Green Finance

Green Finance, 6(3): 430–456.
DOI: 10.3934/GF.2024017
Received: 06 April 2024
Revised: 02 August 2024
Accepted: 14 August 2024
Published: 20 August 2024

https://www.aimspress.com/journal/GF

Research article

Do diversity & inclusion of human capital affect ecoefficiency? Evidence for the energy sector

Óscar Suárez-Fernández[1,*], José Manuel Maside-Sanfiz,[1,2] Mª Celia López-Penabad[1,2] and Mohammad Omar Alzghoul[3]

[1] Financial and Accounting Department, University of Santiago de Compostela, Spain
[2] ECOBAS Research Center, Spain
[3] Phd Doctoral Programme in Economics and Business, University of Santiago de Compostela, Spain

* **Correspondence:** Email: oscar.suarez@usc.es.

Abstract: The aim of this study was to assess the impact of diversity and inclusion (D&I) initiatives in workplaces on both financial performance and environmental considerations (referred to as ecoefficiency, ECO). We focused on the energy sector, a significant environmental contributor, and the research spanned from 2016 to 2022, analyzing a broad global sample of 373 firms from 53 countries. ECO was evaluated by integrating environmental scores and conventional financial metrics using data envelopment analysis (DEA).

The findings revealed a significant positive relationship between the collective indicator of diversity, inclusion, people development, and the absence of labor incidents on ECO. Specifically, practices related to workforce diversity, cultural and gender implementation, and investments in employee training and development opportunities were found to be beneficial for ECO. Additionally, we found that these policies impact the environmental component of ECO. However, no significant relationship was observed between practices related to inclusion policies and controversial labors, and ECO.

Furthermore, the results suggested that ECO within the energy sector is influenced by factors such as board size, the integration of environmental, social, and governance (ESG) aspects into executive remuneration, the adoption of a corporate social responsibility (CSR) strategy, alignment with the United Nations (UN) Environmental Sustainable Development Goals (SDGs), and the implementation of quality management systems. Conversely, CEO-chairman duality and the presence of independent board members do not significantly impact ECO in energy companies.

These research findings provide valuable insights and recommendations for industry managers pursuing sustainable business practices, particularly through effective talent management strategies. Additionally, they offer guidance for investors interested in constructing environmentally conscious portfolios.

Keywords: diverse workplace; inclusive workplace; environmental performance; ecoefficiency; energy sector

JEL Codes: M12, M14, M53

1. Introduction

Energy is the engine that drives economic growth in any modern economy, as it is one of the essential inputs in the development of any economic activity. In recent decades, both the production and consumption of energy from fossil fuels have led to an exponential increase in greenhouse gas emissions, resulting in undesirable environmental consequences (International Energy Agency, 2018). Therefore, the development of a green economy with environmental awareness has become necessary, involving more sustainable forms of energy production and consumption. The energy sector has become a key axis in achieving internationally agreed-upon goals on climate change (Kim et al., 2022).

As an industry that provides an essential good for any economy and concurrently plays a crucial role in initiatives to mitigate climate change (European Commission, 2020), studying the energy sector and its environmental impact is of interest. However, the primary challenge facing modern societies in the 21st century is achieving sustainable development (United Nations, 2012). Therefore, environmental commitment alone is insufficient for business survival; it must be coupled with economic growth and socially responsible behaviors, constituting the so-called triple bottom line: profit, people, and planet.

Among socially responsible practices, particular emphasis has been placed on those associated with human resources management. The examination of their impact on the generation of corporate value has garnered attention in prior literature, given that human capital constitutes a key element in realizing both economic goals and a company's climate strategy (Camilleri, 2017). In the study of the effect of workplace diversity and corporate performance, past research has yielded inconclusive findings. Some papers found that gender diversity had a positive effect on financial performance (McKinsey, 2015; Ahmadi et al., 2018), while others concluded the opposite effect (Provasi and Harashah, 2020). Additionally, some authors have pointed out that cultural diversity can have negative effects (Giannetti and Zhao, 2019). If the measure of business performance is based on environmental parameters, studies have showed mixed results: some found that gender diversity has a positive effect (Webb, 2004; Walls and Hoffman, 2013), others indicated that cultural diversity positively affects it (de Klerk and Singh, 2023), while others found no impact (Zaid et al., 2020).

Likewise, the effect of training and promotion policies on employee productivity has also been investigated (Guthrie, 2001), having a positive effect by reducing absenteeism and employee turnover (Aziri, 2011; Katou, 2011). Regarding inclusion policies, the results of previous research indicate that their implementation leads to an increase in financial productivity (Bengisu and Balta, 2011) and

environmental performance (Habib and Khalid, 2019), by increasing employee engagement and performance. Finally, analyses on the impact of incidents related to social, environmental, and corporate governance aspects on corporate performance yield mixed results. While studies such as Krüger' s (2015) point out that negative news related to corporate social responsibility (CSR) has adverse effects on investors, others like Suciu et al.'s (2020) research on labor controversies did not yield conclusive results.

Considering previous research, we have identified gaps in studying the impact of diversity, inclusion, and people development policies on corporate performance, which this paper aims to address. First, most of the previous literature has measured corporate performance using one-dimensional measures that capture only one aspect, such as financial (e.g., ROE) or environmental (e.g., CO_2 emissions). Studies like those by Lu et al. (2022) and Ren et al. (2022) highlight the importance of using aggregate measures incorporating both financial and environmental factors, being especially important in the analysis of a sector like the energy sector, which is highly environmentally sensitive (Beck et al., 2018). Second, it is necessary to study certain human resource management policies in the energy sector, such as those related to diversity and inclusion, for the entire company, not just the board of directors, which are connected to the reputational risk faced by this sector due to the increased public scrutiny of its activities (González-Ramos et al., 2018). Third, previous research has addressed the relationship between inclusion and people development policies with financial performance but not with environmental performance, making its analysis necessary.

As a result, research gaps still exist regarding the relationship between diversity, inclusion, and people development policies and corporate performance, particularly in the energy sector, and which justify the need for the analysis conducted. This article aims to investigate and assess the impact of diversity and inclusion initiatives in workplaces on ECO of 373 listed firms covering the period from 2016 to 2022 across 53 countries in the global energy sector.

This study makes significant contributions to the analysis of the relationship between human capital management and financial and environmental sustainability, with valuable implications for regulators, managers, and investors. First and foremost, it proposes the adoption of an environmentally adjusted measure of business efficiency using the data envelopment analysis (DEA) technique. This measure is an aggregate indicator that includes economic, financial, and operational aspects, as well as, innovatively in this field of study, environmental performance. The latter is a composite indicator consisting of a total of 286 values that gauge both the environmental impact of the company's activities and its practices to mitigate environmental risks. This approach contrasts with the use of one-dimensional measures employed in previous research in this field.

Second, this study employs a measure of diversity that encompasses diversity at all levels of the company, not just the board of directors, consisting of a total of eight different indicators. The measure of workplace inclusion used is composed of 5 indicators. The measure of people development consists of 7 indicators, and finally, a measure of labor controversies consists of 2 indicators. This study is pioneering in analyzing the relationship of all of the aforementioned D&I measures in the workplace with an aggregated financial performance measure such as ECO. The use of combined measures assessing the degree of diversity, inclusion, and people development in the company has been sparingly explored in previous research, and only in relation to financial performance (Suciu et al., 2020) or investment decisions (Bax, 2023).

Third and finally, to the best of our knowledge, this paper proposes the analysis of human resource management strategies in a crucial sector (the energy industry) for the first time.

The results obtained indicate that the ECO of companies in the energy sector increases when human resource management policies focus on criteria of diversity, inclusion, and people development. Specifically, the implementation of gender and cultural diversity policies, as well as practices of promotion and professional training, has a catalytic effect on ECO. Additionally, only employee people development practices impact financial performance, while environmental performance is influenced by policies that promote diversity and people development, as well as inclusion. The results obtained are consistent across various robustness tests implemented.

The remainder of the paper is organized as follows: Section 2 outlines the theoretical framework and hypotheses derived from the literature review; Section 3 details the methodology employed in the study; Section 4 presents and analyzes the main empirical findings; and finally, in Section 5, key conclusions are highlighted, limitations of the study are outlined, and suggestions are provided for expanding the analysis in future research.

2. Theoretical framework and hypothesis development

2.1. Theoretical framework

In this research, we explore the impact of diversity, inclusion, and people development policies, as well as the level of labor controversies on ECO from the perspective of stakeholder theory and resource-based theory.

Stakeholder theory (Freeman, 1984) is grounded in the concept that a company should meet the needs of all stakeholder groups, not just shareholders. Therefore, its activities should aim to achieve not only accounting-related outcomes but also social and environmental goals. Hence, both financial and non-financial performance metrics are necessary to evaluate the value created for all stakeholders (Harrison and Wicks, 2013). Diversity and inclusion policies are geared toward satisfying various stakeholders. As indicated by Nyeadi et al. (2021), the female management style is oriented toward all stakeholders, not just shareholders, like boards of directors with greater cultural diversity. Furthermore, the implementation of inclusive policies in the workplace, such as support for the LGBT community, sends a signal to diverse stakeholders, including employees and markets, of socially responsible behavior, particularly regarding minority support policies (Pichler et al., 2018). This, ultimately, enhances the corporate reputation (Kim et al., 2018), creating a valuable, intangible asset that improves financial performance (Li et al., 2019).

Considering that human capital in an organization plays a fundamental role in improving company performance (Naciti et al., 2022), resource-based theory (Wernerfelt, 1984) serves as a foundation to understand that socially responsible human resource management practices and policies create a competitive advantage for the company. In the case of human resources, this advantage materializes in the development of unique skills and competencies, allowing companies to possess difficult-to-imitate intangible resources (Sgrò, 2021), thereby enhancing the corporate reputation.

