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Financing Businesses for Sustainable Growth: Economic, Social, and Environmental Drivers With A Gender Approach

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ABSTRACT

This study examines the relationship between Environmental, Social, and Governance (ESG) practices and financial performance, incorporating a gender perspective. While ESG frameworks enhance investment attractiveness, the role of female leadership remains underexplored. Using a sample of EuroStoxx 300, the data was analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM). The study assessed financial capital, investment attractiveness, and sustainability performance with gender representation as a moderating variable. The results confirm a positive relationship between financial capital and economic/social efficiency, while environmental efficiency presents mixed effects. Female board representation strengthens the link between investment attractiveness and financial capital. These findings contribute to the literature by integrating gender as a strategic factor in ESG-financing research and highlight the practical implication that companies should promote gender-diverse leadership to maximize the financial and strategic benefits of sustainable practices.

1 | Introduction

Environmental, Social, Governance (ESG) factors beyond setting priorities for international policymakers, they have become a key element in business strategy and decision-making (Cardillo and Harasheh 2023; Deng et al. 2013; Hoyos Guevara & de Hoyos Guevara and Dib 2022). Companies take up the challenge as part of their commitment to the environment (Hoyos Guevara & de Hoyos Guevara and Dib 2022) but also as a challenge to adapt and connect with its stakeholders (Freeman and Dmytriiev 2017; Ma 2023). Implementing ESG practices can also have a positive impact on business sustainability and performance (Feng 2021; Saulick et al. 2023) and even intangibles linked to reputation and brand value (Deng et al. 2013).

Although in recent years there has been a proliferation of research focusing on how ESG practices contribute to a better long-term outcome stand out, a gendered approach is practically non-existent. The issue is addressed indirectly by linking the presence of women as business leaders on the Board and the influence on the development of corporate social responsibility in the company (Baatwah and Wahab 2023; Bruna et al. 2014; del Mar Alonso-Almeida et al. 2015; Setyowati et al. 2023). Another interesting example is that it underlines the concern of CEOs and startup promoters with social and environmental issues as a key element in the activity and strategy.

This is especially relevant in the context of the United Nations' Sustainable Development Goals (SDGs), particularly Goal 5

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(Gender Equality), Goal 8 (Decent Work and Economic Growth), and Goal 13 (Climate Action), which call for integrated approaches to leadership, innovation, and sustainability. However, despite the interconnections between ESG, gender, and inclusive growth, empirical research that connects these dimensions remains scarce.

Considering the relevance of the issue, as well as the existing gap, this research aims to compare the attractiveness of financing/investment as well as financial performance in relation to ESG (Environmental, Social, and Governance) practices by introducing a gender perspective. Consequently, the moderating effect on the relationship between financial performance and investment attractiveness of female-led companies versus male-led companies is considered.

The originality of this study lies in exploring how gender diversity at the top executive level may alter the way companies implement ESG strategies and how this, in turn, influences their access to capital. This focus contributes to an emerging strand of literature at the intersection of gender studies, corporate governance, and sustainable finance.

A sample of companies listed in the Eikon database and included in the EuroStoxx 300 index over a period of 10 years (2012–2022), with 2900 observations, is used to develop the fieldwork. This European focus is justified by the region's strong regulatory push toward sustainability and corporate accountability, such as the European Green Deal and the Corporate Sustainability Reporting Directive (CSRD), which make the European corporate context a relevant setting for analyzing ESG-related impacts.

A conceptual model is tested using PLS-SEM, confirming the effect of economic, social, and environmental efficiency on investment and financial attractiveness. The effect is only evidenced for capital financial in the case of economic and social efficiency. Thus, this research work keeps the discussion open related to the gender gap and insists on reflecting on the balance between sustainability and the effects of the social and environmental dimension on the economic performance and profitability of today's companies.

This study also offers practical implications for investors, policymakers, and business leaders, suggesting that ESG criteria, when paired with gender-diverse leadership, may enhance both performance and market appeal. As the pressure for sustainable transformation increases, understanding the differentiated impact of gender on ESG effectiveness becomes crucial.

Likewise, another interesting contribution is introduced with the moderating effect of gender in the intensity of the relationships between the variables. Going beyond providing evidence of the connection between considering ESG in strategy and company performance, this study highlights that gender-diverse leadership can act as a catalyst, enhancing the integration of ESG into corporate philosophy and actions, and ultimately driving more inclusive and resilient business models.

2 | Theoretical Framework

2.1 | Sustainability and Performance

The ultimate goal of any company is to generate profits and maintain its activity over time with acceptable levels of competitiveness. The company is an economic and social reality that is currently pursuing its profits in accordance with the triple bottom line (Boubaker et al. 2018), that is, considering three areas: social, environmental, and economic outcomes. These three areas used to be recognized with the acronym: ESG (Environmental, Social and Governance). The criteria refer to environmental, social, and governance factors that enable the responsible and sustainable behavior of an organization to be assessed. These indicators have become a key tool for investors, companies, and public policy makers seeking to integrate sustainability into economic and strategic decision-making (Barros et al. 2022; Feng 2021). Each of these entails a number of challenges for the company that need to be managed with some balance and integrated into the corporate strategy (Barros et al. 2022; de Hoyos Guevara and Dib 2022; Saulick et al. 2023). Efforts can be rewarded by corporate value in terms of image, financial value and attracting investment/financing, employee satisfaction, and business longevity (Baumgartner 2014; Deng et al. 2013; Renneboog et al. 2008; Saulick et al. 2023).

In 2022, nearly 9600 out of 43,970 publicly listed companies worldwide, accounting for a total market capitalization of USD 85 trillion out of a global USD 98 trillion, reported sustainability-related information. The increasing need to address climate-related risks, social commitment, among others related to sustainability dimensions, has heightened investor interest (OECD 2024).

According to the concept of sustainable development, the efficiency of any enterprise is assessed by an appropriate set of indicators. The system of indicators widely agreed upon by the scientific and business community is the one proposed by the Organization for Economic Co-operation and Development (OECD) (OECD 2024). It is a scorecard with more than 132 indicators. This indicator system groups the parameters according to the dimensions of sustainability. Despite the robustness of this system and its extensive application, the lack of detailed statistics in some countries makes comparability in global terms complex (Kaasa 2007; MSCI 2024).

Based on the above, the following hypotheses are put forward. A group posits the positive effect between financial capital and economic, social, and environmental efficiency derived from ESG practices implemented in the company, and another group links the relationship between financial/investment attractiveness and sustainability.

