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THE MEDIATING ROLE OF INTELLECTUAL CAPITAL IN THE ESG - PERFORMANCE RELATIONSHIP: EVIDENCE FROM THE U.S. IT INDUSTRY

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ABSTRACT

Purpose- This study aims to empirically investigate the relationship between Environmental, Social, and Governance (ESG) performance and financial performance, with a particular focus on the mediating role of intellectual capital (IC) in publicly traded IT firms in the United States.
Methodology- The research uses a sample of 204 U.S.-based publicly listed IT firms, covering 917 firm-year observations from 2011 to 2022. Descriptive statistics, correlation analysis, and multiple regression models were employed to test the proposed hypotheses and assess the impact of ESG on Return on Assets (ROA) and the potential mediating role of intellectual capital (IC).
Findings- The results indicate that intellectual capital partially mediates the relationship between ESG performance and financial performance. While IC contributes significantly to explaining the effect of ESG on ROA, it does not fully account for the relationship.
Conclusion- This study highlights the importance of considering intellectual capital as a strategic asset in enhancing the financial returns of sustainability-oriented initiatives. The findings provide actionable insights for corporate leaders and policymakers seeking to align ESG practices with long-term financial goals.

Keywords: ESG, intellectual capital, financial performance, IT sector, United States
JEL Codes: G30, M14, O34

1. INTRODUCTION

In an era of knowledge-based deconomy, where growth is driven primarily by creating, distributing, and using knowledge and information, intellectual capital (IC) is considered a vital intangible asset that gives firms a competitive edge and enhances their performance. Rather than relying solely on physical assets such as land and raw materials, or labor, firms are increasingly creating value by accumulating, managing and using knowledge derived from human expertise, organizational processes, and social relationships. Intellectual capital typically consists of human capital, organizational or structural capital, and social or relational capital, each having a different and specific role in the firm's ability to innovate, adapt, and maintain its competitive advantage (Subramaniam & Youndt, 2005; Gogan et al., 2015).

Research has demonstrated that IC positively influences firm productivity, thereby enhancing their financial and market performance. Firms that effectively use their IC are found to outperform their peers financially, while at the same time showing greater potential for future growth, leading to a positive market perception. While this holds across all sectors generally, it is particularly pronounced in knowledge-intensive sectors, such as IT (Tan et al., 2007). However, this relationship varies depending on the growth rate of IC and the industry context. Consequently, understanding and managing intellectual capital is considered a strategic requirement for sustained value creation (Gogan et al., 2015).

On the other hand, Environmental, Social, and Governance (ESG) performance is vital in developing and enhancing a firm's IC. Studies have shown a strong, positive relationship between a firm's ESG practices and its IC. For example, ESG practices that encourage ethical conduct, employee welfare, and community engagement, help firms attract and retain qualified human capital by creating an attractive work environment, thereby contributing to a firm's innovation and competitive position (Pham, Liu, & Chen, 2024).

Given the role of IC in enhancing firm performance in the modern economy, and the ever-growing evidence associating ESG practices with enhanced IC, it is only reasonable to believe that ESG may indirectly influence firm performance through its impact on IC. Although the direct relationship between ESG and financial performance has been extensively researched, the ESG ability to influence firm performance through intangible value drivers such as IC remains underexplored. This study aims to fill this gap by (1) exploring the ESG - financial performance relationship in the U.S. IT sector and (2) examining whether there is an indirect influence of ESG on financial performance through IC.

2. LITERATURE REVIEW

The relationship between ESG practices and firm performance has been extensively studied, but in recent years, the interplay between these variables and IC has gained attention.

When it comes to the direct impact of ESG on firm performance, the literature has reported mixed results. Eriany and Widyawati (2024), for example, found a positive and significant relationship between ESG scores and financial performance measured by ROA. Their findings support the notion that socially and environmentally responsible practices can enhance firm performance, notably through risk mitigation and improved reputation. However, Destyasa and Bustaman (2024) found no significant influence of ESG scores on firm value among Indonesian companies, suggesting that regional factors and market expectations may moderate this relationship. Similarly, Demiraj et al. (2024) showed that country-level governance quality significantly moderates the ESG–performance relationship suggesting that the institutional environment plays an important role in shaping how ESG strategies impact financial outcomes.

