significantly increases firm performance

Many firms have been compelled to seek new and innovative green solutions in order to achieve environmental sustainability due to factors such as the rapid development of technology, market expansion, environmental degradation, and the introduction of creative business models (Gharib *et al*., 2022). The global business community has witnessed a substantial increase in their ESG investments, with the total amount rising from 17 trillion to 28 trillion dollars. ESG investing and its associated criteria have garnered significant attention due to many factors. One factor that contributes to this phenomenon is the growing interest in ESG considerations. This interest has been fuelled, in part, by recent academic and business research that demonstrates how ESG investing can yield comparable return on investment to traditional financial investments in specific situations (Boffo *et al*., 2020). Several studies have documented a detrimental impact of ESG investment on the financial performance of companies (Shaikh, 2022).

Additionally, ESG practices have been found to reduce the probability of encountering financial difficulties (Habib, 2023). Recent research has yielded conflicting results about the correlation between ESG factors and corporate performance, as evidenced by several studies (Alsayegh *et al*., 2020; Wong *et al*., 2020; Ma'aji *et al*., 2022). Recent research also yielded similar positive results and firm performance (Alsayegh *et al*., 2020; Wong *et al*., 2020; Ma'aji *et al*., 2022). In their empirical research evaluation, Friede *et al*. (2015) discovered that among a sample of 2,000 papers, around 48% indicated a favourable correlation between ESG factors and company success. In line with this assertion, following studies have demonstrated a positive correlation between ESG practices and company performance (Wong *et al*., 2020; Eliwa *et al*., 2021; Ghardallou, 2022).

The extant literature is mainly focused on developed countries. For example, Achima *et al*. (2015) analysed 65 selected companies listed on the Bucharest Stock Exchange (BSE) in Romania between 2011 and 2012. The research team found that the listed companies in Romania scored higher in environmental and social aspects than in corporate governance. Sassen *et al*. (2016) studied the correlation between ESG performance and the systematic, specific, and total risks of 8,752 listed companies in Europe between 2002 and 2014. The results showed that the improvement of environmental performance significantly reduces the company's risk while governance performance has no significant influence on the three afore-mentioned types of risks. Rose *et al*. (2016) analysed the relationship between the financial performance of Danish companies and corporate governance and found a positive correlation.

Auer *et al*. (2016) analysed companies' ESG performance and investor relations in the Asia-Pacific region, the United States (US), and Europe, found that in the Asia-Pacific region and the United States, investors can obtain relatively good returns by investing based on ESG performance. However, in Europe, this strategy tends to be less effective. Chelawat *et al*. (2016) used panel regression to study the correlation between the ESG performance and the financial performance of listed companies in India. Regression results showed that companies with good ESG performance can improve financial performance. Velte (2017) investigated the impact of ESG and its components on performance of German firms for the period 2010-2014, regression result revealed that ESG significantly and positively increases ROA performance but no significant effect on Tobin's Q.

In a recent study, Polino *et al*. (2022) focused on ESG and firm performance relationship in 263 Italian firms. Considering time span of 10 years (2011-2020, result show) shows a significant impact of ESG on ROA. There is less evidence for ESG and IC relationship. Karyani and Perdiansyah (2022) conducted study on Indonesian firms for the period 2015-2020. Results revealed that ESG significantly increases MVAIC of industries. In contrast, Narula *et al*. (2023) did not find any significant effect of ESG disclosure on performance of Indian companies during the period 2018-2020.

For developing countries, due to less stringent regulatory frameworks, voluntarily adherence of high ESG standards may attract more skilled employees and build strong relationship with stakeholders (Haron *et al*., 2020). Moreover, developing countries are often characterised by rapid economic development and increasing integration into the global economy. As such, firms that prioritise ESG may be better positioned to access international markets, attract foreign investment, and comply with global standards. This global alignment further strengthens the moderating role of ESG, as firms with higher ESG performance may experience a more significant positive impact from their IC on overall firm success (Manrique & Marti-Ballester, 2017). Thus, based on the above literature review, below hypothesis is developed.