According to the classical approach, efficiency is the ratio between the useful effect (result) and the costs (resources) needed for the achievement (Baumgartner 2014; Feng 2021; Renneboog et al. 2008; Teti and Spiga 2023). Thus, the higher the economic performance of the company's activity, the higher the financing (financial capital of the company), which is a prerequisite for the further development of the company. In general, there is a

two-way relationship between these two variables. If the financial resources of the enterprise (financial capital of the enterprise), which are the source of the formation of its assets and working capital, do not grow, then it is unlikely that the sustainable economic efficiency of the enterprise can be counted on in the future. This negative impact is possible due to the high debt burden of the company, when the amount of interest payments significantly reduces the profits received and prevents sustainable development (Baumgartner 2014; Bossel 1999; MSCI 2024; Teti and Spiga 2023).

H1. *The financial capital has a positive relationship with economic efficiency.*

There is a connection between social efficiency and the financing of enterprises. The possibility of removing barriers to enterprise development depends on the ability of enterprises to increase social satisfaction with the results of their activities (Soana 2024). Thus, financial capital can be fostered by the company's ability to take into account the interests of its staff, stakeholders, and society as a whole in the development of its activities. Even so, the balance between profit maximization and the preservation of the stability of the social and cultural system (Baumgartner 2014; Hall et al. 2010) that corporate social responsibility practices of companies increase their financial performance in the future. Furthermore, several studies demonstrate the positive effect of CSR on the value of financial and brand capital at the level of internationalization (Ashraf et al. 2021; OECD 2024; Teti and Spiga 2023) and investment attractiveness (Feng 2021; Ma 2023).

The complexity of the social dimension is that it serves different stakeholders, highlighting the relevance of the sustainability of the human team and society. With regard to staff, social efficiency is operationalized through employee turnover and training investments. Ashraf et al. (2021) and Soana (2024) have been shown to influence labor productivity and cost efficiency, thereby affecting financial capital availability. Currently, even international policy design emphasizes issues related to corporate employee well-being and how work-life balance measures and social benefits not only improve the working environment but also the company's results (Cornea et al. 2023; Giovanis 2018; Gubler et al. 2018; Patterson et al. 2004). In this regard, it may also be relevant to point out how some studies highlight the relative importance workers attach to their company's social policies depending on the gender of the team (Reichel et al. 2023). Furthermore, these are relevant elements that connect with human resource management theories such as emotional salary. The investment required by the company to implement these practices can therefore be offset by the results obtained, as confirmed by previous studies (Cornea et al. 2023; Patterson et al. 2004; Teti and Spiga 2023).

On the other hand, commitment to society as part of the strategy also affects the perception of the company and, therefore, the value associated. Baumgartner (2014) states that both the concern for social impact and the implementation of concrete actions to give value back to society involve combining strategies and instruments to contribute to sustainable development with double impact: for society and for the company. The return for the company of this social commitment to sustainability can

be translated into different effects, highlighting the relevance for attracting investments (Chan et al. 2022; Ma 2023; Saulick et al. 2023).

Therefore, the needs of employees/society are not addressed in the strategy; its implementation is unlikely to deliver the desired result and lead to an increase in labor productivity and financial capital.

H2. *The financial capital has a positive relationship with social efficiency.*

Regarding the third dimension, linked to the environment, it also seems to have an impact on the financial capital of companies. The literature suggests that environmental responsibility provides a number of opportunities to increase revenues (Ashraf et al. 2021; Barros et al. 2022; Feng 2021; OECD 2024; Petera et al. 2021; Tan et al. 2022; Yan et al. 2023). Beyond the perceptual compliance with the environmental standards they apply, the implementation and development of environmental practices and policies in this area improve both their image and access to capital markets under better terms (Arena et al. 2015; Bueno-Garcia et al. 2022; Chan et al. 2022; Deng et al. 2013; Fores 2019; Ma 2023; OECD 2024; Renneboog et al. 2008). In fact, environmental sustainability practices can contribute to reducing firms' cost of capital by improving risk perception and enhancing long-term investor confidence (Fores 2019; Renneboog et al. 2008; Yan et al. 2023). When companies implement effective environmental strategies—such as reducing emissions, managing waste efficiently, and conserving resources—they not only align with regulatory expectations but also signal lower environmental and operational risk to capital providers (Do and Nguyen 2020; Yan et al. 2023). This improved perception can translate into more favorable financing conditions, particularly in contexts where ESG compliance is increasingly valued by institutional investors (OECD 2024; Villabruna et al. 2024). Moreover, transparency in environmental performance reinforces stakeholder trust and positions the company as a responsible long-term investment, thereby reducing volatility and financing constraints (Petera et al. 2021; Soana 2024). However, in this dimension, there is an inverse effect since the higher the environmental requirements, the higher the implementation costs may be (Do and Nguyen 2020; de Hoyos Guevara and Dib 2022; Soana 2024; Teti and Spiga 2023; Yan et al. 2023). Even considering this nuance, the hypothesis also identifies a positive effect of one on the other.

H3. *The financial capital has a positive relationship with environmental efficiency.*

The relationship between output and the resources required to achieve the entrepreneurial achievements proposed by the classical theory, referred to above (Baumgartner 2014; Feng 2021; Teti and Spiga 2023) also affects financial/investment attractiveness. Consequently, the better the performance and financial stability, the greater the attraction of investment and financing, key factors for its growth and development. If the company does not get investment and financing on favorable terms, growth, internationalization, innovation, and competitiveness could be severely constrained (Meng and Shaikh 2023; Villabruna et al. 2024; Yan et al. 2023). As evidenced in the literature, sustainable practices in the economic dimension enhance investment attractiveness

because they provide trust in the company and, consequently, competitive advantage results (Bueno-Garcia et al. 2022; Tan et al. 2022). Thus, financial institutions such as banks, venture capital, or other kinds of investors can be motivated to invest or grant credit on better terms (Ashraf et al. 2021; Deng et al. 2013; Feng 2021; Villabruna et al. 2024).

Additionally, an excessive dependence on external financing, such as high interest tax or restricted deadlines, can generate an unsustainable financial burden, reducing profitability and affecting its long-term viability (Chaouachi and Balsalobre-Lorente 2022; MSCI 2024; Tan et al. 2022).

