

# Individual and organizational intellectual capital, ESG dimensions and competitive advantage: a focus on Italian SMEs

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## Abstract

**Purpose** – The aim of this study is to explore the influence of intellectual capital (IC), at both the individual and organizational levels, on environmental, social, and governance (ESG) dimensions. It also investigates how these ESG dimensions, ultimately, affect firms' competitive advantage, focusing on strategic and financial performance outcomes.

**Design/methodology/approach** – The study employs a quantitative methodology based on survey data collected from SMEs in Italy. A multilevel framework distinguishes IC at the individual level (human and relational capital) and at the organizational level (structural and organizational capital) to assess their impact on ESG dimensions. The research also utilizes a newly validated perceived-ESG (P-ESG) scale to measure ESG performance and its subsequent effects on strategic and financial performance. We tested hypotheses using structural equation modelling with the partial least squares approach (PLS-SEM).

**Findings** – The results show that human capital significantly impacts social sustainability while relational capital supports social and governance sustainability. In addition, it is highlighted that structural capital positively influences all three ESG dimensions, whereas organizational capital strongly drives environmental outcomes but negatively affects social sustainability. Among ESG dimensions, governance sustainability emerges as the strongest determinant of both strategic and financial performance. Social sustainability positively affects strategic performance but exhibits a negative effect on financial performance, reflecting short-term financial constraints for SMEs implementing social initiatives.

**Originality/value** – This study is among the first to analyse the multilevel influence of IC on ESG dimensions while utilizing a newly validated scale to measure ESG performance. It also provides novel insights into the distinct effects of ESG dimensions on firms' competitive advantage, providing a more sophisticated interpretation of the relationship between IC, ESG, and performance.

**Keywords** Intellectual capital, ESG, Competitive advantage, Sustainability

**Paper type** Research article

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## 1. Introduction

Intellectual capital (IC), which encompasses intangible assets such as relationships, skills and knowledge, has long been acknowledged as being essential for achieving organizational success and fostering innovation (Edvinsson and Sullivan, 1996; Bontis *et al.*, 2000; Subramaniam and Youndt, 2005; Guthrie *et al.*, 2018; Baima *et al.*, 2021). More recently, IC has also gained prominence in sustainability discussions, with scholars examining its role in supporting sustainable development (López-Gamero *et al.*, 2011) and in aligning business practices with Sustainable Development Goals (SDGs) set by the United Nations (Secundo *et al.*, 2020; Alvino *et al.*, 2021). Additionally, increasing attention has been given to “green IC”, which refers to the accumulation of intangible resources, expertise, and competences that embed environmental sustainability and green innovation into organizational processes aimed at value creation (Mansoor *et al.*, 2021; Asiaei *et al.*, 2023; Martínez-Falcó *et al.*, 2024). All these studies highlight the pivotal role of IC as a strategic resource that organizations leverage to gain competitive advantage, to favour innovations, and to address sustainability challenges (Marr and Chatzkel, 2004; López-Gamero *et al.*, 2011; Iazzolino and Laise, 2016; Secundo *et al.*, 2020; Alvino *et al.*, 2021). However, despite its importance, the existing body of research often adopted a broad and aggregated perspective on IC, focusing on macro-level impacts or societal implications (Dumay, 2016; Secundo *et al.*, 2016). This approach leaves an underexplored area regarding the nuanced interplay of IC at the individual and organizational levels, where the creation, utilization, and transfer of intangible assets directly influence sustainable practices and outcomes, innovations and ultimately competitive advantage, proxied by strategic and financial performance.

IC at the individual level – comprising the skills, expertise, creativity, and relationships of employees and leaders – underpins organizational agility, decision-making quality, and a culture of continuous improvement (Subramaniam and Youndt, 2005). Instead, IC at the organizational level includes collective knowledge, proprietary information, and embedded capabilities that drive value creation and operational excellence (Edvinsson and Sullivan, 1996; Scuotto *et al.*, 2017; Manfredi Latilla *et al.*, 2018). The extension beyond internal organizational dynamics to consider the broader external environment, including societal influences, has impressed a strong acceleration to combine IC performance measurement with sustainability-oriented dimensions (Dumay and Garanina, 2013; Secundo *et al.*, 2016; Tonelli *et al.*, 2024). This shift is even more relevant as sustainability reporting – through Environmental, Social and Governance (ESG) dimensions – continues to gain prominence (Tyan *et al.*, 2024; Paolone and Bitbol-Saba, 2025) and has already become mandatory for large European companies under the Corporate Sustainability Reporting Directive (EU CSRD, 2022). As ESG reporting becomes an essential element of corporate governance (Billio *et al.*, 2021; Khan, 2022; Rahman *et al.*, 2023), understanding how firms develop and leverage their intangible assets, such as IC, to enhance ESG performance and long-term competitiveness, becomes increasingly important (Abdallah *et al.*, 2024; Tonelli *et al.*, 2024). Scholars have attempted to integrate IC with multicriteria accounting performance models (Iazzolino and Laise, 2016), while others have explored sustainable IC in natural capital management (López-Gamero *et al.*, 2011) or the impact of IC components on environmental performance (Asiaei *et al.*, 2023). Other proposals to assess the firm efforts towards sustainability-oriented efforts comes from the use of ESG dimensions to gain financial outcomes (Franco *et al.*, 2020; Chen *et al.*, 2023; Collevocchio *et al.*, 2024), highlighting the enhancement of organizational resilience and stakeholder trust (Friede *et al.*, 2015; Velte, 2020; Khan, 2022) or the individual effect of one ESG dimension as the role of good governance on competitive advantage (Koroleva *et al.*, 2020). However, the focus remains on financial variables with challenges on a weak consensus on ESG ratings (Chatterji *et al.*, 2016; Billio *et al.*, 2021; Paolone and Bitbol-Saba, 2025), contradictory findings and unresolved discrepancies (Khan, 2022).

In sum, an integrated approach is still missing, and it is not yet clear how IC contributes to the integration of the ESG dimensions into business strategies, and how such integration

influences long-term sustainability outcomes (Dumay and Garanina, 2013; Guthrie *et al.*, 2018; Abdallah *et al.*, 2024). For instance, at the individual level of IC, contributions have begun to explore how employees' skills interact with organizational systems to advance sustainability-focused goals (Pedrini, 2007; Tejedo-Romero and Araujo, 2022), while at the organizational level, IC has gained prominence in sustainability-oriented frameworks such as Corporate Social Responsibility (CSR) and Circular Economy (CE) (Morea *et al.*, 2021). However, the mechanisms by which IC drives these sustainable-oriented initiatives and then uphold competitive advantage are not well explored as well as multilevel lens of analysis is overlooked. Building on these gaps, this study aims to investigate how IC at both individual and organizational level support or hinder the achievement of firms' sustainability and competitiveness. Our study posits that understanding the dynamic interplay between these dimensions can yield actionable insights into optimizing IC for sustainability. Specifically, the research question explored in this study is the following: does IC – at both individual and organizational levels – affect ESG dimensions performance to ultimately attain competitive advantage?

