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Are corporate social responsibility and environmental management 'influencers' of performance in companies of the energetic sector?

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Abstract
Prior research has suggested that Corporate Social Responsibility (CSR) may affect Environmental Management (EM). Nevertheless, there has been a lack of empirical studies that have examined these relationships, specially, in companies of the energetic field. This research empirically examines whether there is a positive relationship between the implementation of a CSR culture in a company and the obtaining of better Operational Performance, as well as between CSR and EM processes and also between EM and Operational Performance. The analysis of the results obtained through the Partial Least Squares (PLS) methodology concludes that there is a positive relationship between all of them, including this paper a main contribution to Literature as it is the fact that EM plays a mediator role increasing the CSR impact over Operational Performance. The major implication derived from this study is that investments in CSR and EM practices towards all the company stakeholders should positively affect performance. Therefore, both should be equally as important as other functions of a firm.

Keywords Corporate social responsibility · Environmental management · Partial least squares · Energetic sector · Operational performance

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1 Introduction

To comply with the 2030 Framework of policies on climate and energy (Fitch-Roy & Fairbrass, 2018), energy is expected to come from renewable energy resources since it seeks to reduce greenhouse gases by 40% by 2035 (MITECO, 2021), While this objective must be pursued in a responsible manner by society, seeking incremental change toward radical transformation (Kulovesi & Oberthür, 2020).

In this sense, talking about Environmental Management (EM) is talking about the ISO 14,000 standards. In 1987 the ISO 9000 standards were created, which were used for the development of quality management systems in companies, a decade later, in 1996, the ISO 14,000 standard was created, which is not an independent standard, but is complementary to the ISO 9000 standard, since it improves the perspective and gives guidelines for the company's EM (Marques de Almeida & da Costa Marques, 2002).

Without a doubt, the ISO 14,001 standard is the central axis of the EM standard. This standard establishes the criteria for the implementation of an EM system in a company. Within the implementation of this standard, future positive results for the company that implements it can be included, such as the improvement of the organization's relationship with the environment, being able to comply with the laws established by governments to comply with objective environmental standards and achieve the company's environmental objectives (AENOR, 2021). This standard, in turn, allows any type of organization (international companies, SMEs, etc.) to implement it (Delmas & Montes-Sancho, 2011; Nouri & Toutounchian, 2004). ISO 14,001 is structured according to the Plan, Do, Verify, Act (PDCA) methodology and is based on the Continuous Improvement Cycle (Rajic et al., 2020).

Over the past few years, sustainability has emerged not only as a long-term aspiration but also as an integral part of corporate values (Mirvis et al., 2010). In this vein, both large enterprises and small and medium-sized businesses have recognized the need to integrate sustainability principles into their operations, embedding them into their mission, vision, and values (Baral et al., 2017), as well as defining and improving the sustainability metrics (Slager et al., 2021).

In fact, support coming from institutions through, for example, technical and financial assistance, is required for executing these strategies based on sustainability (Hao et al., 2018). In this sense, the principal stakeholders which include international agencies, scientists, politicians, legislators, government institutions and non-profit groups, and communities need to cooperate for the deployment of these strategies. Besides, Khosravi Mashizi et al. (2022) claim that social, economic, and ecological challenges should also be pointed out and communicated to clear the way for the suggested adaptation strategies.

As a consequence, the main contributions and research questions of this paper are: (i) How EM could increase CSR impact over Operational Performance?; (ii) How an EM system could help to increase organizational Operational Performance? (iii) Does EM mediate between other variables and firm performance, enhancing this last?. (iv) How could the above relationships be explored using Partial Least Squares modelling?

The following review supplies functional information for researchers, regulators, and specialists, which may activate future researchers to run more quantitative analysis on CSR and EM. Besides, business practice and legislators should be conscious of the great need to build up the emphasis of CSR over performance and related CSR reporting instruments.

Practitioners may be also encouraged to implement stricter EM practices and tools in order to decrease negative impacts on society and lower negative information excess regarding CSR.

More specifically, the selected organizations predominantly have more than 250 employees. Data was collected via a tailored questionnaire accessible through a dedicated webpage. For each variable, we gathered information from four sources: Production, Environmental, Quality, and HR managers.

In order to achieve the above-mentioned main contributions, the paper is arranged in several sections. The first one inquires the CSR concept. Secondly, the analysis of the relationship between CSR and EM for organizations is underlined. The article explores the effect of CSR on operational performance, followed by an examination of the mediating role of EM in the relationship between CSR and operational performance, as well as the direct influence of EM on operational performance. It then meticulously outlines the employed methodology, followed by a presentation of the empirical study's findings, which involve examining the hypotheses using 72 energetic firms. The study concludes by meticulously discussing the most salient results, elaborating on practical implications, Proposing future research avenues and highlighting the limitations of the study.

2 Literature review

2.1 CSR: origin, concept, and history

Corporate Social Responsibility (CSR) is related to the business world. However, making a profit cannot be at any price.

In the 1960s, Nobel Laureate in Economics Milton Friedman defined CSR as: "*It is an instrument of the shareholders, who are its owners. If the company contributes, it prevents shareholders from deciding how they should dispose of their funds*"(Amador de Avila & Alvarez Quintana, 2012, p. 6).

Subsequently, specifically, on December 19, 1983, the United Nations General Assembly presented a report on the environment and world problems up to the year 2000. *The Brundtland Report*, as it was called, deals with different topics divided into three parts. The first part of the study explores new approaches to environmental and development issues, examining the concepts of equity and common interest, and the role of the international economy in shaping environmental policies and practices. The second part delves into various environmental challenges and their implications for human well-being. It examines topics such as population growth and its impact on resource consumption, food security challenges, the conservation of biodiversity and ecosystems, energy production and its environmental impact, the relationship between environmental policies and economic growth, the role of fossil fuels in the global energy mix, and the sustainability of industrial practices … The third part deals with topics such as the administrations of common spaces (oceans, Antarctica, etc.) and peace (ONU, 1987).

Following the chronological axis, at the end of the 90s, institutions were established that promoted CSR in most developed countries (Hack et al., 2014). Likewise, the so-called GRI is established. It is an independent institution that oversees the implementation of sustain-

ability practices for companies and organizations. They measure and analyse social, environmental, and economic performance (Hishan et al., 2017).

Later, in the early 2020s, *The Davos Manifesto* was created. This manifest conveys the purpose of the companies in the so-called Industry 4.0. It means that companies must see value beyond economic benefits, in the relationship that the company maintains with its employees, with society, with the environment. It is also highlighted that the company is an interest group in itself (Andreu Pinillos & Fernández Mateo, 2020). In addition, there is support for the CSR of the new generations, identifying the need for companies to carry out these practices (Luger et al., 2022).

2.2 The relationship between CSR and operational performance

Several studies have examined the relationship between CSR and performance. Specifically, recently, Ryu et al. (2021) have identified a relationship between CSR, audit committee experience and financial performance in Korean companies. Concerning this, although CSR reporting is voluntary, unlike financial reporting, which is subject to audit; While the percentage of S&P 500 companies publishing CSR reports has declined slightly in recent years, it remains relatively high, with 85% of companies still releasing these reports (Du & Yu, 2021).