This base allows us to propose the following hypothesis:

H4. *The financial/investment attractiveness has a positive relationship with economic dimension of sustainability.*

The relationship between a firm's financial/investment attractiveness and the economic dimension of sustainability has been extensively analyzed in the literature, highlighting its positive impact on investor perception and financial stability. Bueno-Garcia et al. (2022) argue that companies integrating sustainable practices into their economic strategy achieve higher profitability and lower financial risks, increasing their attractiveness to institutional investors. Aligning with sustainable development goals and ensuring efficient resource use enhance cash flow stability, reducing volatility and the cost of capital. Similarly, strong economic sustainability practices not only strengthen stakeholder confidence but also foster a more favorable investment environment (Kaasa 2007). In economies where sustainability is a key decision-making criterion, firms with robust economic strategies gain a competitive edge and better access to financing (Kaasa 2007; OECD 2024). Moreover, nowadays, investors prioritize companies with sustainable and transparent economic management, as these firms mitigate regulatory and financial risks. Implementing sustainable economic strategies—such as optimizing supply chains and investing in responsible innovation—leads to more stable financial returns and enhances market perception (OECD 2024). In fact, Yan et al. (2023) emphasize that companies with strong economic sustainability likely to attract long-term investments, along the same lines as the above-mentioned works, and add that this kind of companies reduce operational costs and adopt resilient business models strengthen financial stability and build investor and shareholder confidence. While social indicators linked with financial/investment attractiveness could be seen as indirect, they reflect a commitment to sustainability that investors value. Currently, the institutions themselves are also aligned and defined by their 'responsible investment' so these issues become even more important (OECD 2024; Renneboog et al. 2008). So much so that policymakers establish recommendations in this line and, in certain way, suggest rewarding companies that operate by adding social and environmental impact to economic profit (Cardillo and Harasheh 2023; OECD 2024). Therefore, the following hypothesis is:

H5. *The financial/investment attractiveness has a positive relationship with social practices in the company.*

The relationship between environmental efficiency and a firm's financial/investment attractiveness has been widely supported

in the literature. Do and Nguyen (2020) highlight that greater resource efficiency and emission reductions not only lower operational costs but also enhance investor perception, particularly among those prioritizing ESG criteria. Similarly, companies with stronger environmental sustainability indicators tend to secure more favorable financing conditions, reflecting a lower perceived market risk (Yan et al. 2023).

Furthermore, recent studies reinforce the idea that environmental efficiency serves as a differentiating factor in attracting investments, as it aligns with the expectations of sustainable funds and increasingly stringent regulations (Peters et al. 2021; Soana 2024). Villabruna et al. (2024) emphasize that transparency in environmental practices strengthens market confidence, while (OECD 2003) had already anticipated that institutional investors were beginning to actively consider environmental criteria in their decision-making. Likewise, authors such as Barros et al. 2022; Yan et al. (2023) evidence environmental practices to enable the company to be better assessed for investment and financing. Green finance/investment is gaining in relevance and driving companies to implement environmental practices (Kraus et al. 2020; Meng and Shaikh 2023). Collectively, these findings support the following hypothesis:

H6. *The financial/investment attractiveness has a positive relationship with environmental efficiency.*

The dependent relationship between financial/investment attractiveness and financial capital with the three dimensions of Sustainability: economic, social, and environmental efficiency is proposed in the following hypothesis:

H7. *Financial/Investment attractiveness affects to financial capital.*

2.2 | Gender Approach in Sustainability

Although much of the existing literature focuses on how ESG practices improve company performance, the gender perspective remains insufficiently explored (Reichel et al. 2023; Setyowati et al. 2023). However, recent studies suggest that gender-diverse leadership, particularly female presence on boards, can significantly influence how firms interpret and implement sustainability strategies (Xie et al. 2020). Women in leadership roles tend to be more sensitive to social and environmental issues, leading to a greater integration of CSR and ESG values in corporate governance (Bruna et al. 2014; del Mar Alonso-Almeida et al. 2015; Boukattaya et al. 2022). This approach often translates into a long-term orientation and a more cautious risk perception, which can increase corporate resilience and ethical standards, thereby reducing reputational and operational risks (UNTACD 2014; World Bank 2019).

Furthermore, companies with gender-diverse boards are perceived as more credible and trustworthy by stakeholders and investors when it comes to sustainability performance (Hampl and Vágnerová Linnertová 2025). The presence of women on boards enhances transparency and social legitimacy, which may positively influence investment decisions, especially from

ESG-focused investors (Boukattaya et al. 2022). Reports such as the GEM Global (2024) and the W Startup Observatory (Alarcos Tamayo et al. 2024) reinforce this, showing that women entrepreneurs tend to prioritize social impact and sustainability, often embedding these values into their business models from the beginning. However, despite these strengths, female-led ventures frequently encounter barriers to accessing finance (Setyaningrum et al. 2023), revealing a paradox in which stronger ESG commitment does not always translate into greater funding opportunities—possibly due to gendered biases in investors' risk assessment processes.

In sum, incorporating a gender lens into ESG and financial performance analysis not only contributes to closing knowledge gaps in the literature but also helps understand the mechanisms through which gender diversity can reduce perceived risk (Byrnes et al. 1999; He et al. 2008) and enhance ESG credibility, ultimately affecting firm value and access to capital (Hampl and Vágnerová Linnertová 2025; Huang et al. 2024; Johnsen and McMahon 2005).

Given these previous research works and the identified gap, a gender-based analysis into ESG-financing research is added in this study. Specifically, examining the mediating effects between ESG practices and both firm's financial capital and financial attractiveness in male- and female-led firms. To fulfill this goal, women on the board of directors and the existence of equal initiatives in the company are considered. Both are combined to analyze if there is a moderator effect on ESG practices.

Consequently, this hypothesis is proposed.

H8. *Gender on Board have a moderator effect the relationship between financial/investment attractiveness and financial capital.*

Based on above, the proposal model is illustrated in Figure 1.