The achieved results contribute to the literature in several ways. First, it is one of the earliest studies to examine IC's influence on ESG dimensions using a multilevel framework, distinguishing between individual IC and organizational IC. Second, it provides an empirical validation for a newly validated ESG measurement scale (Oh *et al.*, 2024), offering a more refined assessment of the link between IC and sustainability performance. Finally, it highlights how ESG performance influences competitive advantage, focusing on both strategic and financial performance. Beyond its theoretical contributions, this study provides practical insights for managers and policymakers, offering guidance on how to develop IC strategies that align with ESG dimensions to enhance sustainability and competitiveness. The remainder of the paper is as follows: in section 2 we introduce the background and the hypotheses of the study; in section 3 we outline the research methodology adopted; in section 4 we report the outcomes of the study; in section 5 we discuss the results and the contributions of the research.

## 2. Literature review and hypothesis development

The literature review is structured into two main parts. The first part provides an overview of the theoretical definitions and dimensions of the three core constructs: IC, ESG dimensions, and competitive advantage. The second part reports the conceptual framework and the formulation of the research hypotheses for empirical investigation.

### 2.1 IC, ESG, and competitive advantage: definition and dimensions

2.1.1 IC. IC represents the collection of intangible knowledge assets within an organization, recognized as a fundamental driver of organizational success and competitiveness (Bontis *et al.*, 2000; Subramaniam and Youndt, 2005; Guthrie *et al.*, 2018). Among the various definitions of IC, a recurring theme is its contribution to value creation. Indeed, IC is often described as the collection of knowledge and expertise that organization can exploit to generate value (Edvinsson and Sullivan, 1996). It encompasses intellectual property, information, experience, and other intangible assets that, when effectively managed, contribute to competitive advantage and business success (Dumay, 2016). These descriptions align closely with one of the most widely adopted theoretical lenses for analysing IC, namely the resources-based view (RBV). This perspective allows scholars to underscore the distinctive and strategic importance of IC in driving long-term organizational success, as it may sustain competitive advantage due to its uniqueness, high value, and the challenges associated with its replication or replacement (Martín-de Castro *et al.*, 2019).

IC contribution to value creation allows considering it as a cornerstone of organizational success, yet its measurement and classification remain subjects of ongoing debate among scholars (Dumay, 2016; Guthrie *et al.*, 2018; Tonelli *et al.*, 2024). Various studies emphasize

different components of IC each contributing uniquely to an organization's capacity to innovate, adapt, and excel, with a predominance of a tri-part model rooted in the recognition of human capital (HC), structural capital (SC), and relational capital (RC) (Baima *et al.*, 2021). HC is one of the most widely recognised components of IC, encompassing the skills, knowledge, creativity, and experience of an organization's workforce. As it directly refers to people, HC is the foundation of any knowledge-based asset, as organizations rely on their employees to generate, apply, and transfer knowledge resources (Ahmed *et al.*, 2020). Beyond the individual competencies of people, the quality and strength of relationships between a firm and its internal and external stakeholders, play a crucial role. This aspect is generally referred to as RC (Mubarik *et al.*, 2022; Ahmed *et al.*, 2022; Troise *et al.*, 2022; Asiaei *et al.*, 2023) and reflects the firm's ability to create and maintain valuable connections with key actors such as customers, suppliers, business partners, and employees. Other researchers prefer the term social capital instead of RC (Ahmed *et al.*, 2020; Gu *et al.*, 2023), emphasizing the broader network-based nature of these relationships and their role in facilitating trust, knowledge exchange, and collaborative innovation. While HC and RC operate at the individual level, IC also encompasses embedded knowledge assets that reside within the organization itself. This aspect has been conceptualized in two distinct but related ways. SC refers to the systems, processes, databases, and intellectual property that support the efficient utilization of knowledge within the organization (Mubarik *et al.*, 2022; Troise *et al.*, 2022). Alternatively, scholars used the term organizational capital (OC) to highlight the firm's ability to structure and integrate its internal knowledge resources into a cohesive, strategic framework (Chen *et al.*, 2009; Liu and Jiang, 2020; Ahmed *et al.*, 2022).

2.1.2 ESG. ESG principles provide a robust framework for integrating sustainability into business operations (Koroleva *et al.*, 2020; Velte, 2020). Emerging from the 1960s CSR movement (Carroll, 1991), ESG extends the focus on ethical corporate behaviour to include measurable standards for assessing sustainability and governance practices. ESG scores are used as a proxy for CSR, as they encompass all the three dimensions of sustainability, emphasising environmental and social issues rather than focusing solely on economic factors (Franco *et al.*, 2020). ESG offers specific, actionable criteria that help organizations align with societal and environmental objectives while ensuring accountability to investors, regulators, and other stakeholders (Tyan *et al.*, 2024; Paolone and Bitbol-Saba, 2025). The increasing demand for sustainable business practices has elevated ESG as a cornerstone for socially responsible investment (SRI). By incorporating ESG dimensions, investors gain insights into a company's long-term stability and societal contributions (Chollet and Sandwidi, 2018; Rahman *et al.*, 2023). From an operational perspective, ESG encompasses three key dimensions: environmental activities (ENV; e.g. reduction of carbon emission, use of renewable energy use), initiatives towards society (SOC; e.g. positive working environment, product quality and security), and governance elements (GOV; e.g. anticorruption guidelines, healthy leadership by CEO).

The relationship between ESG performance and financial outcomes has been demonstrated especially looking at its potential to strengthen organizational resilience, reduce risk exposure, and build stakeholder trust (Friede *et al.*, 2015; Franco *et al.*, 2020; Velte, 2020; Khan, 2022; Collevocchio *et al.*, 2024). The variables influenced by ESG considered so far include for example return on assets, equity, or invested capital (Khan, 2022; Chen *et al.*, 2023). However, the evaluation metrics and ESG outcomes change from one study to another. For example, Chatterji *et al.* (2016) examined the validity of ESG ratings from various raters, highlighting discrepancies and low agreement among them. Further, Billio *et al.* (2021) analysed the mixed impact of ESG scores on financial performance, showing that the relationship between ESG and financial outcomes can vary significantly depending on the metrics used. In response to this mixed variables and results, regulatory frameworks are playing a growing role in standardizing ESG reporting, ensuring greater transparency and more homogeneity among metrics (e.g. EU CSRD, 2022), and reinforcing the integration of ESG principles into corporate strategy and decision-making.