That could be explained by three different currents: on the one side, because investors consider the CSR reports of companies. The way to disclose CSR is through annual reports or CSR reports and communications for external personnel (Fatima & Elbanna, 2021). If these reports are linked to promoting higher financial performance, the investment will be stronger. However, on the other side, the second current state that the implementation of CSR depends on the managers of the company. For example, the ability to convey CSR information to employees is a management task. There are studies that indicate that this is not always done correctly (Fernández-Ferrín et al., 2021), what could impact negatively on performance. In general, in big companies, CEOs carry out CSR practices much more than in companies that are family owned or are less larger (Meier & Schier, 2021).

A third consideration is that while stakeholders possess rights that should be respected, it is also essential to recognize that they hold obligations that influence the firm. In this vein, Muruviwa et al. (2020) delved into the intricate dynamics between corporations and CSR stakeholders, investigating how their reciprocal interactions influence the success or failure of CSR initiatives. They observed that stakeholders, including local leaders, government officials, politicians, and community members, played a limited role in achieving corporate CSR goals. This limited engagement resulted in CSR initiatives failing to adequately address the developmental aspirations of various stakeholders.

Once analysed all currents existing, other authors, such as Hermundsdottir and Aspelund (2022) found clear consistence that social innovations, that are related to CSR, positively affect perceived performance measures. Thus, the following hypothesis is being proposed:

H_1 There is a positive relationship between CSR and the Operational Performance of companies in the companies of the energetic sector.

2.3 The link between EM and operational performance

Therefore, it becomes critical to understand how Environmental Management (EM) can lead to improved firm performance. In fact, this can be achieved through various means, including enhanced value creation, reduced costs, or minimized risks, suggesting that perspectives from Stakeholder Theory or Resource-based Theory offer valuable insights into this phenomenon. Effectively mitigating the ecological changes induced by climate change necessitates societal transformations that empower institutions to enhance their agility. This involves embracing a culture of risk-taking and experimentation to navigate uncertainties, address trade-offs, and operate seamlessly across diverse temporal and spatial scales (Clifford et al., 2020).

In a tangible example, Hermundsdottir and Aspelund (2022) examined Norwegian manufacturing companies that had embraced sustainability strategies and innovations, scrutinizing the ensuing impact on firm performance over time. The study reached a clear conclusion, supported by strong evidence, that environmental innovations have a positive impact on both subjective and objective measures of firm performance. This includes value creation, risk reduction, and cost savings (Hermundsdottir & Aspelund, 2022). Notwithstanding, that is not always the current. Another approach has been developed by the authors that defend that in turbulent ambiances, EM do not always improve performance. The COVID-19 pandemic severely disrupted the renewable energy sector, as Eroğlu (2021) aptly observed. Investors behaved erratically due to uncertainty caused by supply chain disruptions, stock market difficulties, and the looming expiration of government incentives. To ensure sustainable growth in the renewable energy sector, governments must demonstrate stability and commitment to clean energy incentives.

Therefore, EM has a direct impact on operational performance and acts as a mediator in the correlation between CSR and operational performance:

H_2 EM in companies of the energetic sector has a positive impact on their Operational Performance.

2.4 The correlation between CSR and EM

Following an approach provided by different authors, CSR entails a change of mentality in all facets of organisations, which means that with a good implementation of CSR, Environmental Behaviour (EB) and Ethical Leadership (EL) in organisations, they will improve their performance (Wu et al., 2021). Industry increased the continuous improvement of organisations, thereby improving the business results (Arredondo-Méndez et al., 2021). CSR and EM have been also key during the COVID-19 crisis, where a good management of a CSR policy of the companies has allowed the continuity of growth of the employees in the organisations, as well as the hiring of junior employees during the pandemic, allowing them to start their working life and have less negative impact when they start their first jobs, maintaining good results for the organization (Cyfert et al., 2021). Moreover, authors such as Rahman Khattak et al. (2021) have explored the association between CSR and employee environmental behavior in diverse sectors and countries, revealing a positive correlation. Additionally, the connection between CSR and sustainability has been examined,

demonstrating a positive relationship between CSR, sustainability, and ultimately, business outcomes (Sánchez-Teba et al., 2021).

Despite this, some argue that while the social dimension of CSR gained significant traction during and after the COVID-19 pandemic, the environmental dimension experienced a decline in focus. In this context, the top CSR priorities included implementing health and safety plans within organizations, engaging in social and volunteer activities, prioritizing biodiversity, and promoting job creation. However, environmental protection and the utilization of clean energy were not identified as CSR priorities (Zhang et al., 2022).

Under the current situation of environmental pollution, resource shortage, and the *2030 Sustainable Development Goals' Agenda* framework, the research junction of CSR and EM is of great importance to promote the sustainable development of society, as Wang (2010) stated. This article analyses the relationship between CSR and EM from the perspective of Stakeholder Theory and EM.

Rahman Khattak et al. (2021) have examined the correlation between CSR and employee environmental behaviour in various sectors and countries, and have discovered a positive relationship. They have also found a positive correlation between CSR and sustainability, which ultimately impacts business outcomes (Sánchez-Teba et al., 2021).

Consequently, the following hypothesis is presented:

H_3 There is a positive relationship between the inclusion of CSR and the improvement of EM in companies of the energetic sector.

2.5 The mediator effect of EM between CSR and operational performance

Several researches have claimed that environmental R&D is increasing both in public and private companies, generating more patents over the last years (Häggmark & Elofsson, 2022). In reality, private and public Environmental Management (EM) R&D priorities appear to be converging towards a focus on energy-related research. Specifically, Häggmark and Elofsson (2022) found that the public sector has maintained a positive patent growth for technologies with a greater potential to generate external social benefits, aligning with CSR principles. Conversely, the private sector has shifted its attention to more energy-related technologies, which also indirectly benefit CSR-related social issues while yielding easier-to-retain benefits.

Given the increasing pressure on managers to integrate climate change adaptation into their operations (Clifford et al., 2020), the need for efficient resource management becomes paramount. Managers must skillfully navigate limited budgets and utilize their resources effectively to achieve the desired outcomes (Valdivieso et al., 2022).

Indeed, there are substantial business advantages to proactively pursuing nature-positive outcomes, including enhanced risk management and superior organizational performance (Hermundsdottir & Aspelund, 2022; Labodová, 2004). Labodová (2004) emphasised the need for integrating quality management, environmental management, and occupational health and safety systems effectively, either independently or as a unified system. Risk analysis should serve as the underlying foundation.

H_4 EM mediates the relationship between CSR and Operational Performance in companies of the energetic sector.

While CSR as it can be observed in Table 1, has been extensively researched, with numerous literature reviews available, studies specifically focused on the energetic sector are scarce. This lacuna serves as a primary motivation for the current study. Although some work has examined various aspects of CSR in the energy industry, a comprehensive and systematic empirical investigation is lacking.

