

Determinants of corporate environmental performance and the moderating effect of economic crises

Corporate
environmental
performance

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Abstract

Purpose – This paper aims to identify the effect of environmental management systems (EMSs), commitment to stakeholders and gender diversity on corporate environmental performance (CEP) and the extent to which an economic crisis moderates these relationships.

Design/methodology/approach – A regression analysis was conducted on a sample of 14,217 observations from 1,933 firms from 26 countries from 2002 to 2010. The estimator used is ordinary least squares with heteroscedastic panel-corrected standard errors (PCSEs), which allows us to obtain consistent results in the presence of heteroscedasticity and autocorrelation.

Findings – The results show that EMSs and stakeholder engagement are mechanisms that drive CEP but lose their effectiveness in times of crisis. However, the presence of women on boards has a positive effect on CEP that is not affected by an economic crisis.

Research limitations/implications – The study has some limitations that could be addressed in the future. We present board gender diversity as a governance mechanism because its role is strongly related to non-financial performance. Future studies could focus on other corporate governance mechanisms, such as the presence of institutional or long-term investors. In addition, other mechanisms could be found that can counteract poor environmental performance in times of crisis. Finally, it might be useful to contrast these results with the crisis generated by the coronavirus pandemic.

Practical implications – The results obtained have important practical implications at the corporate and institutional levels. At the corporate level, they highlight, as essential contributions, that environmental management systems and stakeholder orientation are not effective in times of economic crisis, except for with the presence of women on the board.

Social implications – Following the crisis, the European Commission has promoted gender diversity on boards as a mechanism to improve the governance of entities – improving, among other aspects, sustainability. In this sense, another one of the practical implications of the study is support for the policies that the European Union has implemented over the last two decades.

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Originality/value – The paper analyses how a crisis affects the moral and cultural institutional mechanisms that promote CEP. Gender diversity on the board of directors not only promotes environmental performance but also appears to be a governance mechanism that ensures this performance in times of crisis when the other mechanisms lose their effectiveness. The study proposes specific policies that help maintain environmental performance in an economic crisis.

Keywords Corporate environmental performance, Stakeholder engagement, Environmental management systems, Gender diversity

Paper type Research paper

1. Introduction

One of the main concerns related to corporate social responsibility (CSR), both at the institutional and at the business level, that have been emphasised in recent decades is corporate environmental performance (CEP). Companies have been investing in their environmental strategy for years, currently integrating it into their core business (Arco-Castro *et al.*, 2020). Firstly, given the importance of CEP for the long-term sustainability of companies, the objective of this research is to identify the factors that have an impact on CEP. One of these factors may be the establishment of environmental management systems. Two other factors may be the increasing participation of women in governance bodies, thereby incorporating a greater sensitivity towards social and environmental aspects, and the companies' own orientation towards the stakeholders' demands (Van Hoang *et al.*, 2021). Better environmental performance of companies could be linked to greater sensitivity related to the board composition and greater orientation towards stakeholders. Specifically, this paper aims to identify the effect on CEP of environmental management systems (EMSs), commitment to a company's stakeholders, and gender diversity on the board. Secondly, focussing on the onset of the 2007 financial crisis, this paper seeks to clarify whether these factors continue to be effective in times of economic crisis or whether their effect may diminish under these circumstances. The idea is to clarify whether, in times of crisis, companies would focus on other objectives, such as financial performance (Al-Dah *et al.*, 2018; Bansal *et al.*, 2015), and whether this would moderate the influence on CEP of EMSs, the commitment to stakeholders, and the presence of women on the board.

The institutional theory is used as the theoretical background. The institutional environment delimits norms that are based on the moral and cultural standards according to which an organisation is legitimised to operate (institutional regulatory, normative, and legitimacy environment) (Koster *et al.*, 2019; Riquel-Ligero and Sánchez-Vargas, 2013).

The EMS stands out among the factors that could impact CEP and reflects the pressure from the institutional environment (Javeed *et al.*, 2020). EMSs are generally based on environmental frameworks or standards that have been institutionally promoted in the past 2 decades. EMSs integrate environmental concerns in the different parts of the organisation by establishing policies, objectives, plans, and control processes. CEP can be affected by the pressures of the institutional, regulatory, and policy environments (Scott, 2008).

A more integrated or shallow implementation of EMSs could be conditional on environmental factors. In times of economic stability, EMSs may be implemented in a more integrated way and promote environmental performance, whereas in times of economic crisis, they may be implemented in a more superficial way. Thus, this study tries to identify whether EMSs are integrated into companies and promote CEP and whether their impact is moderated by the economic circumstances. In doing so, the paper addresses the ongoing debate on the causes of the effectiveness of EMSs (Ferrón-Vilchez, 2017).

In addition to normative factors, a society's cultural trends (Ben Selma *et al.*, 2020) and the expectations of stakeholders (Javeed *et al.*, 2020) could have an impact on CEP. CEP must respond to the requirements and demands of the different groups that are affected by a company's activity (Freeman, 1984). Companies are developing communication and participation channels to collect stakeholders' demands and interests, thereby showing their engagement with and commitment to stakeholders. This engagement can affect financial performance indicators, but there are few studies on its effect on environmental performance (Salem *et al.*, 2018). Even less studied has been the effect of turbulent external environments on this relationship (Ajamieh *et al.*, 2016; Elmagrhi *et al.*, 2019; He and Harris, 2020). In periods of economic crisis, this relationship may be affected when a company might not meet the demands of the different stakeholders, as the company might prioritise financial performance objectives to ensure business survival.

