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Eugenio Zubeltzu Jaka

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Tesis Doctoral

SUSTAINABILITY, CORPORATE GOVERNANCE AND ORGANIZATIONAL PERFORMANCE: FIVE ESSAYS.

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UNIVERSIDAD DE ZARAGOZA

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Sustainability, corporate governance and organizational performance: five essays.

Department

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PhD dissertation

Sustainability, corporate governance and organizational performance: five essays

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Publication list

This Doctoral Thesis consists of a compendium of 5 research papers published in international scientific journals, 4 of which are published in journals whose impact index is included in the Journal Citation Reports (JCR). The list of published articles is as follows:

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Eugenio Zubeltzu Jaka, con D.N.I. 72.44.94.86S expone:

Siendo el primer autor del artículo titulado: *"Corporate social responsibility and corporate governance and corporate financial performance: Bridging concepts for a more ethical business model"*, afirmo haber contribuido en todo el proceso de elaboración de este trabajo de investigación, incluyendo el análisis cuantitativo y cualitativo, la interpretación de los datos, así como la redacción y corrección del manuscrito. Además, siendo el único autor de este artículo no poseedor del título de Doctor, este trabajo de investigación no formará parte de ninguna otra tesis en modalidad de compendio de publicaciones.

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Siendo el tercer autor del artículo titulado: *"Firms' board independence and corporate social performance: A Meta-Analysis"*, afirmo haber contribuido en todo el proceso de elaboración de este trabajo de investigación, incluyendo el análisis cuantitativo y cualitativo, la interpretación de los datos, así como la redacción y corrección del manuscrito. Además, siendo el único autor de este artículo no poseedor del título de Doctor, este trabajo de investigación no formará parte de ninguna otra tesis en modalidad de compendio de publicaciones.

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“hori ba,,, *milla esker bide luze hontan lagundu gaiztuzuen guztioi”*.

“De eso se trata, de coincidir con gente que te haga ver cosas que tu no ves. Que te enseñen a mirar con otros ojos.”

Mario Benedetti

Zuri Politta eta zuei nere txikiak...

INDEX

Abstract

This PhD dissertation aims to contribute to three knowledge fields that are closely linked: i) corporate governance; ii) business sustainability; and, iii) organizational performance. This thesis comprises five research studies, so that the dissertation is constructed under the publications compendium model. The dissertation analyze, from an international perspective, the influence of different corporate governance mechanisms on companies' sustainability performance. Furthermore, it provides two studies that go deeper in that relationship by addressing the determinants of Eco-innovation and voluntary environmental certifications effect over Environmental performance. This will bring some help to companies' managers at the time of adopting strategic decisions to achieve enhanced social and environmental performance.

In this way, the main objective of the dissertation is to evaluate whether several corporate governance mechanisms and processes and proactive environmental strategies make it possible for companies to make specific contributions to the United Nations Sustainable Development Goals (SDGs) (Schönherr, Findler, & Martinuzzi, 2017). The main methodology applied in this thesis is the meta-analysis and the meta-regression. These approaches provide the opportunity to obtain additional empirical evidence based on the systematic review of previously published empirical works on one field or topic (Borenstein, Higgins, & Rothstein, 2009; Lipsey & Wilson, 2001). With that goal in mind, this dissertations is structured in the following way. The first article presents the state of the art of research on common issues in business performance and corporate governance, in order to present a basic framework for the subsequent analysis of the relationship between good governance practices, sustainability, and organizational performance. The second study analyses the effect the board of directors' independence on the corporate social and environmental performance of companies of a sample of more than 100,000 firms (grouped in 87 empirical articles). The third study analyzes the association between firms' boardroom size (i.e., diversity) on corporate social performance. The fourth study focuses on a strategic tool that promotes sustainability –eco-innovation in particular–. Specifically, this chapter aims to

capture the main determinants of companies' eco-innovation practices. Finally, the last study focuses on shedding light on the performance implications of other strategic tool that promotes sustainability –the adoption of voluntary environmental certifications on corporate environmental performance–.

The main results of the dissertation allow contributing to expand the current knowledge in the field in the following ways. Firstly and foremost, we found that the incidence of board independence and size positively influences companies' social and environmental performance. More interestingly, we found that the aforementioned connections are conditioned by both methodological and theoretical moderators such as: i) minority investors' protection measures; ii) countries' corporate governance systems; and, iii) corporate social and environmental performance proxies, among others. This finding is in accordance with the view that the interdependence between corporate governance mechanisms proposed by the "bundle of corporate governance". Secondly, this dissertation address that companies with collaborative networks and/or more environmental involvement are more prone to eco-innovation, emphasizing the role of "technology push" as the main group of determinants, regardless of the type of eco-innovation analyzed. Finally the positive impacts of environmental management systems on environmental performance is captured, and the moderating role of corporate environmental performance measures and environmental management certifications maturity and internalization is addressed and contextualized.

Resumen

Esta tesis doctoral pretende contribuir en tres campos de conocimiento estrechamente vinculados: i) el gobierno corporativo; ii) la sostenibilidad empresarial; y, iii) el desempeño organizacional. Esta tesis consta de cinco estudios de investigación, de modo que la tesis se presenta bajo el modelo de compendio de publicaciones. La tesis analiza, desde una perspectiva internacional, la influencia de los diferentes mecanismos de gobierno corporativo sobre el desempeño de las empresas en materia de sostenibilidad. Además, incluye dos estudios que profundizan en el estudio de la sostenibilidad empresarial al abordar los determinantes de la eco innovación y analizar el efecto de las certificaciones medioambientales sobre el comportamiento medioambiental de las empresas. Esto ayudará a los directivos de las empresas a la hora de adoptar decisiones estratégicas para lograr un mejor desempeño social y medioambiental.

De esta manera, el objetivo principal de la tesis es evaluar si los diferentes mecanismos y procesos de gobierno corporativo y diversas estrategias medioambientales proactivas permiten a las empresas realizar contribuciones específicas a los Objetivos de Desarrollo Sostenible (ODSs) de las Naciones Unidas (Schönherr, Findler y Martinuzzi, 2017). La metodología principal aplicada en esta tesis es el meta-análisis y la meta-regresión. Estos enfoques brindan la oportunidad de obtener evidencias empíricas adicionales basadas en la revisión sistemática de trabajos empíricos previamente publicados sobre un campo o tema (Borenstein, Higgins y Rothstein, 2009; Lipsey y Wilson, 2001). Con ese objetivo en mente, esta tesis se estructura de la siguiente manera. El primer artículo presenta el estado del arte de la investigación sobre temas comunes en el desempeño de los negocios y el gobierno corporativo, con el fin de presentar un marco básico para el posterior análisis de la relación entre las prácticas de buen gobierno, la sostenibilidad y el desempeño organizacional. El segundo estudio analiza el efecto de la independencia del consejo de administración sobre el desempeño social y ambiental de las

empresas de una muestra de más de 100.000 empresas (agrupadas en 87 artículos empíricos). El tercer estudio analiza la asociación entre el tamaño del consejo de administración las empresas (como medida de la diversidad) y el desempeño social y medioambiental de las empresas. El cuarto estudio se centra en una herramienta estratégica que promueve la sostenibilidad, la eco-innovación. En concreto, este capítulo pretende captar los principales determinantes de las prácticas de eco innovación de las empresas. Finalmente, el último estudio trata de clarificar las implicaciones sobre el desempeño medioambiental de otra herramienta estratégica que promueve la sostenibilidad empresarial -la certificación voluntaria de los sistemas de gestión ambiental -.

Los principales resultados de la tesis permiten contribuir a ampliar el conocimiento actual en el campo de las siguientes maneras. En primer lugar, encontramos que la incidencia de la independencia y el tamaño de los consejos de administración influye positivamente en el desempeño social y ambiental de las empresas. Más interesante aún, encontramos que las conexiones antes mencionadas están condicionadas por moderadores tanto metodológicos como teóricos, tales como:
i) medidas de protección de los inversionistas minoritarios; ii) sistemas de gobierno corporativo de los países; y, iii) indicadores de desempeño social y ambiental de las empresas, entre otros. Esta conclusión concuerda con la opinión sobre la interdependencia entre los mecanismos de gobierno corporativo propuesta por el "bundle of corporate governace"(Rediker & Seth, 1995). En segundo lugar, esta tesis concluye que las empresas con redes de colaboración y/o mayor implicación ambiental son más propensas a la eco-innovación, enfatizando el papel del "empuje tecnológico" como factor determinante principal, independientemente del tipo de eco-innovación analizada. Finalmente, se muestran los impactos positivos de los sistemas de gestión ambiental sobre el desempeño ambiental, y se aborda y contextualiza el papel moderador de las formas de medición del desempeño medioambiental de las empresas y del grado de madurez de los sistemas de gestión ambiental.

PART I

1. Introduction

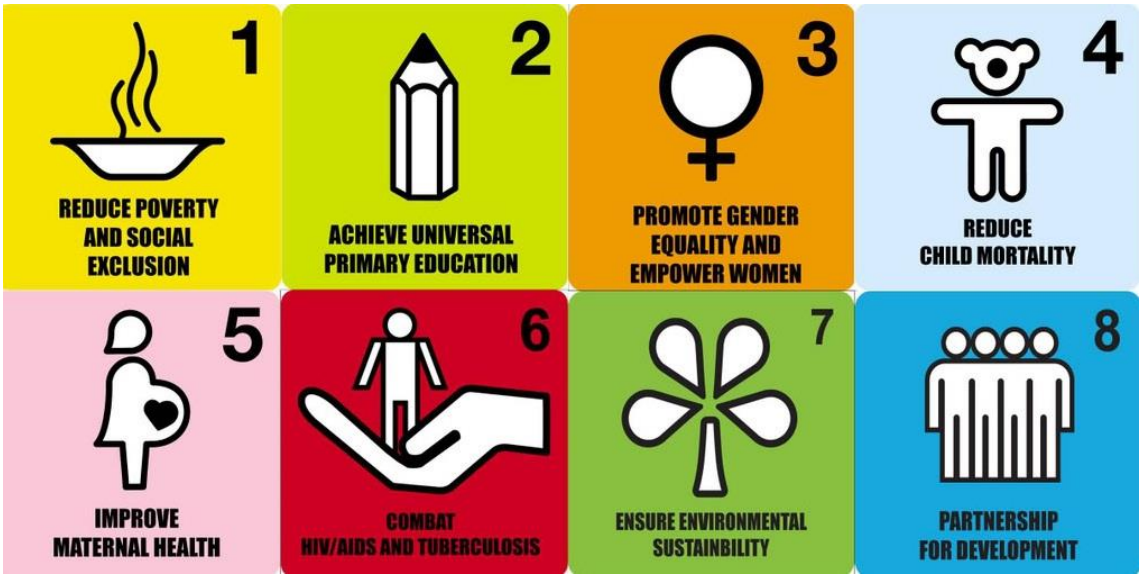
In these first two decades of the new century, a new way of approaching the strategic and management scheme of companies is being manifested. Organizations are moving towards a more sustainable economic, social and environmental model with greater quotas of accountability (Carroll & Shabana, 2010; Schaltegger & Wagner, 2011).

The concept of sustainability in its contemporary and most reproduced sense is the one proposed by the "World Commission on Environmental and Development" created in 1983 by the United Nations and headed by the Norwegian Prime Minister, Go Harlem Brutland. The commission published in 1987 the report "Our common Future" or also called the Brundtland report on environmental responsibility, where it defines sustainable development as that "development that meets current needs without compromising the ability of future generations to meet their own needs"(Brundtland et al., 1987) (Pg. 24).

This basic definition of sustainable development has evolved and incorporated new approaches (Kates, Parris, & Leiserowitz, 2005). In this sense, Elkington (1997) (pg. 20) states that sustainability is the principle that ensures that our current actions do not limit the range of economic, social and environmental options open to future generations. The World Summit on Sustainable Development held in Johannesburg, South Africa (2002) marked a new expansion of the standard definition with the incorporation of the Elkington´s Triple Bottom Line (economic, social and environmental) approach to the concept of sustainable development.

In 2000, The Millennium Development Goals (MDGs) (Figure 1) issued by the UN marked a roadmap that includes 8 generic goals, with measurable and time bound specific targets for 2015, which made possible the existence of a global awareness and mobilization movement to meet a set of social, economic and environmental priorities worldwide.(Sachs, 2012)

Figure 1. The Millennium Development Goals.



