
Organisational Capital and ESG Performance

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doi.org/10.51505/IJEBMR.2025.91222 URL: <https://doi.org/10.51505/IJEBMR.2025.91222>

Received: Dec 20, 2025

Accepted: Dec 24, 2025

Online Published: Dec 26, 2025

Abstract

This paper investigates the relationship between organisational capital (OC) and firms' environmental, social and governance (ESG) performance, drawing on resource-based view theory (RBVT). Organisational capital is conceptualised as a firm-specific intangible resource embedded in managerial practices, routines, processes and accumulated knowledge, enhancing operational efficiency and long-term value creation. Using a global sample of 1,000 listed firms (7,000 firm-year observations) over the period 2017–2023, we examine whether organisational capital contributes to superior ESG performance and whether such effects materialise contemporaneously or with a temporal lag. Organisational capital is measured following Peters and Taylor (2017) by capitalising a fraction of selling, general and administrative expenses, while ESG performance is proxied by the LSEG ESG score. Our results indicate that contemporaneous organisational capital does not exert a statistically significant effect on ESG performance.

By contrast, lagged organisational capital is positively and significantly associated with ESG scores, suggesting that the benefits of organisational capital for sustainability outcomes emerge over time. Additional analyses reveal that this relationship persists across industries, including controversial sectors, where organisational capital appears to mitigate legitimacy challenges. Overall, the findings provide novel empirical evidence that organisational capital constitutes a strategic intangible resource that enhances firms' ESG performance over time, thereby extending the literature on organisational capital and corporate sustainability.

Keywords: organisational capital; ESG performance; controversial industry sectors

1. Introduction

Despite the growing importance of organisational capital, its impact on environmental, social and governance (ESG) performance remains, to the best of our knowledge, only partially explored. In

fact, Provaty et al. (2024) provide empirical evidence that organisational capital reduces greenhouse gas (GHG) emissions, while Zheng and Sun (2025) demonstrate that organisational capital is less exposed to the consequences of climate change. The literature (Eiadat et al., 2008) posits that firms investing in organisational capital are characterised by innovative technologies, efficient logistics and specialised knowledge that reduce a firm's environmental impact. As a consequence, organisational capital is considered an intangible resource that encompasses firm-specific knowledge, facilitating the efficient connection between a firm's employees and tangible assets, resulting in greater efficiency, enhanced productivity and higher output. The literature (Lev et al., 2009, p. 277) points out that "organisational capital enables superior operating, investment and innovation performance, represented by the agglomeration of technologies – business practices, processes and designs". In addition, OC is considered a source of competitive advantage because this intangible resource enhances managerial capability (Eisfeldt & Papanikolaou, 2013, 2014; Lev et al., 2009; Martín-de-Castro et al., 2006).

Organisational capital enhances firms' operating, investment and innovation capabilities through the accumulation of firm-specific knowledge, thereby exerting a positive influence on ESG performance (Francis et al., 2021; Lev et al., 2009), enabled by organisational learning. Moreover, Barney (1991) contends that rare and valuable resources, such as organisational capital, can generate a competitive advantage that may translate into superior environmental, social and governance performance. The resource-based view theory (RBVT) maintains that a firm's capacity to integrate and develop internal and external competences in response to a dynamic environment depends on its resource endowment and capabilities, which are shaped by its organisational capital (Teece et al., 1997). Adizes (1979) further argues that organisational capital facilitates the effective exploitation of a firm's resources, thereby engendering a sustainable competitive advantage (Martín-de-Castro et al., 2006). Nadeem et al. (2021), under the lens of RBVT, argue that organisational capital may take different forms, such as culture and product development, the effectiveness of supply chain management, or people and knowledge-sharing systems, all of which may provide firms with a sustained competitive advantage (Marwick et al., 2020).

Nevertheless, as RBVT has evolved, scholarly attention has largely shifted from tangible assets to intangible resources, including organisational capital (Reed et al., 2006), positing that OC contributes more to a firm's sustainable competitive advantage. There is empirical evidence in the literature that organisational capital reduces firms' impact on the environment (Provaty et al., 2024; Zheng & Sun, 2025), while, to the best of our knowledge, there is no empirical evidence on the relationship between OC and overall ESG performance, which has become a pivotal topic among academics, practitioners and institutions (Dipierro et al., 2025). As a result, the existing literature reveals a gap, as GHG emissions, as examined by Provaty et al. (2024), cannot serve as a comprehensive measure of overall ESG performance. Therefore, this research addresses this gap in the literature by asking: Is organisational capital positively associated with overall ESG performance? By addressing this research question, the study shows that OC can serve both as a resource for firms' competitive advantage and as a key determinant of ESG performance.

To test the RBVT-based argument, a sample of 1,000 firms is employed. In line with prior studies (Eisfeldt & Papanikolaou, 2013, 2014; Hasan & Cheung, 2023; Lev et al., 2009; Peters & Taylor, 2017; Provaty et al., 2024), organisational capital is measured by capitalising a share of selling, general and administrative (SG&A) expenses. ESG data are sourced from the LSEG (formerly Refinitiv) ESG database, whereas accounting data are obtained from the ORBIS database. Consistent with RBVT, the findings indicate that firms with higher lagged OC exhibit superior ESG performance, whereas contemporaneous OC is not significantly associated with ESG performance. The results further show that firms in controversial industry sectors, i.e., gaming, adult entertainment and petroleum and chemical industries (Cai et al., 2012; Jo & Park, 2020), exhibit a negative relationship with ESG performance. The negative coefficient indicates that controversial industry firms are associated with lower ESG performance, consistent with an inverse relationship.

Findings of our research contribute to the extant literature in several ways. First, they extend the literature on organisational capital by providing evidence that this intangible resource is a source of competitive advantage, as prior literature has stated (Hasan & Cheung, 2018; Martín-de-Castro et al., 2006; Nadeem et al., 2021). Second, extending the results of Provaty et al. (2024), the findings provide evidence that OC has a positive effect on overall ESG performance, suggesting that investors and other stakeholders associate a high ESG score with the firm's internal value, as reflected in OC. Third, the study contributes to the literature by providing empirical evidence that OC is an internal determinant of ESG performance, extending the results of Martiny et al. (2024). Fourth, the results indicate that organisational capital functions as an intangible resource that operates alongside other tangible assets, enabling firms in controversial industries to address legitimacy challenges. Finally, the analysis incorporates both contemporaneous organisational capital, as in previous literature (Provaty et al., 2024), and lagged organisational capital. This approach allows an assessment of whether organisational capital contributes to improved ESG performance when the accumulated stock of intangible assets (OC) from the previous year is taken into account.