**H6:** ESG significantly moderates the positive relationship between IC and company performance

## Research Methodology

### *Sample and Data*

This study concentrated on the non-financial enterprises in eight developing countries. Information on all financial indicators and ESG were obtained from the Refinitiv Eikon DataStream platform from 2015 to 2022. The eight countries selected for this study were Malaysia, Thailand, Vietnam, Brazil, Indonesia, Pakistan, Philippines, and Nigeria. These countries were selected based on the availability of data for all variables of interest from 2015 to 2022. Refinitiv Eikon has lately been used to undertake studies on related subjects and it provided one of the most complete ESG datasets (Pulino *et al*., 2022). The output of a panel of dataset with 13,632 observations at the firm level and 1,890 businesses. However, due to least reporting by many firms in DataStream (particularly the low-middle-income countries such as Indonesia, Nigeria, and Pakistan). Therefore, this study measured ESG using binary.

In this study, the Value-Added Intellectual Coefficient (VAIC) created by Public (1998) was used to measure IC as an independent variable. But in response to measurement criticism, this study used a modified version of IC (MVAIC), which was also used in other investigations (Majumder *et al*., 2021; Dalwi & Salehi, 2021). MVAIC measurement is presented in Table 1. The moderating variable was ESG disclosure, proxied by ESG score. ESG scores for all countries were collected from Data Stream. The total ESG score was an aggregated value of ESG items. This study measured ESG disclosure based on availability of a company's ESG score i.e., if ESG score was available = 1, otherwise = 0.

Our dependent variable firm performance was proxied by ROA, ROE, and Tobin's Q. ROA and ROE were two famous accounting-based variables (Nimtrakoon, 2015; Hamdan, 2018; Kadim *et al*., 2020) used to describe company performance based on total assets and total equity, respectively. Additionally, this study included company size and lev as control variables according to past studies on IC and company performance (Majumder *et al*., 2021; Dalwi & Salehi, 2021).

### *Research Framework*

Figure 1 shows the research framework which consists of five independent variables, two control variables, and three dependent variables. The independent variables were HCE, RCE, SCE, CEE, and MVAIC, with firm size and leverage as control variables. Meanwhile, the dependent variables were the measurement of company performance by using ROA, ROE, and Tobin's Q as proxy.

### *Regression Model*

The study examines whether IC positively impacts business performance and whether ESG modifies this relationship. Three categories of firm performance exist Tobin's Q, ROA, and ROE. According to the methodology by Hair *et al*. (2009), the regression's underlying hypotheses (serial correlation and heteroscedasticity) were tested.

$$FP\ (ROA_{it,}, ROE_{it}, Tobin's\ Q_{it} = a_0 + \beta_1 HCE_{it} + \beta_2 SCE_{it} + \beta_3 CEE_{it} + \beta_4 RCE_{it} + \beta_5 ESG_{it} + \beta_6 FS_{it} + \beta_7 LEV_{it} + \varepsilon_{it} \quad \text{(Equation 1)}$$

$$FP\ (ROA_{it,}, ROE_{it}, Tobin's\ Q_{it} = a_0 + \beta_1 MVAIC_{it} + \beta_4 FS_{it} + \beta_5 LEV_{it} + \varepsilon_{it} \quad \text{(Equation 2)}$$

Table 1: Variables measurement

| Variables | Explanation |
|---|---|
| ***Dependent variable*** | |
| ROA | Net income/total assets |
| ROE | Net income/total equity |
| Tobin's Q | Market value of equity + book value of debt/book value of assets |
| ***Independent variables*** | |
| IC | MVAIC = HCE + SCE + CEE + RCE<br>VA = Value Added (sales revenue - operating expenses interest expenses - taxes dividend)<br>HC = Human Capital (Total salaries, wages, and benefits given to employees by a firm)<br>SCE = VA/SC<br>SC = Structural Capital (Intangible assets of firm)<br>CEE = VA/CE<br>CE = Capital Employed (Total assets - intangible assets)<br>RCE = VA/RC<br>RC = Relational capital (Selling, marketing, or distribution expenses) |
| ***Interaction*** | |
| ESG | If ESG score is available for firms = 1, otherwise = 0 |
| ***Control variables*** | |
| Firm Size (FS) | Natural logarithm of total assets |
| Leverage (LEV) | Total debt/total equity |