Source: http://un.dk/about-the-un/the-mdgs

Important achievements have been reached in the area of the MDG targets around the world, but as discussed by Ban Ki-moon, Secretary-General of the UN, the achieved outcomes are significant but incomplete (Way, 2015)*"The MDGs helped to lift more than one billion people out of extreme poverty, to make inroads against hunger, to enable more girls to attend school than ever before and to protect our planet….Yet for all the remarkable gains, I am keenly aware that inequalities persist and that progress has been uneven. The world's poor remain overwhelmingly concentrated in some parts of the world"*. Thus, the extent to which the MDGs have been achieved varies across goals, specific targets, countries, and regions (Sachs, 2012; Way, 2015). MDGs have been considered as objectives addressed to the developing countries, conceived by the developed countries (Kharas & Zhang, 2014). The MDGs have made it possible to move towards the elimination of extreme poverty and the improvement of living conditions in much of the developing world, but there is a widespread understanding that throughout the world, in addition to poverty reduction goals, environmental goals needs greater benefit (Sachs, 2012)

In 2015, after a massive stakeholder consultation process (Kharas & Zhang, 2014; Scheyvens, Banks, & Hughes, 2016), the UN proposed a set of Sustainable Development

Goals (SDG) (Figure 2) to replace the MDGs for the timeframe 2015-2030. SDGs are a set of 17 goals with 169 accompanying targets encompassing quantitative and qualitative objectives across the triple bottom line dimensions of sustainable development (Kolk, Kourula, & Pisani, 2017).

SDGs have made it possible to change the scheme from a state-centred approach and a duty-based model aimed at developing countries to an approach focused on collaboration, opportunity-based and oriented to both developing and developed countries (Le Blanc, 2015; Van Zanten & Van Tulder, 2018).

Figure 2. Sustainable Development Goals

Source: http://un.dk/about-the-un/sdgs

Noteworthy also is the importance placed on private sector to drive SDGs implementation (Kolk et al., 2017; Scheyvens et al., 2016; Van Zanten & Van Tulder, 2018) and enable the success of the new sustainable development agenda (UN News Centre, 2015).

The effect of the private sector and mainly of multinational companies (Sachs, 2012) on sustainable development can be materialized through the control of their environmental and social negative impacts (Kumi, Arhin, & Yeboah, 2014) , this "avoid harm" approach has been considered the most usual to date (Van Zanten & Van Tulder, 2018). However, it is necessary that the private sector goes “beyond business as usual”

(Scheyvens et al., 2016) and positions itself as a provider of measures aimed at the "doing good" approach (Van Zanten & Van Tulder, 2018).

Schönherr et al. (2017) states that SDGs could provide an integrated theoretical or managerial frameworks that would guide corporations to measure and model their contributions to sustainable development, *"Mapping their CSR activities in order to identify leverage points for enhancing positive impacts and mitigating negative ones".* Sustainability requires drastic changes in the performance of organizations to obtain advantages and create value in the economic, social and environmental aspects (Elkinton (1997), incorporating to the way of thinking and the set of values of the company a greater accountability over a greater number of company´s stakeholders. This vision known as business model or Instrumental perspective of the Stakeholders theory (Freeman, 1984; Jones, 1995), seeks the justification of this type of business measures not only by its environmental and social effect, but also by its positive effect on the company's financial performance, (Griffin & Mahon, 1997; Ortas, M. Moneva, & Álvarez, 2014; Van de Velde, Vermeir, & Corten, 2005; Waddock & Graves, 1997)

Epstein (2014) argues that companies are increasingly aware of the importance of managing and controlling their social and environmental performance, and managers respond to both internal and external stimuli and pressures. The recognition of sustainability as a company's fundamental value or principle and the recognition that sustainability can bring positive financial results through increased sales or reduced costs (Berman, Wicks, Kotha, & Jones, 1999; Dechant & Altman, 1994; Dey, LaGuardia, & Srinivasan, 2011; Margolis, Elfenbein, & Walsh, 2007), are some of the internal motivators, while strategies aimed at sustainability and government regulation, market demands, competitors' attitudes or pressure from non-governmental organizations among others are the main external motivators (Collins, Steg, & Koning, 2007; Sajjad, Eweje, & Tappin, 2015; Sharfman, Shaft, & Anex Jr, 2009; Walker, Di Sisto, & McBain, 2008).

Sustainability does not only focus on the economic situation of the company itself but also encompasses the effect of the company's activity on the environment, on the economic and social situation of stakeholders and on local, national and international

economic frameworks (GRI, 2013), but Schaltegger and Synnestvedt (2002) anyway stress the need for environmentally sustainable companies to be economically sustainable as well, otherwise they are bound to disappear from the market sooner or later.

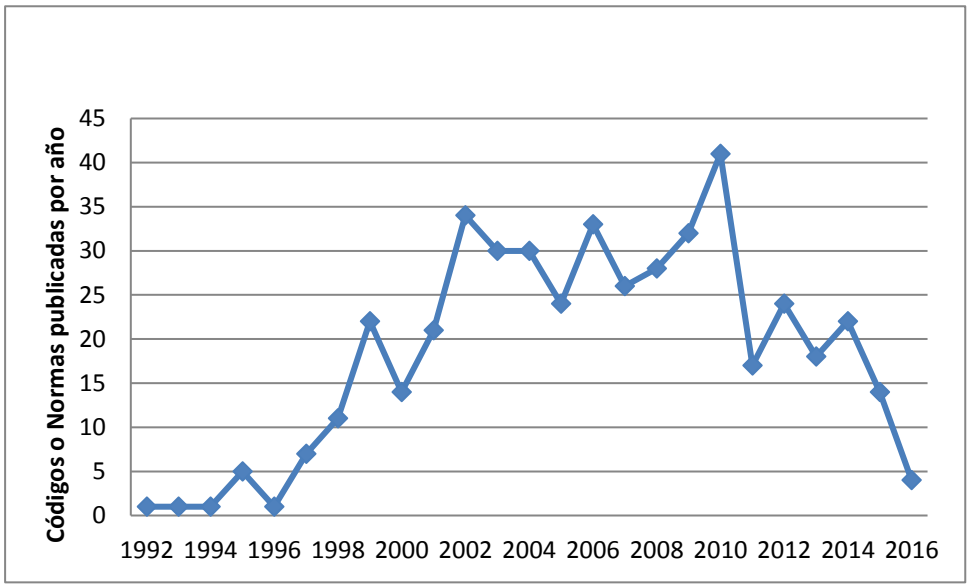
The recognition and awareness of organizations of the need to implement sustainable development as integral part of business strategy (Epstein, 2008) and as a cornerstone of the environmental, economic-financial and social management of companies has led to a change in the governance of organizations. In this sense, Elkinton (1997) considers that Corporate Governance is the key to the "sustainable revolution", considering 3 fundamental points for the transformation towards corporate sustainability, first of all the need to incorporate sustainability into the corporate governance agenda of the company, complemented by the involvement of the board of directors as a driving force for change. Secondly, a change in the way of dialogue and interconnection with the different stakeholders of the company, facilitating their participation in the decision-making process and finally the need to reflect diversity in the board of directors to facilitate their change towards sustainability.

Corporate Governance is being implemented as a necessary measure to improve the confidence of markets and stakeholders (Van Essen, Engelen, & Carney, 2013), in an environment of general uncertainty and distrust, caused by financial crises and multiple scandals as a result of unethical attitudes on the part of company managers (Adams, 2012; Kirkpatrick, 2009; Muller-Kahle & Lewellyn, 2011).

It is not surprising in this context that there has been an action-reaction effect and, as a consequence, regulators and practitioners have responded to the weakness of governance systems with the publication of numerous recommendations (COM, 2005; Walker, 2009), principles (OECD, 2015) and government codes in which non-compliance must be explained or reasoned, and mandatory rules and laws (Adams, 2012; Aguilera & Cuervo-Cazurra, 2009; Cuomo, Mallin, & Zattoni, 2016; ECGI, 2016).

Graph 1 shows the Corporate Governance codes, principles and recommendations published per year during the period 1992-2016 (461 codes in total), based on data obtained from the European Corporate Governance Institute.

Graph 1 Corporate governance codes, principles and recommendations published during the period 1992-2016 at international level.



Own elaboration based on data from the European Corporate Governance Institute (ECGI, 2016)

In this line of argument, Aguilera and Cuervo-Cazurra (2004) consider that the dissemination of corporate governance codes is born as a response to a combination of endogenous and exogenous conditioning factors, aimed at solving the deficiencies of the corporate governance systems of the different countries. Internal determinants aim to increase the efficiency of Corporate Governance systems and external pressures seek legitimacy in capital markets.

The various recommendations and codes of good governance seek to encourage the board of directors to play a proactive and independent role in monitoring and advising the management team of companies (Cuomo et al., 2016; Zattoni & Cuomo, 2008), recommending: the incorporation into the board of an increasing number of non-executive and independent directors (Linck, Netter, & Yang, 2008; Terjesen, Couto, & Francisco, 2016); the enhancement of board gender diversity (Adams & Ferreira, 2009; Catalyst, 2017); division of board chairman and CEO roles (Krause, Semadeni, & Cannella Jr, 2014); the establishment of committees within (nomination, remuneration and audit committee), among other measures (Chen & Wu, 2016; Reeb & Upadhyay, 2010).These

measures have been considered as mechanisms of good corporate governance (Daily, Certo, & Dalton, 1999; Fama & Jensen, 1983; Farrell & Hersch, 2005) that improve the effectiveness of the board (Ferrero-Ferrero, Fernández-Izquierdo, & Muñoz-Torres, 2015) impacting on business performance (Byron & Post, 2016; Lagasio & Cucari, 2019; Mutlu, Van Essen, Peng, Saleh, & Duran, 2018; Ortas, Álvarez, & Zubeltzu, 2017; Terjesen, Aguilera, & Lorenz, 2015; Terjesen et al., 2016).

It is considered that the final responsibility for the design and implementation of the Corporate Governance structure lies with the board of directors, insofar as it is the body that acts as a link between shareholders, managers and the different stakeholders of the company (Cadbury, 2000).

Board of directors must be in charge of establishing the company's mission and the strategies aimed at achieving this mission(Salas Fumás, 2002) (pg 149) being the main body in charge of designing, implementing and improving the contributions that the company is going to make to sustainability understood as an objective and common good of society. Shaukat et al. (2015) consider that the change in the course of the boards of directors, orienting them towards Corporate Social Responsibility through the increase in the diversity of its components and the incorporation of stakeholders into the decision-making process, may make it possible to obtain competitively additional returns in the social and environmental performance of companies.

The awareness and alignment of the company with a strategy of contribution to the common objective of SDGs must be approached with a long-term vision, which may affect the strictly economic performance of the company in the short term, but which in turn may generate additional economic returns in the long term and an improvement in the indicators of social and environmental performance of the company, allowing the approach to the desired concept of sustainability (Scheyvens et al., 2016).

This thesis aims to provide the previous literature with a set of meta-analytical studies (art. 2 and 3) that shed light on the impact that the different measures of corporate governance related to the characteristics of the board (independence, size, gender and duality) exert on sustainability performance. This thesis also wants to

complement its contribution to the literature with the study of some tools that companies have applied to improve sustainability performance.(art. 4 and 5)

The quality of governance at all levels (including corporate) is considered as a determining element for the achievement of the SDGs, Thus, private sector´s corporate governance structures *"should support the SDGs in practical and measurable ways, in their policies, production processes, and engagement with stakeholders"* (Sachs, 2012).

Organizations have modified their governance structures and formed CSR-oriented boards of directors (Helfaya & Moussa, 2017; Mallin, Michelon, & Raggi, 2013; Shaukat et al., 2015), which have applied novel strategic models, defined as proactive environmental strategies (PES), which involve anticipating future regulations and social trends through the redesign and modification of processes or products to try to prevent negative environmental impacts (Aragón-Correa & Sharma, 2003; Darnall, Henriques, & Sadorsky, 2010).

This thesis also aims to analyze two of these PES, Eco-innovation and environmental management certification systems´ contribution to corporate sustainability and SDG´s consecution.

Eco-innovation has been defined as "the production, assimilation or exploitation of a product, production process, service or management or business method, which is a novelty in the organization (developed or adopted) and which implies, throughout its life cycle, a reduction of environmental risks, pollution and other negative impacts of the use of resources (including energy) in comparison with the corresponding alternatives"(Kemp & Pearson, 2007) (Pg. 7) and has been recognised as one of the practices resulting from the proactive environmental strategies PES (Ryszko, 2016; Tsai & Liao, 2017) as Cai and Zhou (2014) affirm, eco-innovation provides companies with the skills to reduce their negative environmental impacts, enabling more sustainable development.