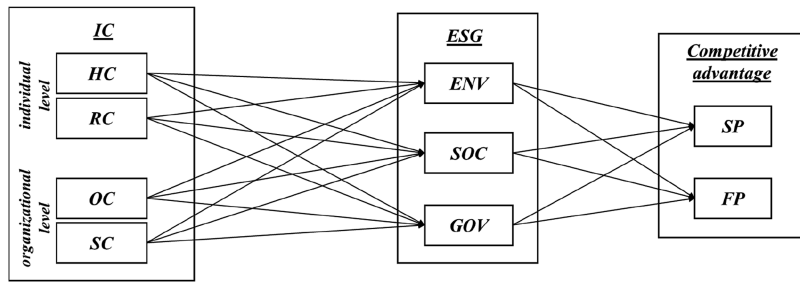
*2.1.3 Competitive advantage.* Achieving and sustaining competitive advantage remains a critical goal for organizations seeking superior performance. Competitive advantage arises when a firm outperforms its current or potential competitors by effectively leveraging resources and capabilities (Peteraf and Barney, 2003; McWilliams and Siegel, 2011). This perspective is related to RBV where IC plays a central role as a strategic resource that enables organizations to attain and maintain long-term competitive advantage. Reaching sustainable competitive advantage is consequence of adaptation and reconfiguration of resources to align with evolving market conditions (Teece *et al.*, 1997; Helfat and Peteraf, 2003) where organizational routines enable strategic transformation and innovation (Teece *et al.*, 1997; Schilke, 2014; Ahmed *et al.*, 2022). Further, the ever-evolving contexts in which organizations operate, have led scholars to start analysing the relation between competitive advantage and environmental dynamism (Schilke, 2014), or digital technologies and organizational agility (Bhatti *et al.*, 2021; Ahmed *et al.*, 2022; Troise *et al.*, 2022).

Studies oriented to measure and compare organizations' competitive advantage are usually developed around two main constructs (Schilke, 2014; Bhatti *et al.*, 2021), namely strategic performance (SP; a qualitative dimension measuring strategic advantages over competitors and large market share), and financial performance (FP; a quantitative dimension using indices such as sales growth and return on investment). Regarding SP, only a limited number of studies have explored the effects of ESG on this dimension, and the extent to which strategic orientation facilitates the integration of sustainability into business strategy is still not well understood, highlighting a gap as indicated by Khan (2022). With respect to FP, some scholars have started to identify the positive effects of ESG on FP (Friede *et al.*, 2015; Velte, 2020; Khan, 2022). While Friede *et al.* (2015) focused on the contrast between the common perception among investors and the ESG outperformance opportunities, Velte (2020) emphasized the critical role of strong executive leadership, particularly a powerful chief executive officer (CEO), in strengthening the relationship between ESG practices and financial success. More recently, Khan (2022) underscored the need for further exploration into the role of intangible assets in driving ESG performance, suggesting that knowledge-based resources and IC may serve as key enablers in enhancing sustainability-driven financial outcomes.

## *2.2 Conceptual framework and hypotheses development*

This study proposes a comprehensive framework to understand the effects of IC on ESG performance and, in turn, on organizations' competitive advantage (Abdallah *et al.*, 2024). Adopting a multilevel perspective (Dumay, 2016; Secundo *et al.*, 2016; Tonelli *et al.*, 2024), the research distinguishes between two levels of IC: individual and organizational. IC at the individual level refers to intangible assets held by individuals, such as employees' knowledge, skills, creativity, and relationships, and comprising HC and RC. IC at the organizational level, on the other hand, encompasses non-human resources embedded in systems, processes, databases, and intellectual property, and is represented by SC and OC. Considering both levels is essential because their interplay significantly influences an organization's ability to innovate, adapt, and address sustainability challenges. This approach reflects the dynamic nature of IC, emphasizing its role as a driver of sustainable value creation at both individual and organizational levels.

The study also implements a newly developed ESG measurement scale (Oh *et al.*, 2024) to provide a refined assessment of ESG performance. By integrating IC and ESG within a unified framework, the study explores how different IC dimensions contribute to sustainability efforts, proxied by ESG, and overall drive competitive advantage, measured through SP and FP. While previous research has widely acknowledged the positive effects of IC on competitive advantage (see among others Bontis *et al.*, 2000; Ahmed *et al.*, 2020), this study specifically examines how the two levels of IC functions as antecedents of ESG and, ultimately, the role of ESG in driving SP and FP. The proposed conceptual model (see Figure 1) aims to provide a



**Figure 1.** Conceptual model. Source: Authors' own work

structured approach to analyse the influence of IC dimensions on ESG dimensions and competitive advantage. The following subsections elaborate on the theoretical foundation supporting this perspective and present the hypotheses developed for empirical testing.

**2.2.1 IC at the individual level and ESG.** IC at the individual level consists of HC and RC. HC, which encompasses employees' knowledge, skills, problem-solving abilities, and innovative potential, is widely recognised as a fundamental driver of sustainable practices (Subramaniam and Youndt, 2005; Guthrie et al., 2018). Previous studies suggest that employees with strong HC significantly contribute to environmental initiatives by enabling organizations to adopt green technologies and eco-friendly business models (Asiaei et al., 2023), while also ensuring responsible governance through improved decision-making processes and ethical leadership, supported by well-developed networks of trust and cooperation (Pedrini, 2007; Tejedo-Romero and Araujo, 2022). RC, on the other hand, strengthens an organization's ability to collaborate with internal and external stakeholders (Ahmed et al., 2020; Gu et al., 2023), which is fundamental for firms striving to build ethical and inclusive working environment (Mansoor et al., 2021). Strong RC facilitate fruitful relationships with employees, customers, suppliers, and institutions, ensuring that firms are more responsive to social expectations and equity-oriented policies, including gender diversity and female entrepreneurship (Dal Mas and Paoloni, 2020). Moreover, RC has been identified as a key factor in developing transparent and trust-based networks among stakeholders tend to perform better in compliance, corporate ethics, and investor relations (Ahmed et al., 2022). Building on the above, this study posits that IC at the individual level (HC and RC) plays a central role in supporting organizations in achieving sustainability in the triple perspective of ESG, namely environment, society, and governance. Therefore, we propose the following hypotheses:

- H1. HC has a positive impact on ESG measured in terms of (a) ENV, (b) SOC, and (c) GOV.
- H2. RC has a positive impact on ESG measured in terms of (a) ENV, (b) SOC, and (c) GOV.

**2.2.2 IC at the organizational level and ESG.** At the organizational level, IC is primarily represented by OC and SC that include non-human and embedded resources such as processes, databases, and intellectual property. These intangible assets are critical for fostering innovation and aligning organizational strategies with ESG objectives (Edvinsson and Sullivan, 1996; Chen et al., 2009). They facilitate the integration of sustainability principles into operations by embedding sustainable practices within organizational systems and routines (Mubarik et al., 2022). SC, which represents organizational structures, patents, and internal databases, enable organizations to institutionalize environmental initiatives by promoting efficient resource utilization, waste reduction, and compliance with environmental regulation (Asiaei et al., 2023). Additionally, well-developed SC supports social efforts by fostering inclusive workplace practices and CSR initiatives (Manfredi Latilla et al., 2018). Similarly, OC, which includes a

firm's internal culture, decision-making framework, and organizational routines, plays a vital role in embedding sustainability-oriented principles into business strategies. Firms with strong OC are better equipped to ensure regulatory compliance and reinforce corporate governance practices through transparency, accountability, and robust decision-making processes (López-Gamero *et al.*, 2011). Considering these dynamics, we hypothesise that IC at the organizational level positively influence all the three ESG dimensions:

- H3. OC has a positive impact on ESG measured in terms of (a) ENV, (b) SOC, and (c) GOV.
- H4. SC has a positive impact on ESG measured in terms of (a) ENV, (b) SOC, and (c) GOV.