Finally, board diversity, specifically gender diversity, could be a determinant of environmental performance (Hussain *et al.*, 2018; Kooskora, 2008; Orazalin and Mahmood, 2021). The relationship between CSR or its components and gender diversity on the board has been studied, but most studies have not considered the environment or context in their analysis (Elmagrhi *et al.*, 2019), such as an economic crisis. An economic crisis could have a moderating effect on the impact of gender diversity on CEP. During a recession, the effect of EMSs and a company's commitment to stakeholders on environmental performance would diminish but not the effect of a diverse board composition. These boards have high-level links with different stakeholders, tend to develop diverse views, and might promote policies that are not solely directed at better financial performance (Ferrero-Ferrero *et al.*, 2015a) and would therefore take decisions to safeguard environmental performance also in times of economic downturn (Jaakson *et al.*, 2012; Karmani *et al.*, 2023).

To test these hypotheses, the ordinary least squares (OLS) estimator with heteroscedastic panel-corrected standard errors (PCSEs) is used to treat panel data from a sample of 14,217 observations (1,933 companies in 26 countries committed to CSR issues) from 2002 to 2010.

The main findings of this study are, firstly, the need to consider normative (EMS) and cognitive (orientation to stakeholders) factors and the active attitude of the board towards environmental issues to ensure the effectiveness of CEP. Secondly, in the face of an economic crisis, gender diversity on the board is a guarantor of environmental performance acting as a resilience mechanism. These results could be taken into account in new crisis situations to maintain the environmental performance achieved.

This paper contributes to research on the determinants of CEP and the effect of economic crises on CEP (Cavero-Rubio and Amorós-Martínez, 2020; Heras-Saizarbitoria *et al.*, 2016). Although companies may pursue CEP for external reasons mainly related to improving stakeholder relations and meeting societal demands and institutional pressures (Manzanaque-Lizano *et al.*, 2019), there may also be internal determinants, such as diversity on the board or a company's active attitude towards environmental issues. These factors may be the ones that ensure CEP in times of economic crisis (Heras-Saizarbitoria *et al.*, 2016). The 2007 crisis exemplifies a new crisis. The analysis of the effect of a crisis on CEP drivers – whether the management of environmental issues (stakeholder relations and EMS) is affected during an economic crisis – to determine the main factors that affect CEP or act as a resilience mechanism may be important in view of the emergence of new threats that may make companies reconsider the place of environmental practices (Karmani *et al.*, 2023; Sajko *et al.*, 2021).

To address these objectives, the rest of the paper is organised as follows. Section 2 contains a literature review and hypotheses. Section 3 describes the sample, variables, and methodology used. Finally, Sections 4 and 5 present the results, discussion, and main conclusions.

2. Literature review and hypotheses

2.1 Institutional theory and the determinants of corporate environmental performance

Institutional theory explains that organisational behaviour is motivated not only by economic reasons but also by socially determined justifications and obligations. Institutional theory postulates that organisations are influenced by the pressures that they receive from their institutional environment in three domains: the regulatory domain, which establishes formal rules; the normative domain, understood as the set of moral and cultural norms; and the cognitive domain, referring to the perception of organisational legitimacy (Koster *et al.*, 2019; Scott, 2008). These pressures lead entities to adapt their organisational behaviour, processes, and structures (Ortas *et al.*, 2019; Ali *et al.*, 2019).

In relation to the normative environment in the context of our research, companies would adopt voluntary standards to detect, reduce, eliminate, and control the environmental impact of their operations. The EMS would be an example of this, explicitly embodying the set of social and cultural norms that a company is expected to comply with in order to control the environmental impact of its activity (Daddi *et al.*, 2016). The establishment of an EMS responds to pressure from public administrations (Heras-Saizarbitoria *et al.*, 2016), as well as to board-related factors. Board managers' decision-making is conditioned by their habits, management norms, and acquired culture (Ben Selma *et al.*, 2020). In the case of gender diversity, the presence of women increases the board's attention to social and environmental issues, improving the company's overall vision and attention to a greater number of stakeholders (Alfiero *et al.*, 2015; Hoang *et al.*, 2018). It is, therefore, a matter of interest to analyse how the representation of women in governance bodies influences corporate behaviour (Cha and Abebe, 2016).

On the other hand, the establishment of channels of communication and stakeholder participation would respond to the pressures of the cognitive environment, trying to satisfy the demands of society and meet stakeholders' expectations (Javeed *et al.*, 2020).

In this area, institutional theory explains that the effect of economic context on company behaviour is determined by isomorphism. Thus, during periods of economic crisis, coercive isomorphism would occur. Companies would prioritise stability and viability by heeding pressures from stakeholders, such as investors and financial creditors, whilst taking advantage of lesser pressures from the regulatory, normative, and cognitive environments to adopt environmental policies (Ali *et al.*, 2019). On the other hand, the governance system constitutes a normative and cultural framework formed by a set of moral norms and ethical principles (Graaf, 2016) acquired by board members through their personal and professional experiences, which constitute a mechanism of resistance to change, or resilience, motivated by causes such as a crisis. Thus, in situations of economic crisis, the presence of women on the board can lead to environmental values and a broader business vision, allowing the company to continue promoting strategies and actions to boost CEP.