2.2. Diversity, inclusion, people development, labor controversies, and ECO

Previous research demonstrates that business performance is positively affected by corporate social responsibility activities implemented by companies (Jo and Harjoto, 2011; Gherghina et al., 2015; Adeneye and Ahmed, 2015). According to the paper of Iazzolino et al. (2023), this effect is

greater in sectors that engage in polluting (energy) or harmful (alcohol, gambling, arms, etc.) activities, which attract the attention of multiple stakeholders. The effect of certain policies, such as D&I, on business performance has not been a prolific field of research.

Various studies attribute the implementation of D&I policies in companies to reasons of social justice (Dahanayake et al., 2018) and to ethical and moral motivations (Gotsis and Kortezi, 2013), but the argument regarding the impact of such policies on business performance has been the focus of most investigations, yielding inconclusive results. The variety of findings is largely attributable to the diversity of methods and measures used (Urwin et al., 2013). Nevertheless, most studies in this field of research highlight the benefits of human resource management practices centered on diversity and inclusion. For example, Rohwerder's (2017) review of the literature on D&I in organizations indicates that failing to promote diversity and inclusion in companies, thereby allowing discrimination, leads to lower employee commitment to the organization, lower job satisfaction, higher work stress, absenteeism, lower talent retention, and increased litigation, with consequent repercussions in terms of image. The same conclusions are reached by the paper of Özbilgin and Tatli (2011) based on 66 interviews with key actors in the field of equality and diversity in the United Kingdom. Drawing from these findings, we suggest the following hypothesis:

H1: D&I policies and practices positively influence the ECO of energy companies.

Since D&I policies and practices can vary, we analyze them below by breaking them down into four categories: three that we believe can have positive effects (diversity, inclusion, and people development) and one aspect that can have negative effects on ECO (labor controversies).

Specifically, the impact of diversity on corporate performance has been extensively researched, with demographic diversity (gender, culture, age, etc.) being the most analyzed. It indicates a greater availability of cognitive resources and knowledge within teams, translating into competitive advantages that can have positive financial (Choi et al., 2017) and environmental (Liu, 2018) effects. However, conclusions regarding the impact of diversity on financial performance are inconclusive. Diverse groups offer different perspectives, beneficial for solving complex problems or fostering creativity (Prieto et al., 2009). For instance, Farrel and Hersch (2005) suggested that increased female participation in boards enhances corporate image and attracts new investors. McKinsey (2015) demonstrated that companies with greater gender equality in their boards achieve a 41% higher financial return than those with less equality, a conclusion also reached by Ahmadi et al. (2018) regarding financial and economic profitability. In contrast, Provasi and Harashah (2020) found no relationship between gender diversity on the board and financial performance, based on the idea that heterogeneous groups are less productive and have lower internal cohesion due to tensions and conflicts arising from differences among members (Horwitz, 2005).

Regarding the impact of gender diversity on environmental performance, previous research suggests that women are more concerned about aspects related to CSR, particularly the environment, due to their lower inclination toward power than men (Burkhardt et al., 2020). Kemp et al. (2015), Li and Nagar (2013), and Williams (2003) demonstrated that women have greater environmental awareness than men. The findings of Webb's study (2004) suggested that companies with greater gender diversity in their boards adopt sustainable environmental policies. Walls and Hoffman (2013) found a positive relationship between gender diversity and CSR policies. Evidence suggests that gender diversity in the board is associated with early adoption of SDGs (Rosati and Faria, 2019), increased commitment to SDGs (Zampone et al., 2024), particularly environmental goals (Taglialatela et al., 2023).

Concerning cultural diversity, individuals' behavior and decision-making are influenced by culture. Its potential influence on board activities can be positive or negative for stakeholders. It can provide different perspectives, greater creativity, and diverse skills and knowledge, contributing to improving corporate results. Studies like Harjoto et al. (2019) in the United States argue that an increase in cultural diversity on boards improves corporate social responsibility, and de Klerk and Singh (2023) found a positive relationship between cultural diversity and sustainability performance in healthcare institutions. However, other studies found the opposite relationship, arguing that cultural diversity can cause friction within the board. Zaid et al. (2020) concluded that foreign board members do not influence a company's sustainability activity. The relationship of cultural diversity with financial performance also yields mixed results. Wang and Clift (2009) measured board cultural diversity based on racial diversity and concluded that it has no effect on financial results. Giannetti and Zhao (2019) highlighted the pros and cons of cultural diversity, suggesting high but volatile performance, implying inefficiencies and conflicts on the board. The only study using an aggregated measure of diversity, integrating gender and cultural dimensions, is that of Suciu et al. (2020), which concluded that it has a positive effect on financial performance. Drawing from these findings, we suggest the following hypothesis:

H2: Diversity policies and practices in the company positively influence the ECO of energy companies.

On the other hand, training and promotion aim to improve employees' professional skills, a systematic process called human resource development (Nadler, 2012). Despite criticism of training as too costly (Kraiger et al., 2004) and doubts about its relationship with business performance (Wright and Geroy, 2001), previous research mostly considers that a company's human resource development plays a fundamental role in achieving sustainable competitive advantages (Kareem and Hussein, 2019), influencing reduced employee turnover, absenteeism, and conflicts (Salas and Cannon-Bowers, 2000), and increasing job satisfaction, which has a positive effect on productivity and business profitability (Aziri, 2011; Katou, 2011). Syed et al. (2020), who measured human resources recruitment and training practices through surveys, found that they are related to environmental performance but not to financial performance. Based on previous research, we believe that our index, which is an aggregate measure of internal promotion indicators, training, and employee satisfaction, may have a positive relationship with ECO. Therefore, we propose the following hypothesis:

H3: People development policies and practices in the company positively influence the ECO of energy companies.

In terms of inclusive policies aimed at integrating workers with family responsibilities, disabilities, or chronic illnesses into the company, previous research indicates a positive impact on business performance. Human resource management practices that promote the inclusion of minorities in the workplace have been associated with effects such as retaining talented and creative employees, and fostering innovation, which can positively influence the company's financial performance (Sears and Mallory, 2011). Hossain et al. (2019) found that companies with anti-discrimination policies in the workplace encourage innovation, which can positively influence the company's financial performance. Li and Nagar (2013), using the corporate equality index developed by the Human Rights Campaign, argued that policies supporting the LGBT community improve company performance, adding value to such policies. Pichler et al. (2018) reached the same conclusion using other CSR policies as a control variable, in addition to inclusion. In the same vein, Jiraporn et al. (2019) demonstrated that policies supporting the LGBT community in the company increase financial performance, measured by the Tobin's Q, both in the short and long term, as

investors consider the value of such policies. Regarding employees with disabilities, despite being stereotyped as dependent and inefficient (Colella and Bruyére, 2011), it has been shown that companies implementing inclusive policies witness increased productivity (Bengisu and Balta, 2011). Additionally, flexible working hours for family reconciliation increase employee commitment and performance (Meyer et al., 2001), having a positive effect on the company's environmental performance (Habib and Khalid, 2019). The study by Suciu et al. (2020) on European companies, which used an aggregate index similar to ours to measure inclusion policies, found that these policies negatively impact both economic and financial profitability, but positively affect outcomes. However, in the present study, focusing on a sector under high public scrutiny where projected image is crucial, and incorporating financial and environmental performance measures that previous research has shown to be positively influenced by inclusion policies, we propose the following hypothesis:

H4: Inclusion policies and practices in the company positively influence the ECO of energy companies.

Regarding the effect of the level of labor controversies on business performance, incidents, especially those related to environmental or labor aspects, can damage corporate image and reputation when made public (Krüger, 2015; Aouadi and Marsat, 2018), leading to negative consequences on corporate performance (Nirino et al., 2021). Kang and Kim (2013) found a positive relationship between the negative tone of CSR news and market share loss, and Krüger (2015) observed that negative CSR news leads to a negative investor response. However, the evidence from previous literature is inconclusive. Studies like Rodríguez-Fernández et al. (2018), analyzing the effect of controversies related to top management in a global sample of 119 travel agencies, did not find them to be related to financial performance, measured both as economic and financial profitability, as well as Tobin's Q. Also, in the study of Suciu et al. (2020), which used the same indicator as this study, the results were inconclusive regarding financial performance. For example, when controversies are related to a company's human resources, they positively affect financial and economic profitability and negatively affect results measured by earnings before interest, taxes, depreciation, and amortization (EBITDA) and earnings before interest and taxes (EBIT). In the energy sector, subject to intense public scrutiny due to the impact of its activities on the environment, controversies are particularly important because they have a greater negative effect on reputation and credibility compared to other sectors, rendering environmental policy efforts futile (García-Amate et al., 2023). Therefore, we propose the following hypothesis:

H5: Labor controversies negatively influence the ECO of energy companies.

3. Materials and methods

3.1. Sample and data collection

Our dataset comprises listed energy companies spanning the period 2016–2022, hailing from 53 countries (Table i in Appendix A shows the sample distribution by country) and operating within the coal, oil and gas, renewables, and uranium sub-sectors. Commencing our analysis in 2016 aligns with the introduction of the Global Reporting Initiative (GRI) G3 guidelines (Kumar et al., 2022).

Financial, environmental, governance, and diversity and inclusion (D&I) scores were obtained from the London Stock Exchange Group (LSEG) Data & Analytics company database, previously known as Thomson Reuters' Refinitiv database, widely recognized in scholarly research (Lahouel et

al., 2022; Ren et al., 2022). This database covers over 90% of global market capitalization and encompasses more than 630 distinct ESG criteria (LSEG Data and Analytics, 2022). In order to select the sample, our analysis was confined to firms that were listed and reported their environmental, social, and governance scores on the LSEG platform. After excluding observations lacking essential variables for analysis, our final dataset comprised of 377 companies and 1062 company-year observations. Further details on the sample selection process are provided in Table ii in Appendix A. This data represents 90% of the firms in the energy sector included in the LSEG database.

3.2. Methodology

The empirical model used to investigate the relationship between human capital management and financial and environmental sustainability (ECO) is presented below. It also provides an overview of the different variables used.

3.2.1. Variables

Dependent variable: Ecoefficiency (ECO).