*2.2.3 ESG and competitive advantage.* Extensive literature has recognised ESG dimensions as key drivers of competitive advantage, emphasising their role in improving firms' SP and FP (Friede *et al.*, 2015; Billio *et al.*, 2021; Chen *et al.*, 2023). ESG principles provide a structured framework for aligning organizational strategies with sustainability goals, offering a pathway for businesses to create sustainable value (Tyan *et al.*, 2024; Paolone and Bitbol-Saba, 2025). ENV has been widely linked to competitive advantage through cost reduction, increased resource efficiency, and enhanced brand reputation (Chollet and Sandwidi, 2018; Oh *et al.*, 2024). Firms that adopt eco-friendly innovations, carbon reduction initiatives, and circular economy principles benefit from improved operational efficiency and greater appeal to sustainability-conscious investors and consumers with a growth in sales and market share (Teece *et al.*, 1997; Ahmed *et al.*, 2022). SOC enhances a firm's strategic positioning by fostering stronger relationships with stakeholders, improving customer loyalty and retention, and enhancing employee engagement (Khan, 2022). Finally, GOV is critical for ensuring ethical leadership, transparency, and investor confidence, all of which contribute to long-term resilience and financial stability (Velte, 2020; Koroleva *et al.*, 2020). Organizations with strong governance frameworks are better positioned to mitigate risk, attract responsible investors, and achieve sustainable competitive advantage (Billio *et al.*, 2021). However, the positive effects of ESG on FP have predominantly been analysed in the contexts of large corporations (Velte, 2020; Khan, 2022; Chen *et al.*, 2023), overlooking SMEs. Additionally, ESG's impact has often been examined holistically rather than through the disaggregated effects of its individual components (Friede *et al.*, 2015; Velte, 2020; Khan, 2022; Xu *et al.*, 2023). For all these reasons, our study moves beyond aggregate ESG scores by examining how each specific ESG dimension uniquely contributes to competitive advantage, distinguishing between SP and FP as distinct but interconnected outcomes. This approach builds on Rahman *et al.* (2023), who highlighted the moderating role of sustainability strategies in enhancing ESG's influence on FP, by proposing that each ESG dimension plays a critical role in enabling companies to achieve competitive advantage, both in term of SP and FP. Accordingly, we present the following hypothesis:

- H5. ENV has a positive impact on company competitive advantage in term of (a) SP and (b) FP.
- H6. SOC has a positive impact on company competitive advantage in term of (a) SP and (b) FP.
- H7. GOV has a positive impact on company competitive advantage in term of (a) SP and (b) FP.

### 3. Methodology

#### 3.1 Data collection and sample

SMEs represent a relevant source of employment and gross domestic product worldwide, and are estimated to be around 358 million in 2023 (Statista, 2024). SMEs represent the backbone

of the EU-27 economy, accounting for more than 99% of businesses within the EU (Katsinis *et al.*, 2024). Among the European countries, Italy has the highest number of SMEs, with approximately 3.9 million businesses (European Commission, 2024), making it a particular context for investigating our research question. Given their economic significance, the EU CSRD (2022) has mandated sustainability reporting for large firms, while a proposal has been introduced to grant SMEs additional time to comply with these requirements. This transition period provides a valuable opportunity for SMEs to understand how to develop and leverage their IC to enhance ESG performance and achieve long-term competitiveness. Therefore, this research focuses on SMEs, specifically analysing firms operating within the Italian business landscape.

In line with previous studies (see among others El-Kassar and Singh, 2019; Bhatti *et al.*, 2021; Elnadi *et al.*, 2024) and given the novelty of the topic (with the related lack or limited availability of specific data or existing databases) a convenience sampling procedure was followed. As initial step, and before the launch of the survey, we performed a pilot test with 9 SMEs, in contact with the authors, to check the clarity of the questionnaire and solve initial issues related to the readability and comprehensibility. Then, we approached the potential respondents, thanks to the contacts of the authors, i.e. the CEOs of these companies, by email and, specifically, we shared with them the survey link. In some cases, this was also done using specific social media, particularly LinkedIn. The questionnaire included a cover letter to ensure the anonymity of the survey as well as the academic research purposes of the survey. We have distributed 450 questionnaires and 166 were returned complete (2 were incomplete and, hence, deleted). Table 1 reports the characteristics of the final sample. The entire survey period of the questionnaire lasted 2 months; specifically, the questionnaires were distributed from October 2024 to December 2024.

### 3.2 Measures

To ensure content validity, this study adopted validated scales from the literature. Participants were first asked to offer details about their company and then to indicate their level of agreement based on the items of the constructs. All the survey items were assessed through a five-point Likert scale, i.e. from “strongly disagree” (equal to 1) to “strongly agree” (equal to 5).

The dimensions of IC were assessed with items from existing literature. To measure HC, RC and OC, the study adopted the scales adopted in previous research (see among others Chen

**Table 1.** Sample characteristics

Characteristics	%
<i>Firm age</i>	
0–6 years	41
≥7 years	59
<i>No. employees</i>	
50–100	68
101–249	32
<i>Location</i>	
North	53
Center-South and Islands	47
<i>Sector</i>	
Services	60
Industry, crafts and manufacturing	37
Others	3
<b>Source(s):</b> Authors' own work	

*et al.*, 2009; Liu and Jiang, 2020; Ahmed *et al.*, 2022); similarly, the study leveraged the scale developed by Mubarik *et al.* (2022) to measure SC. Sample items include: “Employees hold suitable work experience for accomplishing their job successfully” and “Employees are well-skilled professionally to accomplish their job successfully” for HC; “Employees have a close interaction with their partners” and “Employees have personal friendships with the partners” for RC; “Employees can effectively share their knowledge with each other”, “Employees effectively utilize their information system” and “Employees can conveniently access enterprise information” for OC; “Our company uses intellectual property rights (patents/registered software, and copyrights) as a way to store knowledge” and “Our company embeds much of its knowledge and information in structures, systems and processes” for SC. The variable is built as the average of Likert scaled answers to each of the items. The measures used in this study for ESG, namely ENV, SOC and GOV, were taken from the recently validated scale proposed by Oh *et al.* (2024), namely the perceived-ESG (P-ESG). In this vein, and to analyse ESG dimensions, we relied on this new scale, which is designed as a tool for assessing and tracking the ESG initiatives developed by organizations. While its name suggests a focus on external perceptions, the scale identifies key dimensions (or factors) that influence organizations’ sustainable performance. Furthermore, the individual items selected and validated were derived from three leading sources of global ESG evaluation, reinforcing the scale’s effectiveness in capturing the manifestations of organizations’ sustainability efforts. Thus, it serves as a valuable parameter for identifying both the practices and policies implemented by the companies, as well as the related disclosures made to external stakeholders, along with their perceptions of these efforts and the companies’ commitment to sustainability. As noted by the authors, the validated scale they proposed is highly applicable to studies beyond the domains of public relations and external audiences (Oh *et al.*, 2024). Among the items included are for example: “The company uses environmentally friendly materials and a sustainable supply chain” and “The company establishes policies to prevent the depletion of natural resources.” for ESG; “The company is well-equipped with consumer remedy systems” and “The company has a healthy corporate culture and positive employee relationships for SOC; “The employees comply with workplace ethics and anticorruption guidelines.” and “The company has a transparent system of internal audits.” for GOV. The variable is built as the average of Likert scaled answers to each of the items. Finally, the constructs of competitive advantage, namely SP and FP, were retrieved from extant research (Schilke, 2014; Wamba *et al.*, 2017). Examples of items are “We have gained strategic advantages over our competitors” and “Our ROI (return on investment) is continuously above industry average”, respectively. The variable is built as the average of Likert scaled answers to each of the items.