The remainder of the paper is organised as follows. Section 2 reviews prior literature and develops the research hypotheses. Section 3 explains the research methodology, while Section 4 presents the research design. Section 5 outlines the empirical analysis and, finally, Section 6 concludes the paper, setting out the implications and limitations of the research.

2. Literature review and hypothesis development

Lev et al. (2009, p. 277) define organisational capital (OC) as the accumulation of firm-specific knowledge that 'enables superior operating, investment and innovation performance, represented by the agglomeration of technologies, business practices, processes and design'. OC encompasses organisational practices, human knowledge and skills, and culture, all of which play an essential role in improving a firm's efficiency and productivity (Hasan & Cheung, 2018). Evenson & Westphal (1995) link organisational capital to firms' operating, investment and innovation capabilities. Prior studies (Eisfeldt & Papanikolaou, 2014; Lev et al., 2009; Peters & Taylor, 2017) further indicate that organisational capital underpins sustainable competitive

advantage and is becoming increasingly critical for firms. Organisational capital has been increasingly recognised for its role in enhancing firm performance, managerial effectiveness, operational efficiency and competitive positioning (Eisfeldt & Papanikolaou, 2013, 2014; Lev et al., 2009). Organisational capital consists of a bundle of integrated technologies—including managerial practices, process designs and reward systems—that allows some firms to extract greater value from the same physical and human inputs than others. Organisational capital is a resource embodied in the firm, granting it a competitive advantage primarily because it cannot be entirely codified, making it difficult for other organisations to transfer or imitate (Lev & Radhakrishnan, 2005).

Francis et al. (2021) demonstrate empirically that OC stimulates innovation, facilitates firm growth and contributes to value creation. Organisational capital is understood as knowledge embedded in a firm's routines, structures, systems, culture, values and processes, and thus constitutes a key resource for organisational effectiveness (Mention, 2012; Subramaniam & Youndt, 2005). Therefore, under the lens of the resource-based view, OC is a catalyst for the development of innovative capabilities and for enhancing overall organisational performance, which may also improve sustainability performance. The relationship between organisational capital and ESG performance is hypothesised as follows. As organisational capital facilitates the efficient use of resources, stable business operations and better firm performance, firms with high organisational capital are likely to be in a better position to invest in ESG initiatives, given that ESG initiatives are costly for the firm and require continuous management commitment. Organisational capital fosters superior ESG performance by strengthening firms' operating, investment and innovation capabilities through the accumulation of firm-specific knowledge (Francis et al., 2021; Lev et al., 2009) enabled by organisational learning (Martín-de-Castro et al., 2006). Moreover, Barney (1991) argues that rare and valuable resources, such as organisational capital, can create a competitive advantage that may translate into superior environmental, social and governance performance. Therefore, it is arguable that the accumulation of knowledge, leading to superior operating performance (Lev et al., 2009), among other effects reported in the prior literature, also allows a firm to improve overall ESG performance. The literature (Lev & Radhakrishnan, 2005) suggests that firms with high levels of organisational capital tend to outperform their competitors, achieving more efficient production, more stable transactions and lower environmental risks. Hasan and Cheung (2018) show that organisational capital supports firm growth across different stages of the corporate life cycle, while Francis et al. (2021) demonstrate that organisational capital stimulates innovation, which is essential for superior firm performance. Finally, organisational capital facilitates optimal resource planning (Venieris et al., 2015). Overall, organisational capital is a key firm-specific resource that contributes meaningfully to long-term growth potential and superior value creation (Provaty et al., 2024)

Within RBVT, it is posited that OC enhances resource efficiency, operational stability and overall firm performance (Lev et al., 2009). Consequently, firms with higher levels of organisational capital are likely to be better positioned to invest in ESG initiatives. Lev et al. (2009) argue that organisational capital is critical because it enables productive interactions

between tangible and intangible assets to create economic value, and they suggest that organisational capital, conceived as a combination of knowledge, business systems and distinctive processes, plays a pivotal role in shaping firm performance and sustaining competitive advantage.

In stating the hypothesis, this study considers the second school of thought, according to which organisational capital is an intangible resource embodied in the firm itself, as it is rooted in organisational systems and processes and remains within the firm even when employees leave (Atkeson & Kehoe, 2005; Hasan & Cheung, 2018; Lev et al., 2009; Nadeem et al., 2021). This leads to the conceptualisation of organisational capital as a resource embodied within the organisation, in line with the resource-based view, which holds that a firm's competitive advantage is built on the use of its unique and inimitable resources (Nadeem et al., 2018, 2019, 2021). Within the resource-based view, organisational capital is regarded as a pivotal determinant of competitive advantage because it underpins the development of robust business systems, reliable operational processes and advanced manufacturing techniques that strengthen firms' sustainability efforts (Francis et al., 2021; Lev et al., 2009; Provaty et al., 2024), including in relation to the environment, society and governance. Therefore, based on RBVT, OC empowers firms to leverage their resource-based advantages and innovative capabilities, thereby enhancing their ability to improve overall ESG performance.

Provaty et al. (2024), investigating a sample of US-listed firms for the period 2002–2019 and adopting a multi-theoretical framework built on the resource-based view, signalling theory and agency theory, examine the impact of OC on GHG emissions, which constitute one of the three pillars of ESG performance. Their findings provide empirical evidence of a negative relationship, consistent with the scholars' hypothesis and expectations, supporting RBVT and signalling theory. In addition, the authors state that OC, as an intangible resource embodied in the firm, enhances the firm's innovative capacity, facilitating engagement in sustainable projects. Elevated levels of organisational capital, as perceived through the lens of RBVT, empower firms to leverage their innovation capabilities more effectively, thereby reducing greenhouse gas emissions. The capabilities associated with intangible assets, in contrast to tangible resources, emerge from the manner in which diverse resources are combined and coordinated (Teece et al., 1997). These capabilities, which Grant (1991) defines as routines, are embedded in organisational routines that, in turn, remain intangible (Leonard-Barton, 1992; Martín-de-Castro et al., 2006). Capabilities are rooted in accumulated knowledge, with organisational learning serving as their principal source (Teece et al., 1997). In the context of path dependence (Barney, 1991), learning processes have been shown to exert a continuous influence on the development of organisational capabilities. As Martín-de-Castro et al. (2006) posit, these capabilities, in turn, have been demonstrated to engender rents that are both highly firm-specific and sustainable (Teece et al., 1997). Scholars further contend that OC is valuable because it enables firms to create benefits for both internal and external stakeholders, as this intangible asset supports higher sales, broader profit margins and cost reductions. As a consequence, organisational capital is a resource that is difficult for competitors to imitate, thereby representing a source of competitive advantage (Martín-de-Castro et al., 2006).