The dependent variable in this study is the measure of the company's ECO. A common method for assessing industry performance entails measuring efficiency. Traditional financial indicators often fall short in fully capturing a business's overall performance. To address this limitation, we use frontier methods, which consider multiple inputs and outputs. The main frontier methods used to measure efficiency are data envelopment analysis (DEA), which is non-parametric, and stochastic frontier analysis (SFA), which is parametric. Specifically, this study employs DEA to estimate efficiency. This model uses linear programming which results in a set of production possibilities in which the efficient units are represented by an "efficient frontier", against which the inefficiency of other firms is measured.

For efficiency estimation in this paper, we employ DEA with variable returns to scale (VRS) and an output-oriented perspective. By adopting VRS, the group of energy firms used for comparison remains similar in size to the firm under evaluation. The VRS model, with output orientation, was mathematically represented as follows:

$$Max\ \theta_{0t}: x_{s0t} - \sum_{i=1}^{n_t} \lambda_{it} x_{sit} \geq 0;\ \sum_{i=1}^{n_t} \lambda_{it} y_{rit} - \theta_{0t} y_{r0t} \geq 0; \sum_{i=1}^{n_t} \lambda_{it} = 1;\ \lambda_{it} \geq 0 \qquad (1)$$

We evaluated n DMUs ($i = 1, 2,..., n$) for every time period t ($t = 1,..., t$), considering m outputs ($r = 1, 2,..., m$), which produced $Y_{it} = \{y_{rit}\}$, and j inputs ($s = 1, 2,..., j$), which consumed $X_{it} = \{x_{sit}\}$. The efficiency score for each DMU was denoted by θ_0 and lambda (λ) was the input and output multipliers (weight).

The DMU was efficient if θ_0 was equal to 1, and the DMU was inefficient if θ_0 was greater than 1. We have inverted the efficiency scores, ($1/\ \theta_0$), to express them on a scale from 0 to 1.

Table 1. Inputs and outputs for operational efficiency and ECO.

Categories	Operational Efficiency	ECO
Inputs	Operating cost, Employees, PP&E*	Operating cost, Employees, PP&E*
Outputs	Operating revenues, Market capitalization	Operating revenues, Market capitalization, Environmental score

* Property, plant, and equipment.

We assume that the behavior of energy firms is oriented toward maximizing output, considering that environmental scores, financial performance, and market performance represent the primary variables of interest that managers seek to enhance. Thus, we differentiate between operational efficiency and ECO. Table 1 presents the inputs and outputs used for each efficiency measure.

Operational performance measures encompass a variety of metrics, predominantly utilizing accounting and market indicators. In line with previous studies, the inputs considered were operating cost; property, plant, and equipment (PP&E); and the number of employees; while operating revenues and market capitalization served as outputs. Then, we calculate ECO scores by including environmental scores (Env. Score) as outputs alongside traditional operational and financial measures (Iazzolino et al., 2023; Lu et al., 2023; Ren et al., 2022; Sánchez-Robles et al., 2022; Stefanoni and Voltes-Dorta, 2021; Sueyoshi et al., 2017). Table iii (in Appendix B) presents the descriptive statistics for the variables used in calculating efficiency, and we Winsorized the variables at level 1% and 99%. The environmental score is calculated by assigning weights to three categories, which vary by industry: innovation, emissions, and resource use; for their calculation, 57, 190, and 39 variables are used, respectively. The pillar weights are normalized to percentages ranging between 0 and 100, with higher values indicating better performance. The approach for calculating the different ESG pillars can be found in the LSEG methodology document[1]. All data were obtained from the LSEG database. The proposed models fulfill the isotonicity requirement, ensuring that the outputs not decrease as the inputs increase (Golany & Roll, 1989). This criterion is essential to ensure coherence and reliability within the model framework. There is a statistically significant positive correlation among inputs and outputs. Additionally, the selected combinations of inputs and outputs maintained Spearman's rank correlation coefficients below 0.9 (Lee and Seo, 2017) (see Table iv in Appendix B).

Independent variables: Diversity and inclusion scores

Building on prior research that employed the same measure of a company's diversity and inclusion policies and practices (Suciu et al., 2020; Bax, 2023), we examined the impact of each dimension of D&I as independent variables on ECO. The explanatory variables in this research consist of five elements, four key pillars, and a fifth one that encompasses these (D&I Global), offering a comprehensive view of the company's diversity and inclusion policies and practices. The four pillars address various aspects of diversity (D&I Div), inclusion (D&I Incl), people development (D&I PD), and controversies (D&I Contr), and include of 24 metrics outlined in Table 2. These metrics are sourced from the LSEG database, where data are manually collected and verified by experienced analysts (LSEG, 2024). The 5 indices range from 0 to 100 points, with lower scores indicating poorer ratings. The approach for calculating diversity and inclusion scores is detailed in the Refinitiv methodology document[2].

[1]See the following link, https://www.lseg.com/content/dam/data-analytics/en_us/documents/methodology/lseg-esg-scores-methodology.pdf.

[2] See the following link, https://www.lseg.com/content/dam/lseg/en_us/documents/media-centre/press-releases/refinitiv/diversity-inclusion-rating-methodology.pdf.

Table 2. Composition of D&I scores.

Diversity Pillar	Inclusion Pillar	People Development	News & Controversies
Board Gender Diversity	Flexible Working Hours	Internal Promotion	Diversity and Opportunity Controversies
Board Member Cultural Diversity	Day Care Services	Average Training Hours	Wages or Working Conditions Controversies
Women Employees	Employees with Disabilities	Management Training	
New Women Employees			
Women Executive Employees	HRC Corporate Equality Index	Career Development Processes	
Women Managers	HIV/AIDS	Employee Satisfaction	
Diversity Process		Skills Training of Employees	
Diversity Objectives		Training Cost per Employee	

Source: LSEG. Note: The LSEG database also includes controversies published since the last fiscal year company update. These are two additional data points for the frame News & Controversies measures shown but in a more recent timeframe.

Control variables

To avoid specification errors in the model, we include control variables that have been identified in the literature as relevant. These variables are divided into two categories: the first group comprises characteristics associated with firms' corporate governance mechanisms, while the second group consists of firm-specific control variables.

The board of directors holds a key role in ensuring effective control of significant environmental and financial risks. Previous literature suggests that corporate ECO may be influenced by various factors related to board composition and governance practices. Therefore, as the control variables, we considered factors such as board size (B_Size), the presence of independent members on the board of directors (IndpBMemb), and the duality of CEOs and chairman roles (CEO_Duality). Additionally, we incorporated other relevant aspects of corporate governance, including the integration of ESG objectives into executive compensation (Sus_Comp), the presence of a CSR strategy (CSR_Stra) and committee (CSR_Com), or the adoption of quality management systems (QMS).

We have also incorporated the extent to which a company's ECO can be influenced by supporting environmental SDGs (Env_SDGs). Adopted by the United Nations in 2015, the 17 SDGs are a global call to end poverty, protect the planet, and ensure peace and prosperity for all (UN, 2024). In terms of environmental SDGs, following Taglialatela et al. (2023), we have considered the following SDGs: 6, Clean Water and Sanitation; 7, Affordable and Clean Energy; 11, Sustainable Cities and Communities; 12, Responsible Consumption and Production; 13, Climate Action; 14, Life Below Water; and 15, Life on Land. We have developed an environmental SDG index calculated as the ratio between the number of environmental SDGs the company has adopted, and the full set of environmental SDGs available. This index ranges from 0 to 1, depending on the company's contribution to the environmental SDGs.

We have included various firm-specific control variables previously identified in the literature, such as the economic profitability (ROA), capital expenditure (Capex), market risk (Beta), leverage (Lev), firm size (Size), and firm age (Age). The definitions of these variables, their expected signs concerning the dependent variable, and the bibliographic references by which they were selected can be found in Table v (Appendix C). All variables were sourced from the LSEG database.

Model settings

Next, the analysis uses truncated regression to examine the relationship among D&I and ECO. The econometric model is outlined as follows:

$$\widehat{\widehat{ECO}}_{it} = \gamma DIV_{it} + \beta Z_{it} + \eta D_t + \varepsilon_{it} \quad (2)$$

where $\widehat{\widehat{ECO}}_{it}$ is the dependent variable, the ECO score for DMUi of each year t. DIV_{it} is a vector of each of the D&I Index and Z_{it} is a vector of control variables that are expected to explain ECOand D_t is a vector of year dummies from 2016 to 2022. $\gamma, \beta,$ and η are the parameters which are evaluated, and $\mathcal{E}_{it}$ is an error term that is normally distributed with a zero mean, σ_ε^2 variance, and left truncation $(1 - \gamma DIV_{it} - \beta Z_{it} - \eta D_t)$.

The study framework is illustrated in Figure 1 below.

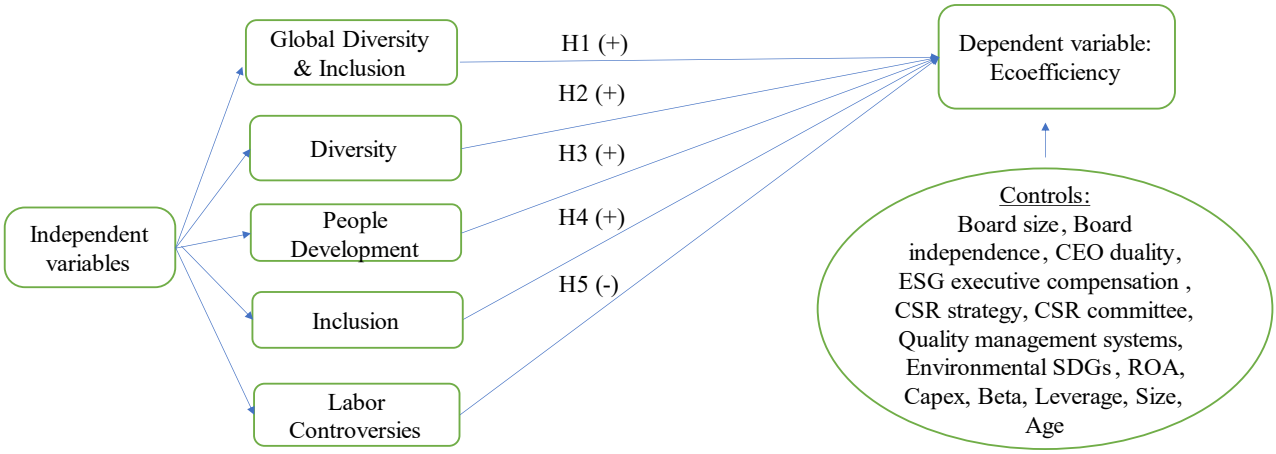

Figure 1. Study framework.