2.2 Environmental management systems and environmental performance: the moderating effect of an economic crisis

Environmental standards serve as a reference framework for companies to structure and develop environmental impact management, as they enable their control and analysis of objective and widely agreed parameters. These standards provide measures to reduce environmental impacts and measures that favour sustainability (Bravi *et al.*, 2020; Murmura *et al.*, 2018; Papagiannakis *et al.*, 2019).

The objective of implementing an EMS can be said to be twofold: (1) introducing reactive measures aimed at avoiding potential risks related to environmental aspects and reducing the impact of actions (Kim and Chae, 2022) and (2) taking advantage of business opportunities and seeking environmental value creation and sustainability in the medium and long term

through proactive policies (Chatzitheodorou *et al.*, 2019). In the second case, measures would focus more on sustainability and good business practices (Ryszawska, 2016; Talan and Sharma, 2019), beyond legal compliance and reactive practices (Baah *et al.*, 2020; Kim and Chae, 2022). This more strategic approach to environmental management – in the sense that it becomes part of the core of the business – could improve the level of CEP (Wiengarten *et al.*, 2017).

The diversity of objectives would justify the fact that the results obtained in various studies are not unanimous (Boiral *et al.*, 2018; Zobel, 2018). Research suggests that the application of environmental standards is the result of institutional pressures from the environment to promote more environmentally friendly behaviour (Javeed *et al.*, 2020). Thus, the lack of integration into the business would cause an EMS to be more affected by environmental factors such as an economic crisis (Iatridis and Kesidou, 2018). Studies on EMSs in times of economic crisis focus on how a crisis affects the desire to renew certificates and, therefore, influences compliance with environmental standards (Cavero-Rubio and Amorós-Martínez, 2017; Heras-Saizarbitoria *et al.*, 2016). It follows from these findings that during an economic crisis, the benefits of EMS integration do not compensate for the implementation costs (Cavero-Rubio and Amorós-Martínez, 2017). Taking institutional theory as a framework, CEP objectives in times of economic crisis may be less ambitious because companies may be more interested in achieving financial performance targets, addressing more urgent financial needs, or controlling costs (Bansal *et al.*, 2015). Thus, in times of crisis, environmental management could be a superficially adopted tool (Cavero-Rubio and Amorós-Martínez, 2020; Iatridis and Kesidou, 2018).

Based on the above studies, we can expect that EMSs that are implemented in an integrated manner in times of financial stability positively affect CEP, but that periods of economic crises moderate the effect of EMSs on CEP, leading to the relationship being negative. We propose that, in these situations, the organisational structure created is maintained but actions are reduced because resources are allocated to other, more immediate objectives. In this sense, we formulate the following research hypotheses.

H1a. EMSs have a positive impact on CEP.

H1b. Economic crises moderate the impact of EMSs on CEP.

2.3 Stakeholder engagement and corporate environmental performance: the moderating effect of an economic crisis

The environmental performance of organisations responds to changes and social demands from different groups (Rodríguez-Gómez *et al.*, 2020). The influence of stakeholders must be taken into account in a company's strategy to achieve better business performance, so companies develop mechanisms that capture the demands and interests of these groups and implement channels of communication and participation.

Commitment to stakeholders has been analysed as the set of business mechanisms that meet stakeholder demands (Johnson *et al.*, 2018; Salem *et al.*, 2018), highlighting mechanisms that promote a continuous flow of information between a company and its stakeholders (Garde-Sánchez *et al.*, 2020; Johnson *et al.*, 2018), as they capture the demands and interests of these groups and establish networks of mutual collaboration (Johnson *et al.*, 2018) and relationships of trust (Papagiannakis *et al.*, 2019).

Regarding the relationship between commitment to stakeholders and CEP, collaboration between a company and its stakeholders can benefit both parties. Knowledge sharing and access to environmental information enable companies to improve their environmental procedures and practices. They can help companies overcome internal shortcomings and enable the development of new environmental protection practices (Papagiannakis *et al.*, 2019)

and achieve higher levels of CEP (Amankwah-Amoah *et al.*, 2019). Moreover, networking between a company and its stakeholders allows the company to communicate environmental initiatives to the stakeholders, thus improving relations with them. Stakeholders can participate in the process of implementing a company's environmental protection programmes and have their environmental demands addressed.

However, these mechanisms may not always be effective; indeed, they can be expected to be less effective in times of crisis (Lin *et al.*, 2021). In times of economic crisis, stakeholders tend to demand higher levels of social performance and may be less demanding in relation to environmental issues, while companies may focus on economic and financial objectives (Bansal *et al.*, 2015). The European capital market seems to value sustainability only in the early years of economic crises, without homogeneous results across countries (Miralles-Quiros *et al.*, 2017). The market penalises actions not directly related to financial performance at such times of crisis (Al-Dah *et al.*, 2018). In crisis contexts, companies may focus their attention on the demands of internal stakeholders, such as investors and employees, who do not seem to respond favourably to environmental and social practices (Yang *et al.*, 2022).

In this context, the mechanisms created to meet the environmental demands of stakeholders would be affected, reducing their operability. Companies would prefer to meet the demands of the capital market and ownership, although they should adopt a proactive stance and consider different types of stakeholders and institutional stimuli to support recovery (Amato *et al.*, 2020; Gromis di Trana *et al.*, 2022; Thai *et al.*, 2023; Yang *et al.*, 2022).