Within RBVT, the primary sources and drivers of a firm's competitive advantage and superior performance are attributed to the unique resources and capabilities under its control, which are defined as valuable, rare, inimitable and non-substitutable (Barney, 1991; Barney et al., 2001). Valuable resources enable a firm to capitalise on environmental opportunities and/or to mitigate external threats (Barney et al., 2001), thereby supporting the development and implementation of strategies that enhance organisational efficiency and effectiveness. Kshetri (2007) conceptualises sustainability as a pathway to competitive advantage, achieved through the strategic use of distinctive intangible assets, such as corporate reputation, innovative capability, and human capital, to secure a firm's long-term success (Lev et al., 2009; Youndt et al., 2004). Zheng & Sun (2025) ground their hypothesis in the RBVT, aiming to examine whether firms with high organisational capital sustain a more substantial, more durable competitive advantage against external risks than those with lower organisational capital. The scholars find that firms with high OC capital are less exposed to climate change than those with low OC capital. In other words, the scholars provide evidence that OC built a greater resilience against external firm risks. Therefore, based on the previous argument, under the lens of the RBVT, OC also improves the overall ESG firm's performance. Lanzalonga et al. (2025) point out that structural capital, of which the organisational capital is a component (Lev et al., 2009), includes internal processes, management systems, and technology. This structural capital supports the human capital productivity in ESG performance (Dal Mas, 2019). Consequently, structural capital, which includes organisational capital, is inherently connected to ESG performance, as well as to firms' capabilities to comply with ESG requirements and to clearly disclose their initiatives and outcomes (Lanzalonga et al., 2025; Ronalter et al., 2023). Based on the statements above, we state our first hypothesis:

H1: There is a positive relationship between organisational capital and ESG performance.

In contrast to existing literature (Provaty et al., 2024), our findings suggest that organisational capital requires time to exert its effects on ESG performance. This delayed impact may be attributable to our measurement approach, which, following Peters and Taylor (2017), capitalises and amortises a portion of SG&A expenses, including investments in employee training. Based on the statements above, we state our second hypothesis:

H2: There is a positive relationship between the lagged organisational capital and ESG performance.

3. Research Methodology

3.1 Data and sample

Our sample focuses on worldwide-listed firms, in order to check for ESG performance and we collect ESG score data from the LSEG database (London Stock Exchange Group, formerly Thomson Reuters Refinitiv) spanning the years 2017 to 2023. We cannot extend the sample firm and sample period because our organisation is waiting to renew the database subscription next year. From the LSEG database, we have requested all firms with the ESG score. Financial

information is retrieved from the ORBIS database, and Table 1 details the sample selection procedure and the resulting distribution. Our final sample comprises 1,000 unique firms, yielding 7,000 firm-year observations. Panel B of Table 1 shows that 47.10% of the sample firms are manufacturing firms, and 15.70% are transportation and storage firms. These two industry sectors represent the 62.8% of our sample firm. Panel D of Table 1 shows that the 50.90% of our sample firms are incorporated in Europe (3,563 firm-year obs.), the 31.80% in America (2,226 firm-year obs.), the 11.50% in Asia (805 firm-year obs.), while the 5.80% in other geographical areas, different from the first three geographical areas (406 firm-year obs.).

Table 1. Sample selection process and distribution

Panel A. Sample selection process

Description	Total firms
Initial sample from LSEG	12,698
Less: firms with missing ESG score	(4,197)
Less: firms with missing financial data (from Orbis database)	(6,744)
Less: firms with missing country of incorporation and industry sector (Orbis database)	(757)
Final sample (unique firms)	1,000
Firm-year obs. (period 2017-2023)	7,000

Panel B. Industry distribution of the sample (Level 1 NACE, Rev. 2.1, source: ORBIS Database)

Level 1 Code — Economic Area	Frequency (Percentage %)
C — Manufacturing	3,297 (47.10%)
H — Transportation and Storage	1,176 (11.80%)
F — Construction	637 (9.10%)
N — Professional, Scientific and Technical Activities	588 (8.40%)
M — Real Estate Activities	567 (8.10%)
G — Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles	224 (3.20%)
J — Publishing, Broadcasting, and Content Production and Distribution Activities	182 (2.60%)
K — Telecommunication, Computer Programming, Consulting, Computing Infrastructure, and other Information Service Activities	154 (2.20%)
E — Water Supply; Sewerage, Waste Management and Remediation Activities	98 (1.40%)
T — Other Service Activities	21 (0.30%)
B — Mining and Quarrying	14 (0.20%)
Q — Education	14 (0.20%)
I — Accommodation and Food Service Activities	7 (0.10%)
L — Financial and Insurance Activities	7 (0.10%)
O — Administrative and Support Service Activities	7 (0.10%)

D — Electricity, Gas, Steam and Air Conditioning Supply	7 (0.10%)
Total firm-year obs.	7,000 (100%)

Panel C. Country distribution of the sample and associated Area

Country of incorporation	Frequency (firm-year obs.) (Percentage %)	Associated Area
United States	2,212 (31.60%)	America
Germany	903 (12.90%)	Europe
Japan	805 (11.50%)	Asia
France	511 (7.30%)	Europe
Switzerland	462 (6.60%)	Europe
Sweden	287 (4.10%)	Europe
United Kingdom	280 (4.00%)	Europe
Netherlands	231 (3.30%)	Europe
Australia	154 (2.20%)	Other
Finland	140 (2.00%)	Europe
Italy	133 (1.90%)	Europe
Spain	112 (1.60%)	Europe
Denmark	105 (1.50%)	Europe
Luxembourg	98 (1.40%)	Europe
Austria	77 (1.10%)	Europe
Norway	70 (1.00%)	Europe
Bermuda	56 (0.80%)	Other
Singapore	49 (0.70%)	Other
Marshall Islands	42 (0.60%)	Other
Cayman Islands	42 (0.60%)	Other
New Zealand	42 (0.60%)	Other
Ireland	42 (0.60%)	Europe
Greece	28 (0.40%)	Europe
Jersey	28 (0.40%)	Europe
Belgium	21 (0.30%)	Europe
Portugal	14 (0.20%)	Europe
Canada	14 (0.20%)	America
Hong Kong	14 (0.20%)	Other
Iceland	7 (0.10%)	Europe
Czech Republic	7 (0.10%)	Europe
Poland	7 (0.10%)	Europe
Russia	7 (0.10%)	Other
Total firm year obs.	7,000 (100%)	

Panel D. Sample firms grouped by geographical area

Geographical area	Frequency (firm-year obs.)	Percentage %
Europe	3,563	50.90
America	2,226	31.80
Asia	805	11.50
Other	406	5.80
Total firm year obs.	7,000	100%

Panel E – Controversial Industries Level 2 Division (2-digit codes) NACE, Rev. 2.1, source: ORBIS