Existing literature suggests that research on CSR management in the energetic sector is in its early stages. Scholars have primarily concentrated on three areas: (i) regulations in industries such as oil companies; (ii) economic incentives for corporate social responsibility; and (iii) implementation.

Moreover, existing studies have mainly concentrated on literature reviews that investigate the influence of CSR practices on a sole measure of corporate performance, such as financial performance (Coles et al., 2013; Farrington et al., 2017; Rhou & Singal, 2020). These studies have disregarded other relevant financial and non-financial matters, such as environmental practices. Furthermore, the analysis of CSR practices within the energy

Table 1 Analysis of the literature consulted about the mediator effect of EM between CSR and operational performance

Authors (year of publication)	Title	Methodology	Significant Result(s)
Wu et al. (2021)	"The Role of CSR and Ethical Leadership to Shape Employees' Pro-Environmental Behavior in the Era of Industry 4.0. A Case of the Banking Sector"	SEM	CSR, Environmental Behaviour (EB) and Ethical Leadership (EL) in organisations, they will improve their performance
Rahman Khattak et al. (2021)	"Corporate Social Responsibility and Employee Green Behavior in the Hospitality Industry: A Cross-Country Study."	PLS-SEM	There is a positive relationship between CSR and sustainability, showing a final transmission on business results.
Hermundsdottir and Aspelund (2022)	"Competitive sustainable manufacturing-Sustainability strategies, environmental and social innovations, and their effects on firm performance."	SEM, Confirmatory Factor Analysis (CFA) and Latent Path Analysis (LPA)	Social innovations, that are related to CSR, positively affect perceived performance measures.
Ryu et al. (2021)	"Corporate Social Responsibility, Audit Committee Expertise, and Financial Reporting: Empirical Evidence from Korea."	Multivariate Analysis	Identification of a relationship between CSR, audit committee experience and financial performance.
Hermundsdottir and Aspelund (2022)	"Competitive sustainable manufacturing-Sustainability strategies, environmental and social innovations, and their effects on firm performance."	SEM, Confirmatory Factor Analysis (CFA) and Latent Path Analysis (LPA)	Environmental innovations have a positive impact on both perceived and objective measures of firm performance, including value creation, risk reduction, and cost reduction.
Sánchez-Teba et al. (2021)	"Mapping the Knowledge of CSR and Sustainability"	Bibliometric analysis	There is a positive relationship between CSR and sustainability and the final transmission on business results

Source: Own elaboration (2023)

sector has not been comprehensive, as it has not included all financial and non-financial outcomes.

To address these gaps, our study aims to expand and contribute to existing literature by examining all aspects of CSR practices, including non-financial aspects such as CSR measurement, disclosure, customer impact, implementation, and monitoring, as well as financial issues such as benefits and unitary cost production.

In addition, our study aims to improve upon existing review studies by taking a wider scope of analysis. We draw from studies that have examined not only the energy sector but also other fields, including economics, general management, and information management. This interdisciplinary approach aims to ensure that our results are applicable not only to stakeholders in the energy sector but also to environmentalists, government departments, policymakers, regulators, practitioners, academics, researchers, and students.

We used a variety of databases, such as Scopus, Web of Science, and Emerald Insight, to conduct our search. This approach allowed us to identify a comprehensive selection of relevant studies for inclusion in our research.

2.6 Proposed model

From the study of the theoretical framework, it is identified that there is an apparent relationship between CSR and EM at the same time the studies reviewed on these two aspects indicate that both CSR and EM are positive for the Operational Performance of the organisations. Therefore, based on these premises, the following working hypotheses can be presented, on which a statistical study will be carried out to verify whether they are indeed satisfied.

The hypotheses raised are:

H_1 There is a positive relationship between CSR and the Operational Performance of companies in the companies of the energetic sector.

H_2 EM in companies of the energetic sector has a positive impact on their Operational Performance.

H_3 There is a positive relationship between the inclusion of CSR and the improvement of EM in companies of the energetic sector.

H_4 EM mediates the relationship between CSR and Operational Performance in companies of the energetic sector.

The addition of the previous above commented hypotheses is summarized in Fig. 1:

3 Materials and methods

Data collection was conducted using a structured form embedded within the Google Forms tool. The survey was distributed via social media and email channels. Hence, the survey methodology has been carried out through online platforms because data collection is very

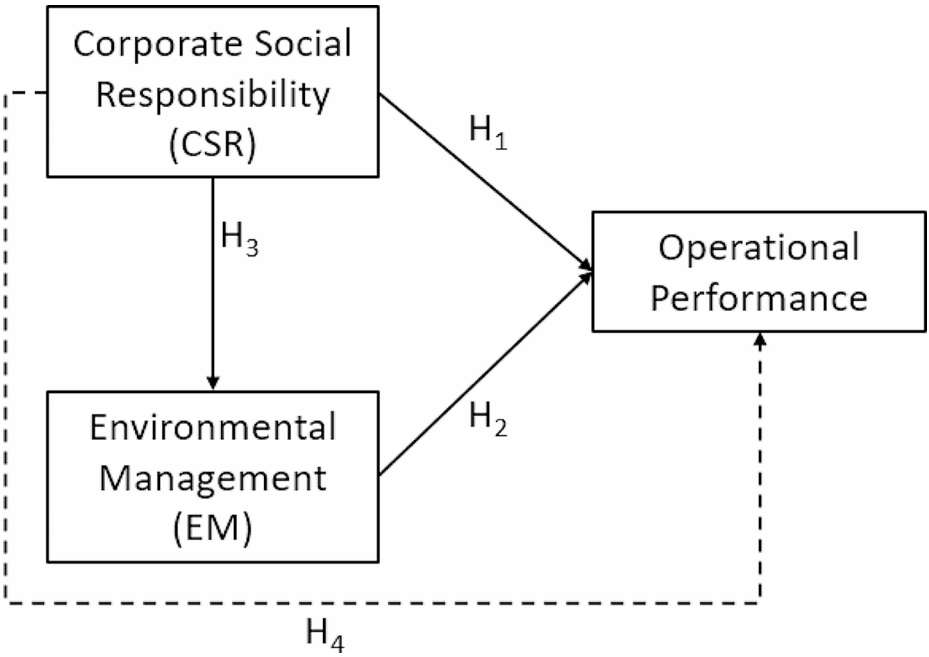

Fig. 1 Hypothesis model with direct hypotheses (solid lines) and mediating hypotheses (dashed lines). Source: Own elaboration (2023)

fast in this way, and it is possible to access people from large companies. In addition, the survey has among its advantages, the low economic cost, the ease of use, and the possibility of carrying out measurements on many subjects (Díaz de Rada, 2007).

Likewise, the use of the survey allows the direct response of the respondent, who, although in this survey is anonymous, it is known to which bias of the workers the survey has been sent.