### 3.3 Data analysis methods

The proposed model has been assessed using the structural equation modelling with the partial least squares approach (PLS-SEM). SMART PLS V.3.2.8 has been used to apply the analysis. This approach has been used as the aim of this study is to elucidate the key target construct, competitive advantage, which is a prediction-oriented approach that aligns with the objective with the PLS-SEM (Henseler *et al.*, 2009; Becker *et al.*, 2012). The assessment has been done in two stages as recommended by Hair *et al.* (2019): (1) the assessment of the measurement model to ensure the reliability and validity of the constructs and (2) the assessment of the structural model to assess the proposed hypotheses.

## 4. Results

### 4.1 Common method bias and non-response bias

The common method bias (CMB) could affect the subsequent analysis of the results by making the indicators have some common variance. Therefore, the CMB has been tackled using two criteria. First, the collinearity test recommended by Kock and Lynn (2012) has been calculated

for all the measurements. If the variance inflation factors (VIF) for all the indicators are below the critical threshold of 5, we can conclude that the data has no multicollinearity. As shown in the last column of Table 2, all the VIF values range from 1.00 to 3.61. Second, Harman’s single factor test developed by Podsakoff *et al.* (2003), where the principal axis factoring is used to extract the first factor, has been conducted. The first factor accounted for 30.2% of the overall variance, which is below the recommended threshold (50%). Accordingly, we concluded that CMB does not affect the analysis conducted. Regarding the non-response bias, we followed the recommendations of Armstrong and Overton (1977) by dividing the sample into two groups: early adopters (90 respondents) and late adopters (76). We conducted a paired *t*-test on all latent variables to identify any significant differences between the two groups. The results indicated that all *p*-values were greater than the 0.05 significance level (see Appendix 1). Therefore, we have not found evidence of non-response bias in our study.

4.2 Measurement model assessment

In the first stage, as reported in Table 2, we assessed the outer model by computing the indicator reliability, construct reliability, convergent and discriminant validity (Hair *et al.*, 2019). The initial assessment has been done by including all the items (56). The items that have loading below 0.7 have been deleted, leading to the inclusion of 30 items in the final model. For

Table 2. Validity and reliability evidence

Construct	Items	Loading	CR <sup>a</sup>	Alpha	AVE	Outer VIF				
HC	HC1	0.891	0.865	0.701	0.762	1.383				
	HC3	0.855				1.275				
RC	RC1	0.703	0.836	0.702	0.631	1.000				
	RC3	0.876				1.025				
OC	OC1	0.758	0.864	0.765	0.680	1.340				
	OC4	0.866				1.799				
	OC7	0.846				1.954				
SC	SC1	0.789	0.831	0.719	0.623	1.554				
	SC3	0.692				1.416				
	SC5	0.877				1.337				
ENV	ENV1	0.725	0.916	0.885	0.688	1.650				
	ENV3	0.889				3.283				
	ENV5	0.775				1.816				
	ENV7	0.852				2.526				
	ENV9	0.892				3.390				
SOC	SOC2	0.698	0.877	0.824	0.589	1.446				
	SOC3	0.778				1.727				
	SOC4	0.833				2.490				
	SOC6	0.785				2.097				
	SOC7	0.735				1.994				
	GOV	GOV1				0.802	0.884	0.825	0.658	1.894
	GOV4	0.855				3.474				
GOV6	0.876	3.611								
GOV7	0.701	1.631								
SP	SP1	0.775	0.842	0.722	0.640	1.497				
	SP2	0.796				1.334				
	SP3	0.828				1.787				
FP	FP1	0.867	0.884	0.804	0.717	1.724				
	FP3	0.820				1.723				
	FP4	0.853				1.758				

Note(s): <sup>a</sup>Values were computed after deleting indicators with low loadings

Source(s): Authors’ own work

assessing the reliability of the constructs, we assessed composite reliability and Cronbach's alpha, and both of them are greater than the 0.7 threshold recommended by Hair *et al.* (2019). Based on these results, it can be concluded that the measurement model has a high degree of internal consistency, indicating that the set of items that pertains to each construct coherently represents the construct at hand. Convergent validity has been assessed using the average variance extracted (AVE) which is greater than the 0.5 threshold (Hair *et al.*, 2019) for all constructs. Accordingly, this result indicates that a substantial proportion of the variance captured by the construct is attributed to the underlying factor. Finally, discriminant validity was verified using two criteria. The first criterion is proposed by Fornell and Larcker (1981). According to this criterion, the square root value of the AVE for all the latent variables should exceed its correlation with any other latent variables. As shown in Table 3, the diagonal bold numbers represent these values, and all of them are greater than the other values. The second criterion is the cross-loading criterion (Hair *et al.*, 2019), indicating that the outer loading of the indicators that pertains to a specific latent variable should be greater than its cross loadings on the other latent variables. As shown in Appendix 2, all the indicators have loadings (highlighted loadings in italic) that exceed the cross loadings on the other constructs. Based on these two criteria, it can be concluded that the discriminant validity is confirmed. Based on the measurement model analysis and the overall analysis above, we conclude that the model was adequate for structural evaluation.

### 4.3 Structural model

**4.3.1 Assessment of model fitness.** The fitness of the structural model has been evaluated by using four different criteria. First, the coefficient of determination ( $R^2$ ) has been calculated. As reported in Table 4, our model has appropriate predictive relevance as the values of  $R^2$  for dependent variables range from 0.484 to 0.677. This result is supported by the second criterion  $Q^2$  values, which are greater than the recommended threshold of 0 for all the dependent variables. Based on the above results, the model has satisfactory predictive relevance for all the dependent variables. The third criterion is related to assessing the multicollinearity between the latent variables. According to Hair *et al.* (2019), all the inner VIF values should be below 3.3 threshold. Referring to Table 4, all the inner VIF values range from 1.428 to 3.143, indicating that the multicollinearity does not affect the structural model results. Finally, the fitness of the structural model is evaluated by the standard mean square residual (SRMR). The model is considered to have good fitness if the value of SRMR is less than 0.08 (Henseler *et al.*, 2009). Our model has a value of 0.065, thus indicating that the model has satisfactory level of fitness.