4. Results

4.1. Descriptive statistics

As we indicated in the previous section, in the initial stage, we calculated two types of efficiency, the descriptive statistics of which are shown in Table 3. The average operational efficiency is 44.80%, suggesting a moderate level with room for improvement. These findings align with the results of Maside-Sanfiz et al. (2023) for the global energy sector but are lower than those found in the analysis of the European energy sector conducted by Sánchez-Robles et al. (2022), which reported an average of 27%. Regarding ECO efficiency, the mean is 64.64%, consistent with the averages reported by Ren et al. (2022) and Maside-Sanfiz et al. (2023).

Table 3. Descriptive statistics of operational efficiency and ECO.

	Mean	Std.Dev.	Min.	Max.
Operational efficiency (%)	44.7962	23.3313	0	1
ECO (%)	64.6438	22.6991	0	1

Figure 2 shows the evolution over time of both types of efficiency, which follow a similar trend. The COVID health crisis of 2020 had a negative impact on the evolution of both types of efficiency, which subsequently improved in 2020 and 2021.

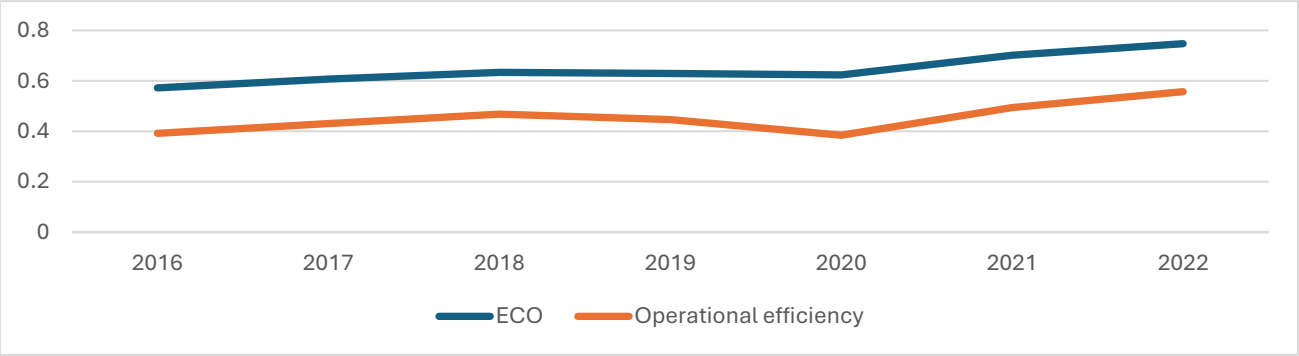

Figure 2. Evolution of efficiency over time.

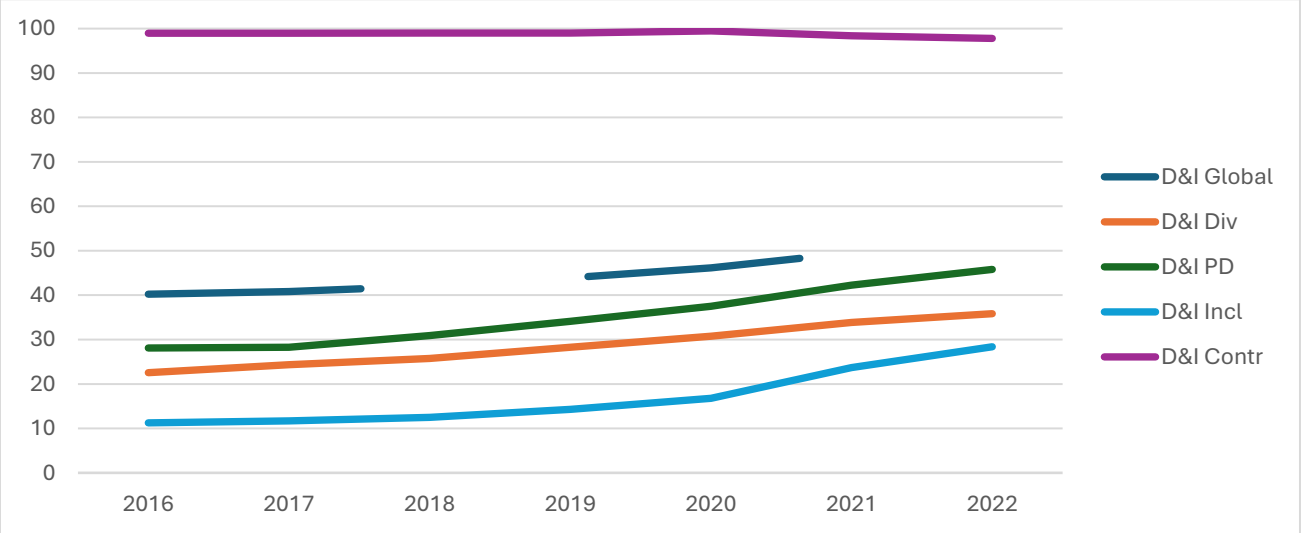

Figure 3. Evolution of D&I scores over time.

Table 4. Descriptive statistics of independent variables.

	Mean	Std.Dev.	Min.	Max.
D&I Global	44.69034	10.21319	22	72.75
D&I Diversity	28.62669	13.65103	0	70
D&I People Development	34.93664	21.63004	0	91
D&I Inclusion	16.30391	19.90899	0	95
D&I Controversies	98.89411	4.976336	50	100

Table 4 presents descriptive statistics for the D&I scores. As can be observed, low levels of performance are evident across both the overall D&I score and its dimensions (Figure 3). The average D&I global score is 44.69%. The results for each of their dimensions, namely, diversity (D&I Div), people development (D&I PD), inclusion (D&I Incl), and controversies (D&I Contr), are as follows: 28.63%, 34.94%, 16.30%, and 98.89%, respectively. A study conducted by Suciu et al. (2020) on a sample of European companies for the year 2020 reported values of 32.28%, 40.88%, 15.76%, and

99.01%, respectively. Therefore, it is noted that the dimensions of inclusion and controversies exhibit very similar values, while the magnitudes of diversity and people development are notably lower in our study. In line with previous research, there is considerable variability in the values across dimensions. For instance, while controversies exhibit minimal variation, 4.97 versus 5.08 in Suciu et al. (2020), inclusion scores demonstrate significant variability, 19.90 versus 20.49 in Suciu et al. (2020). As a result, we observed significant room for improvement in human resource management policies through the implementation of measures that promote professional development, diversity, and especially inclusion in the workplace.

Table 5. Descriptive statistics of control variables.

Variable	Mean	Std.Dev.	Min.	Max.
B_Size	9.119908	3.021639	1	26
CEO_Duality	0.3278237	0.469528	0	1
IndpBMemb (%)	62.69972	23.6498	0	100
Sus_Comp	0.3365473	0.472637	0	1
QMS (%)	35.73083	39.76922	0	90.90909
CSR_Stra (%)	53.42132	31.57636	0	99.84177
CSR_Com (%)	51.96271	33.86232	0	92.59259
Env_SDGs	0.375224	0.3834094	0	1
ROA	0.0286333	0.1604271	-0.9189032	1.719715
Capex	1.24e+09	3.74e+09	0	4.69e+10
Beta	1.427232	0.8599068	-2.427832	9.45791
Lev	0.5727568	0.3878766	0.0015434	8.820139
Size	1.95e+10	5.42e+10	10,034.31	6.64e+11
Age	24.47688	24.69391	0	140

Regarding the control variables (Table 5), the board size of the companies in our sample has a size of 9.12 directors. In relation to the levels of independence of this body, it is worth noting that in 32.78% of the companies, the CEO is also the chairman of the board, and 62.70% of its members are independent directors. In addition, 43.95% of their executives are women. 33.65% already apply ESG metrics in their senior management incentive plans, 35.73% have implemented a quality management system, 53.42% have defined CSR strategies, and 51.96% have a CSR committee. In terms of sustainable development objectives, the number of environmental SDGs that a firm supports is 35.52. In terms of size, the average assets are 1.95e+10, the average age is 24.48 years old, the ROA is 2.86%, the Capex is 1.24e+09, the leverage is 57.27%, and the Beta is 1.43.

In summary, although companies in the energy sector have made progress in CSR-related areas such as appointing independent directors and women executives, a significant proportion of firms have yet to define CSR strategies or establish sustainability committees. Additionally, only a small percentage of companies incorporate ESG metrics into senior management incentive plans or actively support environmental SDGs.

We examine the correlation between D&I scores and the control variables. While the D&I global index and its dimensions exhibit high correlation, they are not included in the same models. Adhering to Brooks's rule (2019), the correlation coefficients do not indicate any issues of collinearity, as their absolute values remain consistently below 0.8. Furthermore, the variance inflation factor (VIF) shows no evidence of multicollinearity.

4.2. Baseline model: Results and discussion

Table 6. Regressions results for the D&I-ECO relationship.