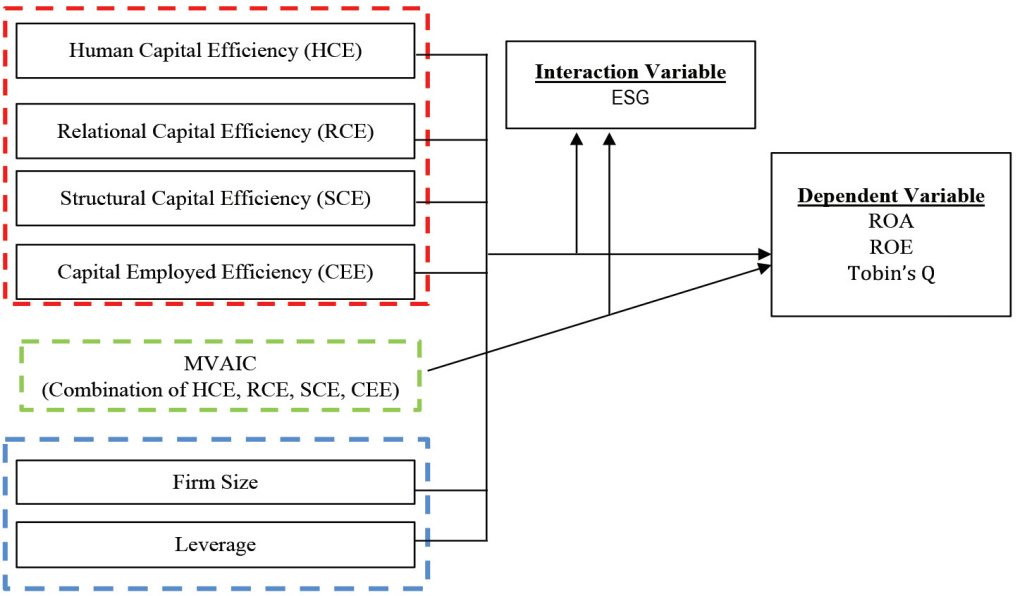


Figure 1: Research framework

Equations 1 and Equations 2 were tested to examine the direct effect of IC on company performance. For the moderation effect of ESG on IC and performance, further Equations 3 and Equations 4 were developed.

To examine the above models, the Ordinary Least Squares (OLS) method was employed to estimate the baseline model, examining the relationship between IC, ESG disclosure, and company performance. However, OLS may not adequately address unobserved heterogeneity across firms, leading to biased estimates (Wooldridge, 2010). To account for these potential biases, we considered both fixed effects and random effect models. The fixed effect model controlled the time-invariant firm-specific characteristics, but it might result in a loss of efficiency due to multicollinearity when variables exhibited little variation over time. To determine the appropriate model, we conducted a Hausman test, which indicated that the fixed effects model was preferable due to significant differences between the estimates of the two models. Furthermore, all results were robust to heteroscedasticity-consistent standard errors, ensuring the reliability of the findings.

$$FP\ (ROA_{it,}, ROE_{it}, Tobin's\ Q_{it} = a_0 + \beta_1 HCE_{it} + \beta_2 SCE_{it} + \beta_3 CEE_{it} + \beta_4 RCE_{it} + \beta_5 ESG_{it} + \beta_6 HCE * ESG_{it} + \beta_7 SCE * ESG_{it} + \beta_8 CEE * ESG_{it} + \beta_9 RCE * ESG_{it} + \beta_{10} FS_{it} + \beta_{11} LEV_{it} + \varepsilon_{it} \quad \text{(Equation 3)}$$

$$FP\ (ROA_{it,}, ROE_{it}, Tobin's\ Q_{it} = a_0 + \beta_1 MVAIC_{it} + \beta_2 ESG_{it} + \beta_3 MVAIC * ESG_{it} + \beta_4 FS_{it} + \beta_5 LEV_{it} + \varepsilon_{it} \quad \text{(Equation 4)}$$

## Results

Three proxies—ROA, ROE, and Tobin's Q—were used to gauge financial performance. This analysis tried to include all of the 1,890 enterprises in selected developing countries. This section showed results for descriptive statistics, correlation, and regression analysis.