**Table 3.** Discriminant validity of constructs

	1	2	3	4	5	6	7	8	9
1. HC	<i>0.873</i>								
2. RC	0.491	<i>0.794</i>							
3. OC	0.409	0.429	<i>0.825</i>						
4. SC	0.546	0.478	0.777	<i>0.789</i>					
5. ENV	0.391	0.539	0.699	0.657	<i>0.829</i>				
6. SOC	0.514	0.590	0.417	0.729	0.693	<i>0.767</i>			
7. GOV	0.354	0.445	0.504	0.643	0.748	0.764	<i>0.811</i>		
8. SP	0.478	0.493	0.500	0.477	0.573	0.617	0.672	<i>0.800</i>	
9. FP	0.213	0.285	0.337	0.370	0.611	0.532	0.809	0.635	<i>0.847</i>

**Note(s):** Italic numbers represent the square root of AVEs.

**Source(s):** Authors' own work

**Table 4.** Assessment of model fit

Criteria	R <sup>2</sup>	Q <sup>2</sup>	Inner VIF			SP	FP
			ENV	SOC	GOV		
HC			1.428	1.428	1.428		
RC			1.890	1.890	1.890		
OC			2.874	2.874	2.874		
SC			3.143	3.143	3.143		
ENV	0.525	0.336				2.483	2.483
SOC	0.647	0.348				2.622	2.622
GOV	0.451	0.280				3.062	3.062
SP	0.484	0.282					
FP	0.677	0.452					

**Source(s):** Authors' own work

To assess the proposed hypotheses, we used the bootstrapping (5,000) to calculate path coefficients, t-values and p-values. As shown in Table 5, 12 of 18 hypotheses have been accepted. Regarding the HC effects, the results showed that HC has a significant positive effect on SOC ( $\beta = 0.149, t = 2.646, p\text{-value} = 0.004$ ), supporting H1b. However, HC has no significant effect on ENV ( $\beta = 0.054, t = 0.972, p\text{-value} = 0.166$ ) and GOV ( $\beta = -0.004, t = 0.052, p\text{-value} = 0.479$ ). Therefore, H1a and H1c have been rejected. RC has a significant positive effect on both SOC ( $\beta = 0.267, t = 3.819, p\text{-value} = 0.000$ ) and GOV ( $\beta = 0.267, t = 3.319, p\text{-value} = 0.000$ ), while there is no significant effect on ENV ( $\beta = 0.050, t = 0.650, p\text{-value} = 0.258$ ). Therefore, H2b and H2c have been accepted but H2a has been rejected. The results also showed that OC significantly impacts ENV ( $\beta = 0.452, t = 4.255, p\text{-value} = 0.000$ ) and SOC ( $\beta = -0.476, t = 5.755, p\text{-value} = 0.000$ ), respectively supporting H3a and finding an opposite effect with respect to H3b, but it does not significantly affect GOV

**Table 5.** Effect on endogenous constructs

Hypothesis and relation	Direct effect	t-value (bootstrap)	p-value	Support	
H1a	HC → ENV	0.054	0.972	0.166	No
H1b	HC → SOC	0.149	2.646	0.004	Yes
H1c	HC → GOV	-0.004	0.052	0.479	No
H2a	RC → ENV	0.050	0.650	0.258	No
H2b	RC → SOC	0.267	3.819	0.000	Yes
H2c	RC → GOV	0.276	3.319	0.000	Yes
H3a	OC → ENV	0.452	4.255	0.000	Yes
H3b	OC → SOC	-0.476	5.755	0.000	No <sup>a</sup>
H3c	OC → GOV	-0.107	0.947	0.172	No
H4a	SC → ENV	0.246	3.399	0.000	Yes
H4b	SC → SOC	0.854	15.422	0.000	Yes
H4c	SC → GOV	0.552	7.145	0.000	Yes
H5a	ENV → SP	0.093	0.961	0.168	No
H5b	ENV → FP	0.084	1.149	0.125	No
H6a	SOC → SP	0.229	2.287	0.011	Yes
H6b	SOC → FP	-0.233	2.758	0.003	No <sup>a</sup>
H7a	GOV → SP	0.429	4.499	0.000	Yes
H7b	GOV → FP	0.926	11.761	0.000	Yes

**Note(s):** <sup>a</sup>Opposite effect found  
**Source(s):** Authors' own work

( $\beta = -0.107, t = 0.947, p\text{-value} = 0.172$ ), leading to a rejection of H3c. SC significantly affect ENV ( $\beta = 0.246, t = 3.399, p\text{-value} = 0.000$ ), SOC ( $\beta = 0.854, t = 15.422, p\text{-value} = 0.000$ ), and GOV ( $\beta = 0.552, t = 7.145, p\text{-value} = 0.000$ ). Therefore, H4a, H4b, and H4c have been accepted, regarding the effects of ENV, SOC, and GOV on competitive advantages. The results showed that ENV has no significant effect on SP ( $\beta = 0.093, t = 0.961, p\text{-value} = 0.168$ ) and FP ( $\beta = 0.084, t = 1.149, p\text{-value} = 0.168$ ), leading to rejecting H5a and H5b. On the other side, both SOC and GOV significantly affect SP ( $\beta = 0.229, t = 2.287, p\text{-value} = 0.011$ ;  $\beta = 0.429, t = 4.499, p\text{-value} = 0.000$ ) and FP ( $\beta = -0.233, t = 2.758, p\text{-value} = 0.003$ ;  $\beta = 0.926, t = 11.761, p\text{-value} = 0.000$ ), leading to accepting H6a, H7a, H7b and finding an opposite effect with respect to H6b.

## 5. Discussion and conclusion

The results of this study offer valuable insights into the influence of IC – at both individual and organizational levels – on ESG dimensions, and ultimately on competitive advantage, offering both confirmation of existing theories and new perspectives.

Starting with the individual level of IC, HC demonstrates a significant positive impact on SOC, reinforcing the view that employees' knowledge, training, and engagement are key drivers of workplace equity and stakeholder trust. However, HC does not show significant effects on ENV or GOV. This suggests that while HC enhances internal cohesion, its role in broader governance and environmental contexts may depend on complementary organizational systems. These results align with Subramaniam and Youndt (2005), who emphasized HC's conditional impact on organizational outcomes. Looking at RC, it significantly influences SOC and GOV, confirming its importance in fostering stakeholder relationships and ethical governance practices. Interestingly, RC's lack of significant influence on ENV and suggesting that stakeholder trust and mutual respect may be more crucial for social and governance goals than for environmental initiatives. These findings corroborate Ahmed *et al.* (2022), who highlighted the pivotal role of RC in governance and social contexts. The results on the organizational level of IC highlight that OC plays a strong and significant role in driving ENV, but shows a negative association with SOC (with an opposite sign with respect to our hypothesis H3b) and no significant effect on GOV. This indicates that while OC is effective for embedding environmental practices, its rigid structures may inadvertently hinder social adaptability. A possible explanation for this negative effect on SOC (H3b) is that highly formalised organisational structures, though beneficial for operational efficiency and compliance, may limit flexibility in responding to social dynamics. Rigid hierarchies and bureaucratic procedures could reduce employees' engagement, inhibit inclusivity, or slow down responsiveness to stakeholder concerns, thereby weakening the firm's ability to foster a socially sustainable environment. On the other side, SC exhibits significant positive effects across all ESG dimensions, confirming the three hypothesized relationships. These results reinforce SC central role in operationalizing sustainability practices across environmental, social, and governance domains, supporting recent findings by Asiaei *et al.* (2023) on SC as critical for embedding sustainability into organizational frameworks.