Furthermore, this study employed a convenience sampling technique for data collection. To achieve a sample size of at least 35 companies with responses from various managers, a population of 73 companies was identified (from the SABI-System of Iberian Balance Analysis database-), and 4 managers per company, giving a total population of 292 possible responses. We randomly contacted via LinkedIn with 235 managers, obtaining a total of 72 valid responses. This implies a response rate of 24.66% of total Environmental, Production/Quality, CSR and HR managers of companies in the Spanish energy sector.

The professionals and senior managers chosen through the *LinkedIn* and other social networks were those who had specific or similar positions: Directors of Operations/Production, Directors of Environmental Management, Directors of Corporate Social Responsibility and Directors of Human Resources in Spain.

For this study, 72 surveys were finally collected. Everyone was considered, since there were not errors regarding the control questions made for identifying those surveys that were answered without objectivity or those whose all their responses were answered with 1 or with 5 on the Likert scale. All this considered, the final sample was made up of 72 professionals from companies of different sizes, economic sectors, and years in the market.

The questionnaire was subjected to rigorous review by eminent academics from various universities, specializing in CSR, EM, and Business Management disciplines. These experts were carefully selected based on their outstanding citation record in the past five years, as recognized by prestigious research social networks like Scholar Google Metrics and ResearchGate. The primary focus of the review was to ensure that each question was clearly understood and adequately addressed the present and future concerns of the companies involved in the study. Furthermore, a pre-test was conducted among several companies. Interviews were used to refine the questionnaire's clarity and enhance effective, accurate, and unambiguous communication with the respondents.

The questionnaire design was informed by a review of the literature. The research model employed a five-point Likert scale (1='Strongly disagree'; 5='Strongly agree').

The introductory part of the questionnaire covered four questions in which the respondent was expected to introduce the type of company to which they belonged, indicating the sector of activity, the number of employees and the years of seniority of their company, as well as a first introduction to the topic in the fourth question, which asked whether your company has CSR or not.

Subsequently, the first part of the survey was based on the knowledge of CSR, which included six questions related to this topic. *CSR* measures the extent to which each firm has adopted a system of CSR practices composed of its six dimensions, previously described. For the elaboration of the questions in this part, the scale of Rodrigues García (2019) has been used, which deals with the way in which companies implement CSR systems, as well as the one of Hernández Fajardo (2019), in which CSR is related to Corporate Responsibility (CR) and the economic impact on the company, and finally the scale of Álvarez González et al. (2020), since it deals with the way in which methods are implemented in business marketing to have a greater impact on the economy.

The second part consisted of five questions related to EM. *EM* measures the extent to which each firm has adopted a system of EM practices composed of clean energy sources employment, waste reduction and enhancement of biodiversity, among others. For the elaboration of this part, the study of Díaz de Rada (2007) has been used, as well as the one of López et al. (2019), which deals with how the protocols established in a political manner influence decisions on EM in companies and, finally, the one of Solano and Barriga (2019), which deals with how is the management of companies in the areas of environment and its impact on their business results. Foreign firms can acquire certifications to increase their legitimacy when operating in an emerging economy (Zhang et al., 2019).

The third and last part, consisted of seven questions in which the criteria of EM and CSR of the companies of the respondents were asked, in order to know whether the companies have a global concept of both two, or instead of that, carry them out separately. For its preparation, the studies of Salas Nestares (2017) and Sebares Sánchez (2019) were used, since both deal with the creation of value of companies not only for their shareholders, but also for their stakeholders, conforming the construct Operational Performance. This construct measures the extent to which firms that have adopted a system of CSR and EM practices achieve better levels of productivity, profits, and profitability, or reduce unitary production costs. The language has been made more objective and value-neutral, and technical terms have been defined. The sentence structure has been simplified for better comprehension and logical flow. The grammar, spelling, and punctuation have been corrected. No new content has been added. Operational Performance has been chosen to be measured, instead of Per-

formance as a whole, since within Performance other parameters different from productivity or profitability could be examined, such as the grade of satisfaction with the relations with the Administration, the number of clients' complaints, the grade of knowledge of the organization in the society and so on (EFQM, 2021). All these ones are more specific parameters that could be influenced by other topics that get out of the scope of this research, such as the number and quality of publicity campaigns made, the country's government at the time and others.

As control variables, the size of the organizations by its number of employees has been considered as a control variable in the hypothesis model developed in this study. Specifically, size refers to the number of employees in an organization. In this study, 82% of the companies analyzed have more than 250 employees. 8% of the companies, between 50 and 250 employees. Finally, 10% of the companies analyzed have less than 50 employees.

The age has been considered as the second control variable of this study. The age or antiquity indicates the range of years that companies have been operating in the market from their creation. For this study, it is observed that the professionals belonging to the analyzed companies, work mostly in companies that are more than 10 years old, with a result of 82%. Then, there are the companies less than 5 years old, with a value of 10%. Finally, the professionals surveyed working in companies between 5 and 10 years old in the market, were the 8%.

The Partial Least Squares Structural Equation Modelling (PLS-SEM) method was used to obtain the results and to verify the model (IBM, 2021; Rivadeneira Pacheco et al., 2020). The data were processed using SPSS software and the model was then verified in Smart PLS (GmbH, 2021; Ringle et al., 2015; Sarstedt & Cheah, 2019). This methodology was chosen because it is suitable for composite constructs (Henseler, 2017). The composite model assumes that the construct is made up of indicators or elements that are combined linearly. Therefore, the relationships between the indicators and the construct are not causal. As a result, PLS-SEM always models variables as compounds.

To test the hypotheses, SmartPLS with the bootstrapping resampling method was used (Chin, 1998b). In this research, a bootstrap resampling procedure with 500 subsamples was used to analyze the significance of interaction effects (Chin, 1998b).

According to Podsakoff and Organ (1986) PLS-SEM avoids the stringent assumptions that underpin maximum likelihood techniques, which safeguards against flawed solutions and factor indeterminacy. Furthermore, PLS-SEM is unaffected by sample size, making it suitable for both small and large samples, unlike SEM (Hair et al., 1998). Moreover, PLS-SEM enables the analysis of both reflective and formative constructs (Hair et al., 1998).

The content of the improved text must be as close as possible to the source text, and no new aspects should be added. Reflective indicators can be identified by analyzing the item's reliability using standardized loads or simple correlations. An indicator can be considered a component of a construct if its load is greater than 0.707. However, in certain situations such as the development of initial scales, initial loads of 0.5 or 0.6 may also be acceptable.

The formative indicators are weighted according to the construct to which they are linked. To accept a formative indicator, it must have a significance level for $p < 0.05$ of the t-statistic for two tails (Para González, 2014).

For the purposes of this research model, the CSR construct has been defined as formative, and the constructs of EM and Operational Performance as reflective.

The characteristic of a reflective measurement model is that a change in the latent (unobservable) variable will be reflected in a change in all its indicators. In the formative model, the indicators are the ones that cause a latent variable, so a change in it is not accompanied by a change in all its indicators. The difference between the two approaches is in the causal priority between the latent variable and its indicators (Bollen, 1989).