Ghisetti and Pontoni (2015) highlighted that many authors have considered Eco-innovation as an essential element in decoupling environmental pressure and economic

growth. Eco-innovation should be a key element to guaranteeing a more sustainable economy and society (Carrillo-Hermosilla, Del Río, & Könnölä, 2010).

The literature has mainly considered two types of Eco-innovation, one with impact on the production process (EIPROC) and innovations with impact on products (EIPROD) (Ghisetti & Pontoni, 2015; Horbach, Rammer, & Rennings, 2012) other hand, the drivers of eco-innovation have been considered to be grouped into the following four clusters: Technological push, Market pull, Regulatory push and company-specific factors (Horbach et al., 2012; Horbach, 2008). We have aimed to shed light on the drivers of corporate environmental innovative performance

Both Eco-innovation and environmental sustainability must be considered by companies in their management and coordination activities (Bossle, de Barcellos, Vieira, & Sauvée, 2016), whose ultimate responsibility rests primarily with the board of directors.

In addition, so far this century, the diffusion of voluntary environmental certifiable standards to implement environmental management systems (EMSs) has gained notoriety and relevance. These standards specify sets of internal organizational environmental practices and a system for third-party audits to certify compliance with the standard's requirements, but auditors have no commitment to assess the effective impact on corporate environmental performance (Boiral, 2011; Chiarini, 2017; Delmas, 2002; Iatridis & Kesidou, 2018; King, Lenox, & Terlaak, 2005). Mainly the ISO 14001 voluntary environmental certifiable standard and to a lesser extent the Eco-Management and Audit Scheme (EMAS) promoted by the European Commission (mainly disseminated in the European Union) are the main reference model (Boiral, Heras-Saizarbitoria, & Testa, 2017; Daddi, Testa, Frey, & Iraldo, 2016; Iraldo, Testa, & Frey, 2009; Testa et al., 2014). Both EMAS and the ISO 14001 standards are generally presented by the mainstream scholarly literature (e.g. Iraldo et al., 2009; Link & Naveh, 2006; Morrow & Rondinelli, 2002; Testa et al., 2014) as an effective tool to improve environmental practices and organizational environmental effectiveness. This study provide literature with empirical evidence and aims to clarify the influence of ISO 14001 and EMAS certifications on corporate environmental performance.

In the following section we will justify meta-analytical studies based on the contradictory and inconclusive previous empirical evidence in these two convergent issues in corporate sustainability: The influence of governance structures and proactive environmental strategies on business sustainability.

2. Justification

The relevance of issues related to business sustainability in areas related to Corporate Social Responsibility (CSR), Sustainability Performance (SP), Good Corporate Governance (GCG) or Eco-Innovation (EI) has increased exponentially in recent decades in both academic and professional spheres(Barbieri, Ghisetti, Gilli, Marin, & Nicolli, 2016; Byron & Post, 2016; García-Meca & Sánchez-Ballesta, 2009; Garcia-Meca & Sánchez-Ballesta, 2010; Post & Byron, 2015; Zubeltzu-Jaka, Erauskin-Tolosa, & Heras-Saizarbitoria, 2018)The number of studies on CRS, SP, GGC and EI has multiplied by 9.5; 12.8; 13.8 and 12.3 respectively in the last 10 years[1].

The bibliographical review process carried out in the two lines of research of this work has allowed us to codify 349 articles (310 in the line of corporate governance and sustainability and 36 in the line of sustainability and eco-innovation). Tables 1 presents the results of the articles that have analyzed the relationship between different corporate governance variables (board´s independence, gender diversity, size, board duality) and the social and environmental performance of companies.

The results shown in Table 1 reflect that the evidence obtained from the numerous empirical studies is contradictory and inconclusive, for most of the government variables analyzed as can be observed in Tables 1. Only in the case of studies that have analyzed the incidence of gender composition on the social and environmental performance of

[1] The increase in the number of studies that in the last decade include the term **"Corporate Social Responsibility"** in the title of the work has increased in Google Scholar (highlighting only the quantity of the same and without valuing quality) in 29,100 articles. The number of studies in 10 years is multiplied by 9.5. 32,500 studies have been identified by 2018, 3,400 studies by 2006

"Sustainability Performance" multiplies by 12.8, increase by 1,042 studies: 2018↔ 1,130 studies 2008↔ 88 studies

"Good Corporate Governance" multiplies by 13.8, increase by 3,840 studies: 2018↔ 4,140 studies 2008↔ 300 studies.

"Eco-innovation" multiplies by 12.3, increasing studies by 816: 2018↔ 888 studies 2008↔ 72 studies.

"Business ethics" multiplies by 1.9, increase by 2970 studies: 2018↔ 6.160 studies 2008↔ 3.190 studies.

"Board Diversity multiplies by 16.2, increase by 407 studies: 2018↔ 582 studies 2008↔ 36 studies.

Date of search 19/09/2018

companies, we observe the existence only of studies with positive and non-significant results, we have not located works with negative results. For the rest of the variables we have verified the existence of studies with positive, negative and non-significant results of the incidence of government variables (independence, size and duality) on the sustainability performance variable. This fact justifies the realization of a set of four meta-analytical and meta-regression studies (two of them are published and included in the thesis contributions), with the objective of contributing evidence on the impact of governance measures to sustainability performance. The main advantage of this type of study is that it allows summarizing and quantifying the counter-evidence collected in different studies, resulting in a set of statistical data that allows additional evidence to be obtained that is assignable to the entire sample obtained from the studies analyzed, and that could not be obtained from the individual studies.

Table 1. Empirical studies results.

	Corporate Social Performance		
Corporate Governance measure	+ effects	- effects	NS effects
Board independence	25	5	17
Board Size	17	5	2
Gender composition	27	0	7
CEO duality	2	15	9

This table presents the number of empirical studies with positive, negative or non-significant results when analyzing the effect that different corporate governance variables have on social and environmental performance

Tables 2 present the results of the studies that have analyzed the different driving factors of Eco-innovation.

Table 2. Empirical studies results.

	Eco - Innovation		
Driving factors	+ effects	- effects	NS effects
Market Pull	21	2	3
Technological push	21	5	3
Regulatory thrust	17	2	1
Firm specific factor	17	6	3

This table presents the number of empirical studies with positive, negative or non-significant results when analyzing the effect that different driving factors have over eco-innovation.

The analysis of the results of the articles that make up the samples of the fourth article shows that the studies that have analyzed the driving factors of eco-innovation is counterpoised and inconclusive, therefore, we consider it relevant to conduct a meta-analytical study to determine which of the driving factors, "Technological push", "market push", "regulatory push" or "company-specific factors" are more significant and which type of eco-innovation is most influenced by innovations in production processes (EIPROC) or innovations with impacts on products (EIPROD).

In the meantime, the results of the studies that have analysed the effect of EMS certification on environmental performance are inconclusive and inconsistent (Boiral & Henri, 2012; Testa et al., 2014; Testa, Boiral, & Iraldo, 2018). Although there is a tendency in most studies to point to the positive nature of these impacts and the fact EMS certification improves environmental performance (Eng Ann, Zailani, & Abd Wahid, 2006; Melnyk, Sroufe, & Calantone, 2003; Potoski & Prakash, 2005). These advantages are contested by other studies (Barla, 2007; Boiral, 2007; Christmann and Taylor, 2006; King et al., 2005;Welch et al., 2003). Boiral, Guillaumie, Heras-Saizarbitoria &Tayo Tene (2017) state that: “However, despite institutional pressure in favour of ISO14001

certification and its rapid growth, the efficiency of this standard remains controversial, and studies of the issue have led to contradictory results ”. This situation reflects the existing narrative reviews on EMS certificaction and Enviromental performance, which describes the relationship as mixed, inconsistent, vexing and contradictory, these results justify the implementation of a meta-analytical study, the results of which are presented in the article 6.

3. Objectives

The main objective of this Doctoral Thesis is to evaluate the impact that corporate governance measures and proactive environmental strategies PES (Ryszko, 2016; Tsai & Liao, 2017) (voluntary environmental management systems certification and Eco-innovation strategies) have on sustainability performance through the meta-analytic and meta-regression method.

The specific objectives of the five articles of the thesis are as follows:

ARTICLE 1: Corporate social responsibility and corporate governance and corporate financial performance: Bridging concepts for a more ethical business model.

Objective: To present the theoretical framework and situation of previous research on aspects related to sustainability performance and corporate economic performance and corporate governance, in order to present a theoretical and empirical framework for subsequent meta-analytical studies.

ARTICLE 2: Firms' board independence and corporate social performance: A meta-analysis.

Objective: To analyze, using the meta-analytical method, the impact of the board´s independence as a measure of good corporate governance on the social and environmental performance of companies, and to assess the moderating role of market conditions, governance systems and ways of measuring social and environmental performance.

ARTICLE 3: The effect of the size of the board of directors on corporate social performance: A meta-analytic approach.

Objective:

To evaluate through a meta-analytic and meta-regression study on a sample of 80 articles (80.912companies), how the impact of "Board Size" on Corporate Social

performance (CSP) evolved over last twenty years at an international level, and to analyze of a set of governance moderating variables such as legal systems and shareholder protection measures from the "bundle of corporate governance" perspective.

ARTICLE 4: Shedding light on the determinants of eco-innovation: A meta-analytic study.

Objective: To determine through a meta-analytical study which of the driving factors of eco-innovation (EI), "technological push", "market push", "regulatory push" or "company-specific factors" is more significant and to analyse whether they have the same impact on Eco-innovation in production processes (EIPROC) or on Eco-innovation with impacts on products (EIPROD).

ARTICLE 5: ISO 14001, EMAS and environmental performance: a meta-analysis.

Objective: To shed light on the environmental performance implications of the adoption of voluntary environmental certifications by meta-analyzing a sample of 53 scholarly studies analyzing a total of 182,926 companies, and to identify a set of underlying moderating effects, such as the maturity and the level of internalization of the EMS on the relationship of the certified EMS with CEP and the international reference standard adopted (either EMAS or ISO 14001).

4. Research method

This thesis has applied meta-analysis and meta-regression as main research methods, the term meta-analysis proposed and defined by Glass (1976) as "the statistical analysis of a large number of empirical study results in order to integrate the findings presented" resembles a type of survey research where the subjects surveyed or interrogated, are not people but previous empirical works, these "surveys" require a careful coding process that allows the extraction of the necessary information from each of the studies that compose the samples of the different meta-analysis(Lipsey & Wilson, 2001), and its transformation to a common metric called effect size, that allows its integration and quantitative comparison(Botella-Ausina & Sánchez-Meca, 2015)

Meta-analysis is therefore considered as a statistical method, that allows the integration of previous empirical research whose object of research is common, these studies, must meet the same demands of scientific rigor required to primary studies (Botella-Ausina & Sánchez-Meca, 2015; Sánchez-Meca, 1999). This methodology allows to summarize and quantify the evidence gathered in these empirical studies (Lipsey & Wilson, 2001).

The statistical methods applied in the individual studies, are analogous to those used in the meta-analysis. In the individual studies the descriptive statistics, means and standar deviations of the subjects under study are published, complemented with studies of variance analysis or multiple regressions. In the same way, the meta-analytical study publishes the mean values and estimated standar deviations of the considered effect size, and is complemented as in our case with an analysis of the variance (articles 2 and 4) or a study of meta-regression (article 3), that evaluate the moderating capacity of different variables and that allow to explain the heterogeneity of the individual studies results. (Borenstein, Higgins, & Rothstein, 2009; Botella-Ausina & Sánchez-Meca, 2015; Lipsey & Wilson, 2001; Schmidt & Hunter, 2014)

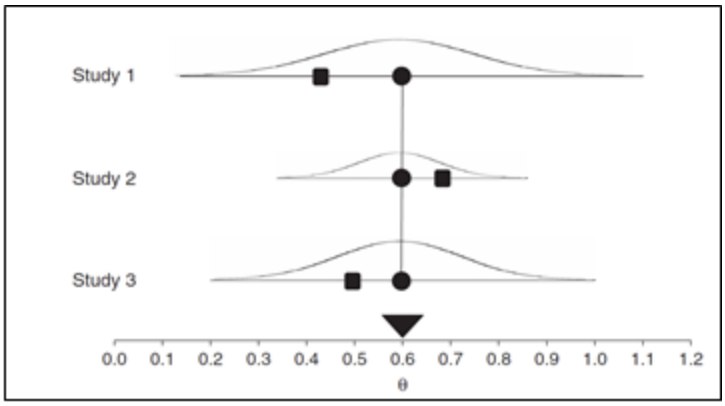
In a meta-analysis the effect size, measures the magnitude of the relationship between two variables (Lipsey & Wilson, 2001), our case for meta-analytical studies we

have used the correlation coefficients as a common metric. So in articles 2 and 3 the effect size represents an approximation to the degree of connection between the corporate social performance and the board´s independence and size. In article 4 correlation represents the association between eco-innovation practices and its different driving factors.