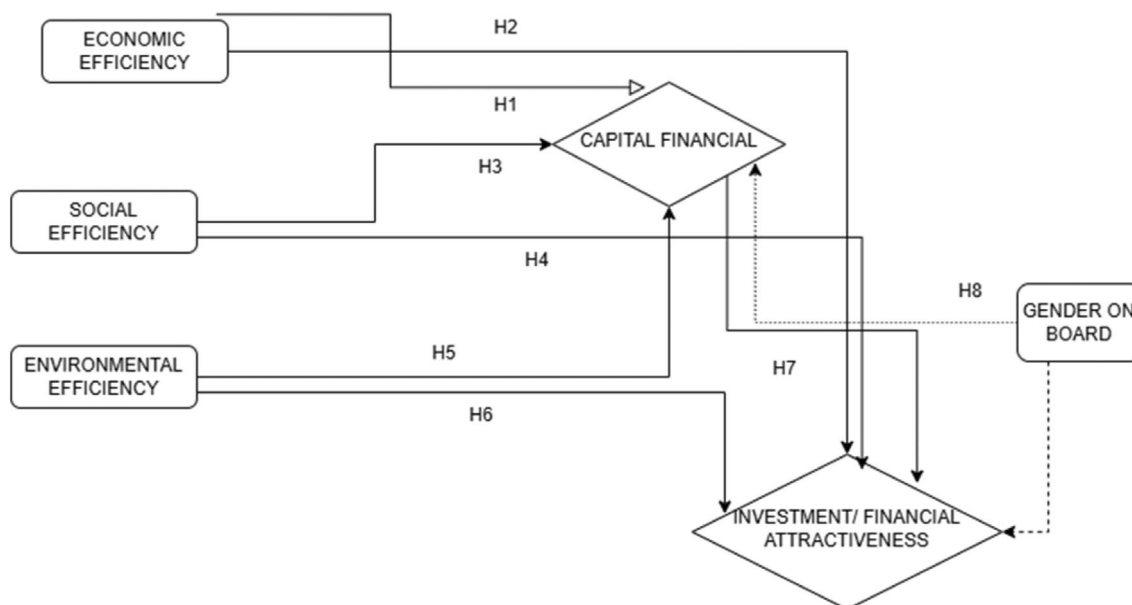


FIGURE 1 | Proposal model.

3 | Materials and Methods

3.1 | Sample

According to the main objective, explore relationships between ESG practices and capital financial and investment attractiveness with a gender approach, the Eikon database is used. European and US companies are included in this dataset so it can provide a comprehensive information from various perspectives: global economic, company and financial data. Additionally, this source is recurrent and has been validated by both financial analysts in professional settings and researchers in academic studies. The Eikon database was used considering companies listed in the index Eurostoxx 300. This database has a fixed number of 300 components; the index provides extensive and diversified coverage across 17 countries and 11 industries within Europe's developed economies, representing nearly 90% of the underlying investable market. After excluding observations with missing values for any of the study variables, the final sample consisted of 2900 observations, representing 96.7% of the initial dataset of 3000 firm-year observations. This indicates a relatively low level of data loss (3.3%), which reduces the risk of bias associated with listwise deletion. Moreover, we verified that the excluded observations were not concentrated in specific years or firms, minimizing concerns about systematic attrition affecting the validity of the results. Likewise, for cases with isolated missing values in individual indicators, we applied the mean replacement method available in SmartPLS 4. This procedure replaces missing values with the mean of the available values for the corresponding indicator, allowing us to retain the observation for the analysis. This approach is commonly accepted in Partial Least Squares Structural Equation Modeling (PLS-SEM) when the proportion of missing data is small and the missingness is random or unsystematic (Hair 2022). Mean replacement helps preserve the sample size and estimation efficiency without introducing significant bias, especially

when the goal is prediction rather than parameter inference. Information from companies of the above database covers a period from 2012 to 2022. This 10-year period was selected for its ability to produce solid and reliable results. Additionally, it represents the most up-to-date data available at the time of extraction.

The choice of the Euro Stoxx 300 index was motivated by its sectoral and geographical representativeness, covering 17 European countries and 11 industries, and accounting for nearly 90% of the investable market capitalization in developed European economies (Montero et al. 2025). This makes it a benchmark sample for analyzing sustainability and financial practices in large, listed European firms, frequently used in both academic and professional research. The 2012–2022 time frame was selected because it includes significant regulatory developments in ESG disclosure (such as the EU Non-Financial Reporting Directive of 2014 and its implementation in subsequent years) and captures both stable and turbulent economic cycles, including the COVID-19 crisis. This period provides a comprehensive view of medium-term trends in ESG practices and corporate financial performance.

3.2 | Variables and Measuring Instrument

The variables included in the study were selected in accordance with the established objectives. The proposal model raises ESG practices, each one independently: economic efficiency, social efficiency, and environmental efficiency as independent variables while the dependent variables are financial capital and financial/investment attractiveness. Tested the relationships and effect between these variables, gender is introduced to analyze the mediator effect.

Eikon was an accurate source of data because it provides valuable information for this study in accordance with objectives. The database includes: deal analytics like global merger and acquisition, ESG (Environmental, Social and Governance). Likewise, specific data related to gender like gender on board, total women in company can be extracted. Consequently, it is added to the widespread use in academic research work of the Eikon database with the opportunity offered by concrete data that allows for constructing the most common indicators for Sustainability and financial performance.

The variables are relevant for the proposal model and use indicators measured in many countries around the world so international comparisons are possible. Moreover, analytics research usually draws these variables (Bossel 1999; MSCI 2024; OECD 2024; United Nations (UN) 1992).

Consequently, the variables are in Table 1:

3.3 | Data Analysis

The research model proposed in this study consists of six variables defined as composites in Mode A (reflective). The classification of these constructs as composites is based on the

TABLE 1 | Variables board.

Variable type	Category	Indicators/metrics
Independent variables	Economic efficiency	- RoA - Surplus actual value - Return on equity - Net sales or revenues - Net income available to common - Earnings before interest & taxes
	Social efficiency	- Employee accidents - Value in training & development costs - Employee turnover rate
	Environmental efficiency	- CO ₂ equivalents - Total emissions - Total waste - Water pollutant emissions - Water recycled
Dependent variables	Financial capital	- Total debt - Market value - Working capital - Property, plant & equipment (Net) - Interest expense on debt
	Investment/financing attractiveness	- Book value per share - EBIT & depreciation - Market capitalization
Moderator variable	Gender approach	- Gender on the board - Women in the team

Note: Own elaboration.

relationship between the variables and their respective indicators (Sarstedt et al. 2016). Additionally, this study employs a confirmatory and explanatory approach, as emphasized by Cepeda-Carrion et al. (2019). Given the proposed model with Mode A composites and the various direct and indirect relationships, including mediator and moderator effects, the most appropriate analytical technique has been PLS-SEM (Hair 2022). This method is particularly suitable for analyzing complex models that include latent constructs, mediating and moderating effects, and composite measurement models. Unlike traditional econometric models such as fixed-effects panel regression, PLS-SEM is designed to model causal relationships among latent variables in cross-sectional or pooled data structures (Hair 2022), which aligns with the objectives of this study.

To test the hypotheses, a bootstrapping procedure with 10,000 samples was conducted, following the methodology outlined by (Streukens and Leroi-Werelds 2016), using the SmartPLS 4.1.11 software (Ringle et al. 2022).