NACE (Division)	Controversial Industries	Frequency
6	Extraction of crude petroleum and natural gas	7
20	Manufacture of chemicals and chemical products	7
24	Manufacture of basic metals	49
35	Electricity, gas, steam and air conditioning supply	7
41	Construction of buildings	91
42	Civil engineering	427
43	Specialised construction activities	119
46	Wholesale trade, except for motor vehicles and motorcycles	217
51	Air transport	189
58	Publishing activities	42
62	Computer programming, consultancy and related activities	14
63	Information service activities	126
64	Financial service activities, except insurance and pension funding	21
66	Activities auxiliary to financial services and insurance activities	133
84	Public administration and defence; compulsory social security	7
	Total firm year obs.	1,456 (20.8%)
—	Non-controversial (firm years obs.)	5,544 (79.20%)

Note: Panel A of this represents the non-controversial selection procedure, and Panel B outlines the sample distribution. Panel C shows the countries of incorporation of the sample firms, while Panel D shows the sample firms grouped by geographical area. Panel D shows the frequency of firms operating in sectors from an ESG perspective based on NACE2 divisions. Panel E groups the sample firms into two categories: controversial (or unethical) and non-controversial.

Table 1, Panel E, indicates that 20.8% of observations are classified as controversial, whereas the remaining 79.2% (5,544 firm-year observations) are non-controversial (Cai et al., 2012; Jo & Park, 2020). Table 1, Panel D, shows that 50.90% of our firm-year observations (3,563) relate to firms incorporated in Europe, 31.80% (2,226 firm-year observations) to firms incorporated in America, 11.50% (805 firm-year observations) to firms incorporated in Asia, and 5.80% (406 firm-year observations) to firms incorporated in other countries.

3.2 Measures and Covariates

3.2.1 Measurement of the dependent variable

Our dependent variable is the $ESG_{i,t}$ score, a proxy for the ESG performance, drawn from the LSEG database. According to the LSEG methodology, the ESG score varies from 0 (lowest) to 100 (highest). LSEG’s ESG score is divided into quartiles. Category scores are aggregated into three pillar scores: environmental, social, and corporate governance. The ESG pillar score represents a weighted sum of these categories, with industry-specific weights applied to the environmental and social dimensions. For Governance, the weights remain the same across all industries (<https://www.lseg.com/en/data-analytics/sustainable-finance/esg-scores#t-score-range>). As a consequence, the ESG scores issued by third-party rating agencies serve as simplified, aggregate, and quantitative indicators of the complex set of metrics that constitute overall ESG performance (Clément et al., 2025). A strand of the literature raises concerns regarding what ESG scores actually capture, particularly given that the aggregate ESG rating is constructed from a substantial number of underlying indicators and heterogeneous metrics (Friede et al., 2015; Oh et al., 2024).

3.2.2 Measurement of the testing and control variables

Our testing variable is organisational capital (OC). Organisational capital is conceptualised as a fundamental source of competitive advantage, arising from the integration of human capabilities, corporate culture, managerial practices, organisational processes, and accumulated know-how (Martín-de-Castro et al., 2006; Provaty et al., 2024). These elements interact synergistically with physical assets to produce and deliver goods and services. According to prior literature (Eisfeldt & Papanikolaou, 2013, 2014; Peters & Taylor, 2017; Provaty et al., 2024), we estimate the stock of OC by using the perpetual inventory approach that is obtained by capitalising a fraction of selling, general, and administrative expenses (SG&A), as in equation 1:

$$OC_{i,t}^j = (1 - \delta_0) OC_{i,t-1}^j + (SGA_{i,t}^j \times \theta_{i,t}^j) \tag{Eq. (1)}$$

Where $OC_{i,t}^j$ denotes the end of the period stock of OC; δ_0 represents the depreciation rate equal to 20%; $\theta_{i,t}^j$ is the proportion of SG&A expenditure invested in OC, which, according to prior literature (Peters & Taylor, 2017), is 30%. Following previous studies (B. Francis et al., 2021; H. D. Kim et al., 2021; Li et al., 2018), we treated missing SG&A expense values as 0. The initial

stock of organisational capital is captured using the following formula (Peters & Taylor, 2017), as in equation 2:

$$OC_{i,0}^j = (SGA_{i,1}^j \times \theta_{i,t}^j) / (g + \delta_0) \tag{Eq. (2)}$$

Where the variable $SGA_{i,1}^j$ corresponds to the first non-missing SG&A expenses, $\theta_{i,t}^j$ is the proportion of SG&A expenditure invested in OC, according to prior literature (Peters & Taylor, 2017), which is 30% of SG&A expenditure, and g is the average real growth rate of firm-level SG&A expenses. We then divide the stock of organisational capital by the year’s total assets. In equations 1 and 2, the coefficients are estimates for firm i classified in industry j in year t .

3.3 Regression model

To test our hypothesis and investigate the relationship between ESG (dependent variable) and OC_t (test independent variable), We estimate the ordinary least squares (OLS) regression model of equation 3. In equation (4), the OLS specification uses the test variable OC_{t-1} , which serves as a proxy for lagged organisational capital. The regressions include year fixed effects for the period 2017–2023, a dummy capturing the controversial nature of the industry (Cai et al., 2012; Jo & Park, 2020), and firm-level cluster-robust standard errors (Petersen, 2009).

$$ESG_{i,t}^j = \alpha_0 + \beta_1 OC_{i,t}^j + \beta_2 SIZE_{i,t}^j + \beta_3 LEV_{i,t}^j + \beta_4 ROA_{i,t}^j + \beta_5 TOBINQ_{i,t}^j + \beta_6 TANG_{i,t}^j + \beta_7 ZSCORE_{i,t}^j + \beta_8 ICP_{i,t}^j + \beta_9 GDP_{i,t}^j + \beta_{10} YEAR_{i,t}^j + \beta_{11} CONTR_{i,t}^j + \beta_{12} AREA_{i,t}^j + \beta_{13} COVID_{i,t}^j + \epsilon_{i,t}^j \tag{3}$$

$$ESG_{i,t}^j = \alpha_0 + \beta_1 OC_{i,t-1}^j + \beta_2 SIZE_{i,t}^j + \beta_3 LEV_{i,t}^j + \beta_4 ROA_{i,t}^j + \beta_5 TOBINQ_{i,t}^j + \beta_6 TANG_{i,t}^j + \beta_7 ZSCORE_{i,t}^j + \beta_8 ICP_{i,t}^j + \beta_9 GDP_{i,t}^j + \beta_{10} YEAR_{i,t}^j + \beta_{11} CONTR_{i,t}^j + \beta_{12} AREA_{i,t}^j + \beta_{13} COVID_{i,t}^j + \epsilon_{i,t}^j \tag{Eq (4)}$$