### *Descriptive Statistics*

The descriptive statistics for each variable are summarised in Table 1. In our sample, the mean (median) scores for HCE, RCE, SCE, CEE, and MVAIC were 0.456 (0.155), 0.311 (0.215), 16.725 (0.309), 0.201 (0.022), and 17.695 (1.709). When compared to the HCE, RCE, and CEE, the SCE displayed a higher score. Additionally, financial performance measurement showed that ROA, ROE, and Tobin's Q had mean and median values of 1.468 (0.183), 0.441 (0.273), and 1.565 (0.623), respectively. The descriptive statistics for control variables, FS and LEV were 12.830 (12.003) and 1.072 (0.478), respectively, in terms of mean and median.

### *Correlation Results*

The correlation matrix for the dependent, independent, and control variables is shown in Table 2. The significant positive correlations between HCE, RCE, SCE, CEE, and ROA, and ROE as financial performance metrics were typical. As predicted, LEV and ROA had a negative, substantial association. MVAIC and ROA and ROE had a strong positive association. This study calculated Variance Inflation Factors (VIF) to test multicollinearity based on the correlation for some of the variables. Severe multicollinearity issues could arise if the VIF was higher than 10. In this data, there was no VIF greater than 3.12, hence, multicollinearity should not have an impact on the study's findings (Table 3).

### *Regression Analysis*

Table 4 reports the findings of the static regressions (panel least square) of 12 distinct models. The white cross-section (period cluster) was also used in this study. White cross-section (period cluster) refers to the application of heteroskedasticity-robust standard errors, commonly known as White standard errors, adjusted for clustering by time periods. This adjustment accounted for potential serial correlation and heteroskedasticity across different time periods, allowing for more accurate inference in panel data. By clustering standard errors by periods, the model could capture correlations that might exist within the same period, but not across periods, thus, improving the robustness and reliability of the estimated coefficients.

Table 2: Descriptive statistics of variables used to gauge financial performance

| | Mean | Median | Max | Min | SD | Observations |
|---|---|---|---|---|---|---|
| ROA | 1.468 | 0.183 | 9.447 | -0.002 | 2.692 | 13632 |
| ROE | 0.441 | 0.273 | 2.191 | -0.017 | 0.534 | 13632 |
| TQ | 1.565 | 0.623 | 17.500 | -5.988 | 5.194 | 13632 |
| HCE | 0.456 | 0.155 | 5.537 | -3.876 | 1.972 | 13632 |
| RCE | 0.311 | 0.215 | 4.598 | -3.858 | 1.756 | 13632 |
| SCE | 16.725 | 0.309 | 247.236 | -92.419 | 67.621 | 13632 |
| CEE | 0.201 | 0.022 | 3.910 | -2.372 | 1.226 | 13632 |
| MVAIC | 17.695 | 1.709 | 261.282 | -102.526 | 69.600 | 13632 |
| FS | 12.830 | 12.003 | 24.2571 | 0.000 | 3.337 | 13632 |
| LEV | 1.072 | 0.478 | 6.782 | 0.001 | 1.648 | 13632 |
| ESG | 0.082 | 0.000 | 1.000 | 0.000 | 0.274 | 13632 |