	ECO	ECO	ECO	ECO	ECO
D&I Global	0.005***				
	(0.001)				
D&I Div		0.003***			
		(0.001)			
D&I PD			0.002***		
			(0.000)		
D&I Incl				0.000	
				(0.000)	
D&I Contr					−0.002
					(0.002)
B_Size	0.010***	0.010***	0.010***	0.010***	0.010***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
CEO_Duality	0.015	0.019	0.008	0.010	0.011
	(0.014)	(0.014)	(0.014)	(0.015)	(0.015)
IndpBMemb	−0.001*	−0.001**	−0.000	−0.000	−0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Sus_Comp	0.014	0.009	0.013	0.015	0.013
	(0.014)	(0.014)	(0.015)	(0.015)	(0.015)
QMS	0.001***	0.001***	0.001***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
CSR_Stra	0.001***	0.002***	0.001***	0.002***	0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
CSR_Com	−0.000	0.000	−0.000	−0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Env_SDGs	0.078***	0.079***	0.094***	0.100***	0.102***
	(0.020)	(0.020)	(0.020)	(0.021)	(0.021)
ROA	0.366***	0.379***	0.356***	0.370***	0.370***
	(0.068)	(0.072)	(0.066)	(0.071)	(0.070)
Capex	−0.028***	−0.026***	−0.028***	−0.030***	−0.029***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.008)
Beta	−0.007	−0.011	−0.006	−0.008	−0.008
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Lev	0.043**	0.044**	0.045***	0.049***	0.049***
	(0.018)	(0.018)	(0.017)	(0.018)	(0.017)
Size	0.054***	0.054***	0.056***	0.059***	0.058***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.010)
Age	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	−0.445***	−0.334***	−0.334***	−0.331***	−0.157
	(0.113)	(0.109)	(0.110)	(0.118)	(0.218)
Sigma	0.167***	0.168***	0.166***	0.172***	0.172***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Year FE	Yes	Yes	Yes	Yes	Yes
N	918	918	918	918	918
Wald chi2	669.67	670.21	703.51	598.85	587.88
Prob > chi2	0.0000	0.0000	0.0000	0.0000	0.0000

Note: The dependent variable is the ECO score, computed using 2000 bootstrap replications to correct bias in DEA. Data enclosed in () are the standard error. Dummy variables for time have been used. Asterisks indicate significance at the 10 percent (*), 5 percent (**), and 1 percent (***) levels.

The results of the truncated regression, presented in Table 6, allow us to examine the relationship between D&I practices and ECO as measured by the DEA model. First, our results indicate a positive relationship between the index that collectively measures diversity, inclusion, people development,

and the absence of labor incidents, and ECO. This may be due to the fact that, as pointed out in the conclusions of previous literature in this field (Özbilgin and Tatli, 2011; Rohwerder, 2017), diversity, inclusion, and equality measures in the workplace encourage employee commitment to the organization, improve job satisfaction and absenteeism, promote talent retention, and reduce litigation, with the consequent impact on financial and environmental performance. Our results are consistent with the findings of Suciu et al. (2020) regarding profitability, thus supporting our first formulated hypothesis (H1). Particularly noteworthy is the significant positive correlation between ECO and policies that promote diversity in the workforce, as well as their effective implementation, especially concerning cultural and gender diversity, thereby supporting Hypothesis 2. These results align with studies that associate gender balance and greater cultural diversity with higher financial performance, such as those by de Klerk and Singh (2023) in the healthcare sector or Harjoto et al. (2019) in their analysis of US companies. Furthermore, our findings regarding gender diversity are consistent with empirical studies by Kemp et al. (2015), Li and Nagar (2013), and Williams (2003), all suggesting that women exhibit higher commitment to environmentally friendly behavior (Davidson and Freudenburg, 1996) and are less likely to face lawsuits for breaching environmental requirements (Liu, 2018). However, existing studies primarily focus on gender diversity within the board of directors rather than across the entire company. The only study examining gender diversity globally throughout the entire company, along with cultural diversity on the board, alongside the adoption of diversity policies using an aggregate measure similar to ours, is that of Suciu et al. (2020). Their study reached a similar conclusion to ours but only examined the effect on financial performance.

Similarly, we found a positive and significant relationship between people development, that is investments in training and employee development opportunities, and ECO, thereby supporting Hypothesis 3. While the most obvious direct effects are related to both cost savings and reduced employee turnover, absenteeism, and labor conflicts that can boost productivity, these aspects can also have indirect effects on environmental commitment (Ajgaonkar et al., 2022) and direct effects on productivity and profitability (Aziri, 2011; Katou, 2011).

In relation to inclusion policies, although several studies have positively linked inclusion policies and practices with financial performance (Sears and Mallory, 2011; Li and Nagar, 2013; Pichler et al., 2018) or environmental performance (Habib & Khalid, 2019), our results do not find a statistically significant relationship with the ECO. This aligns with the only study that used the same composite metric as a measure: the human resource management policies. In the study by Suciu et al. (2020), the results were inconclusive since the effect of workforce inclusion policies depended on the measure used for financial performance. Therefore, we cannot confirm Hypothesis 4.

Regarding controversies, our results do not show a relationship with ECO, consistent with the findings of Suciu et al. (2020), who also analyzed labor controversies. Our findings also support and extend previous research examining controversies, not only of labor origin but related to any aspect of sustainability, which found mixed results concerning financial performance (Rodríguez-Fernández et al., 2018; Nirino et al., 2021). Therefore, we cannot confirm the formulated Hypothesis 5.

As for the control variables and corporate governance structure, the results indicate that ECO in the energy sector is positively and significantly influenced by factors such as board size, adoption of a CSR strategy, implementation of quality management systems, and alignment with the United Nations' environmental SDGs. These findings are consistent with previous studies such as those of McGuinness et al. (2017), Shaukat et al. (2016), Kumar et al. (2018), and Taglialatela et al. (2023). Conversely, we did not find significant effects regarding CEO-chairman duality, the integration of ESG aspects into

executive compensation, and the presence of a CSR committee. As for the presence of independent directors, the effects on ECO are not conclusive.

Regarding other control variables, it is evident that firms with higher profitability have higher ECO. More profitable firms tend to reduce production costs, thereby improving financial efficiency (Guo et al., 2020) and acquiring resources that can be applied to enhance their CSR efforts (Ruggiero and Cupertino, 2018; Ramecesse, 2021; López-Penabad et al., 2022).

Similar to the findings in Haque's work (2017), we find a positive relationship between leverage and ECO. It could mean that companies with higher indebtedness may try to divert shareholder attention by disclosing more information about their environmentally responsible behavior. The relationship between Capex and ECO is negative, contrary to studies such as those by Amorelli and García-Sánchez (2023) and Moussa and Elmarzouky (2023), which found a positive effect on environmental commitment. It may be that the effects of increased capital investments will not translate into immediate operational and environmental efficiency improvements, but rather manifest in later years, especially considering our composite measure assessing environmental aspects.

The association between Beta and ECO was found to be non-significant, consistant with De Villiers et al. (2011). One possibility for this non-significant relationship could be market fluctuations having less impact on environmental practices in the energy sector, regulated by external policies and driven by long-term strategic goals rather than direct pressures. Our results also show that, in line with previous research (Waddock and Graves, 1997; Ruggiero and Cupertino, 2018), larger companies are more environmentally friendly due to increased resource availability and heightened sustainability expectations from stakeholders. Finally, contrary to the study of De Villiers et al. (2011), the association between firm age and ECO was not significant.

4.3. Complementary analysis

Table 7. Regressions results for the D&I-environmental score relationship.

	ENV	ENV	ENV	ENV	ENV
D&I Global	0.528***				
	(0.060)				
D&I Div		0.117***			
		(0.038)			
D&I PD			0.271***		
			(0.026)		
D&I Incl				0.063**	
				(0.025)	
D&I Contr					0.032
					(0.065)
Control	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
N	1061	1061	1061	1061	1061
Wald chi2	763.13	633.06	811.51	625.98	612.88
Prob > chi2	0.0000	0.0000	0.0000	0.0000	0.0000

Note: Data enclosed in () are the standard error. Dummy variables for time have been used. Asterisks indicate significance at the 10 percent (*), 5 percent (**), and 1 percent (***) levels.

As a complementary analysis, we ran the models independently for environmental performance, using the environmental score as a proxy, and for financial performance, using ROA as a proxy[3].

As for the results observed when using only the environmental variable as the dependent variable (see Table 7), both diversity, inclusion, and people training and development affect it positively and significantly. In this way, we can verify the interconnection between human capital and environmental factors. Our findings indicate that a stronger D&I is a significant driver of environmental commitment. However, higher diversity and inclusion policies do not guarantee higher financial performance; only training and development opportunities for employees show positive and significant results with ROA (see Table 8). Our findings are in line with those found in the Pakistani manufacturing sector by Syed et al. (2020), who measured recruitment and staff training policies through surveys.

Regarding inclusion policies, our results show that they positively affect environmental performance (Table 7), in line with Habib and Khalid (2019), and do not affect financial performance (Table 8), coinciding with the conclusions of the work by Suciu et al. (2020), which found different results depending on the financial performance measure used. It might be advisable for companies in the energy sector to redesign the jobs held by employees with family reconciliation needs, disabilities, or AIDS/HIV to adapt them to their characteristics and thus improve financial performance.

Regarding labor controversies, although our results align with those of Suciu et al. (2020) and Rodríguez-Fernández et al. (2028), we find it surprising that they do not have an effect on performance, either environmental or financial (see Tables 7 and 8, respectively), especially in a sector with such high reputational risk as the energy sector. In our study, this could be due to the almost absence of labor disputes in the sample under study, with an average score of nearly 99 out of a maximum of 100, and very low variability, of just 5 points.

Table 8. Regressions results for the D&I-financial performance relationship.

	ROA	ROA	ROA	ROA	ROA
D&I Global	0.001				
	(0.001)				
D&I Div		−0.000			
		(0.000)			
D&I PD			0.000*		
			(0.000)		
D&I Incl				−0.000	
				(0.000)	
D&I Contr					0.001
					(0.001)
Control	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
N	1062	1062	1062	1062	1062
R2	0.2645	0.2639	0.2669	0.2636	0.2644

Note: Data enclosed in () are the standard error. Dummy variables for time have been used. Asterisks indicate significance at the 10 percent (*), 5 percent (**), and 1 percent (***) levels. Ordinary least squares estimation has year fixed effects. Standard errors are clustered at firm level.

In conclusion, our findings support the idea that human resources management policies promoting workforce diversity, along with practices fostering job satisfaction through promotion and training,

[3] As a dependent variable, we removed ROA as a control variable.

result in companies that are more environmentally committed, but only in the last case are more economically profitable.