In the formative model, the observed variables cause the latent variable (CSR, Fig. 2). In the reflective model the latent variable causes the observed variables (Operational Performance and EM, Fig. 2). The dimensions are a reflection of enhancement of the Operational Performance and the EM.

The items of the hypotheses Model are, thus, configured as shown in Fig. 2:

Figure 2 displays the components of each construct and indicates whether they are formative or reflective through the direction of the arrows. An arrow from an item to a construct indicates a formative construct, while an arrow from a construct to an item indicates a reflective construct.

4 Results

At the end of the search results period, seventy-two responses were obtained for the survey. The search for results was conducted during the second and third quarter of 2021.

The study sample consisted of eighty Managers of Energetic sector companies to whom the survey was sent. However, seventy-two responses were obtained, being the answers' rate 90%. The sample size can be considered valid due to the low starting population, where the survey has been sent to managers with CSR and EM expertise, every of them belonging to Spanish companies of the energetic sector.

The first four questions that were carried out are essential when analysing the responses individually, since, through these questions, the data were obtained to know whether the company is a large company or a small and medium-sized company (SME), the sector to which it belongs, the age of the company and whether or not CSR available is known.

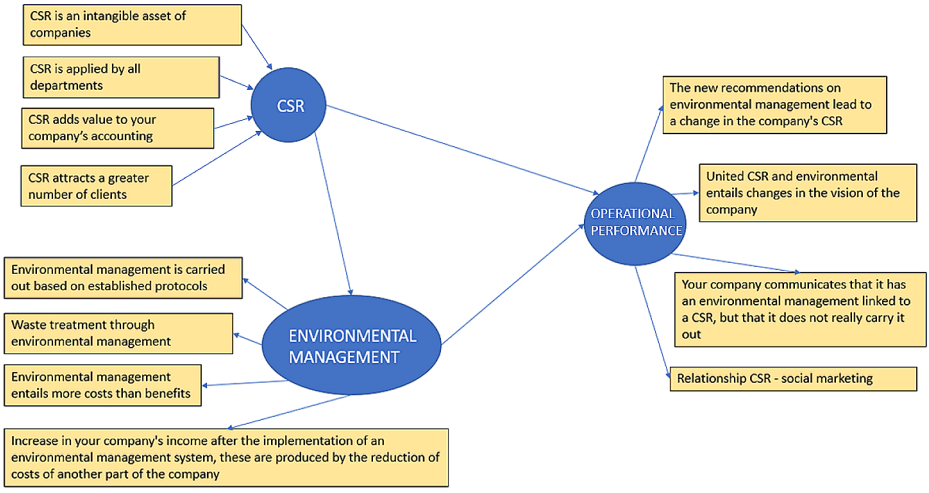

Fig. 2 Hypothesis model and items of each construct. Source: Own elaboration (2023)

As it can be seen in Figs. 3 and 82% of the respondents surveyed belong to large companies, since they have more than 250 workers in their workforce, while 10% belong to small companies, because they have less than 50 workers.

Another question of the survey was related to the age of the company, obtaining the following results: 82% of the respondents surveyed belong to companies with more than 10 years from their creation, 8% to companies between 5 and 10 years and 10% to companies with less than 5 years of life, as can be seen in Fig. 3. The high percentage of companies with more than 10 years of antiquity obtained is positive, since these companies with more experience are probably the most susceptible to developing CSR and EM processes in them.

As the last question, within the initial questions of the survey, is question four: Check if your company has (CSR). The result of this question is 90% of the respondents surveyed affirm that their company does have CSR, while 10% do not. This is a sufficiently high percentage to verify the CSR efforts of the companies surveyed and the importance they are giving currently to this topic. Figure 3 shows, this high percentage of CSR representation in the companies analysed:

As a result of these first data from the introductory part of the survey, a conclusion can be obtained in reference to the first secondary objective of the work: to know if companies have a CSR model implemented, with 90% of companies with a CSR model.

Analysing individually the results obtained for each of the questions asked to the managers surveyed. In this sense, the values presented in Table 2 have been obtained:

This Table 2 presents the statistical outcomes of the responses gathered in terms of mean, median, minimum value, maximum value, standard deviation, skewness, kurtosis, minimum value, maximum value, and standard deviation for the items that comprise the reflective constructs. This information is crucial for assessing the validity of reflective constructs but not for formative constructs.

The results show a good relationship between the mean and the median of each item, without a strong difference between these two statistical indicators. On the other hand, the

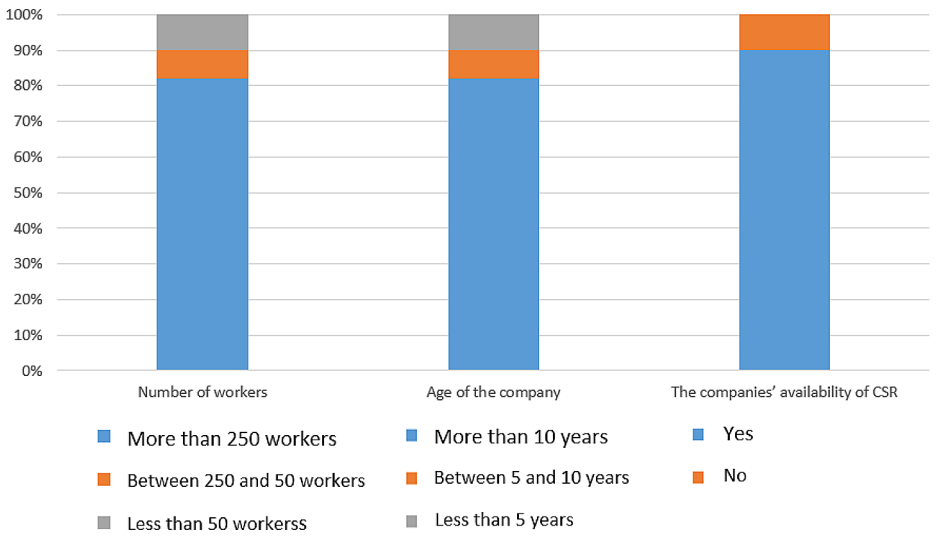

Fig. 3 Number of workers, age of the company and the companies' availability of CSR. Source: Own elaboration (2023)

Table 2 Analysis of the predictive model

	Mean	Median	Minimum	Maximum	Standard derivation	Excessive Kurtosis	Asymetry
1 CSR is an intangible asset of companies	4,140	4,000	2,000	5,000	0,652	0,612	-0,458
2 CSR is applied by all departments	3,861	4,000	2,000	5,000	0,918	-0,519	-0,488
3 CSR adds value to your company's accounting	3,750	4,000	2,000	5,000	0,862	-0,353	-0,415
4 CSR attracts a greater number of clients	3,569	4,000	1,000	5,000	1,091	-0,407	-0,575
5 Environmental management is carried out based on established protocols	4,139	4,000	1,000	5,000	1,004	2,197	-1,463
6 Waste treatment through environmental management	3,889	4,000	1,000	5,000	1,125	0,870	-1,151
7 Environmental management entails more costs than benefits	3,139	3,000	1,000	5,000	1,251	-1,022	-0,226
8 Increase in your company's income after the implementation of an environmental management system, these are produced by the reduction of costs of another part of the company	3,667	4,000	1,000	5,000	0,972	0,812	-0,948
9 The new recommendations on environmental management lead to a change in the company's CSR	3,944	4,000	1,000	5,000	0,831	1,173	-0,782
10 United CSR and environmental entails changes in the vision of the company	4,167	4,000	1,000	5,000	0,833	2,200	-1,209
11 Your company communicates that it has an environmental management linked to a CSR, but that it does not really carry it out	3,222	4,000	1,000	5,000	1,387	-1,105	-0,538
12 Relationship CSR - social marketing	4,028	4,000	2,000	5,000	0,799	-0,057	-0,552

Source: Own elaboration (2023)

maximum and minimum values are different in all the items, which indicates that there has not been a strong repetition in the answers, which means that the questions have obtained different scores among the respondents.