Where: $ESG_{i,t}^j$ is the dependent variable, indicating the ESG score for firm i , in year t , and for the industry sector j . The ESG score values were drawn from the LSEG (London Stock Exchange Group) database. The ESG score varies from 0 (lowest) to 100 (highest). $OC_{i,t}^j$ is the organisational capital, the testing variable, estimated as in equations 1 and 2. The OC was estimated for firm i in year t and for industry sector j . According to our hypothesis, we expect a positive and significant relationship between OC and ESG. In equation 4, we replace the testing variable $OC_{i,t}^j$ with the lagged testing variable $OC_{i,t-1}^j$. Following prior research, in equation 3 we include several firm-level control variables that, according to the RBVT can impact the relationship between OC and the ESG score. We add $SIZE_{i,t}^j$, proxying for the firm’s size. This variable is estimated as the natural logarithm of total assets, according to prior literature (Goebel, 2015; Pham et al., 2024; Provaty et al., 2024; Youndt et al., 2004). Larger firms can generate internal funds and are better able to raise external capital on financial markets to support

sustainable projects and improve firm performance (Pham et al., 2024). Therefore, we expect a positive relationship between firm size and ESG performance. $LEV_{i,t}^j$ is the financial leverage, proxying for total debt scaled by total assets of the year t. This variable is included in the model to account for the impact of financing policy on ESG performance (Luo & Tang, 2014; Pham et al., 2024; Provaty et al., 2024). Investors can better assess a firm's market value and make more informed investment decisions by examining the firm's risk profile, as reflected in its leverage ratio (Elshandidy et al., 2013; Pham et al., 2024). According to prior literature (Pham et al., 2024; Provaty et al., 2024), we expect a positive relationship between ESG score and LEV. $ROA_{i,t}^j$ is the firm performance, proxied by the return on assets ratio of the year t. Profitable firms have more resources and incentives to invest in high technology (Nadeem et al., 2021). Firms with a high profitability may gain a competitive advantage, therefore improving firm performance. Based on the statement above, we expect a positive relationship between ROA and ESG score. $TOBINQ_{i,t}^j$ is a proxy for the firm's growth. The variable is obtained from the Orbis database. Prior studies suggest that rapidly growing firms often face constraints in implementing sustainable strategies (Dhaliwal et al., 2011; Provaty et al., 2024). Therefore, we expect a negative relationship between the control variable TOBINQ and the dependent variable ESG.

$TANG_{i,t}^j$ is the investment in tangible assets, calculated as the net property, plant, and equipment scaled by total assets of year t. Provaty et al. (2024) indicate that this variable reflects how asset characteristics shape both sustainability outcomes and firms' propensity to innovate (Nadeem et al., 2021). The scholars find a negative and significant relationship between tangible assets and GHG emissions. We, however, predict a positive relationship because the ESG score captures a firm's efforts to innovate, which can positively affect ESG performance.

$ZSCORE_{i,t}^j$ is the Altman Z-score (Altman, 1968; Altman et al., 2017; DeFond & Zhang, 2014) to measure financial constraint. The control variable is categorical and assumes the value 0 for firms in the safe zone (Z-score > 2.99), the value 1 for firms in the grey zone (Z-score is ≥ 1.81 , and ≤ 2.99), and the value 2 for firms in the distress zone (Z-score < 1.81). We estimate the score using the method of Pham et al. (2024). The higher the ZSCORE coefficient, the lower the firm's default risk. Therefore, we expect a positive relationship between the firm's financial constraint and the dependent variable ESG performance. The formula used to calculate the Z-Score is presented in Table.

$ICP_{i,t}^j$ is the innovation capital performance, measured as in Pham et al. (2024). This control variable captures innovation capital, measured as the ratio of R&D expenditures to net operating revenues (Tseng et al., 2015). Pham et al. (2024) use this measure as a proxy of investment in intellectual capital.

To capture the effect of the macroeconomic context on the relationship between ESG performance (measured by the ESG score) and the trend-introducible (GDP_i^j), which is the pro-

capital gross domestic product (World Bank, 2025). Finally, we include a set of fixed-effect variables to control for their influence on the ESG score, as detailed below. $YEAR_{i,t}^j$ is the year of the analysis, varying from 2017 to 2023; $CONTR_{i,t}^j$ is a dummy variable equal to 1 if a firm operates in an industry classified as controversial, and zero otherwise. Firms were assigned to the two groups (controversial and non-controversial firms) based on their two-digit NACE code, in line with prior literature (Aqueveque et al., 2018; Cai et al., 2012; Jo & Park, 2020). This control variable is added to control for industry sectors on the relationship between OC and ESG performance (the source is LSEG database), as in Table 1, Panel E; $AREA_{i,t}^j$ is the geographical area of the firm’s incorporation, as in Table 1, Panel D. Finally, $COVID_{i,t}^j$ is a dummy variable controlling for the lockdown period. The variable takes the value 1 if the year of analysis falls within the period 2021-2023, and 0 otherwise. The extant literature indicates that the lockdown period (pre- and post-COVID-19 pandemic) may affect ESG performance (Binesh et al., 2025; Kaminskyi et al., 2025; Yahya, 2023).

We control for fixed-effect variables to account for market and performance conditions that do not depend on the sample firms.

Table 2 summarises the descriptions and definitions of the variables included in Eq. (3).

Table 2. Variable description and measurement

Label	Variable description	Exp. sign
ESG	The LSEG environmental, social, and governance pillar.	
Testing variable:		
OC_t	The level of organisational capital of firm i classified in industry j in year t , estimated as in Peters & Taylor (2017)	+
OC_{t-1}	The level of lagged organisational capital of firm i classified in industry j in year $t-1$, estimated as in Peters & Taylor (2017)	+
Control variables:		
Firm-level characteristics		
SIZE	This variable is estimated as the natural logarithm of total assets	+
LEV	Firm’s financial leverage, proxied by total assets scaled by total assets for firm i in year t	+
ROA	Firm profitability is measured as the return on assets ratio.	+
TOBINQ	TOBIN’S Q, a proxy of firm growth. It is the relationship between a firm’s market valuation of its assets and its book assets. The variable is obtained from the Orbis database.	-
TANG	Investment in tangible assets, calculated as the net property, plant, and equipment scaled by total assets of year t .	+
ZSCORE	The firms’ financial problems are proxied by the Altman Z score (Altman, 1968). The score is calculated as follows: $1.2 \times$ (working	+

capital/total assets) + 1.4 x (retained earnings/total assets) + 3.3 x (earnings before interest and taxes/total assets) + 0.6 x (market value of equity/book value of total debt) + 1.0 x (sales/total assets). The control variable is categorical, taking the value 0 for firms in the safe zone (showing a Z score index above 2.99), that identify non-bankrupt firms; the value 1 for firms in the grey zone (showing a Z score index between 1.81 and 2.99), and the value 2 for firms in the distress zone (showing a Z score below 1.81, indicating firms with a high risk of bankruptcy).