In meta-analytic practice there are two main statistical models, the fixed-effects model and the random-effects model (Borenstein et al., 2009; Botella-Ausina & Sánchez-Meca, 2015; Hunter & Schmidt, 2000). In the first, it is assumed that all studies are studying the same effect size (correlation coefficient in our case) and the observed variability is the exclusive consequence of sampling error. (Figure 2)

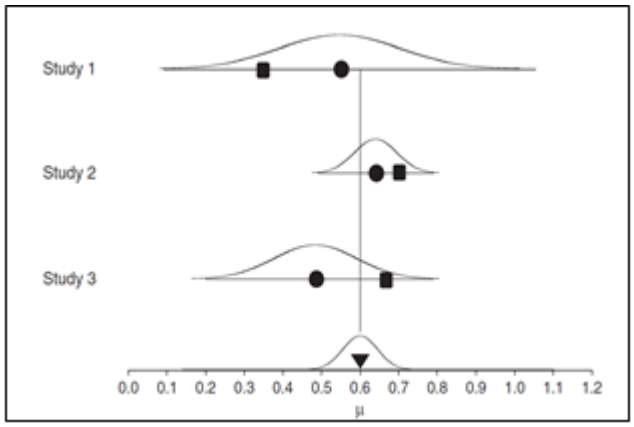
In the random effects model, on the other hand, it is assumed that the variability observed between studies has two sources, intra-study variance or variability due to sampling error and between-study variance, which would be justified by the fact that there is no single effect size for the entire population, but due to meta-analysis design causes (different ways of measuring social or environmental performance or financial performance in our case,) or socio-demographic or economic-legal characteristics of the population (different legal systems of government in our case, market conditions or measures to protect minority shareholders), there are different subgroups in which the value of the population effect size differs.(Figure 3).

Figure 2



Source Borenstein et al. (2009)

Figure 3



Source Borenstein et al. (2009)

We apply the random effects model in our studies, assuming that there are variables that model the relationship between the variables and that the studies included in the different samples are not homogeneous, a decision that is confirmed by Botella-Ausina & Sánchez-Meca (2015) when thye state that "When we assume the random effects model, obtaining a high heterogeneity (our studies present this characteristic) among the Effect Sizes is indicative that the model assumed is the correct one, since in that case it will be reasonable to conclude that each study is estimating a different parametric effect. But, at the same time, the evidence of high heterogeneity among TE tells us that we should not remain only with the estimation of the mean effect, but that it would be convenient to analyze the influence of moderating variables (or characteristics of the studies) that can explain the variability of Effect Sizes". The use of the random effects model allows us to make extrapolable inferences outside the sample of the different studies (Lipsey & Wilson, 2001)

For data analysis we use Comprehensive Meta-Analysis software (Version 3.3.070). For the meta-analytical studies of articles 2,3,4 and 5 we used the meta-analytical technique of Heges and Olkin (HOMA) (Borenstein et al., 2009; Hedged, 1990; Hedges & Vevea, 1998). For article 3 we applied a Meta-regression procedure (meta-analytic regression analysis technique, MARA) (Borenstein et al., 2009; Essen, Carney, Gedajlovic, & Heugens, 2015; Lipsey & Wilson, 2001) which provides additional advantages over the meta-analytical study of subgroup moderating variables (HOMA), as it allows us to

include and analyze jointly two or more discrete or continuous variables as predictors in regression models (Borenstein et al., 2009; Botella-Ausina & Sánchez-Meca, 2015).

The analysis of heterogeneity is performed through the statistical index of Higgins and Thomson (2002), "I^2", which reports the degree of heterogeneity due to the existence of characteristics or moderating variables that make the studies different from each other (Botella-Ausina & Sánchez-Meca, 2015; Higgins & Thompson, 2002). Low values of the statistical index, indicate that most of the variability is due to sampling error and that the results obtained are homogeneous and that it is not necessary to deepen the analysis. High values of the statistical index, lead to the deepening in the study, through analysis by subgroups of discrete variables in articles 2,3 4 and 5 and meta-regression techniques for the study of continuous variables in article 3.

In the case of the study in which we apply the MARA, we present the % of the variability to be explained by the model ($I^2 . \cong \sigma^2_{\text{total}}$), which is not caused by sampling error, and R^2 represents the variability that the moderating variables included in the model are able to explain (Borenstein et al., 2009).

$$R^2 = \frac{\sigma^2_{explained\ by\ model}}{\sigma^2_{total}}$$

It is recommended, that at least 20 studies should be available when preparing a MARA, and the measurement of the predictive capacity of the R^2 model is acceptable from sets of 40 studies (López-López, Marín-Martínez, Sánchez-Meca, Noortgate, & Viechtbauer, 2014) and 10 studies should be available for each predictor (covariate) (Borenstein et al., 2009). These requirements are met for the sample used in the regression models in article 3 .

The main advantage of meta-analytic and meta-regression studies is that they allow summarizing and quantifying the opposing evidence collected in different studies, resulting in a set of statistical data that allow obtaining additional evidence that can be extrapolated to the whole of the target population, and that could not be obtained from individual studies.

Another advantage of this type of study lies in the fact that the integration of the correlation coefficients is considered the sample size of each study. Thus, by giving greater weight to the studies with a greater sample size, the average correlation coefficient estimated with greater statistical power than that of the individual studies is obtained. (García-Meca & Sánchez-Ballesta, 2006)

On the other hand, it facilitates the interpretation of the apparently contradictory conclusions derived from a narrative revision, since through the codification of the characteristics of the studies, effects or obscured relationships can be found (Lipsey & Wilson, 2001).

The methodology applied in the meta-analytical works makes possible the analysis of the sources of the results´ variability and to identify the moderating variables that could explain part of the results´ variability or heterogeneity, giving sense and clarifying the possible contradictions between the results of different studies on a common thematic. (Martínez, Meca, & López, 2009).

PART II

5. RESEARCH CONTRIBUTIONS

Five articles that make up the bulk of the main results of this thesis have been based on the review and codification of the 402 empirical articles that compose the different samples of the 9 meta-analytical studies: 4 for corporate governance (3 published) and 4 for eco-innovation (published) and 1 for EMS-environmental performance relationship, carried out during the process of completing this work.

The results of Corporate Governance-Sustainability relationship meta-analytical studies are summarized in Table 3. For each government variable (independence, gender, size and duality), we have conducted a meta-analytical studies, one that analyzes the impact of each government variable on social and environmental performance,. In the table 3 we present the average correlation coefficient obtained in each study ($\bar{r}$), its statistical significance and the number of studies that make up the analyzed sample, and the meta-analytical studies published to date for each variables crosses.

Table 3. Results of meta-analytical studies .

	Independence	Gender	Board size	Dual
CSP	$\bar{r}$ = 0,1258* (87 studies) **Article 2 (Ortas, Alvarez, & Zubeltzu-Jaca, 2017)**	$\bar{r}$ = 0,1603* (Byron & Post, 2016)	**$\bar{r}$ = 0.208* (80 studies) Article 3 (Zubeltzu-Jaca, Alvarez & Ortas,2019)**	$\bar{r}$ =- 0.001 NS No publications

$\bar{r}$ estimated correlation in each meta-analysis. * Significant at 5%. Enter ( ) the number of studies included in each meta-analysis. The citations refer to the meta-analytical works published in each section.

Independence ($\bar{r}$ = 0.1258*), gender composition ($\bar{r}$ = 0.1603*) and board size ($\bar{r}$ = 0.208*) are manifested as governance variables that have a positive effect on companies' commitment to social and environmental performance practices. The

duality of the board is not presented as a significant variable when it comes to influencing social and environmental performance (r^{-} =- 0.001 NS).

Of the four meta-analytic studies we present, gender composition as a government variable has been studied in two recently published meta-analyses (Byron & Post, 2016; Post & Byron, 2015). The second article presented in this thesis is, as far as we know, the first meta-analytical study that has analyzed the incidence of board´s independence on social and environmental performance. The third article presented in this thesis is also, as far as we know, the first meta-analytical study that has studied the effect of board´s size on corporate social and environmental performance

The analyses of the impact of the duality of the board chairman on social and environmental performance have not, to our knowledge, been the subject of analysis of previous meta-analytical work.

The articles that make up the main contribution of the doctoral thesis are reproduced in full below, in accordance with the thesis by compendium of publications.

The first three publications focus on the effect of corporate governance over corporate sustainability, and the fourth and fifth articles focuses on the study of two strategic tools aimed at enabling corporate sustainability.

These works respond sequentially to the general and specific objectives previously described and are based on the data and methodologies described in the previous section.

5.1 ARTICLE 1: Corporate social responsibility and corporate governance and corporate financial performance: Bridging concepts for a more ethical business model.

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RESEARCH ARTICLE

WILEY Business Strategy and Development

Corporate social responsibility and corporate governance and corporate financial performance: Bridging concepts for a more ethical business model

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Abstract

Awareness on issues relating to business ethics in corporate social responsibility (CSR), good corporate governance (GCG), and environmental social governance (ESG)[1] has significantly increased in the last decade in the academic and professional fields. As a consequence, a large number of theoretical and empirical studies, research and professional publications, and guidelines have been published. This trend toward academic scrutiny is a significant change to the traditional way of understanding corporate governance and has led to an increasing number and diversity of stakeholders to which the corporations must be held accountable.

Traditionally, corporate governance has focused on "financial" aspects with the aim of improving the protection rights of corporate stakeholders whereas the CSR approach has been limited to the consideration of only economic, social, and environmental issues. However, there has, in the recent past, been a convergence of the four concepts that are increasingly frequently being jointly studied by academics and practitioners. A clear example of this convergence is the use of the ESG criteria in the assessment of sustainable investment portfolios.

In this context, the aim of this paper is to present the current state of research on convergence themes (focusing on CSR and CG) in order to present the resulting framework as a basis for the subsequent analysis of the relationship between good governance practices, the CSR, and financial performance. Finally, the effectiveness of such practices and strategies will be assessed.

1 | INTRODUCTION

Concern generated by the financial scandals at the beginning of the last decade sensitized the academic and professional communities and diverse international bodies to the need to incorporate classic economic theory in the analysis of business practices and to the regulatory foundation of an ethical framework that it was believed would inform a roadmap towards a more responsible way of doing business.

Although it could be claimed that, as a result of the more pressing global economic crisis and resultant uncertainty, these ethical considerations have become relevant, for many authors, the implementation of initiatives relating to SR can enable an increase in competiveness through aspects such as corporate reputation (Bebbington, Larrinaga, & Moneva, 2008; Freeman, 2011; Young & Thyil, 2014), the creation of new market niches relating to clients' awareness with socio-environmental aspects (Forética, 2011) and the possibility to access fiduciary deposits that incorporate social, environmental and governance aspects (ESG) in their investment criteria (Bassen & Kovács, 2008) as well as by reducing the potential

[1] Searching for the term "corporate social responsibility" on Google Scholar (we just focus on quantity, not so much on quality) returns 412.000 results.
"Good corporate governance" 59.700 results.
"Business ethics" 645.00.000 results.
"Environmental social governance" 1.380 results
Date of search: February 7, 2018.

risks that could be generated by negligent actions in social and environmental matters (COSO, 2013).

The evolution of markets, which are increasingly competitive, interrelated, and framed in very volatile economic environments, has meant that interested parties or stakeholders have evolved to be better informed and to have higher levels of sensitivity to aspects relating to social and environmental performance. Consequently, the pressure to be successful whilst respecting the principles of sustainability is rapidly growing (COSO, 2013; Johnson & Greening, 1999; Kolk, 2008). Sustainability implies thinking about the creation of long-term value for the enterprise, and should, in these times be a priority for any corporate strategy.