Regarding the competitive advantage, GOV emerges as the strongest determinant of both SP and FP. This highlights the critical role of transparency, ethical leadership, and robust governance systems, and corroborating previous findings in the literature (e.g. Velte, 2020). SOC positively influences SP but exhibits a negative effect on FP, contradicting our initial hypothesis (H6b). This negative relationship may be attributed to the study's focus on SMEs, as most prior research examining the link between SOC and FP has centred the attention on large corporations (e.g. Chen *et al.*, 2023). While social sustainability initiatives contribute to enhanced market positioning and strategic advantages, they may entail high initial costs, which can strain short-term FP. This challenge is particularly relevant for SMEs, typical cases of companies characterized by resource constraints, where sustainability efforts, such as fostering a healthy corporate culture or implementing education and support programs for

employees, require significant upfront investments that may take longer to yield financial returns. Beyond financial costs, cultural and organizational shifts induced by social initiatives may also contribute to the short-term financial downturn. Adapting to new sustainability standards often requires changes in internal processes, training programs, and employee engagement strategies, which may temporarily disrupt productivity and efficiency. Additionally, market resistance could play a role, particularly if customers or stakeholders are slow to recognize or reward a firm's social efforts. These dynamics highlight the complex trade-off SMEs face when integrating SOC initiatives into their business models. Another way to better understand this negative relationship between SOC and FP is by considering the varying impact of RC – closely related to SOC – on FP across different organizational life cycle stages. For instance, [Xu et al. \(2023\)](#) found that RC is often non-significant for small firms, particularly during their early or initial stages. In our study, the sample (see [Table 1](#)) includes SMEs in both birth and development or growth stages (for example, several companies with more than 6 years are ex-startups that were transformed in SMEs, given their development, after the initial and incubation period as a new venture). Future research is needed to delve deeper into the interplay between RC, SOC, and FP, offering more nuanced insights into the reasons behind this negative association. Finally, ENV does not exhibit significant effects on either SP or FP. This finding suggests that the impact of environmental initiatives may require longer time horizons to generate measurable competitive benefits. Unlike GOV and SOC initiatives, which can yield more immediate strategic or reputational advantages, the benefits of ENV often emerge gradually through efficiency gains, regulatory compliance, and evolving stakeholder expectations. One possible explanation for this lack of significance is that many SMEs implement environmental practices primarily in response to compliance pressures rather than as a proactive strategic initiative. In such cases, firms may not immediately experience substantial improvements in FP or SP, as these efforts are often perceived as cost-driven obligations rather than sources of differentiation or competitive advantage. Additionally, given the resource constraints that typically characterise SMEs, investment in ENV initiatives (e.g. adopting cleaner technologies, optimizing energy consumption, or improving waste management) may be deprioritised in favour of initiatives with more immediate operational and financial returns. Another factor to consider is the sectoral composition of the sample, in which approximately two-thirds of SMEs operate in service industries. In sectors where environmental impact is less directly tied to FP – such as service-oriented businesses – the link between ENV and FP or SP may be weaker. Conversely, in industries where sustainability is a key competitive driver, such as manufacturing or energy-intensive industries, ENV may play a more pronounced role. Therefore, the lack of significant results may, at least in part, be influenced by the business contexts represented in the sample.

Overall, this study advances the IC and sustainability literature ([Marr and Chatzkel, 2004](#); [López-Gamero et al., 2011](#); [Iazzolino and Laise, 2016](#); [Secundo et al., 2020](#); [Alvino et al., 2021](#); [Mansoor et al., 2021](#); [Asiaei et al., 2023](#); [Martínez-Falcó et al., 2024](#)) by presenting a multilevel framework that integrates individual (HC, RC) and organizational (OC, SC) levels of IC with ESG dimensions. This approach enables a more comprehensive understanding of how knowledge-based assets interact with sustainability strategies, moving beyond traditional one-dimensional analyses of IC's role in business performance. By disaggregating ESG into ENV, SOC, and GOV, this study offers a nuanced understanding of IC's differentiated contributions to ESG and competitive advantage. Our findings confirm GOV as the strongest determinant of SP and FP, reinforcing literature on the role of ethical leadership, transparency, and regulatory compliance in shaping competitive advantage ([Velte, 2020](#); [Koroleva et al., 2020](#)). Moreover, we highlight the context-dependent effects of ENV and SOC on performance, particularly in SMEs. SOC's negative impact on FP challenges the assumption that social initiatives inherently drive financial gains, underscoring the short-term financial constraints SMEs face when implementing socially responsible practices. This contributes to ongoing debates on the financial materiality of sustainability ([Chen et al., 2023](#); [Xu et al., 2023](#); [Paolone and Bitbol-Saba, 2025](#)). Finally, our findings reveal that OC, while

enhancing ENV, negatively affects SOC, suggesting that rigid organizational structures can impede social adaptability and employee engagement. This expands existing literature on IC and sustainability (Asiaei *et al.*, 2023; Abdallah *et al.*, 2024; Tonelli *et al.*, 2024), emphasizing the need for firms to balance formal governance mechanisms with flexible, employee-centric policies to achieve holistic sustainability.

From a broader theoretical standpoint, this study contributes to the RBV by demonstrating that IC serves as a critical enabler of ESG integration and, overall, competitive advantage. Our findings reinforce the idea that firms leveraging their knowledge resources effectively can enhance sustainability performance while securing strategic differentiation and financial stability. Moreover, by distinguishing between individual and organizational level of IC contributions, this research extends the multilevel perspective in IC studies (Dumay, 2016; Tonelli *et al.*, 2024), offering a structured framework for future investigations into the interconnected roles of HC, RC, OC, and SC in driving ESG outcomes. Finally, this study empirically validates the newly developed ESG measurement scale proposed by Oh *et al.* (2024), assessing its effectiveness within a comprehensive analytical framework. By integrating this scale, we provide a structured approach to examine how different IC dimensions contribute to sustainability efforts, proxied by ESG, and ultimately drive competitive advantage, measured through SP and FP.