4.4. Robustness

Finally, we carry out various analyses to ensure that the results are unbiased and free from endogeneity issues. So, given that the sample is biased due to the high number of observations from the US (32.24% of the sample), we assess the robustness of our initial findings from the baseline model by employing an alternative estimation approach and excluding observations from US companies[4]. We adopt another widely used model in efficiency literature, the Tobit model, as ECO values are bounded between 0 and 1 (Sánchez-Robles et al., 2022). Overall, the results of the Tobit random effects model closely align with those of the baseline model (see Table 9), with most coefficient estimates remaining stable across both models.

Table 9. Regressions results for the D&I-ECO relationship, non-US firms.

	ECO	ECO	ECO	ECO	ECO
D&I Global	0.006***				
	(0.001)				
D&I Div		0.003***			
		(0.001)			
D&I PD			0.003***		
			(0.000)		
D&I Incl				−0.000	
				(0.000)	
D&I Contr					0.001
					(0.002)
Control	Yes	Yes	Yes	Yes	Yes
Constant	−0.227*	−0.080	−0.087	−0.109	−0.251
	(0.132)	(0.132)	(0.124)	(0.134)	(0.232)
Sigma	0.158***	0.160***	0.154***	0.164***	0.163***
	(0.006)	(0.007)	(0.006)	(0.007)	(0.007)
Year FE	Yes	Yes	Yes	Yes	Yes
N	622	622	622	622	622
Wald chi2	471.00	445.42	509.76	424.37	422.92
Prob > chi2	0.0000	0.0000	0.0000	0.0000	0.0000

Note: Data enclosed in () are the standard error. Dummy variables for time have been used. Asterisks indicate significance at the 10 percent (*), 5 percent (**), and 1 percent (***) levels.

Additionally, to address potential endogeneity concerns, we employed two alternative models. We first re-estimated Equation 1, introducing a lag of one year in various independent and control variables as regressors and using the ordinary least squares (OLS) method. Subsequently, we conducted a two-stage least squares regression (2SLS), utilizing the variables with a one-year lag as instruments, consistent with prior studies (e.g., Amorelli and García-Sánchez, 2023; Khatri, 2023). This paper uses different tests, suggesting that the instruments are valid and that the models are correctly specified.

[4] We used the same control variables as in the baseline analysis.

As we can see in Tables (vi) and (vii) in Appendix D, the results of the robustness analysis confirm the positive and significative correlation between the diversity, inclusion, and people development policies of firms and ECO, and specifically with the implementation of human resources management policies that promote gender and cultural diversity in the organization, as well as training and promotion practices for the workforce, suggesting that the main results are robust to endogeneity.

5. Conclusions

Corporate social responsibility activities have a positive effect on business performance in companies (Jo and Harjoto, 2011; Gherghina et al., 2015; Adeneye and Ahmed, 2015). However, in the energy sector, this effect is more pronounced compared to other sectors (Iazzolino et al., 2023), due to the high public scrutiny it faces, both because of the nature of its activities and the size of its companies (Beck et al., 2018). Improving the efficiency and sustainability of companies is paramount, and the study of the factors influencing these in such a crucial sector as energy has not received sufficient attention in previous research. Among these factors, the role of human capital management stands out, as attracting and retaining talent in today's companies is linked not only to salary but also to values such as diversity, equality, and inclusion in the workplace. This article aims to assess the impact of diversity and inclusion initiatives in workplaces on ECO of 373 listed energy companies from a total of 53 countries for the period 2016–2022.

In the descriptive analysis conducted, we observed a wide scope for improvement in human resource management policies by introducing measures that foster professional development, diversity, and especially inclusion in the workplace.

In the multivariate analysis, this research verifies the relationship between human capital management and ECO in the energy sector, concluding that effective workforce management translates into achievements in both economic and environmental realms. Specifically, policies focused on training and career advancement, as well as those aimed at gender and cultural diversity for employees, become drivers of improved ECO. Our results also indicate that while companies in the energy sector have made progress in certain CSR-related areas, such as appointing independent directors and women executives, a notable proportion of companies have yet to define CSR strategies or establish sustainability committees. Furthermore, there remains a low percentage of companies incorporating ESG metrics into senior management incentive plans or actively supporting environmental SDGs.

This study has practical implications for various stakeholders in the energy sector. First, it provides a tool that can be useful for stakeholders seeking to comprehensively analyze business performance management called ECO, by incorporating not only financial aspects but also an indicator that includes 286 environmental measures. Second, our results strongly support the need for energy company managers to place diversity, equality, and inclusion policies as the central axis of human resources management since these aspects are crucial for company executives as they enable them to optimize human resources management while enhancing ECO. Third, although there are both social justice (Dahanayake et al., 2018) and ethical and moral (Gotsis and Kortezi, 2013) reasons for the public sector to define policies that promote diversity, equality, and inclusion in the workplace, our findings have clear implications for guiding regulators and policymakers in ensuring the sustainable development of the sector. Sustainable development involves putting people at the center of management, developing actions based on environmental responsibility, and not focusing solely on

financial objectives (Camilleri, 2017). This is today referred to as the triple bottom line toward which the management of energy companies should be focused.

From a theoretical standpoint, our findings allow for the integration of stakeholder theory and resource-based theory as a framework to frame human resources management in the energy sector. Thus, organizations that demonstrate commitment to diversity, equity, inclusion, and climate transition enhance their corporate reputation and create long-term value for all stakeholders, as advocated by stakeholder theory. Simultaneously, these practices create scarcely imitable competitive advantages that represent highly valuable intangibles, as supported by resource-based theory. Therefore, these theories are compatible in explaining the CSR behavior of energy companies.

Based on our findings, policymakers could enact and refine regulations to promote human resources management policies that emphasize diversity and human resource development within the sector. This strategic approach aims to foster the development of more sustainable companies, benefiting both environmentally and economically. Additionally, investors are increasingly interested in social aspects such as diversity and training, as our research has demonstrated their close relationship with financial and environmental outcomes. As a result, our study offers valuable insights and recommendations for industry managers seeking to implement sustainable business practices, particularly through effective talent management strategies. Furthermore, it provides guidance for investors interested in constructing environmentally conscious portfolios. Moreover, stakeholders within the energy sector should consider incorporating environmental, social, and governance (ESG) criteria into their decision-making processes to ensure long-term sustainability and resilience amidst evolving global challenges.

While this study significantly broadens the existing literature and deepens our understanding of the link between diverse and inclusive workplaces and their financial performance and environmental impact, the results should be considered in light of several limitations. First, the sample is restricted to a specific timeframe and includes only listed energy sector companies. Consequently, these findings may not be applicable to other sectors or to privately held energy firms, indicating a need for future research on other environmentally sensitive industries. Second, our study concentrates on firm-level factors and does not account for institutional or macro-level influences that might also impact financial and environmental performance. For instance, aspects such as public governance quality—including enforcement mechanisms, rulemaking and regulatory frameworks, the overall environmental and social development of countries, and a free press—could compel energy companies to implement certain CSR practices. Future research should explore the relationship between these institutional factors and company ECO. Finally, the sample is predominantly skewed toward developed countries, as illustrated in Table i of Appendix A, which could affect the study's results.

Acknowledgments

This study was carried out with financial aid from the Valoración Financeira Aplicada (VALFINAP, GI-1866-USC), Xunta de Galicia [grant number ED431C 2024/08].

Use of AI tools declaration

The authors declare they have not used Artificial Intelligence (AI) tools in the creation of this article.

Author contributions

Conceptualization, O S-F, JM M-S and MC L-P; data collection and curation, O S-F, JM M-S and MO A; formal analysis, O S-F, JM M-S, MC L-P and MO A; investigation O S-F, JM M-S, MC L-P and MO A**;** methodology O S-F, JM M-S and MC L-P; project administration, O S-F, JM M-S and MC L-P; software, O S-F, JM M-S and MC L-P; supervision, O S-F and JM M-S; visualization, O S-F, JM M-S, MC L-P and MO A; writing—original draft, O S-F, JM M-S and MC L-P; writing—review and editing, O S-F, JM M-S, MC L-P and MO A. All authors have read and agreed to the published version of the manuscript.

Conflict of interest

All authors declare no conflicts of interest in this paper.

References

Adeneye YB, Ahmed M (2015) Corporate social responsibility and company performance. *J Bus Stud Q* 7: 151–166.

Ahmadi A, Nakaa N, Bouri A (2018) Chief Executive Officer attributes, board structures, gender diversity and firm performance among French CAC 40 listed firms. *Res Int Bus Financ* 44: 218–226. https://doi.org/10.1016/j.ribaf.2017.07.083

Ajgaonkar S, Neelam NG, Wiemann J (2021) Drivers of workforce agility: a dynamic capability perspective. *Int J Organ Anal* 30: 951–982. https://doi.org/10.1108/ijoa-11-2020-2507

Amorelli MF, García-Sánchez IM (2023) Leadership in heels: Women on boards and sustainability in times of COVID-19. *Corp Soc Responsib Environ Manag* 30: 1987–2010. https://doi.org/10.1002/csr.2469

Aouadi A, Marsat S (2018) Do ESG Controversies Matter for Firm Value? Evidence from International Data. *J Bus Eth* 151: 1027–1047. https://doi.org/10.1007/s10551-016-3213-8

Aziri B (2011) Job satisfaction, a literature review. *Man Res Pract* 3: 77–68.

Bax K (2023) Do diverse and inclusive workplaces benefit investors? An Empirical Analysis on Europe and the United States. *Fin Res Lett* 52: 103509. https://doi.org/10.1016/j.frl.2022.103509

Beck C, Frost G, Jones S (2018) CSR disclosure and financial performance revisited: A cross-country analysis. *Aust J Mana* 43: 517–537. https://doi.org/10.1177/ 0312896218771438

Ben-Amar W, Chang M, McIlkenny P (2017) Board gender diversity and corporate response to sustainability initiatives: evidence from the Carbon Disclosure Project. *J Bus Ethics* 142: 369–383. https://doi.org/10.1007/s10551-015-2759-1

Bengisu M, Balta S (2011) Employment of the workforce with disabilities in the hospitality industry. *J Sustain Tour* 19: 35–57. https://doi.org/10.1080/09669582.2010.499172

Brooks C (2019) Introductory econometrics for finance. Cambridge university press.