In this regard, a business that integrates ethical values within its corporate governance structure and that adopts in its aims and mission statement social responsibility as the basis for its relations with interested parties or stakeholders (Rodríguez Fernández, 2008) might in fact improve its social as well as its financial performance. This might especially be the case when financial accounting and reporting have been called into question for generating incomplete information (Gwilliam & Jackson, 2008).

The involvement of a large number of groups in the discussions concerning sustainability has meant that the attention has shifted in the last two decades towards a three-dimensional approach. Following this approach involves taking into account the economic, environmental, and social aspects of economic development and its interrelations (Bennett, Schaltegger, & Zvezdov, 2013) where the sustainability of the economic component is not uniquely centered on the economic position of the business but also on the effect that business activity has on the economic positions of stakeholders or interested parties and in the local, national, and international economic framework (GRI, 2013).

Sustainability as an objective (and corporate social responsibility [CSR] as a strategy for achieving it) has, since the time of the financial scandals, gained in significance with regard to a means of establishing the value of companies. It is important also to incorporate such intangibles aspects in the company's information systems and establish new information management systems and an accounting methods that provide relevant, timely, and reliable information that, in turn, help companies value their contribution to a sustainable development (Schaltegger & Burritt, 2010).

In this sense, Freeman (2011) argues that new models of communication are required that go beyond aggregate accounts and financial indicators and that measure and reflect the overall effect that a business has on each one of its stakeholders, considering as a minimum in this regard, its clients, suppliers, employees, and communities as well as investors and other financial institutions.

Business and different public regulating bodies and private professional organizations have included, regulated, or promoted the inclusion of information covering environmental, social, and corporate governance aspects (ESG; Figure 1) in the reporting process. In the majority of cases, this has been achieved by way of Key Performance Indicators, included in both their annual accounts and/or annual reports (including voluntary and mandatory information), and through separate reports where it has been customary to include voluntary information (Bebbington et al., 2008).

Figure 1 shows a proposal for incorporating within financial reporting extrafinancial[2] aspects such as social, environmental, and corporate governance performance. Extra-financial information are, essentially, qualitative factors resulting from governance structures, strategies, and applied processes that have quantitative effects on the performance of a business (Bassen & Kovács, 2008).

This study therefore seeks to advance the emerging field of CSR and CG and measurement by addressing ESG performance issues pertaining to corporate management in general and corporate sustainability management in particular.

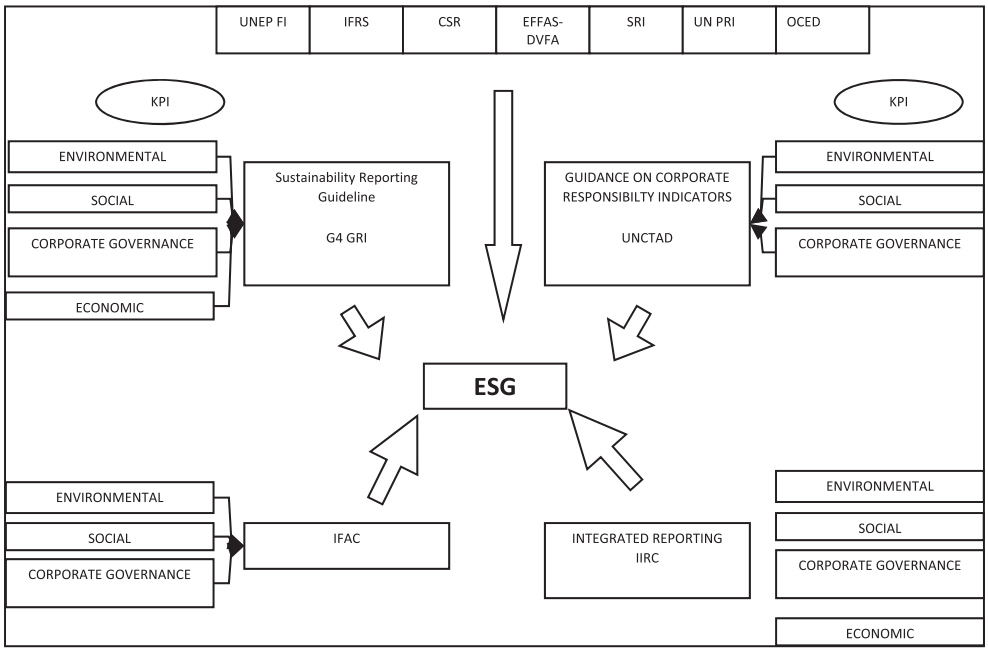

FIGURE 1 International agencies involved in ESG-indicators. Adapted from Kocmanová and Dočekalová (2012)

In order to achieve this, in Section 2, we will analyze the CSR's instrumental motives, its theoretical conception, and a series of empirical tests that measure the interrelation between the CSR and the Financial Performance (FP). In Section 3, we will present the theoretical convergence that the CSR and the CG have experienced and that has led to them becoming "two sides of the same coin" (Bhimani & Soonawalla, 2005). Section 4 will highlight the effect that the convergence of both analytical tools has had on a diverse set of empirical studies. Lastly, we present our conclusions and the research path that we would like to pursue in the future.

2 | CSR, INSTRUMENTAL MOTIVES, CONCEPT, AND EMPIRICAL EVIDENCE

CSR usually refers to companies taking responsibility for their impact on society. It can be defined

> *as a concept whereby companies integrate social and environmental concerns in their business operations and in their interaction with their stakeholders on a voluntary basis. Corporate social responsibility concerns actions by companies over and above their legal obligations towards society and the environment. (European Union, 2011)*

It begins with the voluntary integration of social and environmental concerns in their business operations and relationships with stakeholders.

Chronologically, in the 60s and 70s, social reasons were the main motivators and drivers behind the increase in CSR practices, whereas more recently, instrumental and performance aspects of CSR have gained more relevance (Carroll & Shabana, 2010).

Other authors also point out that the economic qualities of the CSR have gradually gained importance, as they are established not only as a response to an ethical/ideological imperative but also as a factor that contributes to financial performance (Albinger & Freeman, 2000). This idea is supported by Bhattacharya and Sen (2004) when they declare "doing better at doing good" or Vogel (2005) who points out that financial arguments in favor of deployment of the CSR are increasingly influential; noteworthy if still weak still in terms of empirical contrast in 2005. Schaltegger and Synnestvedt (2002) mention the need for environmentally sustainable businesses that must also be economically sustainable or risk being doomed to disappear from the market sooner or later.

The World Economic Forum (2002) reported that there is increasing empirical evidence that identifies three key factors that influence financial performance: a clear aim and business values, taking into consideration the interests of a wide spectrum of business stakeholders, including (but not limited to) its shareholders and finally to having a proactive management of the economic, social, and environmental impact of the business. There are many studies that have tried to empirically contrast the instrumental variant and the economic impact of CSR through a study of the causality and correlation with financial performance (Allouche & Laroche, 2005; Carroll & Shabana, 2010; Griffin & Mahon, 1997; Hahn & Figge, 2011; Margolis, Elfenbein, & Walsh, 2009; Margolis & Walsh, 2003; Orlitzky, Schmidt, & Rynes, 2003).[2]

The results obtained in the different studies are not conclusive in the sense that they find evidence for opposite hypotheses in the causality and signs of correlation between CSR and FP although it seems that the results that evidence a positive relation between both variables prevails (Allouche & Laroche, 2005; Carroll & Shabana, 2010; Margolis et al., 2009; Orlitzky et al., 2003). The analysis of the causal relation between the two variables has primarily evidenced a bidirectional relation (Fauzi & Idris, 2010; Margolis et al., 2009) and not a static one that changes under macroeconomic or geographic criteria (Moneva, Ortas, & Álvarez, 2014).

The increasing importance that CSR and the sustainability goal have acquired in the academic and professional domains can be explained in the context and under the framework of institutional theory (Aguilera, Rupp, Williams, & Ganapathi, 2007). In this sense, these authors affirm that the different actors that can facilitate or even hinder the diffusion and/or imposition of CSR practices are driven by instrumental, relational, and ethical/moral motives. Zattoni and Cuomo (2008) classify the motives in terms of efficiency (instrumental) or legitimacy (relational and ethical/moral).

Currently, the CSR is interpreted as being a prerequisite to the building of competitive and sustainable enterprises, such enterprises being those that take into account the relations and the dialog established with the corporate stakeholders in establishing their strategies and operations.

From the stakeholder theory (Donaldson & Preston, 1995; Freeman, 1984) perspective, there should be recognition of the potential impact of corporate behavior on a range of stakeholders, and, as a consequence, they should be accountable to them. Concretely, the instrumental dimension of the Stakeholders Theory (Jones, 1995; Moneva et al., 2014) allows us to understand the relationship between those performances. Given the instrumentality of this perspective (Alvarez Etxeberria & Aldaz, 2018, Hahn & Figge, 2011), CSR activities should be considered as a way of satisfying certain interests of stakeholders that influence its survival (Odriozola & Baráibar-Diez, 2017). The instrumental dimension of stakeholder theory suggests a positive relationship between CSR and a company's FP (Griffin & Mahon, 1997; Moneva et al., 2014; Porter & van der Linde, 1995; Wu, 2006).

This is related to a broadening in the concept of corporate governance more compatible with this new concept of corporate responsibility.

3 | GLOBAL CORPORATE GOVERNANCE AND CSR: HOW ARE THEY RELATED?

At the same time as the CSR gained relevance, as a consequence of the scandals and significant corporate failures, aspects relating to corporate governance, confidence, and accountability are increasingly

[2]Compilation studies and meta-analysis regarding empirical investigations that link *Corporate Social Performance* and *Corporate Financial Performance*:

- Allouche and Laroche (2005) carry out a meta-analysis about 82 studies.
- Margolis et al. (2009) compile and analyze 214 studies.
- Orlitzky et al., 2003 carry out a meta-analysis about 52 studies.
- Wu (2006) carry out a meta-analysis about 121 studies.

relevant and they have caused the strengthening of the debate addressing corporate governance and ethics in economic conduct (Marsiglia & Falautano, 2005). This has meant that, as never before, the role and the power that large corporations play and wield, has come under intense scrutiny with the principle of the expansion of benefits, in particular, increasingly being called into question (Jamali, Safieddine, & Rabbath, 2008).

Corporate governance, "the system by which businesses are managed and controlled" (Committee on the Financial Aspects of Corporate Governance, 1992), is the fundamental element designed to comply with the principles of OCDE (2004).

- respect and equal treatment of shareholders,
- recognition and cooperation with the different business stakeholders,
- information disclosure and transparency, and
- strategic direction and responsibility of the Board of Directors.

This set of principles, generally accepted and used as the basis for the development of different and varied codes of good governance (Rodriguez-Dominguez, Gallego-Alvarez, & Maria, 2009), provides a means of responding to the lack of confidence that financial scandals generated at the beginning of the 90s. In this context, the aim was to strengthen the markets by increasing investor's confidence, clarifying businesses' responsibility for performance, and accountability. (Cadbury, 2000).

It is considered that the ultimate responsibility for the design and implementation of a corporate governance structure falls to the Board of Directors to the extent that this is the body that acts as the union between (Cadbury, 2000)

- capital providers and the management that make decisions about the use of the capital and
- the business and the community of which it is part.

The Board of Directors is, by a definition of roles, responsible for setting the business mission and the strategies to achieve such mission (Salas, 2002, p. 149).

The need for better governance, integrating the CSR into a business model, must involve consideration of the CSR at the point of establishing a company's mission, values, strategic vision, and corporate governance (Rodríguez Fernández, 2007, p. 39) and it is, ultimately, the board of directors which is responsible for the implementation of the CSR strategy (Elkington, 2006, p. 524).

As is the case with the CSR, a theoretical model uniquely designed to describe and debate the qualities of corporate governance does not exist. Instead, and again as with the case of the CSR, agency theory and stakeholders theory, have regularly been deployed in an attempt to interpret the operations and reasons for being of the structures of corporate governance. As a result of this theoretical dichotomy, two models of governance, derived from two different ways of understanding business have emerged (Rodríguez Fernández, 2003, 2008).

On the one hand, the financial or shareholder model was developed fundamentally under the anglo-American legal model and is characterized by the dominance of shareholders' interests (Klettner, Clarke, & Boersma, 2014). It was designed principally to overcome the problems of agency posed by the separation of property and management (Jensen & Meckling, 1976). The departing vision for this model was restricted to the growth of benefits for its shareholders—this being the only social responsibility the business was obliged to fulfil (Friedman, 1970).