Regarding the IC relationship with firm performance, the literature supports a positive relationship between the two. A broad study of S&P 500 companies by Sullivan (1999) showed that knowledge companies rely heavily on both human and organizational intellectual capital to maintain their competitive advantage. Nahapiet and Ghoshal (1998) further established that social capital supports the creation of intellectual capital, which in turn supports organizational advantage. Finally, Pulic (2004) proposed the intellectual coefficient (VAIC) model to measure intellectual capital and found that IC components, particularly human capital efficiency, play an important role in improving firm productivity and value creation.

While ESG and IC relationships with firm performce are well researched, the mediating effect of IC is still a relatively underexplored area. Eriany and Widyawati (2024) analyzed ASEAN-5 companies and found that IC plays a moderating role in the ESG–performance relationship. However, while structural capital enhanced the ESG-market performance relationship, and relational capital improved the ESG-financial performance relationship, human capital was found to weaken the ESG–performance relationship, underscoring the need to examine IC's components individually rather than as a combined score. Similarly, in another study, Fathonah et al. (2024) investigated firms in Indonesia's agricultural sector and found that while ESG and IC together explained 60.97% of variation in financial performance, only human capital had a significant individual effect on performance, suggesting that ESG and IC can jointly impact performance, however the influence of IC components is uneven.

The above studies emphasize the need to understand ESG and IC not only as independent determinants of performance, but also as interconnected variables whose interplay can shape firm performance.

Therefore the hypotheses of this study have been formulated as follows:

H1: There is a positive relationship between ESG scores and the financial performance of U.S. IT firms.

H2: IC mediates the relationship between ESG scores and the financial performance of U.S. IT firms.

3. DATA AND METHODOLOGY

To test the study's hypotheses data were retrieved from Refinitiv (LSEG, formerly Thomson Reuters) database. The sample comprised all U.S.-listed firms in the IT sector for which ESG scores and other relevant data for the study are available in the Refinitiv database. The final dataset was an unbalanced panel of 917 firm-year observations, covering 204 firms over the period 2011 to 2022. Due to the unbalanced nature of the dataset, instead of a panel regression, a two-stage least squares (2SLS) regression is used to test the hypothesized relationships. To mitigate the influence of outliers, the data was winsorized at 2%.

As shown in Table 1, the main variables in this study are the firms' ESG scores as the independent variable, and their financial performance (ROA) (Carnini et al., 2022; Demiraj et al., 2022; Dsouza et al., 2023; Habibniya et al., 2022) as the dependent variable. Additionally, the VAIC (Value Added Intellectual Capital) index, proposed by Pulic (2004), is used as a potential mediating variable, to assess whether the impact of ESG on financial performance is channeled at least in part through intellectual capital. Lastly, seven more variables are used as control variables: firm size, liquidity, leverage, capitalization, tangibilty, GDP and the Covid-19 dummy to capture the effects of the pandemic on firm performance.

Table 1: Variables

Dependent variables	Independent variable	Mediating Variable	Control Variables
ROA	ESG	VAIC (Value Added Intellectual Capital) index	Firm Size Liquidity Leverage Capitalization Tangibilty GDP COVID (Dummy)

To test the study's hypotheses, three regression models are estimated as follows:

$$PERFORMANCE = f(ESG, CONTROL\ VARIABLES)$$

$$ROAit + 1 = \propto it + \beta 1ESG + \beta 2CONTROL\ VARIABLES + \varepsilon it \quad (1)$$

$$IC = f(ESG, CONTROL\ VARIABLES)$$

$$VAIC = \propto it + \beta 1ESG + \beta 2CONTROL\ VARIABLES + \varepsilon it \quad (2)$$

$$PERFORMANCE = f(ESG, IC, CONTROL\ VARIABLES)$$

$$ROAit + 1 = \propto it + \beta 1ESG + \beta 2VAIC + \beta 3CONTROL\ VARIABLES + \varepsilon it \quad (3)$$

Where ROA_{t+1} represents firms' performance the following year, capturing the lagged effect of explanatory variables; ESG stands for firms' environmental, social, and governance scores, and serves as the main independent variable in the study; VAIC refers to the Value Added Intellectual Capital index modeled by Pulic (2004) and is the hypothesized mediating variable in the ESG-ROA relationship. The control Variables include firm size, liquidity, leverage, capitalization, tangibility, GDP, and Covid-19 dummy; Ɛ*it* denotes the error component.