In this sense, a positive relationship between commitment to stakeholders and CEP is expected, as well as a loss of impact of commitment to stakeholders on CEP in times of economic crisis. Therefore, we put forward the following hypotheses.

H2a. Firms' commitment to stakeholders is positively related to CEP.

H2b. Economic crises moderate the effect of firms' commitment to stakeholders on CEP.

2.4 Gender diversity on the board and corporate environmental performance: the moderating effect of an economic crisis

Gender diversity on the board can be related to companies' CSR policies and, in the environmental field, to CEP (Reddy and Jadhav, 2019).

Studies generally show that a higher proportion of women on the board of directors is related to greater attention to environmental issues (García-Sánchez *et al.*, 2019; Pucheta-Martínez and Gallego-Álvarez, 2019; Rehman *et al.*, 2020). Indeed, companies with a gender-diverse board of directors have a greater commitment to environmental issues; they are more willing to comply with environmental regulations. They promote a greater number of environmental protection policies and, therefore, are companies with a higher CEP (Shakil *et al.*, 2020; Van Hoang *et al.*, 2021). These studies argue that women are more risk-averse and more sensitive to social and environmental issues (Van Hoang *et al.*, 2021). The underlying reason seems to lie in the ethic of care (Gilligan, 1982). The values held by board members would relate to more sustainable and stakeholder-oriented business goals that are ultimately translated into social and environmental strategies and practices.

While gender diversity on boards appears to be a key determinant in setting environmental goals, periods of crisis may alter this relationship. Boards tend to have less diversity in high-risk environments, making it necessary to strengthen the institutional framework to maintain environmental objectives (Ferrero-Ferrero *et al.*, 2015b). On the other hand, gender diversity could be instrumental in managing the risk associated with events such as an economic crisis (Ooi *et al.*, 2017). Gender diversity could improve decision-making in complex environments, such as those arising from economic crises, by incorporating greater social sensitivity, being more stakeholder oriented, reinforcing the ethical dimension,

and using female-specific skills (Kabongo *et al.*, 2013; Ooi *et al.*, 2017). In times of economic crisis, board values could be a mechanism for maintaining long-term sustainability goals and safeguarding environmental strategies in the face of pressure to meet financial targets. Although in the context of the 2007 global financial crisis stakeholders' welfare was disregarded by pursuing irresponsible corporate practices (Sajko *et al.*, 2021), a gender-diverse board could have provided a broader view of the business, such as different points of view, different skills, and different principles and values, thereby improving decision-making and possibly mitigating the effects of the economic crisis on CEP.

Gender diversity helps in considering the demands of different stakeholders and in building a more resilient organisation. The set of norms, values, and beliefs shared by the board of directors shapes decision-making on environmental performance. The more deeply rooted these values are, the easier it is to ensure that changes in the economic environment will not have an impact on decision-making (Amorelli and García-Sánchez, 2023).

According to this approach, gender diversity on boards can be expected to improve CEP and, due to the introduction of social values and risk aversion, lead to greater stakeholder engagement and the consideration of environmental measures. In times of economic crisis, it is expected that the presence of women on the board will lead to the maintenance of CEP measures. Based on the above, we propose the following research hypotheses.

H3a. Gender diversity on the board of directors is positively related to CEP.

H3b. Economic crises positively enhance the effect of gender diversity on CEP.

3. Method

3.1 Data and sample

The sample is drawn from the Ethical Investment Research Service (EIRIS) database, which is composed of indicators of different areas of sustainability organised into six pillars: environment, human resources, organisational behaviour, governance, community engagement, and human rights. This database is useful for the present research because it is one of the most comprehensive databases of environmental performance indicators (Cassely *et al.*, 2020). To measure the indicators, EIRIS collects the information disclosed by the entities, conducts questionnaires, and surveys the companies, followed by a review of the results by sector specialists (García-Sánchez *et al.*, 2019; Martínez-Ferrero *et al.*, 2015).

The sample consists of large companies from 26 countries in the period from 2002 to 2010. The selected period allows us to analyse a period of economic stability and a period of crisis (Esteban-Sánchez *et al.*, 2017). Moreover, this period allows us to study the effect of a financial crisis, which may be different from the effects caused by the COVID-19 pandemic or the war in Ukraine (García-Sánchez and García-Sánchez, 2020). The sample consists of 1,933 companies in the EIRIS database. In total, we start with 14,217 observations from an unbalanced panel.

Table 1 shows the distribution of the sample by period and country. As can be seen, the years of economic stability are better represented, containing 64.49% of the observations. Regarding geographical diversity, 38.34% of the observations belong to companies located in Europe, 29.88% to companies in America, 27.52% to companies in Asia, and 4.26% to companies in the Australian continent.