ICP The innovation capital performance measure (Pham et al., 2024). This control variable represents innovation capital, estimated as the ratio of R&D expenses to net operating revenues.

Country-level characteristics

GDP The Gross Domestic Product per capita (in current USD), proxied by the GDP divided by midyear population for each country in year *t* (World Bank, 2025)

Fixed effect variables

YEAR Year of the analysis. The variable ranges from 2017 to 2023

CONTR Dummy variable equal to 1 if the firm’s industry sector, based on the NACE 2-digit code, is considered controversial in the previous literature (Cai et al., 2012; Jo & Park, 2020).

AREA We group the sample firms into four geographical areas: Europe, America, Asia, and Others

COVID We define a dummy variable capturing the global COVID-19 lockdown period, which equals 1 for the years 2021–2023 and 0 otherwise.

Note: this table reports the variable description and measurement.

4. Results and analysis

4.1 Descriptive statistics

Table 3 presents the descriptive statistics for the variables in equations 3 and 4. Panels A, and B, show the descriptive statistics for continuous and categorical variables (firm-year observations = 7,000).

Table 3. Descriptive statistics

Panel A: continuous variables

Variables	Mean	Median	Std.Dev	Min	Perc. 25	Perc. 75	Max
ESG	47.351	47.406	21.015	0.246	31.133	64.626	94.053
OC	0.065	0.043	0.075	0.000	0.024	0.081	1.915
SIZE	21.505	21.609	1.853	10.532	20.305	22.726	26.635
LEV	0.029	0.011	0.051	0.000	0.000	0.040	1.851
ROA	0.282	0.256	0.218	-0.211	0.122	0.418	0.917
TOBINQ	1.122	0.724	1.671	0.000	0.322	1.357	42.975
TANG	0.238	0.176	0.200	0.000	0.098	0.305	0.949
ICP	0.078	0.000	1.833	-0.015	0.000	0.019	116.063

Panel B: categorical variables

ZSCORE	N	Percent
0 (safe firms)	3,377	48.24%
1 (firms in the grey zone)	1,755	25.07%
2 (distressed firms)	1,868	26.69%
COVID		
Controversial (value 1)	1,456	20.8%
Non-controversial (value 0)	5,544	79.20%

Note: this table reports the descriptive statistics for continuous variables (Panel A) and categorical variables (Panel B) in the equation

Firms in the total sample have a mean (median) $ESG_{i,t}^j$ score of 47.351 (47.406). These findings suggest that sample firms have, on average, an environment, social, and governance score in the second quartile (range 25-50%) according to the LSEG (London Stock Exchange Group) scale. Sample firms have a mean (median) of $OC_{i,t}^j$ the proportion of organisational capital scaled by the total assets, of 0.065 (0.043), suggesting that the stock of organisational capital is, on average, the 6.5 the total assets. The mean (median) value of the control variable $SIZE_{i,t}^j$, proxied by the natural logarithm of total assets, is 21.505 (21.609), indicating that our sample firms are relatively large. The mean (median) of the control variable $LEV_{i,t}^j$ is 0.029 (0.011), suggesting that our sample firms are lightly leveraged, with total debt accounting for 2.9% of total assets. The mean (median) of the control variable $ROA_{i,t}^j$ is 0.339 (0.266), indicating that our sample firms have, on average, good profitability. In fact, the operating income is, on average, the 33.9% of total assets. The mean (median) of the control variable $TOBINQ_{i,t}^j$ is 1.122 (0.724), suggesting that, on average, the market value of the sample firms is higher than the replacement cost of their physical assets. The market believes the sample firms create more value from their assets than their physical replacement costs would imply, pointing to future growth, innovation, or intangible assets.

The mean (median) of the control variable $ICP_{i,t}^j$. The proxy for the innovation tax is 0.078 (0.000), suggesting that, on average, R&D expense is 7.8% of operating revenues.

The descriptive statistics of the categorical variable $ZSCORE_{i,t}^j$, proxying for the firm's financial constraint, suggest that 48.24% of the sample firms are classified as safe, 25.07% fall into the grey zone, and 26.69% are in the distressed zone. Taken together, 51.76% of the firms in our sample (those in the grey and distressed zones) exhibit some degree of financial constraint.

We control for the global COVID-19 pandemic lockdown period, which equals 1 for the years 2021–2023 and 0 otherwise.

4.2 Correlation analysis

Table 4 reports the correlation matrix, with Pearson coefficients above the diagonal, to describe the associations between the dependent variable (ESG), the test variable (OC), and the set of controls. The main relationships can be summarised as follows. ESG and OC exhibit a weak negative Pearson correlation of -0.142 , significant at the 1% level. ESG is strongly and positively correlated with firm size (Pearson 0.648 , 1% level) and shows a weak but positive Spearman correlation with CONTR, the dummy distinguishing controversial from non-controversial industries (0.033 , 1% level), as well as a weak positive Spearman correlation of 0.148 , also significant at the 1% level.

OC displays a weak positive Pearson correlation of 0.138 with ESG, significant at the 1% level, a weak positive Pearson correlation with TOBINQ (0.066 , 1% level), and a weak positive Spearman correlation with ICP (0.046 , 1% level). Overall, there are no strong pairwise correlations among the control variables in equation (3), alleviating concerns about multicollinearity. The categorical variable ZSCORE, proxied by the Altman Z-Score, shows a positive but non-significant association with ESG. At the same time, there is a significant Spearman correlation with OC.