On the other hand, the stakeholder model (Freeman, 1984, p. 27), otherwise referred to as the strategic model (Salas, 2002) or the global model (Rodríguez Fernández, 2003, 2008), has evolved, primarily from European and Japanese legal models (Klettner et al., 2014). According to this model, stakeholders have a greater say when it comes to determining the objectives of a business (Freeman, 2011). The model also contains a wider vision with regard to CSR, one which seeks to satisfy the legitimate interests of all and different stakeholders, including the interests of its shareholders (Kakabadse, Rozuel, & Lee-Davis, 2005, p. 291). To this end, the alignment of governance structures and business processes with the CSR allow the interests of all stakeholders to be taken into consideration when determining the issues of control and decision making processes. These steps in turn allow for a progression towards corporate sustainability (De Graaf & Stoelhorst, 2013): an understanding of the CSR as a business specific input to the common objective of sustainability.

The financial model has accepted the need to consider the interests of all stakeholders. The Enlightened stakeholder model, Jensen (2010), is a model that the authors have defined as an illustrated financial model and that for many authors such as Rodríguez Fernández (2007) continues to be insufficient because the interests of shareholders continue to prevail above the rest, and this fails to ensure the achievement of the common good and the achievement of sustainability as a common objective.

Over and above the debates that discuss the benefits of each one of these models, it seems clear that there is agreement about the need to more forcefully commit to implementation of the CSR (with different strategic, instrumental, or advanced approaches), to consider, to a greater or lesser extent, the different stakeholders and to employ business governance structures as tools that allow the CSR to be a constituent element in the processes that establish a business and that permit the improvements that a business carries out for the common good to involve sustainability as a common objective.

In this sense, the Federation of European Accountant (2011, p. 5) affirms that it is necessary to integrate sustainability within the business strategy and model and not as a separate policy. Bonn and Fisher (2005) affirm that corporate governance is fundamental when establishing the corporate and strategic focus of CSR and business ethics.

Figure 2 illustrates a model that attempts to integrate sustainability within the business process.

The relationship between the CSR and the CG has been widely theorized, mainly from the point of view of the stakeholders' theory (Freeman, 1984). Jamali et al., 2008 affirm that there exists a clear overlap between the concepts, on the one hand, because application of the corporate good governance code contains specific implications with regard to the responsibility for keeping and declaring of accounts that cover a wide range of stakeholder and on the other hand, because the concept of stakeholder described in the CSR that is the one that

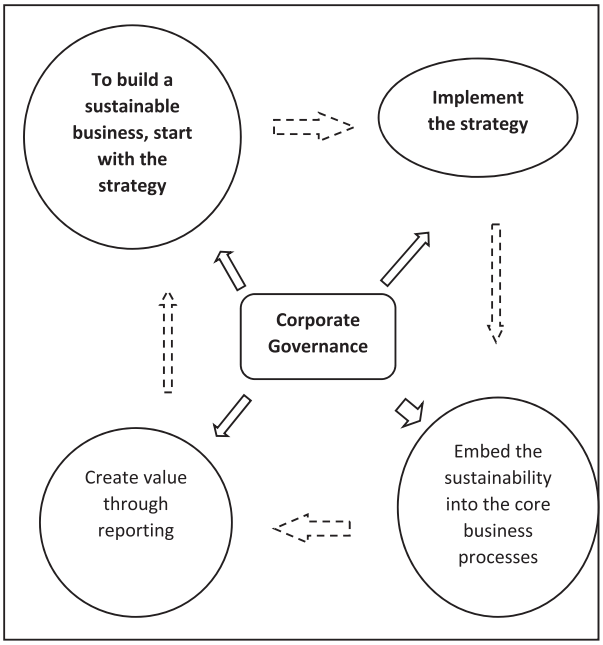

FIGURE 2 Implementing a new strategic approach to sustainability in a corporate context. Adapted from KPMG/The Institute of Chartered Accountants in Australia, 2011

considers a business to be a network of interrelated stakeholders who sustain and give value to the business.

Marsiglia and Falautano (2005) suggest that both concepts are evolving together, starting from a "philanthropic" variant of corporate capitalism towards a strategic variant directed at consolidating the trust of clients and society in general.

The work of Hancok (2005, p. 70) presents CG as a pillar of CSR, alongside human capital, stakeholder capital, and the environment, which, according to the author, are the basic pillars for the creation of value. In this sense, Elkington (2006) and Sustainability and Global Compact (2004) consider good corporate governance as a basic and necessary tool for the development of a sustainable economic model.

Ho (2005, p. 249) suggests a different model that considers the CSR as a component of the corporate governance structure (as a mitigating factor for non-financial risks) alongside the structure of the board, strategic leadership, good stewardship, the capital structure and the relations with the market.

Traditional lines of research have been developed that have treated the CSR and the CG as different issues. They have been focused on the study of CSR practices or CG practices, related to financial or performance indicators, with the aim of observing and subsequently drawing conclusions concerning empirical cause–effect relationships.

The Instrumental Stakeholder Theory (Jones, 1995) has been the principal theoretical approach deployed in previous research, which has analyzed the influence of several CG-related issues on CSR. Furthermore, the stakeholder theory suggests that a companies' board should be the main body responsible for designing, implementing, and improving the contributions that the company will make to sustainable development. In this way, the alignment of governance structures and business processes with CSR activities will allow for the incorporation of all stakeholders' claims and needs into the core decision-making process.

4 | CSR AND CG CONVERGENT ELEMENTS IN RESEARCH, ESG INDICES

As is the case with regard to the study of CSR and Financial Performance, a generally accepted theoretical framework that rationalizes the relation between CG and CSR practices (Jo & Harjoto, 2012) does not, currently, exist. Previous studies, which have differed in terms of analysis, have compared two representative and opposing theories: the agency theory by Jensen and Meckling (1976) and Freeman's (1984) stakeholder theory.

The analysis by different authors of the conflicts of interest and priorities derived from the theory of agency have presented a hypothesis regarding investment in CSR policies (Barnea & Rubin, 2010; Jo & Harjoto, 2012) in which CG's suitable structures act as mitigating agents against the possibility of overinvestment by principal shareholders and/or business management. Under the umbrella of this hypothesis, there is a negative relation between the investment in CSR practices and the application of good corporate governance policies (Barnea & Rubin, 2010).

One current research line, which is cited by a higher number of authors and studies than cite the stakeholder theory and which develops a set of empirically contrasted hypotheses that verify the existence of a positive and significant relationship between CSR practices and good GC policies, is the hypothesis of conflict resolution. The hypothesis of conflict resolution (Jensen's 2002, Jo & Harjoto 2011b, 2012) suggests CSR practices as a tool of corporate governance mechanisms that facilitate the resolution of conflicts between managers and noninvesting stakeholders. The neo-institutional theory (Ducassy, 2015; Ntim & Soobaroyen, 2013; Young & Thyil, 2014), the theory of legitimation (Chan, Watson, & Woodliff, 2014; Ducassy, 2015), and behavioral theory of the firm (Arora & Dharwadkar, 2011) are additional theories presented in the studies reviewed here.

We consider that the causality analysis between CG and CSR is a determining factor that has not been adequately approached by studies that have tried to connect these variables.

Jo and Harjoto (2012) evidenced CG's causal relation with the CSR without analyzing the causal relation from the opposite side. Rees & Rodionova, 2014, p. 8), on the other hand, were unable to evidence the direction of causality (because of endogeneity problems) instead affirming that it is difficult to demonstrate the causality's direction. However, we have been unable to find other studies that have approached the study of causality.

Out of the analyzed studies, 25% (five) are qualitative studies and 75% (15) are quantitative. The majority of the quantitative studies, 14, seek to present econometric models that relate the two concepts.

In the proposed econometric models, 79% (11) evidence a positive relationship between CSR and CG and 14% a negative relationship, whilst Cong and Freedman's (2011) study evidences a positive relationship between CG and the disclosure of environmental information and suggests that there is no relationship between CG and environmental performance.

In five of the studies (Acero & Alcalde, 2012; Jo & Harjoto, 2011a, 2011b, 2012; Ntim & Soobaroyen, 2013), another analyzed factor that we believe is important to consider, from an instrumental viewpoint of the whole analysis of CSR and CG, is the financial performance or

measure of the effect that the CSR and the BGC have on a business' value or series of financial and value generating indicators.

Regarding the relationship that exists between the CG and business performance, Bozec and Bozec (2012) analyze a total of 47 studies. Thirteen of these do not evidence the existence of a relationship between the studied variables (primarily in the US and Canada, where 50% of the studies do not find a relationship between the CG and business performance) whereas 34 of these studies evidence a positive relationship between the CG and financial performance.

Referring specifically to the cases we have studied, from those that have focused on an analysis of FP, 80% evidence a positive relationship between BCG-CSR and FP. However, Acero and Alcalde (2012), which analyzes 171 Spanish listed companies in the period 2004–2008, suggests that there is no relationship between the structure of corporate governance, accountability, and financial performance.

The geographic distribution of the companies analyzed in the study is as follows:

Origin of the analyzed sample	Number of studies
US	8
Australia	2
South Korea	1
Lebanon	1
South Africa	1
Spain	1
Great Britain	1
India	1
France	1
Combined*	3

*Kolk (2008) Out of the first 250 companies that comprise the Global Fortune 500 (the largest companies in the world, in terms of revenue, produced by Fortune magazine), 161 include information about sustainability. Of these, 84 are European, 35 American, 33 Japanese, and 9 others (page 155).

*Young and Thyil (2014) performed 29 interviews in 21 institutions in Australia, Great Britain, and India between 2007 and 2009.

*Rees and Rodionova (2014) performed 23,902 firm-year observations in 46 countries in the period of 2002–2012.

5 | CONCLUSIONS

Both CG and CSR elements are necessary and fundamental to the establishing of a business model that satisfies the needs of the highest possible number of stakeholders (including shareholders), with the objective of increasing, in the long term, the value of the company for those same stakeholders. CG is the structure upon which CSR, as a tool, allows for the functioning of a more sustainable form of business, that business becomes business for everybody.

We consider therefore necessary to incorporate to CSR's variables of determination or measurement the variables that take into account the structures of corporate governance (ES + G) aimed at facilitating accountability, compliance, transparency, and honesty and a proactive and contributing recognition of the different stakeholders' interests.

We therefore consider it necessary to incorporate those determining and mediating variable features of the CSR that take into account the structures of corporate governance (ES + G) and that are designed to facilitate: the disclosure of accounts, to comply with the established norms, to be transparent, to be honest (Jamali et al., 2008, Aras & Crowther, 2008), and to establish a proactive and participative position with regard to the interests of the different stakeholders involved (Rodríguez Fernández, 2008).

We believe that the studies analyzed show that a research field exists, based on the relationship of ESG indicators and financial performance over the last decade in the scope of European companies, where there is little empirical evidence regarding the relation of variables.

The objective of the study would be to compare the existing relationship between the CSR and, on the one hand, the structures of corporate governance, measured through an ESG indicator, and on the other hand, the financial performance, measured with industry-adjusted Tobin's q corresponding to the analyzed studies, presenting the hypothesis according to the most representative and opposing theoretical models: Jensen and Meckling's (1976) Theory of Agency and Freeman's (1984) Theory of Stakeholders. The results would, we believe, generate new and interesting research lines for the future.

This paper also has interesting implications for company managers. As we note above, a company's CSR activity is a key strategic resource (Porter & van der Linde, 1995) needed in order to survive in a highly competitive world where investing in CSR activities (Forcadell & Aracil, 2017) could have a positive effect in terms of business survival. One way of arriving at this objective would be to develop a robust good governance mechanism. As was previously illustrated, the literature supports, with evidence, a positive relationship between the CG and the CSR, and, similarly, between the CSR performance and the FP. The relationship between the two sets of analytical tools can also be understood with the application of the Instrumental Dimension of the Stakeholders Theory.

Another contribution the paper makes to this particular research field may be the suggestion to policymakers and also standards setting bodies, of the positive effects of a promotion of governance recommendations that allow for the improvement in companies' CSR activities. Indeed, given the instrumental and incidence dimensions that contribute to the development and implementation of the CSR, companies which incorporate the CSR initiatives could very well see an improvement in terms of their own corporate performance.