4 | Results

To validate the proposed model, it is crucial to assess both the measurement model and the structural model (Hair et al. 2019).

4.1 | Measurement Model Analysis

First, the measurement model was analyzed to verify the validity and reliability of the included items and variables. Item reliability was determined based on their loadings, as presented in Table 2. Since all items exceed the minimum threshold of 0.7,

their reliability is deemed appropriate (Hair 2022). Furthermore, construct reliability was measured using Cronbach's alpha, composite reliability, and the Dijkstra–Henseler rho coefficient. As all these indicators surpass the recommended threshold of 0.7, the constructs are considered reliable (Dijkstra and Henseler 2015). Convergent validity was also assessed through the average variance extracted (AVE), with all values exceeding 0.5 confirming the internal consistency of the constructs (J. F. Hair et al. 2019) (Table 3).

Discriminant validity was also evaluated, with the results displayed in Table 3. Initially, Fornell and Larcker's criterion

TABLE 2 | Measurement model analysis.

Constructs	Mean	SD	Loading	<i>t</i> -student ^a	α	ρA	ρC	AVE
Economic efficiency					0.812	0.814	0.809	0.662
EE_01	18,543,369,437	7,020,480,000	0.860	80.578				
EE_02	1,052,551,372	448,193,000	0.920	91.921				
EE_03	1,518,985	973,500	0.900	5.841				
EE_04	1,093,760	1,093,760	0.779	2.358				
EE_05	1,137,948	1,004,000	0.724	3.553				
Environmental efficiency					0.832	0.806	0.812	0.686
ENE_01	3,084,564,978	856,915,000	0.767	1.199				
ENE_02	252,982,049	252,982,049	0.755	3.311				
ENE_03	283,358,310,020	283,358,310,020	0.824	10.987				
ENE_04	6,761,096,343	1,078,378,000	0.790	6.355				
Social efficiency					0.815	0.826	0.845	0.691
SE_01	88,812,614	88,812,614	0.727	2.288				
SE_02	588,333	588,333	0.715	1.779				
SE_03	688,327	688,327	0.702	2.103				
Financial/investment attractiveness					0.855	0.896	0.899	0.562
FIA_01	3,086,742,749	1,260,000,000	0.947	164.117				
FIA_02	20,146,999,330	10,906,518,000	0.927	75.189				
FIA_03	24,250,010	13,167,000	0.785	5.456				
Financial capital					0.896	0.885	0.869	0.714
FC_01	27,283,688,197	3,918,479,500	0.780	23.270				
FC_02	1,423,016,803	904,617,000	0.705	23.617				
FC_03	7,867,774,629	2,339,166,000	0.758	3.506				
FC_04	488,367,945	114,660,000	0.738	2.575				
FC_05	1,302,507,317	1,003,945,500	0.798	7.750				
Gender on board					0.722	0.715	0.725	0.619
GE_01	580,622	372,000	0.998	4.273				
GE_02	2,113,180	2,113,180	0.788	6.209				

Note: Significance and standard deviations (SD) performed by 10,000 repetitions Bootstrapping procedure.

Abbreviations: AVE, average variance extracted; α , Chronbach's alpha; ρA , Dijkstra–Henseler's composite reliability; ρC , Jöreskog's composite reliability.

^aAll loadings are significant at the 0.001 level.

TABLE 3 | Discriminant validity analysis.

		I	II	III	IV	V	VI
I	Economic efficiency	<i>0.560</i>	0.367	0.664	0.794	0.322	0.822
II	Enviromental efficiency	0.172	<i>0.514</i>	0.478	0.406	0.576	0.182
III	Social efficiency	0.463	0.026	<i>0.550</i>	0.556	0.258	0.338
IV	Financial/investment attractiveness	0.387	0.116	0.477	<i>0.782</i>	0.746	0.351
V	Financial Capital	0.008	0.112	0.350	0.435	<i>0.508</i>	0.253
VI	Gender on Board	0.137	-0.004	-0.039	0.095	0.067	<i>0.709</i>

Note: HTMT ratio over the diagonal (bold). Fornell-Lacker criterion: square root of AVE in diagonal (italics) and construct correlations below the diagonal.

(Fornell and Larcker 1981) was applied, confirming that the correlations between constructs are lower than the square root of the AVE (Henseler et al. 2015). Furthermore, it was verified that the HTMT values remain below the established threshold of 0.85 (J. F. Hair et al. 2019).

To finalize the evaluation of the external model, it has been verified that, in both the estimated and saturated models, the standardized root mean square residual (SRMR) values remain below the established threshold of 0.08. Similarly, it has been confirmed that the normed fit index (NFI) is greater than 0.9. These results indicate an adequate model fit (Henseler et al. 2015).

4.2 | Structural Model Analysis

Prior to evaluating the structural model, the Variance Inflation Factor (VIF) was analyzed to identify any potential multicollinearity issues. As presented in Table 4, the VIF values range from 1.000 to 2.904, indicating that multicollinearity is not a problem in this model (Kock 2015).

Next, the signs, magnitudes, and statistical significance of the paths representing the proposed relationships were analyzed to determine whether the hypotheses should be confirmed or rejected. The findings are displayed in Table 4 and Figure 2. A one-tailed percentile bootstrapping test was performed with 10,000 subsamples at a 5% significance level.

4.3 | Direct Effects

Regarding the direct effects, the results in Table 4 indicate that economic efficiency has a significant positive impact on financial capital ($\beta=0.129, p<0.01$), supporting H1. Similarly, social efficiency exerts a significant negative effect on financial capital ($\beta=-0.027, p<0.05$), confirming H2. However, the relationship between environmental efficiency and financial capital is not statistically significant ($\beta=0.008, ns$), leading to the rejection of H3.

Additionally, economic efficiency significantly influences financial/investment attractiveness ($\beta=0.897, p<0.001$), providing strong support for H4. Social efficiency also has a significant negative effect on financial/investment attractiveness

($\beta=-0.027, p<0.10$), rejecting H5. Furthermore, environmental efficiency shows a significant negative effect on financial/investment attractiveness ($\beta=-0.038, p<0.001$), supporting H6. Lastly, financial/investment attractiveness has a strong and significant positive effect on financial capital ($\beta=0.701, p<0.001$), supporting H7.

4.4 | Indirect Effects-Mediation Analysis-

Additionally, the results indicate the presence of a mediating effect of financial/investment attractiveness in the relationship between the three dimensions of sustainability and financial capital. This mediation is assessed using the Variance Accounted For (VAF), which quantifies the proportion of the total effect that is explained by the indirect path through the mediator. According to Hair et al. (2019), a VAF between 20% and 80% indicates partial mediation, while values above 80% suggest full mediation.