Table 4. Correlations table

	ESG	OC	SIZE	LEV	ROA	TOBINQ	TANG	ICP	CONTR	A(America)	A(Asia)	A(Europe)	A(Other)	COVID	ZSCORE
ESG	---	-0.121***	0.656***	0.043***	-0.082***	-0.115***	-0.035***	0.087***	0.033***	-0.161***	0.006	0.163***	-0.036***	0.148***	0.004
OC	-0.142***	---	-0.408***	0.032***	0.552***	0.232***	-0.057***	0.007	-0.060***	-0.047***	-0.228***	0.255***	-0.141***	-0.016	-0.233***
SIZE	0.648***	-0.346***	---	0.048***	-0.306***	-0.290***	0.041***	-0.022*	0.144***	-0.059***	0.236***	-0.082***	-0.029**	0.054***	0.146***
LEV	-0.044***	-0.002	-0.038***	---	0.246***	0.016	0.154***	0.151***	-0.013	-0.360***	0.197***	0.192***	0.037***	-0.014	-0.176***
ROA	-0.040***	0.138***	-0.114***	0.005	---	0.428***	0.051***	0.159***	-0.106***	-0.087***	-0.210***	0.259***	-0.094***	-0.009	-0.479***
TOBINQ	-0.112***	0.066***	-0.220***	-0.056***	0.035***	---	-0.073***	0.278***	-0.158***	0.031***	-0.113***	0.044***	-0.001	-0.018	-0.642***
TANG	-0.070***	-0.109***	0.105***	0.080***	-0.021*	-0.096***	---	-0.041***	-0.160***	-0.127***	0.170***	-0.040***	0.105***	0.000	0.033***
ICP	-0.048***	0.046***	-0.074***	-0.018	-0.006	0.071***	-0.030**	---	-0.224***	-0.136***	0.098***	0.129***	-0.139***	-0.007	-0.178***
CONTR	0.032***	-0.076***	0.141***	-0.015	0.004	-0.064***	-0.100***	-0.020	---	0.036***	0.024**	-0.083***	0.075***	0.000	0.081***
A(America)	-0.160***	-0.074***	-0.056***	-0.230***	-0.005	0.047***	-0.070***	0.044***	0.036***	---	-0.246***	-0.695***	-0.169***	0.000	-0.011
A(Asia)	0.001	-0.162***	0.217***	0.155***	-0.041***	-0.082***	0.141***	-0.013	0.024**	-0.246***	---	-0.367***	-0.089***	0.000	0.089***
A(Europe)	0.164***	0.203***	-0.072***	0.103***	0.038***	-0.004	-0.108***	-0.028**	-0.083***	-0.695***	-0.367***	---	-0.253***	0.000	-0.093***
A(Other)	-0.034***	-0.066***	-0.031***	0.026**	-0.015	0.026**	0.178***	-0.010	0.075***	-0.169***	-0.089***	-0.253***	---	0.000	0.099***
COVID	0.145***	-0.006	0.057***	-0.015	-0.014	-0.008	-0.006	-0.013	0.000	0.000	0.000	-0.000	0.000	---	0.016
ZSCORE	-0.007	-0.115***	0.113***	-0.043***	-0.062***	-0.353***	0.092***	0.038***	0.081***	0.001	0.069***	-0.093***	0.102***	0.013	---

Note: Correlation matrix. Pearson coefficients are reported below the diagonal and Spearman coefficients are reported above; statistical significance is denoted as * p < 10%, ** p < 5%, *** p < 1%.

4.3 Results and discussion

Table 5 OLS Regression Results

	Dependent variable			
	Equation 3	Equation 4	Equations 3 and 4	
	Firm-year obs: 7,000	Firm-year obs: 6,000	Firm-year obs: 6,000	
	Expected sign	ESG (1)	ESG (2)	ESG (3)
Testing variable:				
OC_t		10.315		-3.557
OC_{t-1}			18.188**	21.208***
Const		-136.378***	-136.930***	-136.731***
Firm-level characteristics:				
SIZE	+	8.020***	8.258***	8.253***
LEV	+	-9.598	-13.582	-13.651
ROA	+	0.370***	-1.610	-1.525
TOBINQ	-	0.014	0.090	0.087
TANG	+	4.106***	3.874***	3.864***
ZSCORE =1 (grey zone)	+	-0.407	-0.297	-0.296
ZSCORE =2 (distress zone)	+	-3.013***	-3.766***	-3.752***
ICP	?	0.068**	0.062**	0.063**
CONTR		-3.109***	-3.299***	-3.299***
Country-level characteristics:				
GDP	?	-0.035	-0.012	-0.010
Fixed effect				
AREA = America		-5.745**	-5.660**	-5.667**
AREA = Asia		-9.288***	-9.413***	-9.413***
AREA = Europe		1.773	1.568	1.573
COVID		2.897***	2.546***	2.541***
Model specification:				
R-square		0.508	0.516	0.516
Adj. R-square		0.507	0.515	0.515
Log likelihood		-28,759.689	-24,612.964	-24,612.770
AIC		57,563.378	49,267.928	49,269.539
F-test		0.37	12.84***	2.82***
Fixed effects:				
Year		Yes	Yes	Yes
Area		Yes	Yes	Yes
Sector		Yes	Yes	Yes
Robust S.E. clustered		Firm & Year	Firm & Year	Firm & Year

Note: This table reports the results of the OLS regression specified in Equations 3, and 4. Two key explanatory variables are employed. Model 1 includes the testing variable OC_t , which captures organisational capital in year t. Model 2 incorporates the lagged testing variable OC_{t-1} , to examine the effect of organisational capital from the previous year on ESG performance in year t. Model 3 includes both testing variables to assess their impact on the ESG score jointly. Variance Inflation Factor (VIF) values are below 2 for all variables, indicating no multicollinearity concerns. Variable definitions and measurement details are provided in Table 2. In Model 3 the firm-year observations are 6,000, as the calculation of the variable OC_{t-1} results in the loss of 1,000 firm-year observations. We use the robust S.E. clustered for firms and year, according to Petersen (2009). *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 4 reports the estimation results of ordinary least square (OLS) regression models of Equation 3 (Model 1), and Equation 4 (Model 2). Finally, we also report Model 3, including both the testing variables. The Adj. R-square of Model 1 is 50.7%, while the Adj. R-square of Models 2, and 3 is 51.5%. The F-test of Model 1 is 0.37, the F-test of Model 2 is 12.84 significant at 1% level, while the F-test of Model 3 is 2.82, significant at 1% level. Based on the foregoing discussion and a comparison of the F-statistics, Model 2, which includes the lagged testing variable, emerges as the best-fitting specification for explaining the relationship between organisational capital and ESG performance. This is supported by the AIC values, which are -28,759.69 for Model 1, -24,612.96 for Model 2, and -24,612.77 for Model 3. The model with the lowest AIC (even if highly negative) is preferred, as it reflects lower information loss and a better trade-off between goodness of fit and parsimony relative to competing specifications.