Looking at more practical implications, these results underscore the importance of tailoring IC strategies to align with specific ESG goals. Investments in SC and OC should prioritize embedding ENV and GOV practices into organizational systems. This can be achieved through the implementation of formalized sustainability policies, digital tools for ESG tracking and reporting, and the integration of sustainability goals into performance management frameworks. For instance, firms can develop standardized processes for energy efficiency, waste reduction, and responsible sourcing, ensuring that environmental considerations are systematically embedded into operational workflows. Similarly, governance-related structural enhancements (e.g. internal audit mechanisms, transparent reporting structures, and robust compliance programs) can reinforce ethical leadership and regulatory adherence. However, caution is needed to address potential negative impacts of OC through excessive structural rigidity on SOC. So, to optimise OC in a way that strengthens GOV and ENV without sacrificing SOC, organizations can adopt policies that integrate ethical leadership with employee-centred management. For example, firms can promote work-life balance policies, diversity and inclusion initiatives, and employee well-being programmes while simultaneously maintaining strong governance frameworks. Additionally, implementing transparent decision-making processes and fostering a culture of accountability can ensure that governance improvements do not come at the expense of employee engagement and social cohesion. RC should be leveraged to strengthen stakeholder relationships and enhance governance outcomes. This can be achieved through active engagement with external stakeholders, including investors, customers, suppliers, and regulatory bodies, to co-develop sustainability strategies. Firms should consider establishing advisory boards or partnerships with sustainability experts to ensure their ESG initiatives align with industry best practices and societal expectations. HC development should focus on training programmes that promote social cohesion, ESG literacy, and ethical leadership. Firms can invest in sustainability education for employees, equipping them with the knowledge and skills to integrate ESG considerations into their daily responsibilities. Additionally, leadership training programmes that emphasise ethical decision-making and responsible corporate citizenship can contribute to culture of sustainability. Firms seeking financial gains should prioritize GOV, as strong governance practices are directly linked to FP through risk mitigation, regulatory compliance, and investor confidence. Conversely organizations aiming for strategic positioning and long-term competitive advantage should emphasize SOC initiatives, which contribute to stakeholder trust, customer loyalty, and brand reputation. Ultimately, aligning IC strategies with ESG objectives requires a holistic approach that balances efficiency, compliance, and social impact in order to drive to competitive advantage (SP and FP).

This study has several limitations. The use of cross-sectional data limits causal interpretations, and future research should explore longitudinal designs to capture dynamic relationships between IC, ESG, and competitive advantage (SP and FP). Additionally, sector-specific analyses could reveal industry-specific variations in the IC-ESG relationship. Furthermore, cultural and regional differences in ESG practices warrant further investigation to enhance the generalizability of these findings. By integrating intellectual capital and ESG dimensions within a comprehensive framework, this study provides a foundation for future research and actionable insights for organizations seeking to align sustainability practices with competitive advantage. Moreover, as we have used ESG dimensions, which represent a widely applied metric in the study of sustainable development (Tyan *et al.*, 2024; Paolone and Bitbol-Saba, 2025), future research could consider adopting alternative proxies. Similarly, the decision to use the recently validate P-ESG scale (Oh *et al.*, 2024) could be readdressed, and other scales may be selected for future studies. Finally, future research could expand the geographical context considered in this study, as well as the type of firm, given that SMEs are characterized by specific characteristics and modes of operation.

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## Appendix 1

Table A1. Non-response bias

Paired sample test	Mean	St. deviation	<i>t</i>	df	Sig
HC	0.027	1.63478	0.145	74	0.885
RC	-0.130	1.289	-0.870	74	0.387
OC	-0.079	1.338	-0.510	74	0.612
SC	-0.067	1.347	-0.431	74	0.668
ENV	-0.053	1.578	-0.288	74	0.774
SOC	-0.043	1.537	-0.242	74	0.809
GOV	-0.070	1.571	-0.384	74	0.702
SP	0.029	1.542	0.162	74	0.871
FP	-0.028-	1.314	-0.187	74	0.852

## Appendix 2

Table A2. Cross loadings

	ENV	FP	GOV	HC	OC	RC	SC	SOC	SP
ENV1	0.72	0.39	0.52	0.35	0.48	0.38	0.42	0.48	0.33
ENV3	0.89	0.57	0.71	0.43	0.66	0.60	0.66	0.70	0.56
ENV5	0.77	0.35	0.49	0.20	0.66	0.50	0.43	0.35	0.47
ENV7	0.85	0.58	0.66	0.35	0.49	0.30	0.57	0.66	0.50
ENV9	0.90	0.62	0.69	0.29	0.60	0.39	0.62	0.65	0.49
FP1	0.57	0.87	0.79	0.21	0.25	0.35	0.34	0.59	0.69
FP3	0.53	0.82	0.56	0.11	0.26	0.25	0.16	0.34	0.58
FP4	0.46	0.85	0.68	0.20	0.35	0.20	0.41	0.39	0.34
GOV1	0.45	0.65	0.81	0.38	0.22	0.50	0.37	0.65	0.64
GOV4	0.67	0.74	0.85	0.19	0.44	0.38	0.58	0.59	0.58
GOV6	0.70	0.73	0.87	0.19	0.52	0.43	0.56	0.59	0.55
GOV7	0.60	0.48	0.70	0.44	0.44	0.52	0.58	0.67	0.40
HC1	0.32	0.22	0.32	0.89	0.32	0.34	0.49	0.52	0.44
HC3	0.37	0.15	0.30	0.85	0.40	0.30	0.47	0.37	0.40
OC1	0.65	0.16	0.30	0.23	0.76	0.31	0.48	0.27	0.24
OC4	0.62	0.43	0.57	0.36	0.87	0.74	0.71	0.41	0.63
OC7	0.44	0.20	0.33	0.43	0.85	0.53	0.73	0.36	0.30
RC1	0.38	0.38	0.44	-0.06	0.37	0.73	0.25	0.37	0.43
RC3	0.36	0.06	0.35	0.60	0.58	0.69	0.66	0.41	0.42
SC1	0.34	0.08	0.39	0.52	0.61	0.60	0.79	0.57	0.41
SC3	0.31	0.23	0.34	0.21	0.53	0.54	0.69	0.34	0.29
SC5	0.75	0.47	0.68	0.50	0.69	0.44	0.87	0.72	0.42
SOC2	0.42	0.39	0.53	0.45	0.40	0.62	0.61	0.72	0.45
SOC3	0.80	0.54	0.69	0.50	0.55	0.45	0.67	0.77	0.58
SOC4	0.43	0.32	0.56	0.35	0.26	0.39	0.52	0.83	0.43
SOC6	0.55	0.29	0.50	0.35	0.29	0.51	0.54	0.79	0.59
SOC7	0.39	0.48	0.63	0.30	0.03	0.04	0.41	0.72	0.26
SP1	0.29	0.52	0.57	0.46	0.43	0.51	0.48	0.50	0.78
SP2	0.68	0.58	0.61	0.24	0.44	0.57	0.36	0.51	0.79
SP3	0.34	0.39	0.40	0.49	0.29	0.31	0.27	0.47	0.83

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