In the results, the VAF for social efficiency and economic efficiency falls within this 20%–80% range (41.3% and 82.98%, respectively), supporting the presence of partial mediation. In the case of environmental efficiency, mediation is classified as competitive mediation, since the indirect effect through financial/investment attractiveness reverses the sign of the direct effect, changing from a positive direct effect to a negative total effect (Hair et al. 2019).

The analysis of R^2 reveals that this model accounted for 78.9% of the variability in financial/investment attractiveness and 70.8% in financial capital. Moreover, according to J. F. Hair et al. (2019) as the results are close to 0.75, the effect can be considered substantial. Therefore, these results validate the model's strong explanatory capability.

Finally, the impact of each independent variable on the R^2 of the dependent variable was assessed by analyzing the effect size (f^2). Based on Cohen (1988), all obtained values (>0.35) indicate a strong effect of each independent variable on the dependent variable's R^2 . These results indicate that economic efficiency has a particularly high impact on financial/investment attractiveness, while environmental efficiency also shows a considerable effect on financial capital. Additionally, financial/investment attractiveness has a relevant effect on financial capital, although slightly below the 0.35 threshold.

TABLE 4 | Structural model results.

	Path	SD	<i>t</i> -value	<i>f</i> ²	CI		VIF	H	Supported
					5%	95%			
Direct effects									
Economic efficiency > financial capital	0.129	0.057	2.266**	0.412	0.043	0.229	2.902	H1	Yes
Social efficiency > financial capital	−0.027	0.016	1.728**	0.203	0.047	0.052	1.024	H2	No
Enviromental efficiency > financial capital	0.008	0.020	0.388 ^{ns}	0.500	−0.023	0.044	1.037	H3	No
Economic efficiency > financial/investment attractiveness	0.897	0.012	75.814***	3.631	0.876	0.915	1.050	H4	Yes
Social efficiency > financial/investment attractiveness	−0.027	0.016	1.691*	0.203	0.024	0.047	1.019	H5	Yes
Enviromental efficiency > financial/investment attractiveness	−0.038	0.011	3.430***	0.407	0.054	0.068	1031	H6	Yes
Financial/investment attractiveness > financial capital	0.701	0.066	10.651***	0.344	0.578	0.795	2.904	H7	Yes
Indirect effects									
Individual indirect effects							VAF		
Social efficiency > financial/investment attractiveness > financial capital	−0.019	0.088	1.692*		0.033	0.103	41.30%		
Economic efficiency > financial/investment attractiveness > financial capital	0.629	0.029	10.233***		0.516	0.718	82.98%		
Omental efficiency > financial/investment attractiveness > financial capital	−0.027	0.025	3.207***		−0.039	−0.012	70.3%		
Moderating effects									
Gender on board × financial/investment attractiveness > financial capital	0.049	0.026	1.854*		0.013	0.082		H8	Yes
Global indirect effects									
Social efficiency > financial capital	−0.019	0.011	1.692*		0.033	0.103	41.30%		
Economic efficiency > financial capital	0.629	0.062	10.223***		0.516	0.718	82.98%		
Enviromental efficiency > financial capital	−0.027	0.008	3.207***		−0.039	−0.012	70.3%		
Total effect									
Economic efficiency > financial capital	0.758	0.031	24.830***		0.700	0.800			
Enviromental efficiency > financial capital	−0.019	0.024	0.776 ^{ns}		−0.055	0.025			
Gender on board > financial capital	0.031	0.013	2.330**		0.008	0.049			
Social efficiency > financial capital	−0.046	0.025	1.884*		−0.080	−0.000			

Note: *R*² [95% CI in brackets]; Financial/investment attractiveness: 0.789 [0.755; 0.819]; Financial capital: 0.708 [0.644; 0.762]; Standardized path values reported; *f*², size effect index; 95 PCI, 95% percentile confidence interval; VIF, inner model variance inflation factors; VAF, variance accounted for. Significance, *t*-student, and 90% bias-corrected CIs were performed by 10,000 repetitions Bootstrapping procedure; ***: *p* < 0.001; **: *p* < 0.01; *: *p* < 0.05. Only total effects that differ from direct effects are display.

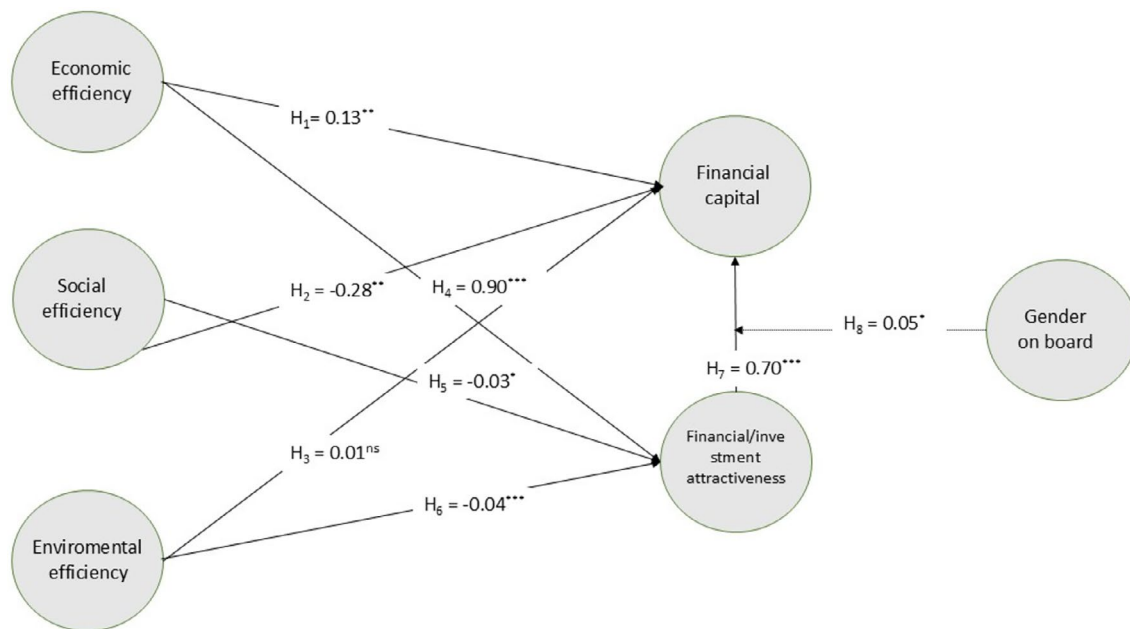


FIGURE 2 | Results.