Whereas the coefficient of the testing variable OC in Model 1 is positive, as expected, though not significant, the testing variable shows a positive relationship, significant at 1% level, with ESG performance in Model 2. Model 3 corroborates the positive and statistically significant association between lagged OC and ESG performance observed in Model 2, showing a positive sign, as expected, significant at 1% level. These findings indicate that while OC estimated at year t doesn't drive the ESG performance, the OC estimated at year $t-1$ drives positively the ESG performance. Consistent with the RBVT, our results provide empirical support that organisational capital estimated at time $t-1$ constitutes a source of competitive advantage (Barney, 1991; Martín-de-Castro et al., 2006), representing an unique and inimitable resource embodied into the firms that enables the development of stable operational processes, exceptional manufacturing techniques that improves the sustainable effort of the firm (Francis et al., 2021; Lev et al., 2009) Our evidence is consistent with prior research (Provaty et al., 2024; Zheng & Sun, 2025), documenting a positive association between organisational capital and ESG performance. Moreover, unlike the existing literature, our findings suggest that organisational capital takes time to generate effects on ESG performance. This delayed impact may be attributable to our measurement approach, which, following Peters and Taylor (2017) by capitalising and amortising a portion of SG&A expenses, including investments in employee training. Consequently, while contemporaneous organisational capital exhibits a positive but statistically insignificant relationship with ESG performance, lagged organisational capital is positively and significantly associated with ESG outcomes. Consequently, HP1 is rejected, whereas HP2 is supported.

Among the control variables, we find that firm size (SIZE) is positively, as expected, related to ESG performance, and is significant at the 1% level in Models 1, 2, and 3. These findings suggest that, as prior literature (Goebel, 2015; Pham et al., 2024; Provaty et al., 2024; Youndt et al., 2004) indicates, large firms are more likely to invest in ESG initiatives. The variable LEV, proxying for a firm's leverage, contrary to expectations, shows a negative sign, though it is not significant in Models 1, 2, and 3. These findings suggest that, not consistent with prior literature (Pham et al., 2024; Provaty et al., 2024), a firm's financing policy doesn't impact ESG performance. The variable ROA shows a positive sign, as expected, and is significant at the 1% level only in Model 1, while it is non-significant in Models 2 and 3. These findings suggest that a

firm's profitability is a proxy for investment in high technology (Nadeem et al., 2021) only when the OC estimated at year t is included in the regression model. The sign of the control variable TOBINQ is not significant in Models 1, 2, and 3. These findings suggest that, in contrast with prior literature (Provaty et al., 2024), firm growth doesn't impact ESG performance. The sign of the control variable TANG, proxying for investment in tangible assets, is positive, as expected, and significant at the 1% level in Models 1, 2, and 3. These findings suggest that, consistent with prior literature (Provaty et al., 2024), firms investing in property, plant, and equipment make every effort to engage in innovation that drives ESG performance. The sign of the categorical control variable ZSCORE is negative, contrary to expectations, and significant at the 1% level in distressed firms (it is not significant for firms in the grey zone). Our findings indicate that the lower the coefficient of the ZSCORE the higher the risk of the firm's default. Therefore, distressed firms are less likely to invest in ESG initiative to improve ESG performance than non-distressed firms. The control variable ICP, which proxies innovation capital performance, displays a positive coefficient that is statistically significant at the 5% level in Models 1, 2, and 3. Consistent with Pham et al. (2024) this variable is interpreted as a proxy for investment in intellectual capital. Therefore, greater investment in intangible capital increases the likelihood of achieving high ESG performance.

The coefficient of the variable CONTR, which captures firms whose activities are classified as controversial, is negative and statistically significant at the 1% level across Models 1, 2, and 3. These findings are unexpected, as firms in controversial industries typically face substantial legitimacy challenges that they may seek to mitigate by attaining high ESG performance. The coefficient on the variable COVID is positive and statistically significant at the 1% level in Models 1, 2, and 3, indicating that during the COVID-19 pandemic firms were associated with higher ESG performance.

The sign of the variable GDP is negative, though not significant in all the three models in Table 5, therefore it doesn't impact on the ESG performance.

6. Conclusion and limitations

This study highlights knowledge as a pivotal intangible asset that enhances production processes and, in turn, supports superior ESG performance. By linking knowledge-based capabilities to environmental, social and governance outcomes, the analysis underscores the central role of knowledge in driving sustainable organisational practices. Grounded in the resource-based view, the analysis demonstrates that organisational capital is a firm-specific, valuable and difficult-to-imitate resource that supports the development of superior sustainability outcomes. Using a large international sample of listed firms, the study finds that organisational capital does not immediately affect ESG performance; instead, its effects materialise with a temporal lag. This result is consistent with the notion that organisational capital reflects accumulated knowledge, routines and managerial capabilities whose benefits emerge gradually through learning processes, improved coordination and the effective deployment of resources (Lev et al., 2009).

The evidence that lagged organisational capital is positively associated with ESG performance extends prior research that has primarily focused on narrower environmental outcomes, such as greenhouse gas emissions. By considering the aggregate ESG score, this study provides a more comprehensive view of sustainability performance and highlights organisational capital as a key internal driver of firms' ability to engage in environmental, social and governance initiatives. Moreover, the finding that organisational capital enhances ESG performance even in controversial industries suggests that intangible organisational resources can help firms address legitimacy concerns and improve stakeholder perceptions in sectors traditionally exposed to higher sustainability risks.

From a managerial perspective, the results highlight the importance of long-term investments in organisational processes, organisational practices and employee development. Such investments may not yield immediate improvements in ESG metrics, but they create the organisational infrastructure needed to sustain credible, practical sustainability strategies over time. For investors and policymakers, the findings suggest that organisational capital should be considered an essential determinant of ESG performance, complementing traditional financial and governance indicators.

Despite these contributions, this study is subject to several limitations that open avenues for future research. First, organisational capital is measured indirectly by capitalising a fixed proportion of SG&A expenses, in line with the established literature. While this approach enhances comparability with prior studies, it may not fully capture qualitative dimensions of organisational capital, such as corporate culture, leadership quality or internal governance mechanisms. Future research could employ alternative measures, survey-based indicators or text-based proxies to capture these dimensions more precisely.

Second, ESG performance is proxied by a composite score from a single rating agency (LSEG). Although widely used, ESG scores are subject to measurement error and methodological heterogeneity. Future research could replicate and extend the analysis by using alternative ESG data providers and by disaggregating the ESG pillars (environment, social and governance) to assess how organisations affect these dimensions.

Third, although the empirical design controls for a wide range of firm- and country-level characteristics, potential endogeneity concerns cannot be entirely ruled out; firms with stronger ESG orientations may simultaneously invest more in organisational capital, leading to reverse causality. Future research could address this issue using quasi-experimental designs, instrumental variables or natural experiments.

Finally, the sample period is constrained to 2017–2023 due to data availability, which may limit the generalisability of the results across different regulatory regimes and economic cycles. Extending the analysis to longer time horizons or specific institutional contexts would further enhance understanding of the dynamic relationship between organisational capital and sustainability performance. Overall, this study highlights organisational capital as a critical, yet

often overlooked, driver of firms' ESG performance and provides a foundation for future research at the intersection of intangible resources and corporate sustainability.

Acknowledgments

The authors declare that no grants, funds, or other financial support were received for this research.

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