Table 3: Correlation matrix

| | ROA | ROE | TQ | HCE | RCE | SCE | CEE | MVAIC | FS | LEV | ESG |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ROA | 1 | | | | | | | | | | |
| ROE | 0.104 | 1 | | | | | | | | | |
| TQ | -0.243 | 0.013** | 1 | | | | | | | | |
| HCE | 0.083* | 0.198 | 0.020** | 1 | | | | | | | |
| RCE | 0.104 | 0.170 | -0.024 | 0.744 | 1 | | | | | | |
| SCE | 0.074* | 0.078* | -0.006 | 0.416 | 0.440 | 1 | | | | | |
| CEE | 0.460 | 0.073* | -0.094 | 0.177 | 0.210 | 0.245 | 1 | | | | |
| MVAIC | 0.085* | 0.087* | 0.007*** | 0.455 | 0.477 | 0.999 | 0.266 | 1 | | | |
| FS | -0.223 | 0.020** | 0.056* | 0.173 | 0.171 | 0.143 | -0.050 | 0.148 | 1 | | |
| LEV | -0.081* | 0.394 | 0.039** | -0.037 | -0.077 | -0.061 | -0.081 | -0.064 | 0.048** | 1 | |
| ESG | 0.015** | 0.064* | 0.036** | 0.093* | 0.117 | -0.044 | 0.014*** | -0.037 | 0.175 | 0.023** | 1 |

Note: Standard errors *, **, *** indicate significance at 10%, 5%, and 1%, respectively.

The direct effect results in model 1 to model 6 showed that HCE, SCE, RCE, CEE, and MVAIC had positive and significant relationship with ROA, ROE, and Tobin's Q as a measure of financial performance in all models. These findings were consistent with past studies (Tan *et al*., 2007; Singh & Narwal, 2015; Sardo & Serrasqueiro, 2017; Ramírez *et al*., 2020; Rehman *et al*., 2021; Xu *et al*., 2022; Barak & Sharma, 2024). The control variables showed different results. FS had negatively affected company performance except in model five, whereas leverage positively affected performance across all models.

The results in model 7 to model 12 showed the effect of ESG on IC and company performance. ESG*HCE and ESG*SCE had significant relationship with ROA when ESG interaction was applied with all components of IC. Upon investigation with MVAIC, in model four, where the results showed ESG*MVAIC had positive and significant correlation to ROA. The lack of improvement in the moderating effects of ESG on ROE and IC components could be due to the nature of ROE itself. Unlike ROA, which focused on operational efficiency, ROE was more influenced by the financial structure of the company, particularly the level of debt and equity.

The interaction between ESG and IC components might not directly impact ROE as strongly because ESG factors tended to affect long-term sustainability and operational performance (reflected in ROA), rather than the immediate returns to shareholders, which ROE captures. Additionally, the IC components might influence operational outcomes more directly, which could explain their stronger impact on ROA compared to ROE. Furthermore, ESG initiatives might take longer to show tangible improvements in shareholder returns, contributing to the nominal effect observed in the short term. Thus, the minimal change in ROE could be attributed to these structural differences between the two performance metrics.

The absence of a moderating effect of ESG on the relationship between IC and Tobin's Q