Table 3 Psychometric properties and correlation matrix

	CSR	EM	Operational Performance
CSR			
EM	0,491		
OPERATIONAL PERFORMANCE	0,062	0,495	
Average Variance Extracted	0,384	0,496	0,349
Composite Reliability	0,690	0,797	0,664
R Square		0,241	0,280
Cronbachs Alpha	0,590	0,668	0,435

Source: Own elaboration (2023)

The standard deviation is not excessive in any item, being no more than 1.5. As well as the excessive Kurtosis and asymmetry, which are within the correct values to be able to perform an analysis of the model using these items for the reflective constructs.

The results in Table 2 validate the ability to use the survey results to form the hypothesis model and employ the PLS-SEM methodology outlined above.

These results provide an insight into the degree of implementation of CSR in companies in the of the energetic sector, and confirm the assertions made in the literature concerning that CSR has become a key element in the management of companies in this sector (Karaman et al., 2021; Shahbaz et al., 2020).

Table 3 shows the correlations between the constructs of the model, which are called Path coefficients, as well as the psychometric properties of each of the constructs.

The goodness of fit of these constructs is verified by the results in this table, the R Square values must be at least 0.10, ideally being greater than 0.67 for its explanatory power to be significant (Chin, 1998a). In this case, EM has 0.241 and Operational Performance 0.280, as shown in Table 3.

Although the Cronbach's Alpha for each construct is slightly less than 0.7, we have analysed the individual reliability of each item within each construct. To do this, we examined the loadings or simple correlations of each indicator with its respective construct in the case of reflective constructs (Roldán & Sánchez Franco, 2012). In order for an indicator to be accepted as part of a construct, it must meet a minimum threshold value of 0.707 (Carmines & Zeller, 1979). However, in some cases, initial loadings of 0.5 or 0.6 may be accepted, such as in the development of initial scales (Chin, 1998b).

As can be seen in the following table (Table 4), all the indicators have loadings above 0.5, with most of the items exceeding the value of 0.707, which indicates good reliability in terms of the items that make up the constructs.

Thus, it can be inferred that all reflective indicators are above this level, indicating that the shared variance between the indicators and the construct is greater than the error variance (Carmines & Zeller, 1979). This means that the indicators are individually reliable.

As for the formative items, it is necessary to evaluate the weights that each indicator has in the construction of the linked construct. The weights provide information on the composition of each variable, indicating how the formative indicator contributes to the formation of the construct. To achieve this, the indicator must have a significance level of $p < 0.05$ for the two-tailed t-statistic (Urbach & Ahlemann, 2010). It is not advisable to remove an indicator, even if it has low significance, as this would remove part of the value of the exogenous construct (Roberts & Thatcher, 2009).

Table 4 Analysis of the literature consulted

Latent variable	Formative / Reflective	Indicator	Loadings	Weights	*P*values
CSR	Formative	1.CSR1	0,546	0,168	0,023
		2.CSR2	0,772	0,333	0,014
		3.CSR3	0,549	0,124	0,044
		4.CSR4	0,876	0,751	0,000
EM	Reflective	5.EM1	0,735	0,350	0,000
		6.EM2	0,635	0,253	0,000
		7.EM3	0,708	0,418	0,000
		8.EM4	0,747	0,390	0,000
OPERATIONAL PERFORMANCE	Reflective	9.OP1	0,719	0,353	0,011
		10.OP2	0,555	0,195	0,050
		11.OP3	0,817	0,715	0,000
		12.OP4	0,576	0,288	0,046

Source: Own elaboration (2023)

The study model includes one formative variable with a total of four formative indicators. To determine their reliability, their factor loadings must be checked. Positive factor loadings, as observed in this study, indicate that the indicator has a positive influence on the construct, although not significantly.

Table 4 shows that the formative indicators in this study have mostly positive factor loadings. The weights indicate the hierarchical order or relative importance of the indicators, with the most influential features having the highest weights. The weights indicate the hierarchical order or relative importance of the indicators, with the most influential features having the highest weights.

About the hypotheses contrast, the method used, as stated in the *Materials and Methods* section of the article, is SmartPLS software. To use this program, you must first make a diagram in which the variables are connected. This means that the hypotheses raised must be connected (Wang et al., 2020). Second, you have to configure the indicators. In this study, these indicators are each of the questions formulated with the answers obtained. The database used is the one generated in the SPSS program 27.0.

PLS seeks to maximize the predictive power in the causal relationships of the model. As the objective pursued by each of the techniques is different, the optimization algorithm used to calculate the parameter estimates is also different. Moreover, PLS does not impose restrictions on the model, in this way the theory necessary to work with it is simplified.

PLS estimates the coefficients of the system of structural equations using least squares and allows both the starting hypotheses and the sample size to be used to be flexible. This sample size is one of the variables for which this model has been used, since PLS should be used when the sample number is below 250 (Reinartz et al., 2009).

Figure 4 provides a graphical summary of the hypothesis model results, showcasing the values of the hypothesis parameters (direct or total effects) and their corresponding *p*-values. The significant *p*-values (<0.05) demonstrate the validity of the hypotheses, in this case, it is shown that hypothesis 1 is not directly fulfilled, but it is fulfilled indirectly (hypothesis 4) thanks to the mediating effect of EM, Hypotheses 2 and 3 are satisfied (Betensky, 2019).