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APPENDIX A

Authors	Type of empirical study	Variables analyzed	Sample
Acero, I. & Alcalde, N. (2012)	Quantitative research	CG or CSR with FP	171 Spanish companies listed on the period of 2004–2008
Aras, G. & Crowther, D. (2008)	Qualitative research, with some simple descriptive and statistical data	CSR and CG	Analysis of the 100 largest companies in the FTSE 100 index of London Stock Exchange
Arora, P. & Dharwadkar, R. (2011)	Quantitative research	CSR and CG	1,522 observations from 518 US companies S&P 500 and KLD Domini 400 for the period of 2001–2005
Barnea, A., & Rubin, A. (2010)	Quantitative research	CSR and CG	The 2,649 largest US companies
Chan, M.C., Watson, J., & Woodliff D. (2014)	Quantitative research (content analysis, page 65)	CSR and CG	Annual Financial Statements of 222 Australian companies listed on the Australian Securities Exchange-ASX for 2004
Choi, B. B., Lee D., & Park Y. (2013)	Quantitative research	CSR and CG	2042 observations for the period of 2002–2008 from companies listed on the Korean KOSPI.
Cong, Y. & Freedman, M. (2011)	Quantitative research	CSR and CG	50 American companies in the period 2003 to 2005: 150 observation
Ducassy, I. (2015)	Quantitative research	CSR and CG	41 French listed companies in 2011
Jamali, D., Safieddine A. M., & Rabbath M. (2008)	Qualitative research in-depth interviews	CSR and CG	Qualitative research of interpretive nature consisting of eight interviews with senior managers of companies based in Lebanon.
Jizi, M.I., Salama A., Dixon, R., and Stratling R. (2014)	Quantitative research (content analysis)	CSR and CG	Annual Financial Statements of 107 American listed banks for the period of 2009–2011
Jo, H. & Harjoto, M. A. (2011a)	Quantitative research	CSR, CG, and FP	12,575 observations of 2,952 firms, including companies CSR and non-CSR of 1993–2004
Jo, H. & Harjoto, M. A. (2011b)	Quantitative research	CSR, CG, and FP (governance-CSR nexus)	12,527 observations, on a sample of 2,952 companies for 1993–2004
Jo, H. & Harjoto M. A. (2012)	Quantitative research	CSR, CG, and FP	9,410 observations for the period of 1993–2004, on a sample of 2,039 companies drawn from the KLD data base
Johnson, R. A. & Greening D. W. (1999)	Quantitative research	CSR and CG	Uses a sample of 252 US companies for 1993
Klettner, A., Clarke, T., & Boersma, M. (2014)	Qualitative research, with some simple descriptive and statistical data (content analysis, page 152)	CSR and CG (ESG)	Review of the Annual Financial Statements, websites, and Sustainability Reports from 50 major Australian companies in late September 2012
Kolk, A. (2008)	Qualitative research, with some simple descriptive and statistical data	CSR and CG	The top 250 companies in the Fortune Global 500 July 2004: 161 include sustainability reporting companies (84 European, 35 USA, 33 Japonesas, nine other countries)
Ntim, C. G. & Soobaroyen T. (2013)	Quantitative research	CSR CG and FP	75 groups of South African nonfinancial listed companies in the 2002–2009 period: a total of 600 observations
Rees, W. & Rodionova, T. (2014)	Quantitative research	CSR and CG (ESG)	23,902 observations, companies from 46 countries for the period 2002–2012
Singh, R. (2013)	Quantitative research	ESG and FP	50 companies in the S&P ESG India Index
Young, S. & Thyil V. (2014)	Qualitative research, in-depth interviews	CSR and CG	29 interviews in 21 institutions in Australia, UK, and India for the period between 2007 and 2009

5.2 ARTICLE 2: Firms' board independence and corporate social performance: A Meta-Analysis.

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Firms' Board Independence and Corporate Social Performance: A Meta-Analysis

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Abstract: This paper investigates the influence of organizations' board independence on corporate social performance (CSP) using a meta-analytic approach. A sample of 87 published papers is used to identify a set of underlying moderating effects in that relationship. Specifically, differences in the system of corporate governance, CSP measurement models and market conditions have been considered as moderating variables. The results show that the independence of a company's board positively influences CSP. This is because companies with more independent directors in their boards are more likely to commit to stakeholder engagement, environmental preservation and community well-being. Interestingly, the results also show that the positive connection between board independence and CSP is stronger in civil law countries and when CSP is measured by self-reporting data. Finally, the strength of the influence of the independence of a firm's board on CSP varies significantly in different market conditions. The paper concludes by presenting the main implications for academics, practitioners and policy makers.

Keywords: corporate social performance; corporate governance; board independence; meta-analysis

1. Introduction

Society's awareness of sustainable business models [1] has had a significant influence on companies' commitment to corporate social responsibility (CSR) and practices related to corporate sustainability. This has resulted in the appearance of different models of corporate governance (CG) that, in general, recognize key stakeholders' claims in the corporate decision-making process. At the same time, significant environmental and social scandals in the corporate sphere have led governments and independent institutions to recommend principles and codes of conduct (a total of 461 codes of conduct were published by approximately one hundred countries and regulators between 1993 and 2016) to encourage companies' management to develop more sustainable CG approaches [2]. The awareness of institutions, and of society in general, of sustainable development has put it on the agenda of governments around the world. In fact, corporate contributions to sustainable development goals have attracted the attention of politicians, practitioners and academics. These contributions have been studied from different perspectives [3,4], but most previous research has focused on identifying and measuring the positive and negative organizational impacts on society and the environment [5,6]. As a result, some sustainability-related concepts have appeared, such as corporate social performance (CSP) [7] and corporate sustainability performance [8], which address corporations' contributions to environmental preservation, societies' economic progress and human well-being. The academic

literature related to corporate objectives and sustainability has grown substantially during the last two decades. Many papers focus on the influence of the adoption of different CG approaches on CSP [9–14]. However, these studies have not arrived at a consensus, and report contradictory and inconsistent results (e.g., while Cuadrado-Ballesteros et al. [15] and Rao et al. [16] found a positive connection, Sundarasen et al. [17] and Walls et al. [18] found a negative association, and Walls and Berrone [19] and Harjoto et al. [20] found no significant relationship).

Although previous research addressed the influence of some CG-related issues [10,12,21–23] (e.g., the independence, gender balance, size and remuneration of company boards, among others), the present paper contributes to the existing literature by providing the first meta-analysis of the influence of the independence of a company's board on CSP. To that end, a sample of 87 previously published papers is analyzed. This paper also contributes to previous research by collating a set of variables that have a potential moderating effect in the relationship between a corporation's board independence and CSP. Specifically, the following variables are considered to be tested as moderators in the relationship: (i) CG systems; (ii) CSP measurement approaches; and (iii) the economic conditions.

The paper is organized as follows. Section 2 introduces the theoretical foundations. Section 3 comprises the literature review and explains the research hypotheses. Section 4 focuses on the research design by describing the econometric notations of the meta-analytic approach. Section 5 shows the data collection procedure, inclusion criteria and measurement of the variables. Section 6 contains the results of the empirical analysis. Finally, the last section concludes that paper.

2. Theoretical Background

Over the last forty years, a large body of academic research has examined the theoretical notions of CSR and CSP from different perspectives [24–26]. Some definitions of CSR and CSP have been suggested [7,27], and there is not complete clarity about the interpretation of the key ideas that underlie these concepts. This has been addressed by Clarkson [28], who stated that the "fundamental problem in the field of business and society has been that there are no definitions of corporate social performance, corporate social responsibility, or corporate social responsiveness that provide a framework or model for the systematic collection, organization and analysis of corporate data relating to these important concepts". Carroll [29] suggests that the social responsibility of business encompasses the economic, legal, ethical and philanthropic responsibilities. Following Carroll [29], Wood [30] provides one of the first definitions of CSP, indicating that it refers to "a business organization's configuration of principles of social responsibility, process of social responsiveness, and policies, programs, and observable outcomes as they relate to the firm's societal relationships". Other researchers provide additional definitions of CSP, such as that given by Lu et al. [31]. This confusion means that there are many ways to model CSP and to investigate its relationship with some organizational outputs such as corporate financial performance (CFP) [32]. Because there are many previously published papers addressing the links between the independence of firms' boards and CSP, this paper adopts the broad definition of CSP suggested by Visser et al. [33] and discussed by Swanson and Orlitzky [7]. In this way, CSP is considered to be the actual organizational social, environmental and economic results rather than the general notion of business accountability or responsibility to society as a whole. Using this definition of CSP, Orlitzky et al. [34] found that CSP is associated with the following four measurement strategies: (i) CSP disclosures; (ii) CSP reputation ratings; (iii) social audits, CSP processes, and observable outcomes; and (iv) managerial CSP principles and values.

Most mainstream studies have used stakeholder theory when addressing firms' incentives to engage with CSR-related practices and to understand differences in CSP between organizations [35]. Stakeholder theory [36] argues that companies should guarantee the protection of the interest of all the firms' stakeholders, arguing that companies are open systems that affect and can be affected by other agents outside and inside them. This reciprocity between companies and their stakeholders may be affected by the links that firms build with their stakeholders. The relationships can provide channels for communication with, and access to support from, external organizations [37] and other

kinds of stakeholders. This perspective makes it necessary to revisit the concept of the effectiveness of a company's board from a shareholder perspective to assess its validity in stakeholder theory [38]. It has been suggested that the stakeholder perspective of CG should be linked to CSP [39].

Among the different mechanisms of internal organizational governance [40], the independence of firms' boards is considered a key issue to ensure effective monitoring by the board [41], and to improve the range of firms' key strategic policies that address their stakeholders requirements [42], thus providing companies the ability to strengthen their links with their stakeholders [43–45] and to adapt to the external environment and increase efficiency [46]. As in the case of CSP, different authors have addressed the theoretical definition of corporate board independence. Historically, the degree of independence of director was assessed by addressing the absence of financial, family or professional ties between them and the companies whose boards they are part of [47]. Accordingly, three main approaches to measuring board independence have been recognized. Specifically, these approaches address the percentage of the presence of the following type of directors in companies' boards: (i) executive/non-executive directors; (ii) inside/outside directors; and, (iii) independent/non independent directors [48–50]. The presence of independent directors on companies' boards has its origins in the Anglo-Saxon economic systems [47], mainly driven by the absence of large shareholders who can directly control decisions about the firm's strategic management. Agency theory addresses the advantages of having independent directors on companies' boards [41,51], because they have the ability to mitigate the conflicts between shareholders and managers, providing a valuable protection mechanism [52]. The independence of firms' boards has become a key element of CG that goes beyond the function of organizational control, and allows companies to gain legitimacy and advice and connection with other organizations [53].

Under the stakeholder theory, those companies with greater board independence are more likely to consider other sensitivities and interests than those of managers and the majority of shareholders [21]. Stakeholder theory suggests that the appointment of independent directors to companies' boards gives companies' the opportunity to develop strategic policies that address a wider range of their key stakeholder needs and claims [54], because the human capital resources of the firms' board are based on the collective experience and expertise of board members [9]. Stakeholder theory argues for independent directors on company boards, because they are more effective in monitoring other societal realities, and therefore more sensitive to stakeholders' needs [55,56]. In general, independent directors are those with little connection with the CEO and others executive board members. Their personal background and their personal skills should increase their sensitivity to a broader context than the conventional view of business objectives (e.g., profits maximization). Stakeholder theory predicts some benefits for companies with more independent boards, including (i) legitimation of company activities [54]; (ii) safeguarding the interests of corporate stakeholders [46]; (iii) ensuring stakeholders' concerns are considered in corporate decision-making; (iv) increasing brand loyalty by building trust in customers [57]; and, (v) making workers more committed to business objectives [32].

The instrumental perspective of stakeholder theory [58] has been the main theoretical approach used to analyze the influence of several CG-related issues on CSP. In general, instrumental stakeholder theory argues that a company's board members should be responsible for setting the organization's mission and the strategies to achieve it [59]. It suggests that a company's board should be the main body responsible for designing, implementing and improving the companies' contributions to sustainable development and human well-being. The alignment of governance structures and business processes with CSR activities will make it possible to manage all the stakeholders' claims and needs in the core decision-making process. This will allow corporations to enhance their levels of both transparency and CSP [59–61]. Moreover, instrumental stakeholder theory predicts that those companies that have greater board independence should be more committed to CSR and also to satisfying the legitimate interests of their key stakeholders [36]. Therefore, it is expected that the presence of independent directors should improve a company's CSP [36]. In this way, instrumental stakeholder theory, [36,62] provides a theoretical basis that links the independence of a company's board and their CSP [20,63,64].