3.2 Measurements

The dependent variable "Environmental performance" (Envperfor) is measured by EIRIS through the information disclosed by the entities on CEP. The variable "Stakeholder engagement" (StakEngag) refers to the orientation and commitment to stakeholders and is

Table 1.
Description of the
sample

	N	%	Description
<i>Zone</i>			
America	4,248	29.88	Canada, USA
Asia	3,913	27.52	China, Japan, Singapore, Korea
Australia	605	4.26	Australia, New Zealand
Europe	5,451	38.34	Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, the UK
<i>Periods</i>			
Stability	9,169	64.49	2002–2007
Crisis	5,048	35.51	2008–2010

Source(s): This table is the original work of the authors

measured by the existence of communication mechanisms and channels related to environmental aspects, which enable active participation and collaboration of stakeholders and provide possibilities for interaction (Garde-Sánchez *et al.*, 2020). The variable “Environment management system” (EMS) is measured by EIRIS by the degree of implementation of the Eco-Management and Audit Scheme (EMAS) or ISO 14001 (Javeed *et al.*, 2020). The variable “Gender” takes a value of 1 if there are three or more women on the board and is 0 otherwise (Amorelli and García-Sánchez, 2020); if the value is 1, then the women on the board may be able to influence corporate policies and practices (Amorelli and García-Sánchez, 2021). Women should be sufficiently represented to be able to have influence and raise issues (Amorelli and García-Sánchez, 2021; Amorelli and Garcia-Sanchez, 2023).

To observe the effect of the economic crisis on these indicators, we use the dependent variable “Crisis”, which takes a value of 0 or 1 depending on whether the observation corresponds to a period of stability or a time of economic crisis (Amato *et al.*, 2020; Esteban-Sánchez *et al.*, 2017).

Finally, we introduce control variables that may affect the outcome of the model. Specifically, for control variables related to environmental performance, we distinguish between common law countries (1) and civil law countries (0) (ComLaw) (Frias-Aceituno *et al.*, 2013) and consider the following variables: return on assets (ROA), leverage (Elmagrhi *et al.*, 2019; Pucheta-Martínez and García-Álvarez, 2019; Arco-Castro *et al.*, 2020; Miralles-Quiros *et al.*, 2017), size (Shakil *et al.*, 2020; Orzalin and Mahmood, 2021; Papagiannakis *et al.*, 2019), and GDP variation, which measures the change in GDP from one period to another and shows the impact of the crisis on the economy of the country where the company operates (Rye and Jackson, 2020).

Table 2 describes all the variables used.

3.3 Model estimation

In order to test the research hypotheses on the sample and with the variables described, we use the following regression model:

$$EnvPerfor_{it} = EMS_{it} + StakEngag_{it} + Gender_{it} + Crisis_{it} + ComLaw_i + ROA_{it} + Leverage_{it} + Size_{it} + GDPvariation_{it} \quad (1)$$

In addition, we propose three additional models to test the possible dampening effect of the crisis:

	Description	Measurement	Source	Previous studies
<i>Dependent variable</i>				
Environmental performance	Level of environmental performance that the company has been able to demonstrate	Ratio from 0 to 100	Eiris	García-Sánchez <i>et al.</i> (2020)
<i>Independent variables</i>				
Environment management system	Degree of implementation of the EMAS or ISO 14001	Ratio from 0 to 100	EIRIS	Amor-Esteban <i>et al.</i> (2019)
Stakeholder engagement	Existence of communication mechanisms and channels related to environmental aspects	Ratio from 0 to 100	EIRIS	García-Sánchez and Noguera-Gámez (2017)
Gender	Number of women in board	Takes a value of 1 if there are three or more women on the board and 0 otherwise	EIRIS	Amorelli and García-Sánchez (2020)
Crisis	Depending on whether the observation corresponds to a period of stability (2002–2007) or a time of economic crisis (2008–2010)	Takes a value of 1 for 2008–2010 years and 0 for 2002–2007 years	From the EIRIS variable “years”	Esteban-Sánchez <i>et al.</i> (2017)
<i>Control variables</i>				
Common law	Depending on whether the company operates in a common law country or in a civil law country	Take a value of 1 for common law country and 0 for civil law country	Based on the EIRIS variable “country”	Frías-Aceituno <i>et al.</i> (2013)
ROA	Return on assets	Profit or loss/Total assets ratio	EIRIS	Pucheta-Martínez and García-Álvarez (2019)
Leverage	Debt to equity	Debt/Equity ratio	EIRIS	Elmagrhi <i>et al.</i> (2019)
Size	Logarithm of total assets	Log assets	EIRIS	Shakil <i>et al.</i> (2020)
GDP variation	Annual percentage growth rate of GDP	$\frac{GDP_{year\ t+1} - GDP_{year\ t}}{GDP_{year\ t}}$	World Bank	Rye and Jackson (2020)

Source(s): This table is the original work of the authors

Table 2. Variables

$$EnvPerfor_{it} = EMS_{it} + StakEngag_{it} + Gender_{it} + Crisis_{it} + ComLaw_i + ROA_{it} + Leverage_{it} + Size_{it} + GDPvariation_{it} + StakEngag \times Crisis_{it} \quad (2)$$

$$EnvPerfor_{it} = EMS_{it} + StakEngag_{it} + Gender_{it} + Crisis_{it} + ComLaw_i + ROA_{it} + Leverage_{it} + Size_{it} + GDPvariation_{it} + EMS \times Crisis_{it} \quad (3)$$

$$EnvPerfor_{it} = EMS_{it} + StakEngag_{it} + Gender_{it} + Crisis_{it} + ComLaw_i + ROA_{it} + Leverage_{it} + Size_{it} + GDPvariation_{it} + Gender \times Crisis_{it} \quad (4)$$

After performing the Durbin–Wu–Hausman test, we found that it is preferable to use a fixed-effects estimation. Subsequently, we tested possible problems of autocorrelation,

heteroscedasticity, and endogeneity with the Wooldridge test, the Wald test, and the Hausman test, respectively. The Wooldridge test and the Wald test yielded a p -value <0.000 , so we cannot accept the null hypothesis of homoscedasticity because the variance of the sample errors is not constant, nor can we accept the null hypothesis that there is no first-order autocorrelation. The Hausman test yielded a p -value >0.05 , so we accept the null hypothesis of exogeneity. We also tested endogeneity with the Mundlacker test. This test also yielded a p -value >0.05 , so we accept the null hypothesis of exogeneity. In short, autocorrelation and heteroscedasticity problems were detected.