Figure 2 presents the standardized path coefficients and R^2 values. These coefficients indicate the extent to which the predictor variables contribute to the variance of the endogenous variables, following the approach of Palos-Sanchez et al. (2021).

4.5 | Indirect Effects-Moderation Analysis

The moderating effect of Gender on Board on the relationship between Financial/Investment Attractiveness and Financial Capital is positive but marginally significant ($\beta = 0.049$, $p = 0.032$), providing limited support for H8. Although the effect size is relatively small, the positive coefficient suggests a potential amplifying effect when there is greater female representation on the board.

To further explore this interaction, we conducted a simple slopes analysis, which revealed that the effect of Financial/Investment Attractiveness on Financial Capital is negative and non-significant at low levels of gender diversity (-1 SD, $\beta = -0.018$), positive but small at average levels (mean, $\beta = 0.031$), and stronger at high levels ($+1$ SD, $\beta = 0.080$).

Figure 3 illustrates these differences by plotting the relationship at three levels of gender diversity: low (-1 SD, red line), average (mean level, blue line), and high ($+1$ SD, green line). The plot shows that, at lower values of financial/investment attractiveness, firms with low female representation tend to have slightly higher financial capital. However, as financial/investment attractiveness increases, the positive slope becomes steeper in firms with higher gender diversity, suggesting that boards with more women may be better positioned to leverage financial/investment attractiveness to improve financial capital.

Nonetheless, given the small magnitude and marginal significance of the moderation effect, these results should be

interpreted with caution and validated in future research with larger or more diverse samples.

5 | Discussion

The results of this study largely confirm previous literature on the relationship between sustainability (ESG) practices and corporate financial performance. However, they also reveal certain contradictions and nuances that require further analysis.

First, hypothesis H1, which establishes a positive relationship between financial capital and economic efficiency, is validated. This finding is consistent with previous studies (Baumgartner 2014; Feng 2021), which argue that efficient management of financial resources is conducive to business stability and growth. Furthermore, hypothesis H4, which relates investment attractiveness to economic efficiency, is also supported, confirming that firms with better financial indicators attract more investment and financing (Meng and Shaikh 2023; Saulick et al. 2023; Yan et al. 2023).

On the other hand, an unexpected result is observed in the relationship between social efficiency and financial capital (H2). Contrary to some previous studies (Ashraf et al. 2021; OECD 2024), a negative effect is identified here, suggesting that, while social initiatives may improve the perception of the firm, they may also generate costs that affect its financial performance (Deng et al. 2013; Ma 2023; Renneboog et al. 2008).

Even more relevant is the rejection of H3, as no significant relationship is found between environmental efficiency and financial capital. This finding contradicts previous studies suggesting that investing in environmental sustainability strengthens the financial position of firms (Peters et al. 2021; Villabruna et al. 2024; Yan et al. 2023). However, other work (Do and Nguyen 2020; de

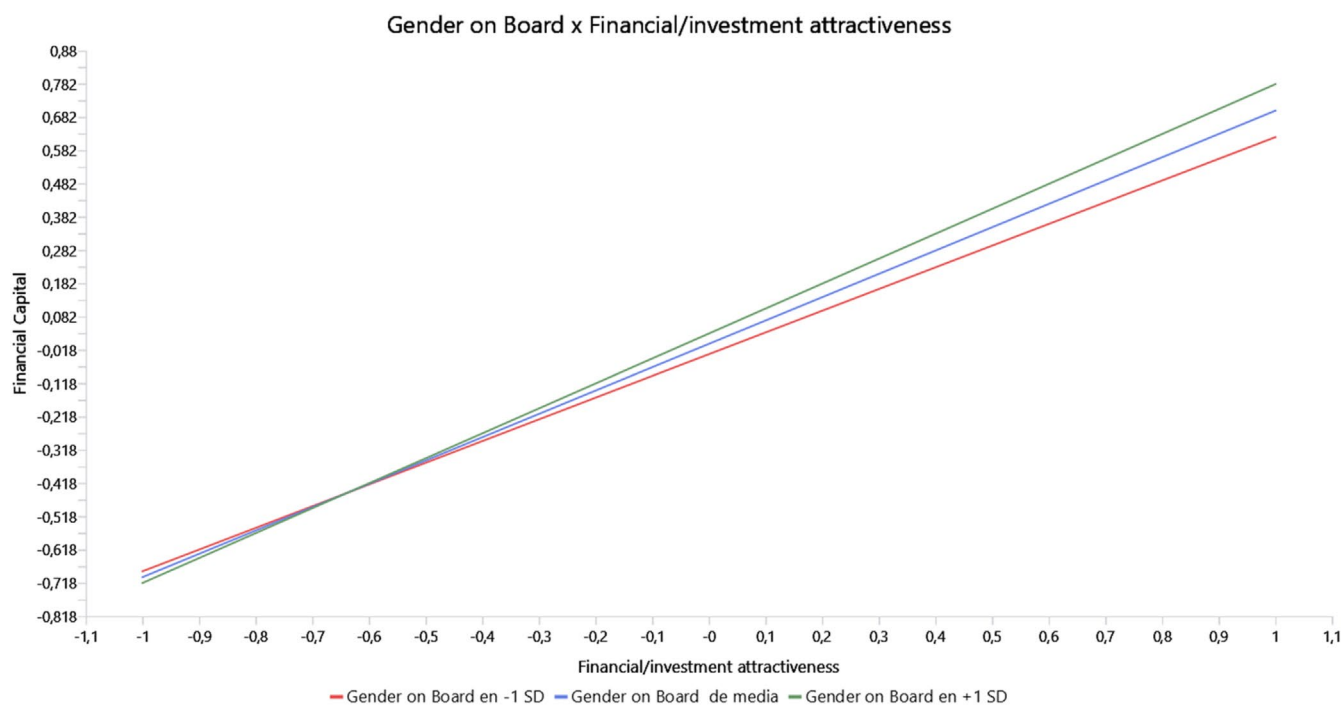


FIGURE 3 | Moderating effect of gender on the Board on the relationship between financial/investment attractiveness and financial capital.

Hoyos Guevara and Dib (2022) has warned that the high costs associated with implementing these environmental strategies beyond those required by regulations in the sector in which each company operates may slow down financial returns in the short term implementación (Do and Nguyen 2020; de Hoyos Guevara and Dib 2022; Soana 2024; Teti and Spiga 2023).