Table 4: Regression analysis

| Variables | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 | Model 6 | Model 7 | Model 8 | Model 9 | Model 10 | Model 11 | Model 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ROA | ROE | TQ | ROA | ROE | TQ | ROA | ROE | TQ | ROA | ROE | TQ |
| HCE | 0.078*** *(0.001)* | 0.034*** *(0.004)* | 0.008** *(0.020)* | | | | 0.072*** *(0.000)* | 0.033** *(0.000)* | -0.011 *(0.814)* | - | - | - |
| SCE | 0.007*** *(0.002)* | 0.019*** *(0.007)* | 0.021*** *(0.012)* | | | | 0.001*** *(0.000)* | 0.000** *(0.001)* | -0.000 *(0.769)* | - | - | - |
| CEE | 0.314** *(0.021)* | 0.023*** *(0.002)* | 0.101** *(0.023)* | | | | 0.322*** *(0.001)* | 0.020** *(0.000)* | 0.100*** *(0.010)* | - | - | - |
| RCE | 0.092*** *(0.003)* | 0.036*** *(0.005)* | 0.002*** *(0.012)* | | | | 0.092*** *(0.000)* | 0.037** *(0.000)* | 0.006 *(0.917)* | - | - | - |
| MVAIC | - | - | - | 0.004*** *(0.000)* | 0.012*** *(0.000)* | 0.192*** *(0.000)* | - | - | - | 0.003** *(0.000)* | 0.001** *(0.000)* | 0.000 *(0.750)* |
| ESG | - | - | - | - | - | - | -0.284** *(0.028)* | -0.019 *(0.246)* | 0.047 *(0.720)* | -0.286** *(0.018)* | -0.022 *(0.189)* | -0.044 *(0.676)* |
| HCE*ESG | - | - | - | - | - | - | 0.108*** *(0.002)* | 0.030 *(0.060)* | 0.036 *(0.838)* | - | - | - |
| SCE*ESG | - | - | - | - | - | - | 0.002** *(0.049)* | -0.000** *(0.041)* | -0.001 *(0.374)* | - | - | - |
| CEE*ESG | - | - | - | - | - | - | -0.094** *(0.016)* | -0.013*** *(0.013)* | 0.005 *(0.953)* | - | - | - |
| RCE*ESG | - | - | - | - | - | - | -0.042*** *(0.050)* | -0.019 *(0.288)* | -0.049 *(0.776)* | - | - | - |
| MVAIC*ESG | - | - | - | - | - | - | - | - | - | 0.003** *(0.022)* | -0.000 *(0.928)* | -0.001 *(0.364)* |
| FS | -0.158*** *(0.002)* | -0.008*** *(0.002)* | -0.502** *(0.021)* | 0.143*** *(0.001)* | 0.027 *(0.212)* | 0.501*** *(0.002)* | -0.156*** *(0.000)* | -0.008 *(0.063)* | -0.503** *(0.003)* | -0.141*** *(0.000)* | -0.002 *(0.407)* | -0.501** *(0.004)* |
| LEV | 0.021*** *(0.001)* | 0.122*** *(0.003)* | 0.046** *(0.040)* | 0.025*** *(0.006)* | 0.115* *(0.056)* | 0.044*** *(0.003)* | -0.001 *(0.964)* | 0.123*** *(0.000)* | 0.047 *(0.423)* | -0.025 *(0.077)* | 0.115** *(0.000)* | 0.044 *(0.428)* |
| Constant | 3.360*** *(0.002)* | 0.380*** *(0.004)* | 7.943** *(0.004)* | 3.263*** *(0.007)* | 0.336*** *(0.003)* | 7.945*** *(0.001)* | 3.353*** *(0.000)* | 0.380*** *(0.000)* | 7.948*** *(0.001)* | 3.259 *(0.000)* | 0.336*** *(0.000)* | 7.947*** *(0.002)* |
| Adjusted R-squared | 0.751 | 0.235 | 0.558 | 0.895 | 0.761 | 0.557 | 0.911 | 0.779 | 0.555 | 0.896 | 0.760 | 0.555 |
| Hausman | 429.539 | 12.67 | 181.131 | 13.215 | 9.061 | 95.824 | 452.825 | 31.360 | 185.560 | 17.143 | 15.198 | 97.708 |

Note: Standard errors *, **, *** indicate significance at 10%, 5%, and 1%, respectively.

could be due to the latter being a market-based metric, influenced more by external factors like investor sentiment and macroeconomic conditions than internal performance drivers such as ESG and IC. Additionally, the long-term benefits of ESG might not be immediately reflected in market valuations, explaining why this moderation effect was less evident for Tobin's Q compared to other performance measures. Thus, based on the results, all six hypotheses were accepted. The control variables for company size were negatively significant in model 7, model 9, model 10, and model 12.

## Discussion

It appeared that ESG could make a more significant contribution to ROA-based performance compared to HCE and SCE. However, when examining the moderating effect of ESG on the relationship between IC components and company performance, the findings indicated a generally negative or insignificant impact. Specifically, the interaction between ESG and IC components resulted in either a nominal or no improvement at all in ROE, suggesting that ESG's role as a moderator was limited. Furthermore, in the case of Tobin's Q, ESG did not play any significant moderating role, indicating that its influence on market-based performance was minimal.