To solve these problems, we used OLS with heteroscedastic panel-corrected standard errors (PCSEs) (Molla *et al.*, 2021; Nyeadi *et al.*, 2021), which is based on the calculation of standard errors and variance-covariance estimates assuming that the disturbances are, by default, heteroscedastic and contemporaneously correlated across panels. Moreover, it seems preferable to apply this estimator because the standard errors estimated by the feasible generalised least squares (FGLS) estimator may underestimate the true sample variability (Molla *et al.*, 2021). It also allows robust estimates to be obtained, not only in the presence of heteroscedasticity but also in the presence of possible correlations between units (Bailey and Katz, 2011; Molla *et al.*, 2021).

We also performed a difference-in-differences model, and we subdivided the sample into two periods (a period of stability and a period of economic crisis) and tested whether the differences between the betas of each of the variables for each period were significant using a t -test.

4. Results and discussion

Table 3 shows the descriptive statistics, and Table 4 shows the correlations between the variables under study.

Most of the companies analysed showed low levels of CEP, demonstrating a lack of mechanisms to promote CEP. Less than half of the companies implemented an EMS, and most of them established few communication channels with their main stakeholders. In addition, only 13% of the companies had a significant number of women on the board. Profitability and leverage fluctuated significantly among the companies in the periods analysed, reflecting high financial volatility. The variation in GDP during the years analysed is high given that the sample includes times of financial crisis.

Correlations between variables show that EMS and stakeholder engagement are two interrelated corporate policies (Papagiannakis *et al.*, 2019). Meanwhile, board gender diversity is positively related to environmental performance and commitment to stakeholders

Variable	Mean	Standard deviation	Minimum	Maximum
Environmental performance	29.573	62.2700	0	100
EMS	49.6298	39.8278	0	100
Stakeholder engagement	25.8811	28.9554	0	100
Gender	0.1333	0.3399	0	1
Crisis	0.3409	0.4740	0	1
Common law	0.5926	0.4914	0	1
ROA	0.1268	1.44159	0.0000123	82.63165
Leverage	1.6473	3.4865	0.0057	97.8
Size	8.0706	1.7041	0.0318	13.3801
GDP variation	1.8389	2.6512	-8.0744	14.5197

Source(s): This table is the original work of the authors

Table 3.
Statistics

	1	2	3	4	5	6	7	8	9	10
1. Enyperform	1									
2. EMS	0.6524***	1								
3. Strakengag	0.4815***	0.4702***	1							
4. Gender	0.0332***	-0.0421***	0.0612***	1						
5. Crisis	0.0777***	0.0816***	0.1012***	0.0585***	1					
6. ComLaw	-0.3036***	-0.3779***	-0.1259***	0.1186***	-0.0017	1				
7. ROA	0.0076	0.0262***	0.0265***	0.0023	0.0181**	-0.0067	1			
8. Leverage	0.0076	-0.0112	-0.0064	0.0035	0.0054	0.0089	0.0003	1		
9. Size	0.2607***	0.2341***	0.2122***	0.0778***	0.0512***	-0.1859***	0.0525***	0.0456***	1	
10. GDPvar	-0.1577***	-0.1642***	-0.1071***	-0.0023	-0.4595***	0.2072***	-0.0721***	-0.0197*	0.0037	1

Note(s): Sig. * $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$
Source(s): This table is the original work of the authors

Table 4.
Correlations

(Elmagrhi *et al.*, 2019; Kabongo *et al.*, 2013; Shakil *et al.*, 2020). However, in contrast to results obtained in other studies (Rehman *et al.*, 2020), gender diversity on the board is negatively related to EMS (EMAS or ISO 14001 implementation). Bansal *et al.* (2015) empirically demonstrated that more profitable companies were more likely to continue their strategic CSR in times of economic constraint. The correlations of GDP variation show that instability is inversely related to CEP, EMS, and commitment to stakeholders. In times of instability, these policies are retracted (Ali *et al.*, 2019).

Table 5 shows the results of the regression analysis for the different models.

The results were checked with a robustness test. We followed the work of Molla *et al.* (2021), which similarly uses PCSE in a sample with heterogeneity and then uses the Driscoll and Kraay standard error estimator to check the robustness of the results. In the application of this method to the sample of this work, similar results were obtained. Therefore, we can conclude that the results of the study are robust.