In terms of investment attractiveness and its relation to social and environmental efficiency (H5 and H6), the results show a negative effect, suggesting that investors may perceive these initiatives as a financial burden rather than an immediate competitive advantage. This raises a debate on the need for mechanisms that incentivize investment in companies with high ESG standards without compromising their economic stability. Thus, it is worth noting the suitability of including incentives or prioritization in business support policies with a view to competitive aid or assessment of their companies' implementation of environmental measures as a sign of their effort and commitment (Barros et al. 2022).

The indirect effect between investment/financial attractiveness and financial capital, as discussed in H7, is also relevant. This statement agrees with Ma (2023); Teti and Spiga (2023).

The mediating effects shown in the study are an innovative contribution to the field of analysis. The mediating effect of the three dimensions of sustainability (economic, social and environmental efficiency) on the attractiveness of investment/finance on financial capital is found. The mediating effect is partial for economic and social efficiency, while for environmental efficiency, a full, competitive mediation on capital is identified.

Although this evidence may seem disruptive to some of the literature, it is considered to be a remarkable contribution to the

explanatory robustness of the model. It explains almost 80% with respect to investment attractiveness and almost 71% with respect to financial capital. In this sense, the academic debate is open and it is necessary to continue investigating the relationships and effects between these key variables in the competitive context and the challenges of the SDGs, sustainability, and corporate social responsibility. Although it is a challenge for today's companies to implement ESG measures, the need to find a balance with their economic and competitive performance cannot be denied (Baumgartner 2014; Ma 2023; OECD 2024).

Finally, hypothesis H8 provides a novel finding by confirming that the presence of women on boards of directors may moderate the relationship between investment attractiveness and financial capital. Although the effect is positive but marginally significant and small in magnitude, it points to the potential relevance of greater female representation in corporate decision-making processes (Setyowati et al. 2023; Xie et al. 2020). However, given the borderline significance of this result, it should be interpreted with caution and further validated through additional research, which reinforces the importance of greater representation of women in corporate decision-making. This aligns with previous research indicating that gender diversity on boards enhances corporate social practices, which in turn improve financial performance (Hampl and Vágnerová Linnertová 2025). Consequently, the gender perspective introduced as an innovator in this study may be conducive to reducing the gender gap. That is, when there is more female representation both on the board of directors and in the company structure, there is a slightly higher effect on equity and investment attractiveness. This statement is in line with Boukattaya et al. (2022) because companies with stronger ESG performance and diverse leadership tend

to adopt more sustainable financial strategies, impacting key decisions such as dividend policies. While it is true that there are numerous studies in previous literature that point to the benefits of the incorporation of women and their higher rates of representation in management positions for companies, there are few studies that relate economic performance (capital and investment attractiveness) to sustainability (benchmark). Thus, another of the most outstanding contributions of this study is precisely that it opens up the possibility that companies whose leadership includes women are more likely to implement more successful ESG measures in relation to the economic impact they generate. This idea is also highlighted by Baatwah and Wahab (2023) Bruna et al. (2014).

6 | Conclusions

The findings of this study highlight the complexity of the relationship between ESG practices, investment attraction, and the financial performance of companies, especially when a gender perspective is incorporated. While economic sustainability emerges as a key factor for financial stability and investment attractiveness, the social and environmental dimensions present more ambiguous results, suggesting that the benefits of these initiatives may materialize over the long term rather than generate immediate returns.

In particular, social efficiency, despite its importance in building a strong corporate reputation, appears to be associated with a negative financial impact in the short term. Similarly, the lack of a significant relationship between environmental efficiency and financial capital suggests that companies may face difficulties in balancing the adoption of sustainable practices with economic profitability.

A key aspect of this study is the inclusion of gender as a moderating variable, which brings an innovative perspective to the analysis of corporate sustainability. Although the effect of female board representation on the ratio of investment to financial capital is small and only marginally significant, its presence reinforces the trend toward greater consideration of ESG criteria in corporate strategy. However, this finding should be interpreted with caution, and further research is needed to confirm its robustness.

6.1 | Limitations and Future Research Lines

Despite the solidity of the database used and the robustness of the statistical model applied, this study has certain limitations. Firstly, the sample used, although representative, is composed of Euro Stoxx 300 companies, which could limit the generalizability of the results to other economic contexts or emerging markets. Moreover, the study is based on quantitative data analyzed through Partial Least Squares Structural Equation Modeling (PLS-SEM), a method particularly suited to modeling complex relationships between latent variables, mediating, and moderating effects. However, this approach does not incorporate panel data techniques such as fixed or random effects models, which could exploit the longitudinal structure of the data to control for unobserved heterogeneity. Additionally, although the dataset spans a 10-year period (2012–2022), allowing us to

identify trends over a meaningful time frame, the analysis does not fully capture very long-term effects or the impact of recent events, such as regulatory changes or economic crises. We also acknowledge the potential risk of omitted variable bias, as the model does not explicitly control for factors such as firm size, industry sector, or country-specific ESG regulations, which could influence the observed relationships. Future research could address these limitations by applying panel data methods or multi-level models that account for firm- and country-level variability.

Another limitation of this study lies in the operationalization of Hypotheses H5 and H6, which aim to assess social and environmental efficiency as components of sustainability. While the indicators used serve as proxies for broader ESG performance, they may not capture the full complexity of environmental and social impact. These metrics, although aligned with commonly used ESG rating systems and increasingly relevant in investment evaluations, can reflect only indirect effects and may omit key dimensions related to firms' long-term sustainability strategies and stakeholder engagement.

Based on these limitations, future research should consider expanding the analysis by applying qualitative methodologies (e.g., case studies) or comparative studies across sectors and regions, as well as incorporating panel data techniques to better capture the dynamic nature of ESG impacts over time. It would also be valuable to examine how the impact of ESG practices varies across different board configurations, particularly regarding gender diversity. Promoting a better understanding of the role of gender-diverse teams remains a relevant avenue for future research aimed at strengthening the link between corporate governance and sustainable financial performance.

6.2 | Practical Implications

These findings have both academic and practical implications. For policymakers and regulators should underline the need to design incentives that favor investment in sustainability without affecting the competitiveness of companies should be underlined. For investors, they highlight the importance of evaluating ESG initiatives with a long-term view. For companies, the study reinforces the relevance of integrating sustainability into their corporate strategy in a balanced and realistic manner. Likewise, the reflection on the gender gap and the need not to be satisfied with the advances that reduce the gap but still do not achieve a balance in the representation of women, especially in the spheres of power and business management, remains open with this research work.

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Conflicts of Interest

The authors declare no conflicts of interest.

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