Burkhardt K, Nguyen P, Poincelot E (2020) Agents of change: Women in top management and corporate environmental performance. *Corp Soc Responsib Environ Manag* 27: 1591–1604. https://doi.org/10.1002/csr.1907

Camilleri MA (2017) Corporate sustainability and responsibility: creating value for business, society and the environment. *Asian J Sustain Soc Responsib* 2: 59–74. https://doi 10.1186/s41180-017-0016-5

Choi JN, Sung SY, Zhang Z (2017) Workforce diversity in manufacturing companies and organizational performance: the role of status-relatedness and internal processes. *Int J Hum Resour Manag* 28: 2738–2761. https://doi.org/10.1080/09585192.2016.1138315

Colella AJ, Bruyère SM (2011) Disability and employment: New directions for industrial and organizational psychology. In S. Zedeck (Ed.), *APA handbook of industrial/organizational psychology. Washington, DC: American Psychological Association*, 473–503. https://doi.org/10.1037/12169-015

D'apolito E, Iannuzzi AP, Labini SS, et al. (2019) Sustainable compensation and performance: an empirical analysis of European banks. *J Financ Manag Mark I* 7: 1940004. https://doi.org/10.1142/S2282717X19400048

Dahanayake P, Rajendran D, Selvarajah C, et al. (2018) Justice and fairness in the workplace: A trajectory for managing diversity. *Equal Divers Incl* 37: 470–490. https://doi.org/10.1108/EDI-11-2016-0105

Davidson DJ, Freudenburg WR (1996) Gender and environmental risk concerns. *Environ Behav* 28: 302–339. https://doi.org/10.1177/0013916596283003

de Klerk K, Singh F (2023) Does Gender and Cultural Diversity Matter for Sustainability in Healthcare? Evidence from Global Organizations. *Sustainability* 15: 11695. https://doi.org/10.3390/su151511695

De Villiers C, Naiker V, Van Staden CJ (2011) The effect of board characteristics on firm environmental performance. *J Manage* 37: 1636–1663. https://doi.org/10.1177/0149206311411506

European Commission (2020) Study on energy prices, costs and their impact on industry and households: Final report. Directorate-General for Energy, European Union. https://doi.org/10.2833/49063

Farrell KA, Hersch PL (2005) Additions to corporate boards: The effect of gender. *J Corp Fin* 11: 85–106. https://doi.org/10.1016/j.jcorpfin.2003.12.001

Freeman RE (1984) Strategic Management: A Stakeholder Approach (Pittman, Marshfield, MA).

García-Amate A, Ramírez-Orellana A, Rojo-Ramírez AA, et al. (2023) Do ESG controversies moderate the relationship between CSR and corporate financial performance in oil and gas firms? *Humanit Soc Sci Commun* 10: 1–14. https://doi.org/10.1057/s41599-023-02256-y

Gherghina ŞC, Vintilă G, Dobrescu D (2015) An empirical research on the relationship between corporate social responsibility ratings and US listed companies' value. *J Econ Stud* 2015: 1–12. https://doi.org/10.5171/2015.260450

Giannetti M, Zhao M (2019) Board ancestral diversity and firm-performance volatility. *J Financ Quant Anal* 54: 1117–1155. https://doi.org/10.1017/S0022109018001035

Golany B, Roll Y (1989) An Application Procedure for DEA. *Omega* 17: 237–250. https://doi.org/10.1016/0305-0483(89)90029-7

González-Ramos MI, Donate MJ, Guadamillas F (2018) An empirical study on the link between corporate social responsibility and innovation in environmentally sensitive industries. *Eur J Int Manag* 12: 402–422. https://doi.org/10.1504/EJIM.2018.092842

Gotsis G, Kortezi Z (2013) Ethical paradigms as potential foundations of diversity management initiatives in business organizations. *J Organ Change Manag* 26: 948–976. https://doi.org/10.1108/JOCM-11-2012-0183

Guo H, Wang C, Su Z, et al. (2020) Technology push or market pull? Strategic orientation in business model design and digital start-up performance. *J Prod Innov Manage* 37: 352–372. https://doi.org/10.1111/jpim.12526

Guthrie JP (2001) High-Involvement Work Practices, Turnover, and Productivity: Evidence from New Zealand. *Acad Manage J* 44: 180–190. https://doi.org/10.5465/3069345

Habib A, Khalid A (2019) High-Performance Work Practices and Environmental Social Responsibility of Firm: Mediatory role of Individually Perceived Stress. *Int J Psychol* 1: 1–21.

Haque F (2017) The effects of board characteristics and sustainable compensation policy on carbon performance of UK firms. *Brit Account Rev* 49: 347–364. https://doi.org/10.1016/j.bar.2017.01.001

Harjoto MA, Laksmana I, Yang YW (2019) Board nationality and educational background diversity and corporate social performance. *Corp Gov* 19: 217–239. https://doi.org/10.1108/CG-04-2018-0138

Harrison JS, Wicks A C (2013) Stakeholder theory, value and firm performance. *Bus Ethics Q* 23: 97–124. https://doi.org/10.5840/beq20132314

Horwitz SK (2005) The compositional impact of team diversity on performance: Theoretical considerations. *Hum Resour Dev Rev* 4: 219–245. https://doi.org/10.1177/1534484305275847

Hossain M, Atif M, Ahmed A, et al. (2020) Do LGBT workplace diversity policies create value for firms? *J Bus Ethics* 167: 775–791. https://doi.org/10.1002/hrm.21831

Hussain N, Rigoni U, Orij RP (2018) Corporate governance and sustainability performance: analysis of triple bottom line performance. *J Bus Ethics* 149: 411–432. https://doi.org/10.1007/s10551-016-3099-5

Iazzolino G, Bruni ME, Veltri S, et al. (2023) The impact of ESG factors on financial efficiency: An empirical analysis for the selection of sustainable firm portfolios. *Corp Soc Responsib Environ Manag* 30: 1917–1927. https://doi.org/10.1002/csr.2463

IEA (2018) Topics: Climate change. Available from: https://www.iea.org/topics/climatechange.

Issa A, Zaid MAA, Hanaysha JR, et al. (2022) An examination of board diversity and corporate social responsibility disclosure: Evidence from banking sector in the Arabian Gulf countries. Int *J Account Inf Manag* 30: 22–46. https://doi.org/10.1108/IJAIM-07-2021-0137

Jiraporn P, Potosky D, Lee SM (2019) Corporate governance and lesbian, gay, bisexual, and transgender-supportive human resource policies from corporate social responsibility, resource-based, and agency perspectives. *Hum Resour Manage-US* 58: 317–336. https://doi.org/10.1002/hrm.21954

Jo H, Harjoto MA (2011) Corporate Governance and Firm Value: The Impact of Corporate Social Responsibility. *J Bus Ethics* 103: 351–383. https://doi.org/10.1007/s10551-011-0869-y

Kang J, Kim YH (2013) The impact of media on corporate social responsibility. Available at *SSRN* 2287002. https://ssrn.com/abstract=2287002

Kareem MA, Hussein IJ (2019) The impact of human resource development on employee performance and organizational effectiveness. *Manag Dyn Knowl Econ* 7: 307–322. https://doi.org/10.25019/mdke/7.3.02

Katou AA (2011) A mediation model linking business strategies, human resource management, psychological contract, and organisational performance. *Int J Hum Resour Dev Manag* 11: 51–67. https://doi.org/10.1504/IJHRDM.2011.041115

Kemp LJ, Madsen SR, Davis J (2015) Women in business leadership: A comparative study of countries in the Gulf Arab states. *Int J Cross Cult Manag* 15: 215–233. https://doi.org/10.1177/1470595815594819

Khatri I (2023) Board gender diversity and sustainability performance: Nordic evidence. *Corp Soc Resp Env Manag* 30: 1495–1507. https://doi.org/10.1002/csr.2432

Kim DH, Wu YC, Lin SC (2022) Carbon dioxide emissions, financial development and political institutions. *Econ Chang Restruct* 55: 837–874. https://doi.org/10.1007/s10644-021-09331-x

Kim KH, Kim M, Qian C (2018) Effects of corporate social responsibility on corporate financial performance: A competitive-action perspective. *J Manag* 44: 1097–1118. https://doi.org/10.1177/0149206315602530

Kraiger K, McLinden D, Casper WJ (2004) Collaborative planning for training impact. *Hum Resour Manag J* 43: 337–351. https://doi.org/10.1002/hrm.20028

Krüger P (2015) Corporate goodness and shareholder wealth. *J Financ Econ* 115: 304–329. https://doi.org/10.1016/j.jfineco.2014.09.008

Kumar A, Gupta J, Das N (2022) Revisiting the influence of corporate sustainability practices on corporate financial performance: An evidence from the global energy sector. *Bus Strategy Environ* 31: 3231–3253. https://doi.org/10.1002/bse.3073

Kumar P, Maiti J, Gunasekaran A (2018) Impact of quality management systems on firm performance. *Int J Qual Reliab Manage* 35: 1034–1059. https://doi.org/10.1108/IJQRM-02-2017-0030

Lahouel BB, Zaied YB, Managi S, et al. (2022) Re-thinking about U: The relevance of regime-switching model in the relationship between environmental corporate social responsibility and financial performance. *J Bus Res* 140: 498–519. https://doi.org/10.1016/j.jbusres.2021.11.019

Lee P, Seo YW (2017) Directions for social enterprise from an efficiency perspective. *Sustainability* 9: 1914. https://doi.org/10.3390/su9101914

Li F, Nagar V (2013) Diversity and performance. *Manag Sci* 59: 529–544. https://doi.org/10.1287/mnsc.1120.1548

Li J, Haider ZA, Jin X, et al. (2019) Corporate controversy, social responsibility and market performance: International evidence. *J Int Financ Mark Inst Money* 60: 1–18. https://doi.org/10.1016/j.intfin.2018.11.013

Liu C (2018) Are women greener? Corporate gender diversity and environmental violations. *J Corp Fin* 52: 118–142. https://doi.org/10.1016/j.jcorpfin.2018.08.004

López-Penabad MC, Iglesias-Casal A, Neto JFS, et al. (2022) Does corporate social performance improve bank efficiency? Evidence from European banks. *Rev Manag Sci* 17: 1399–1437. https://doi.org/10.1007/s11846-022-00579-9

LSEG Data, Analytics (2022) Environmental, social and governance scores from LSEG. Available from: https://www.lseg.com/content/dam/data-analytics/en_us/documents/methodology/lseg-esg-scores-methodology.pdf.