The results show that environmental performance is determined by the implementation of an EMS based on ISO 14001 or EMAS models, the company’s stakeholder engagement, and gender diversity on the board of directors. These results lead us to accept Hypotheses 1a, 2a, and 3a. The EMS is used to improve CEP (Papagiannakis *et al.*, 2019) and allows a more strategic approach to environmental performance (Wiengarten *et al.*, 2017) to promote more proactive environmental behaviour (Javeed *et al.*, 2020). Stakeholder engagement leads companies to adopt environmental measures (Rodríguez-Gómez *et al.*, 2020), and CEP is the means for companies to meet stakeholder demands (Johnson *et al.*, 2018; Salem *et al.*, 2018), with commitment to stakeholders being related to higher levels of CEP (Amankwah-Amoah *et al.*, 2019). The results show that commitment to stakeholders is a determinant factor in the environmental strategy (Lin *et al.*, 2021). Finally, the results show that a significant presence of women on the board is associated with CEP (Amorelli and García-Sánchez, 2020; Shakil *et al.*, 2020; Van Hoang *et al.*, 2021). The characteristics or values of women on the board have an impact on environmental decision-making (Pucheta-Martinez and Garcia-Alvarez, 2019).

Dependent variable Independent variables	Environmental performance			
	Model 1	Model 2	Model 3	Model 4
EMS	0.3528***	0.3519***	0.3659***	0.1957***
Stak Engag	0.1955***	0.2088***	0.1966***	0.3531***
Gender	2.2335***	2.2192***	2.1632***	1.9744**
Crisis	0.2387	1.1948**	2.3180***	0.1566
ComLaw	-6.7372***	-6.7914***	-6.7587***	-6.7274***
ROA	-0.0045	-0.0045	-0.0045	-0.0045
Leverage	0.0017	0.0017	0.0018	0.0017
Size	0.6791***	0.6854***	0.6747***	0.6807***
GDPvariation	-0.1136**	-0.1125**	-0.1122**	-0.1142**
Crisis*Stake eng		-0.0351**		
Crisis*EMS			-0.0409***	
Crisis*Gender				0.5840
Cons	4.5003***	4.2292***	3.9387***	4.4898***
Number of obs	14.217	14.217	14.217	14.217
Number of groups	1.933	1.933	1.933	1.933
Rho	0.6503	0.6536	0.6535	0.6488
R-square	0.2258	0.2240	0.2247	0.2268
p-value Wald χ^2	0.0000	0.0000	0.0000	0.0000

Table 5.
Regression analysis

Note(s): Sig. * $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$
Source(s): This table is the original work of the authors

From the regression analysis, we can also observe the extent to which situations of economic crisis negatively influence the relationship between the independent variables and the dependent variable. The results show that EMSs and commitment to stakeholders are negatively affected by the context of crisis. [Hypotheses 1b](#) and [2b](#) are accepted. Crises lead to a focus on other aspects of management, reducing compliance with environmental standards ([Cavero-Rubio and Amorós Martínez, 2017](#)). Thus, CEP is less ambitious in a crisis context ([Bansal et al., 2015](#); [Iatridis and Kesidou, 2018](#)). The results show how the mechanisms that foster CEP might be affected by a situation of economic crisis ([Jaakson et al., 2012](#); [Karmani et al., 2023](#)). In the same sense, the commitment to stakeholders is moderated by a crisis ([Lin et al., 2021](#)). This study shows that communication channels with stakeholders in times of economic crisis lose their capacity to environmental demand channels. In a crisis, companies focus on financial objectives ([Bansal et al., 2015](#)).

However, the impact of the economic crisis on gender diversity's effect on CEP is not significant. We thus reject [Hypothesis 3b](#). It can be concluded that the effect of board gender diversity on CEP is not affected by economic crises ([Sajko et al., 2021](#)). The results show that corporate governance factors become an important determinant of environmental policies in times of economic crisis and that other mechanisms become less effective. Structures created to address stakeholder demands and EMSs appear to be maintained, but their impact on environmental performance is lower in times of economic crisis – CEP may be reduced in these circumstances so that resources can be allocated to other objectives.

In contrast, the existence of a board of directors with a significant representation of women seems to be more conducive to social and environmental values ([Amorelli and García-Sánchez, 2023](#)). This could be a mechanism that safeguards CEP in times of economic crisis ([Sajko et al., 2021](#)) because these board members have a set of characteristics and values related to the ethic of care ([Gilligan, 1982](#)) that they incorporate into business strategies ([Kabongo et al., 2013](#); [Ooi et al., 2017](#)).

In relation to the control variables, it is noteworthy that the effect of variation in GDP is significant, indicating that economic instability negatively affects CEP. The development of environmental measures requires stability in companies. Another significant variable is the country in which the company operates. Operating in a civil law country is positively related to environmental performance ([Frías-Aceituno et al., 2013](#)). The institutional and regulatory environments exert an influence on companies' performance. Finally, size is also a significant variable, with larger companies having higher environmental performance.

Following [Howell \(2010\)](#), we have performed *t*-tests for two independent samples (before and during the period of economic crisis) to verify whether the differences between beta coefficients in the regressions depend on whether the company is in a context of economic crisis or stability. [Table 6](#) shows the results.

There are significant differences in the influence on environmental performance of the variables stakeholder orientation and EMS depending on whether the company is in a

	No crisis Non-standardised beta	Crisis Non-standardised beta	<i>t</i> -test
EMS	0.4248209	0.3596842	5.227***
Stake Engag	0.2348462	0.2426783	-0.486***
Gender	3.943548	4.268436	-0.264
n	9,169	5,048	

Note(s): Sig. * $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

Source(s): This table is the original work of the authors

Table 6.
Results of the differences of betas coefficients in the regressions by periods (*t* test for two independent samples)

situation of economic crisis or economic stability. In contrast, the effect of board gender diversity in times of crisis and economic stability does not differ significantly.