Continuing the analysis of the hypotheses, the Composite Reliability is calculated using Cronbach's Alpha. It must be greater than 0.7 for the constructs to be considered reliable (Roldán & Sánchez Franco, 2012), although in the first steps of the development of a study,

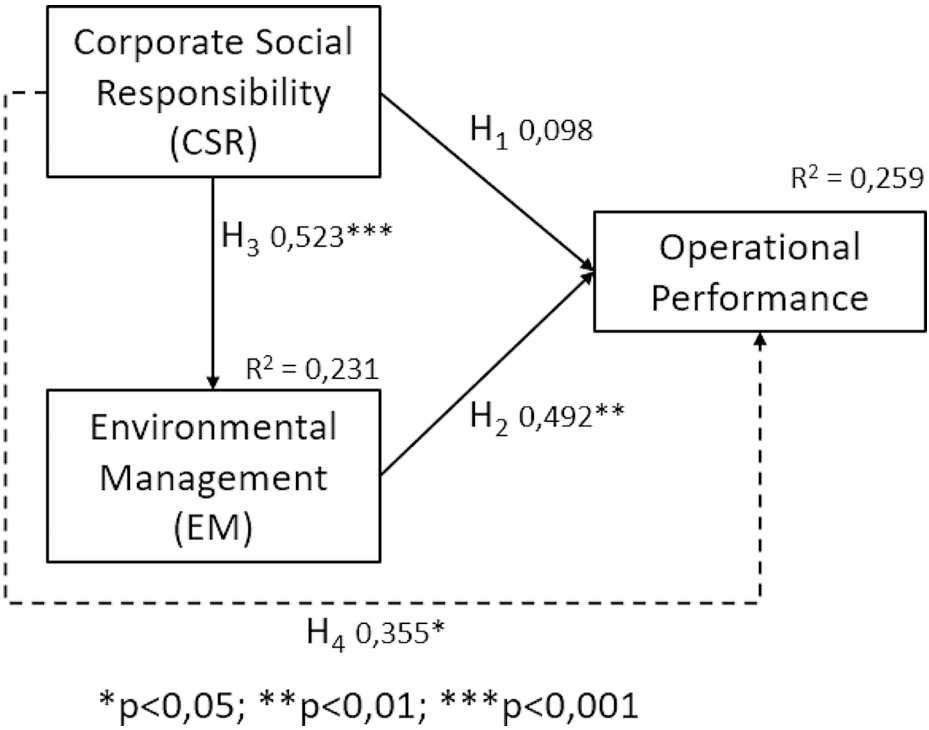

Fig. 4 Results of the hypothesis testing. Source: Own elaboration (2023)

Table 5 Cronbach's Alpha of the hypotheses model

Number of hypotheses	Cronbach's Alpha
H_1	0,600
H_2	0,668
H_3	0,435

Source: Own elaboration (2023)

also values higher than 0.6 are accepted. To calculate this value, the SPSS program is used, obtaining the data reflected in Table 5.

The variables used for each of the hypotheses are above the value of 0.6 established by the Literature. With this, it can be concluded that they have an adequate construct reliability, since their indicators achieve good internal consistency.

Regarding hypotheses, our findings support all relationships presented in Tables 6 and 7. Table 6 displays the direct effects of the structural model, revealing a *p*-value of less than 0.01 for the relationship between EM and OP (H_2), and a *p*-value of less than 0.001 for the relationship between CSR and EM (H_3).

With these results, it can be said that the CSR – Operational Performance relationship is not directly met (H_1). However, it has been proven that it is indirectly fulfilled (Table 7).

With the information shown in the table above, the goodness of the model presented in this research work is verified, allowing the discussion of the results and the presentation of conclusions.

Table 6 Construct structural model: direct effects

Linkages in the model	Hypotheses		Standardised parameter estimates			
	Number	Sign	Parameter	Direct effects	t-value	*p*-value
Corporate Social Responsibility (CSR) → Operational Performance (OP)	H_1	+	β_1	0,098	0,297	0,766
Environmental Management (EM) → Operational Performance (OP)	H_2	+	β_2	0,492	2,764	0,006
Corporate Social Responsibility (CSR) → Environmental Management (EM)	H_3	+	β_3	0,523	4,668	0,000

Source: Own elaboration (2023)

Table 7 Construct structural model: Mediating and total effects

Mediation Paths	Hypotheses		Standardised parameter estimates				Confidence interval	
	Number	Sign	Parameter	Indirect effect	t-value	*p*-value	2,50%	97,50%
Corporate Social Responsibility (CSR) → Environmental Management (EM) → Operational Performance (OP)	H_4	+		0,256	2,269	0,024	-0,155	0,394
Linkages in the model	Hypotheses		Standardised parameter estimates				Confidence interval	
	Number	Sign	Parameter	Total effects	*t*-value	*p*-value	2,50%	97,50%
Corporate Social Responsibility (CSR) → Environmental Management (EM) → Operational Performance (OP)	H_4	+	β_4	0,355	2,091	0,037	-0,367	0,540

Source: Own elaboration (2023)

5 Discussion

As mentioned in the section of *Results*, a detailed questionnaire was carried out following the guidelines of the existing Literature on this subject, which served to consolidate suitable questions to measure the hypotheses put forward. All this has served to adapt to the configuration of the questionnaire as indicated by authors such as Rodrigues García (2019), López et al. (2019) or Salas Nestares (2017).

The data sample was collected over a period of around six months, with a total of 72 valid responses. This number may seem insufficient for the validation of a statistical hypothesis model, and it is clear that it would have been favourable to have obtained more responses. However, it must be considered that the questionnaire was circulated only to CSR and MS experts in the companies, focusing the efforts on companies in the Spanish energetic sector,

which greatly limits the total population, and, therefore, reduces the minimum sample size required. For this reason, the number of responses obtained has been considered sufficient and the results have been analysed, obtaining statistical indicators that validate the strength of the constructs generated (Table 3) and of the items that make them up (Table 2), which can therefore be used to carry out the calculations necessary to study the proposed model.

As shown in Fig. 4, and in Tables 6 and 7, all hypotheses of the proposed model are confirmed. The first hypothesis presented states that the inclusion of CSR processes increases business performance in companies in the energetic sector. This is in line with previous findings in the literature, such as the ones presented in the study of Para-González and Mascaraque-Ramírez (2020). This study claimed that the implementation of the six dimensions of CSR in industrial companies improves the key results of the organisations. Specifically, these authors investigated the results in the shipbuilding industry. Similar to this one, Cho et al. (2019) investigated also this for globalised companies and Kao et al. (2018) exclusively for China-based companies. In the Literature, the importance of the relationship between CSR and public policy has also been taken into account, which has become key in companies operating in several countries (Knudsen & Moon, 2022). In view of the above, this new research strengthens claims previously identified in other industrial sectors and other international companies, focusing the research presented on the results of the energetic sector. As explained above, this hypothesis is indirectly fulfilled (Table 7).

The second hypothesis put forward in this paper indicates that EM processes in energetic companies improve their Operational Performance. There is less information on this statement in the current literature, although some works such as the one of Lundgren and Zhou (2017) identified an increase in performance due to EM, reducing the energy costs of production. Besides, Ma et al. (2020) argued that EM could have a negative influence on business performance, but that good quality management executed in line with EM has a mediating role that promotes the key performance of organisations. On their part, (Huang & Shih, 2009) identified a positive relationship between EM and performance in China Steel Corporation firms, while Famiyeh et al. (2018) found the same for developing countries. In the case of the work presented here, this statement is identified for companies in the energetic sector and can be extrapolated to companies in the industrial and the transport sectors, due to the fact that both of them have organisational similarities to energetic companies.