Model 1 was used to test the influence of ESG on firm performance. Models 2 was used to test the influence of ESG on firms' intellectual capital. While Model 3 was used to test the combined effect of those variables and assess the potential mediating role of IC in the ESG-performance relationship.

4. FINDINGS

Before continuing with the regression analysis, pairwise correlation among the variables was examined to assess the suitability of the dataset for statistical modeling. The correlation matrix did not reveal any excessively high correlations among the independent variables, and all variance inflation factors (VIFs) were within acceptable thresholds, indicating no issues with multicollinearity. The correlation matrix revealed strong and statistically significant relationships between ESG and ROA, ESG and IC, and IC and ROA, providing preliminary support for the possibility of a mediating effect. However, to draw conclusions on the mediating role of IC in the ESG-ROA relationship we rely on the 2SLS regression models discussed below.

Table 2 summarizes the results of the three 2SLS regression models. In the first model, ESG is the main independent variable and ROA is the dependent variable. The second model uses ESG as the main independent variable and IC as the dependent variable. The third model includes both ESG and IC as the key independent variables, with ROA as the dependent variable.

Table 2: 2SLS Regression Results

Independent Variables	**Model 1** Dependent **$ROA_{(t+1)}$**	**Model 2** Dependent **VAIC**	**Model 3** Dependent **$ROA_{(t+1)}$**
ESG	**0.00240*** **	**0.115*** **	**0.00176*** **
VAIC			**0.00537*** **
Firm Size	0.0244***	0.819***	0.0198***
Liquidity	0.177***	0.843	0.169***
Leverage	0.00144	1.034***	-0.00516
Capitalization	0.0344	0.681	0.0286
Tangibility	0.275***	4.704***	0.244***
GDP	-0.0117***	-5.123	-0.0120***
Covid Dummy	-0.167*	21.8	-0.168*
Constant	-0.676***	-12.44	-0.552***
Observations	708	917	708
R-squared	0.22	0.25	0.249

*** p<0.01, ** p<0.05, * p<0.1

The regression results from Model 1 reveal a statistically significant and positive effect of ESG on ROA. This indicates that firms in the U.S. IT sector engaging in ESG practices tend to achieve stronger financial performance. These findings suggest that, in this sector, the benefits derived from ESG engagement outweigh the associated costs in this sector. These results support the study's first hypothesis, which states that there is a positive relationship between ESG scores and the financial performance of U.S. IT firms.

The regression results from Model 2 reveal a statistically significant and positive effect of ESG on VAIC, the proxy used for intellectual capital efficiency. These results indicate that higher ESG scores are associated with stronger intellectual capital. This may be attributed to increased investments in employee training, innovation, and knowledge systems, which are often integral components of ESG strategies and contribute directly to human and structural capital development. This also confirms a key precondition for mediation, that the independent variable must significantly influence the potential mediator.

The regression results from Model 3 reveal that when VAIC is included as an independent variable alongside ESG, the coefficient for ESG decreases but remains statistically significant, and at the same time, VAIC shows a significant positive effect on ROA. These results imply that part of the effect of ESG on financial performance is transmitted through improvements in intellectual capital, which in turn enhances ROA. This pattern is consistent with partial mediation. Therefore, the second hypothesis, that intellectual capital mediates the ESG–performance relationship, is also supported by the results.

5. CONCLUSION

In conclusion, this study provides evidence that ESG engagement is financially beneficial for firms in the U.S. IT sector. While prior research has shown mixed results, the positive association between ESG scores and ROA observed here suggests that sustainable practices can enhance, rather than hinder, profitability. The analysis further confirms the mediating role of intellectual capital, as the inclusion of VAIC in the model reduces the direct effect of ESG on ROA while both remain significant. This implies that part of ESG's impact operates through improvements in intellectual capital efficiency, particularly through human and structural capital. ESG-driven enhancements in employee engagement, innovation, and internal processes help explain how firms can transform sustainability initiatives into financial gains. These

findings highlight that investing in ESG is not only ethically responsible but also strategically valuable, and managers are encouraged to align ESG initiatives with human resource development and knowledge management to fully unlock the benefits of intellectual capital.

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