Moreover, the difference-in-differences method is used to test whether there are differences in the level of environmental performance depending on whether the firm is in a context of economic crisis or stability. The results show a coefficient of -9.1795 (p -value: 0.000), so we can affirm that in times of economic crisis, without taking into account other variables, the level of CEP is lower. Taking into account the results of the regression model and the difference-in-differences method, we can say that in times of economic crisis, the level of CEP drops, largely due to the loss of effectiveness of the determinants and mechanisms that drive CEP. Moreover, we test whether there are differences in the level of environmental performance depending on whether there are three or more women on the board (Amorelli and García-Sánchez, 2020). The difference-in-differences test yields a coefficient of -0.2707 (p -value: 0.813), confirming the results of the t -test for differences in betas; namely, women on the board of directors boost environmental performance in times of stability and economic crisis.

5. Conclusions

The current study contributes to the debate on the impact of the institutional environment on environmental performance. The research shows how organisations adapt their behaviour, processes, and structures (Ortas *et al.*, 2019; Ali *et al.*, 2019). Given the lack of unanimity in the literature, this study highlights the need to consider normative and cognitive factors to predict the effectiveness of these mechanisms in promoting long-term sustainability in companies through CEP. This research analyses how an economic crisis affects the relationship between EMSs, stakeholder engagement, and board gender diversity and CEP. In periods of economic crisis, the application of an EMS can become more symbolic than real (Ferrón-Vilchez, 2017; Zobel, 2018). In these periods, the company's engagement with stakeholders is also affected, and there is a tendency towards a greater orientation towards market demands and the achievement of economic results (Bansal *et al.*, 2015). Ultimately, we can draw the conclusion that the effectiveness of the drivers of environmental performance is conditioned by times of economic crisis.

However, the results show that the presence of women on boards prevents companies from abandoning the development of environmental performance. The effect of such boards on environmental performance is not affected by the moderating effect of the crisis. In other words, the promotion of environmental performance by a board of directors with a significant number of women is not affected by times of economic crisis (Amorelli and García-Sánchez, 2021). This leads us to conclude that the values that women bring to the board – within the framework of the ethic of care – are maintained in periods of crisis. The normative pillar of the institutional theory, consisting of social, ethical, and environmental values and principles, is represented in the board's diversity and guarantees corporate environmental performance when other institutional factors lose their effectiveness.

The results show that in periods of expansion, companies try to obtain competitive advantages in their environmental strategy and to meet the demands of stakeholders but that in periods of crisis, environmental actions are linked more to the legitimisation of performance. In this context, stakeholders' environmental demands are less addressed because companies allocate resources to either social or financial aspects with a short-term vision.

The results obtained have important practical implications at the corporate and institutional levels. At the corporate level, they highlight that EMSs (Clever-Cortés *et al.*, 2011) and commitment to stakeholders (Amankwah-Amoah *et al.*, 2019; Lin *et al.*, 2021) are not effective in times of economic crisis, except when there are women on the board. Additionally,

this study has implications for legal and political institutions. This study makes it clear that public institutions and international bodies are responsible for corporate policies that lead to greater or lesser environmental protection. They can support mechanisms that, during a financial crisis, are not influenced by shareholders and that encourage companies to safeguard the level of environmental performance. Board members decide on the policies the company will implement, which suggests that an appropriate composition ensures attention to social and environmental demands. The European Commission has promoted gender diversity on boards as a mechanism for improving the governance of entities – improving, among other aspects, sustainability (Ferrero-Ferrero *et al.*, 2015b). In this sense, another practical implication of the study's results is support for the policies that the European Union has implemented over the past 2 decades.

The study also has implications for society at large. The study of long-term organisational resilience is necessary to allow sustainable development (Karman and Savanevičienė, 2021). The present study analyses the impact of a crisis on the effectiveness of EMSs on environmental performance. On the other hand, with respect to research on commitment to stakeholders, we found no studies analysing its effect on environmental performance in times of economic crisis. In addition, the study shows that gender diversity on the board is a guarantor of environmental performance in times of economic crisis. It is relevant to consider these results since research on gender diversity is a topic of current interest, but there is a lack of research on the effect of this corporate governance mechanism on environmental performance.

The study has some limitations that could be addressed in the future. We present board gender diversity as a governance mechanism because its role is strongly related to non-financial performance (Kabongo *et al.*, 2013). In addition, other mechanisms could be found that can counteract poor environmental performance in times of crisis. Finally, it might be useful to contrast the financial crisis we studied here with the crisis generated by the COVID-19 pandemic or the crises generated by the war in Ukraine and the Israeli–Palestinian conflict, which affect the energy and food sectors. The financial crisis and these conflicts have caused a global recession according to the International Monetary Fund. It is important to observe what mechanisms companies used to drive the creation of environmental value in previous financial crises, as the COVID-19 crisis and wars have highlighted the importance of responsible and efficient use of resources to protect biodiversity and combat climate change (Gromis di Trana *et al.*, 2022; Karmani *et al.*, 2023).

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