The third hypothesis links the inclusion of CSR processes and the improvement of EM in companies in the energetic sector. Some previous research has identified that good practices in terms of corporate governance are related to each other, stating that for large globalised companies there is a direct relationship between quality management, CSR and EM (Para-González & Mascaraque-Ramírez, 2019). Other authors, such as Dey et al. (2018) also find such a relationship for small and medium sized firms, even in companies in developing countries (Puppim de Oliveira & Jabbour, 2015). In the study of Shantiko et al. (2021), Various dimensions of CSR have been considered, including organizational governance. The significance of the local context in crafting multi-stakeholder platforms tailored to the specific organizational structure and cultural norms of policymaking institutions has been given particular focus. This led to significant stakeholder engagement and interactions, resulting in a better understanding of the factors that affect management. Shantiko et al. (2021) concluded that local stakeholders by being part of decision-making processes, and by being considered as active and long-term participants of the planning process, upgraded their capability to plan and act. Additionally, it is important to deploy the ability of local

groups or administrative entities for self-liability and awareness, both in the short and long term. To ensure the in-depth implementation of CSR in a company, broad support and involvement of stakeholders is necessary. This is because the role stakeholders play is critical in all aspects of decision making, particularly in environmental decisions (Zandebasiri et al., 2022). A flexible and evidence-based approach could enhance participation, leading to increased enthusiasm and better resource management.

In this sense, the present work has explored this aspect further, proposing a clearly defined hypothesis to link CSR and EM. The proposed model has been validated, thus strengthening previous statements in the Literature on this hypothesis, although there is a lack of studies in this field and there is a need for further progress in this area.

6 Conclusions

The validation of the model presented in this study serves to indicate to companies in the energetic sector, that the efforts made in terms of CSR and EM are favourably reflected in Operational Performance. This statement, supported by part of the Literature on the subject in recent years, needed to be supported and studied in more detail, especially in the energetic sector, with the final objective of transmitting confidence to companies in their awareness to continue advancing along these lines, identifying the added value offered by CSR and EM to companies in the energetic sector, as well as to other sectors, which is reflected not only in the image of the company, but also directly in their organizational Operational Performance.

The results of this study have important theoretical and practical implications. Notwithstanding, we should not assume CSR and EM homogeneity regarding its influence in Operational Performance. The key is to assess employees in CSR and EM knowledge, with the aim of influencing those practices and reinforcing performance. Thus, investments in CSR and EM practices, skills and activities towards all the company stakeholders should positively affect performance. In fact, the indirect effect of CSR on Operational Performance is consistent with prior Literature regarding the fact that CSR affect organizational Operational Performance through an adequate EM (Clifford et al., 2020).

In summary, practitioners should adopt Corporate Social Responsibility (CSR) principles and dimensions to improve performance. Implementing Environmental Management (EM) is also desirable as it helps companies achieve their organizational goals. EM is equally important as other functions of a firm.

As limitations of the study and future lines of research, it is worth mentioning the need to go deeper to see if there is a difference between companies in the energetic sector and the rest of the sectors. In this regard, the questionnaire could be used also to measure the difference between sectors, and to obtain conclusions on whether there are sectors that benefit more than others in the implementation of CSR and EM strategies. In this regard, the items used to build each construct, although based on a deep review of the existing Literature, do not employ any official Index, what could be considered as a limitation of this study. On the contrary, there are studies that directly utilise official indexes to measure CSR and EM. That is the case, for instance, of the study of (Hasan et al., 2022), that employs the Bloomberg's® index, as the measure for CSR in firms. This score encompasses disclosures made by companies regarding their environmental, social, and governance practices. Bloomberg compiles annual ratings for companies based on this information, which is collected from

sources such as annual reports, company websites, sustainability reports, and other official publications. The use of official indexes has advantages because they are tailored to the industries in which companies operate, and the assessment is based on industry-specific information. Other studies use different indexes, such as ASSET4® and KLD® (Saadaoui & Soobaroyen, 2018; Xie et al., 2019). These rating indexes consider the multidimensional parameters of CSR in the construction of their respective EM scores, ensuring suitability as their main advantage.

Notwithstanding, in this paper constructs have been built based on a deep Literature review, which allows to join different perspectives on each topic in the same construct.

Furthermore, the cross-sectional design of this research presents a limitation and a disadvantage. Therefore, even though the SEM was used, caution should be exercised when interpreting the causality between the different constructs of the paper (Tippins & Sohi, 2003). To examine the causality of these relationships, future research should employ longitudinal studies.

Other researchers have also used other methods, such as Hasan et al. (2022), who used Ordinary Least Squares (OLS) to regress data using fixed and random effects. However, as previously mentioned, PLS-SEM avoids many of the restrictive assumptions associated with maximum likelihood techniques, ensuring against improper solutions and factor indeterminacy, and is also insensitive to sample size.

Furthermore, although this research uses a broad measure for Operational Performance, it could be considered as subjective, being this considered as another limitation of this study, and could be complemented with objective and financial data. A drawback (and therefore, a limitation of this study) of asking employees about Operational Performance, is that, even though they get to know Operational Performance data, they will answer always from their point of view, that could be biased by several factors, such as their experience, knowledge, labour climate, and others. To address this issue, alternative indicators such as ROA (Return on Assets) or Tobin's Q could be used. ROA is widely used and less susceptible to manipulation, making it an attractive option. Similarly, Tobin's Q can serve as the dependent variable because it can capture the diverse sentiments of investors, including optimism and uncertainty (Siueia et al., 2019).

For future research, three other areas of potential for future research are identified. The first one is to go deeper into CSR, for example by dividing it into its six dimensions and identifying which ones best enhance the EM of energetic companies. The second is to include in the research model other key constructs such as quality management, or even quality models, such as the EFQM. And the third is to break down EM into its different components and to study the implications of each component on companies' Operational Performance. These three fields of action would serve to better specify the recommendations to companies and the good practices they can implement in the field of CSR and EM.

Abbreviations

CR	Corporate Responsibility
CSR	Corporate Social Responsibility
EB	Environmental Behaviour
EL	Ethical Leadership
EM	Environmental Management
LM	Lean Manufacturing

OLS	Ordinary Least Squares
OP	Operational Performance
PDCA	Plan, Do, Verify, Act
PLS-SEM	Partial Least Squares Structural Equation Modelling
PLS	Partial Least Squares
ROA	Return On Assets
SME	Small and Medium-sized company

Author contributions Jesús Ruiz-López and Lorena Para-González are the originators of the initial idea for the work. Lorena Para-González provided the state of the art and developed the proposed models and methodology, Jesús Ruiz-López carried out the queries and made the computations in SmartPLS. Carlos Mascaraque-Ramírez analysed the results and presented the discussions and conclusions. All authors analysed the data, performed the formal analysis, and participated in the writing and revising of the manuscript. All authors have read and agree the publication of the manuscript.

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Data availability The datasets generated during and/or analysed during the current study are not publicly available due to the fact that some of the data is still being analysed as part of a larger research project than the article presented here but are available from the corresponding author on reasonable request.

Declarations

Conflict of interest The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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