The negative direct effect of ESG on company performance, particularly when interacted with IC proxies could be attributed to the fact that companies engaged in ESG activities might redirect substantial resources towards these initiatives, potentially at the expense of other profit-generating operations. This reallocation of resources might lead to a dilution of the returns generated by intellectual capital, as more capital was diverted towards fulfilling ESG commitments. As a result, the increased investment in ESG-related activities might lead to lower Returns On Assets (ROA), lower Returns On Equity (ROE), and a diminished impact on Tobin's Q, reflecting the negative or insignificant moderating effects observed in the study.

By demonstrating that ESG, when interacted with IC proxies, often led to negative or insignificant results, this study challenges the prevailing assumption that ESG initiatives universally enhance firm performance. Instead, it highlighted the complexity of ESG's role, particularly in the context of emerging markets, where the allocation of resources to ESG activities might divert capital from other critical areas, thus, diminishing the returns from intellectual capital.

This study, therefore, provided a novel perspective on the interplay between ESG and IC, offering new insights into the nuanced effects of ESG on company performance. It encouraged future research to delve deeper into the conditions under which ESG might enhance or hinder the effectiveness of IC, particularly in different economic contexts. Additionally, the findings suggested the need for a more cautious and context-specific approach to integrating ESG initiatives with intellectual capital management, contributing to a more refined understanding of how firms can balance these elements to optimise performance.

## Managerial Implications and Recommendations

This study contributed to existing studies on IC and company performance relationship by providing additional insights into moderating role of ESG disclosure. For managers, the findings underscored the importance of intellectual capital as a critical asset that could significantly enhance firm performance. By understanding the specific contributions of HCE, SCE, CCE, and RCE, managers can make informed decisions about where to invest resources to maximise their firm's potential.

Additionally, the study highlighted the moderating role of ESG disclosures, encouraging managers to adopt sustainable practices that not only improve their corporate reputation but also attracted investment and enhance financial performance. For investors, the research provided evidence that firms with strong ESG

practices and robust intellectual capital were likely to yield better returns, guiding investment decisions towards companies that prioritised sustainability and innovation. Policymakers can leverage the study's findings to promote policies that encouraged the integration of ESG factors into business practices, fostering a more sustainable economic environment.

Finally, academics could build upon this research to further explore the intricate relationships between IC, ESG, and company performance, contributing to a growing body of literature that addresses the evolving dynamics of corporate success in developing countries. Overall, the study serves as a comprehensive resource that aligns the interests of multiple stakeholders, promoting a holistic approach to enhancing firm performance through the strategic management of intellectual capital and ESG practices. The recommendation for future researchers is to consider another segment from ESG as an independent variable or moderating variable.

## Conclusions

IC should be treated as an intangible asset in order to boost the company's overall performance and increase its value on the market. The purpose of this study is to investigate how ESG disclosure affects the beneficial relationship that exists between internal control and corporate performance. The results also have a number of significant repercussions that can be applied to management. To begin, the findings revealed that intangible capital is the most valuable resource and that it has the ability to positively contribute to the enhancement of company performance as long as it is handled correctly.

As a consequence, managers should place a strong emphasis on the crucial role that IC plays and make investments in a number of different IC resources. In general, the findings of this study assist companies' stakeholders, decision-makers, legislators, and academics in enhancing their understanding of the influence that ESG disclosure has on both the internal control and firm performance. These findings support the resource-based view and intellectual capital-based view. This is because the findings help them better understand the relationship between ESG disclosure and both of these factors. The findings, which revealed that ESG disclosure led to an increase in the favourable correlation between IC and business performance, need to encourage managers to invest in ESG practices. This is because the findings demonstrated that ESG disclosure led to an increase in the favourable association between IC and firm performance.

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## Conflict of Interest Statement

The authors declare that they have no conflict of interest.

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