Lu WM, Kweh QL, Ting IWK, et al. (2023) How does stakeholder engagement through environmental, social, and governance affect eco-efficiency and profitability efficiency? Zooming into Apple Inc. 's counterparts. *Bus Strategy Environ* 32: 587–601. https://doi.org/10.1002/bse.3162

Maside-Sanfiz JM, Suárez-Fernández Ó, López-Penabad MC, et al. (2023) Does corporate social performance improve environmentally adjusted efficiency? Evidence from the energy sector. *Corp Soc Responsib Environ Manag.* https://doi.org/10.1002/csr.2650

McGuinness PB, Vieito JP, Wang M (2017) The role of board gender and foreign ownership in the CSR performance of Chinese listed firms. *J Corp Finance* 42: 75–99. https://doi.org/10.1016/j.jcorpfin.2016.11.001

McKinsey, Company Organisation (2015) Women in the workplace. Available from: https://www.mckinsey.com/business-functions/organisation/our-insights/women-in-the-workplace.

Meyer CS, Mukerjee S, Sestero A (2001) Work-family benefits: which ones maximize profits? *J Manag Issues*, 28-44. https://www.jstor.org/stable/40604332

Moussa AS, Elmarzouky M (2023) Does Capital Expenditure Matter for ESG Disclosure? A UK Perspective. *J Risk Financial Manag* 16: 429. https://doi.org/10.3390/jrfm16100429

Naciti V, Noto G, Vermiglio C, et al. (2022) Gender representation and financial performance: an empirical analysis of public hospitals. *Int J Public Sect Manag* 35: 603–621. https://doi.org/10.1108/IJPSM-01-2022-00

Nadler Z (2012) Designing Training Programs. Hoboken, NJ: Taylor and Francis. https://doi.org/10.4324/9780080503974

Nirino N, Santoro G, Miglietta N, et al. (2021) Corporate controversies and company's financial performance: Exploring the moderating role of ESG practices. *Technol Forecast Soc* 162: 120341. DOI10.1016/j.techfore.2020.120341

Nyeadi JD, Kamasa K, Kpinpuo S (2021) Female in top management and firm performance nexus: Empirical evidence from Ghana. *Cogent Eco Financ* 9: 1921323. https://doi.org/10.1080/23322039.2021.1921323

Özbilgin M, Tatli A (2011) Mapping out the field of equality and diversity: Rise of individualism and voluntarism. *Hum Relat* 64: 1229–1253. https://doi.org/10.1177/0018726711413620

Pichler S, Blazovich JL, Cook KA, et al. (2018) Do LGBT-supportive corporate policies enhance firm performance? *Hum Resour Manag J* 57: 263–278. https://doi.org/10.1002/hrm.21831

Prieto LC, Phipps ST, Osiri JK (2009) Linking workplace diversity to organizational performance: A conceptual framework. *J Divers Manag* 4: 13–22. https://doi.org/10.19030/jdm.v4i4.4966

Provasi R, Harasheh M (2020) Gender diversity and corporate performance: Emphasis on sustainability performance. *Corp Soc Responsib Environ Manag* 28: 127–137. https://doi.org/10.1002/csr.2037

Ramecesse AD (2021) Corporate Social Responsibility and Firm Performance in SMEs: Empirical Evidence from Cameroon. *Bus Econ Res* 11: 88–105. https://doi.org/10.5296/ber.v11i3.18986

Ramírez-Orellana A, Martínez-Victoria M, García-Amate A, et al. (2023) Is the corporate financial strategy in the oil and gas sector affected by ESG dimensions? *Resour Pol* 81: 103303. https://doi.org/10.1016/j.resourpol.2023.103303

Ren C, Ting IWK, Lu WM, et al. (2022) Nonlinear effects of ESG on energy-adjusted firm efficiency: Evidence from the stakeholder engagement of apple incorporated. *Corp Soc Responsib Environ Manag* 29: 1231–1246. https://doi.org/10.1002/csr.2266

Rodríguez-Fernández M, Sánchez-Teba EM, López-Toro AA, et al. (2019) Influence of ESGC indicators on financial performance of listed travel and leisure companies. *Sustainability* 11: 5529. https://doi.org/10.3390/su11195529

Rohwerder B (2017) Impact of diversity and inclusion within organizations. *Inst Dev Stud*, 13073.

Rosati F, Faria LGD (2019) Business contribution to the Sustainable Development Agenda: Organizational factors related to early adoption of SDG reporting. *Corp Soc Responsib Environ Manag* 26: 588–597. https://doi.org/10.1002/csr.1705

Ruggiero P, Cupertino S (2018) CSR strategic approach, financial resources and corporate social performance: The mediating effect of innovation. *Sustainability* 10: 3611. https://doi.org/10.3390/su10103611

Salas E, Cannon-Bowers J (2000) Teams in organizations: Lessons from history. Work teams: Past, present and future: 323–331.

Sanchez-Robles B, Herrador-Alcaide TC, Hernández-Solís M (2022) Efficiency of European oil companies: an empirical analysis. *Energy Effic* 15: 1–28. https://doi.org/10.1007/s12053-022-10069-2

Sears B, Mallory C (2011) Documented evidence of employment discrimination & its effects on LGBT people. Available from: https://escholarship.org/uc/item/03m1g5sg.

Sgrò F (2021) Intellectual capital and organizational performance. SIDREA Series in Accounting and Business Administration. New York: Springer International Publishing.

Shahbaz M, Karaman AS, Kilic M, et al. (2020) Board attributes, CSR engagement, and corporate performance: What is the nexus in the energy sector? *Energ Policy* 143: 111582. https://doi.org/10.1016/j.enpol.2020.111582

Shaukat A, Qiu Y, Trojanowsk G (2016) Board attributes, corporate social responsibility strategy, and corporate environmental and social performance. *J Bus Ethics* 135: 569–585. https://doi.org/10.1007/s10551-014-2460-9

Stefanoni S, Voltes-Dorta A (2021) Technical efficiency of car manufacturers under environmental and sustainability pressures: A data envelopment analysis approach. *J Clean Prod* 311: 127589. https://doi.org/10.1016/j.jclepro.2021.127589

Suciu MC, Noja GG, Cristea M (2020) Diversity, social inclusion and human capital development as fundamentals of financial performance and risk mitigation. *Amfiteatru Econ* 22: 742–757. http://dx.doi.org/10.24818/EA/2020/55/742

Sueyoshi T, Yuan Y, Goto M (2017) A literature study for DEA applied to energy and environment. *Energy Econ* 62: 104–124. https://doi.org/10.1016/j.eneco.2016.11.006

Syed MW, Li JZ, Junaid M, et al. (2020) Relationship between human resource management practices, relationship commitment and sustainable performance. *Green Financ* 2: 227–242. https://doi.org/10.3934/GF.2020013

Taglialatela J, Pirazzi Maffiola K, Barontini R, et al. (2023) Board of Directors' characteristics and environmental SDGs adoption: an international study. *Corp Soc Responsib Environ Manag* 30: 2490–2506. https://doi.org/10.1002/csr.2499

United Nations (2012) SD21 Summary for Policy Makers. In Back to Our Common Future: Sustainable Development in the 21st century (SD21) project. United Nations, New York.

Urwin P, Parry E, Dodds I, et al. (2013) The Business Case for Equality and Diversity: a survey of the academic literature (BIS OCCASIONAL PAPER NO. 4). Department for Business Innovation & Skills & Government Equalities Office. Available from: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/49638/the_business_case_for_equality_and_diversity.pdf.

Waddock SA, Graves SB (1997) Quality of management and quality of stakeholder relations: Are they synonymous? *Bus Soc* 36: 250–279. https://doi.org/10.1177/000765039703600303

Walls JL, Hoffman AJ (2013) Exceptional boards: Environmental experience and positive deviance from institutional norms. *J Organ Behav* 34: 253–271. https://doi.org/10.1002/job.1813

Wang Y, Clift B (2009) Is there a "business case" for board diversity? *Pac Account Rev* 21: 88–103. https://doi.org/10.1108/01140580911002044

Webb E (2004) An examination of socially responsible firms' board structure. *J Manag Gov* 8: 255–277. https://doi.org/10.1007/s10997-004-1107-0

Wernerfelt B (1984) A resource-based view of the firm. *Strategic Manage J* 5: 171–180. https://doi.org/10.1002/smj.4250050207

Williams RJ (2003) Women on corporate boards of directors and their influence on corporate philanthropy. *J Bus Ethics* 42: 1–10. https://doi.org/10.1023/A:1021626024014

Wright PC, Geroy GD (2001) Changing the mindset: the training myth and the need for world-class performance. *Int J Hum Resour Man* 12: 586–600. https://doi.org/10.1080/09585190122342

Zaid MA, Wang M, Adib M, et al. (2020) Boardroom nationality and gender diversity: Implications for corporate sustainability performance. *J Clean Prod* 251: 119652. https://doi.org/10.1016/j.jclepro.2019.119652

Zampone G, Nicolò G, Sannino G, et al. (2024) Gender diversity and SDG disclosure: the mediating role of the sustainability committee. *J Appl Account Res* 25: 171–193. https://doi.org/10.1108/JAAR-06-2022-0151

AIMS Press