The influence of the independence of a firm's board on CSP has been extensively studied in recent decades by academic researchers, but studies have produced mixed and contradictory results. These are examined and studied in the following section with the aim of developing the research hypotheses.

3. Literature Review and Hypotheses Development

There is a large body of research analyzing the influence of some CG variables on different organizational outcomes. The existing literature also includes several meta-analyses designed to capture the global effect between specific corporate variables and CG-related issues. Such meta-analyses mainly focus on: (i) testing the link between CG variables and CFP [65]; (ii) evaluating the influence of a corporation's board gender composition on CFP [64]; (iii) addressing the impact of companies' board size and composition on CFP [49,66]; (iv) testing the relationship between a company's board leadership structure and CFP [67]; (v) testing the influence of companies' ownership structures on CFP [68]; and, (vi) testing the influence of corporate ownership concentration on CFP [69]. The literature also includes several meta-analyses on the influence of CSP on CFP [34,70,71], and a meta-analysis assessing the influence of a company's board gender composition on corporate environmental performance (CEP) [72]. However, to the best of the authors' knowledge, a meta-analysis of the impact of the independence of a corporation's board on CSP has not been performed, although many papers have reported studies of that relationship. Those papers are reviewed in the following section, and summarized in Table 1.

3.1. Linking Board Independence and Corporate Social Performance

Ntim and Soobaroyen [73] focused on a sample of South African firms and found a positive influence of the board's independence on both CFP and CSP. Similarly, Dunn and Sainty [74] studied a sample of 104 Canadian firms and concluded that companies with more independent boards generally obtain higher levels of CSP. In the same vein, Jo and Harjoto [59] studied a sample of nearly 15,000 U.S. firms, and found a positive connection between the independence of the board and CSP. This effect occurs because greater independence reduces conflicts of interests among different stakeholders. Further research, such as that developed by Sahin et al. [75], analyzed a sample of 165 Turkish firms and concluded that a higher proportion of independent board members allows companies to obtain better levels of CSP. Mallin et al. [76] examined the 100 U.S. best corporate citizens and found that companies with more independent boards often implement a business model that includes stakeholder management, and that ultimately has a positive influence on their CSP.

Table 1. Overview of studies included in the meta-analysis.

Code	Authors	Year	Sample Size	Observed r [a]	Number of r's Reported	Measure of CSP [b]	Measure of Firm Board Independence [c]
1	Amran et al. [77]	2014	113	0.016	1	Sustainability reporting quality index (D)	% of outside and independent directors (OUT, IND)
2	Amran et al. (B) [78]	2014	111	0.307 (t)	1	Bloomberg database of environmental disclosure ratings (SA/P/O)	% of independent and non-executive directors (IND, EX)
3	Arayssi et al. [79]	2016	975	0.300	1	Sustainability disclosures (D)	% of independent directors (IND)
4	Arena et al. [80]	2015	288	0.164 to 0.459	2	Kinder, Lydenberg and Domini (KLD) environmental data (SA/P/O)	% of independent directors (IND)
5	Arora and Dharwadkar [81]	2011	1522	−0.300 to 0.400	2	KLD positive and negative ratings (SA/P/O)	% of independent directors (IND)
6	Barakat et al. [82]	2015	101	−0.200	1	CSR disclosure index (including products, consumers and community involvement) (D)	% of independent directors (IND)
7	Barako and Brown [83]	2008	40	0.272	1	Social disclosure index (D)	% of non-executive directors (EX)
8	Bear et al. [9]	2010	51	0.420 to 0.104	2	KLD social scores (SA/P/O)	Director diversity Blau´s index (IND, EX, OUT)
9	Ben-Amar et al. [84]	2015	541	0.250	1	Environmental disclosures (D)	% of independent directors (IND)
10	Benomran et al. [85]	2015	162	0.020	1	Social and environmental disclosures (D)	% of non-executive directors (EX)
11	Berrone and Gómez-Mejía [86]	2009	2088	−0.040 to −0.080	2	Environmental performance (D)	% of outside directors (OUT)
12	Boulouta [87]	2013	820	−0.023 to 0.101	3	KLD social scores (SA/P/O)	Ratio between outside and inside directors (OUT)
13	Bowrin [88]	2013	96	−0.083 (t)	1	Social and environmental disclosures (D)	% of non-executive directors (EX)
14	Brammer et al. [89]	2009	199	−0.036	1	Corporate reputation indices (R)	% of non-executive directors (EX)
15	Burke et al. [90]	2017	11458	0.130	1	Morgan Stanley Capital Investment (MSCI) CSP data (SA/P/O)	% of independent directors (IND)
16	Cho et al. [91]	2015	10297	0.070 (t)	1	KLD social scores (SA/P/O)	% of independent directors (IND)
17	Choi et al. [92]	2013	2042	0.280	1	KEJI social scores (SA/P/O)	% of outside directors (OUT)
18	Cormier et al. [93]	2011	137	−0.010 to −0.020	2	Social and environmental disclosures (D)	% of independent directors (IND)
19	David et al. [94]	2007	730	−0.040	1	KLD CSP ratings (SA/P/O)	% of outside directors (OUT)
20	De Villiers [22]	2011	5997	0.110	1	KLD environmental ratings (SA/P/O)	% of independent directors (IND)
21	Deschênes et al. [95]	2015	192	0.414 (t)	1	JANTZI CSP scores (SA/P/O)	% of independent directors (IND)
22	Ducassy [96]	2015	41	0.410	1	CFIE CSP scores (SA/P/O)	% of independent directors (IND)
23	Dunn and Sainty [74]	2009	174	0.219	1	JANTZI CSP scores (SA/P/O)	Business´s board independence score (IND)

Table 1. *Cont.*

Code	Authors	Year	Sample Size	Observed r [a]	Number of r's Reported	Measure of CSP [b]	Measure of Firm Board Independence [c]
24	Esa et al. [97]	2012	54	−0.003 to 0.153	2	Sustainability disclosures (D)	% of independent and non-executive directors (IND, EX)
25	Fernández-Gago et al. [98]	2016	145	0.361	1	CPS rating scores (SA/P/O)	% of independent directors (IND)
26	Frias-Aceituno et al. [99]	2013	1575	0.062	1	Sustainability disclosures (D)	% of non-executive directors (EX)
27	Galbreath [100]	2011	161	0.020 to 0.280	2	Social and environmental disclosures (D)	% of outside directors (OUT)
28	Galbreath [23]	2016	300	−0.250 to −0.270	2	GES environmental and social ratings (SA/P/O)	% of inside directors (OUT)
29	García-Sánchez et al. [101]	2015	5380	0.037 to 0.112	2	EIRIS ethics codes (CP/V)	% of independent directors (IND)
30	García-Sánchez [102]	2014	686	0.157 (t)	1	Sustainability disclosures (D)	% of independent directors (IND)
31	Ghazali and Weetman [103]	2006	87	−0.129 (t)	1	Social and environmental disclosures (D)	% of independent and non-executive directors (IND, EX)
32	Gupta et al. [104]	2015	1153	0 to 0.240	4	KLD scores (SA/P/O)	Average of the annual % of independent directors over the 10-year period (IND)
33	Habbash [105]	2016	267	−0.040	1	Sustainability disclosures and ISO 26000 (D, CP/V)	% of non-executive directors (EX)
34	Hafsi and Turgut [106]	2013	95	0.130	1	KLD CSP scores (SA/P/O)	% of outside directors (OUT)
35	Haldar and Mishra [107]	2015	24	0.295	1	Sustainability reporting (D)	% of independent directors (IND)
36	Haniffa and Cook [14]	2005	278	−0.182 to −0.241	4	Social disclosure index (R)	% of non-executive directors (EX)
37	Harjoto et al. [20]	2015	9001	−0.060 to 0.270	3	MSCI CSP scores (SA/P/O)	% of outside directors (OUT)
38	Hogan et al. [108]	2014	540	−0.020 to 0.050	3	Bloomberg environmental and social disclosure scores (SA/P/O, D)	% of independent directors (IND)
39	Hoje and Harjoto [109]	2011	13389	0.190	1	KLD CSP data (SA/P/O)	% of outside and independent directors (IND, OUT)
40	Htay et al. [110]	2012	120	0.120	1	Social and environmental disclosures (D)	% of independent and non-executive directors (IND, EX)
41	Huang [111]	2010	297	0.060 to 0.129	6	Sustainability disclosures (D)	% of independent directors (IND)
42	Hussain et al. [112]	2016	152	−0.042 to 0.325	3	Sustainability reporting (D)	% of independent directors (IND)
43	Ienciu et al. [113]	2012	54	0.476	1	Environmental disclosures (D)	% of independent directors (IND)
44	Janggu et al. [114]	2014	100	-0.124	1	Sustainability disclosures (D)	% of independent directors (IND)
45	Javaid Lone et al. [115]	2016	250	0.660	1	Sustainability disclosures (D)	% of independent directors (IND)
46	Jizi [116]	2017	1155	0.101 (t)	1	Bloomberg CSP scores (SA/P/O)	% of independent directors (IND)

Table 1. *Cont.*

Code	Authors	Year	Sample Size	Observed r [a]	Number of r's Reported	Measure of CSP [b]	Measure of Firm Board Independence [c]
47	Jizi et al. [117]	2014	291	0.199 (t)	1	Sustainability disclosures (D)	% of independent directors (IND)
48	Johnson and Greening [12]	1999	252	−0.050 to 0.060	5	KLD CSP scores (SA/P/O)	% of outside directors (OUT)
49	Khan et al. [118]	2013	580	0.269	1	Social and environmental disclosures (D)	% of independent directors (IND)
50	Khan [119]	2010	30	0.550	1	Sustainability disclosures (D)	% of non-executive directors (EX)
51	Kiliç et al. [120]	2015	3106	0.010	1	Sustainability disclosures (D)	% of independent directors (IND)
52	Kock et al. [121]	2012	657	0.170 to 0.180	2	IRRC environmental performance data (SA/P/O)	% of independent directors (IND)
53	Li et al. [122]	2013	613	−0.080 to −0,050	4	HEXUN CSP data (SA/P/O)	% of independent directors (IND)
54	Liao et al. [123]	2015	329	0.280 to 0.310	2	Carbon Disclosure Project (D)	% of independent and non-executive directors (IND, EX)
55	Lim et al. [124]	2007	181	0.248	1	Social and environmental disclosures (D)	% of independent directors (IND)
56	Lu [125]	2013	2098	0.113	1	KLD CSP scores (SA/P/O)	Dichotomized board independence measure above and below the median (IND)
57	Mallin et al. [76]	2013	221	−0.033 to 0.123	7	Sustainability reporting and KLD CSP scores (D, SA/P/O)	% of independent directors (IND)
58	Martínez-Ferrero et al. [126]	2015	877	−0,380	1	EIRIS CSP scores (SA/P/O)	% of independent directors (IND)
59	Michelon and Parbonetti [13]	2012	114	−0.170 to 0.088	7	Sustainability disclosures (D)	% of independent directors (IND)
60	Mohamad et al. [127]	2011	795	0.164 to −0.027	3	Sustainability disclosures (D)	% of independent directors (IND)
61	Musteen [128]	2010	324	0.190	1	Fortune's reputational rankings (R)	% of outside directors (OUT)
62	Ntim and Soobaroyen [73]	2013	600	0.155	1	Sustainability disclosures (D)	% of independent and non-executive directors (IND, EX)
63	Nurhayati et al. [129]	2015	285	−0.056	1	Sustainability disclosures (D)	% of independent and non-executive directors (IND, EX)
64	Ortiz de Mandojana et al. [130]	2016	210	−0.270	1	Dichotomized environmental sustainability index (R)	% of independent directors (IND)
65	Post et al. [131]	2011	78	−0.010 to 0.039	7	Sustainability disclosures and KLD environmental scores (D, SA/P/O)	% of outside directors (OUT)
66	Post et al. [72]	2015	180	0.085	1	KLD environmental performance scores (SA/P/O)	% of independent directors (IND)
67	Prado-Lorenzo et al. [132]	2009	288	0.270	1	Sustainability disclosures (D)	% of non-executive directors (EX)
68	Prado-Lorenzo and García-Sánchez [133]	2010	283	−0.044	1	Carbon Disclosure Project (D)	% of independent directors (IND)

Table 1. *Cont.*

Code	Authors	Year	Sample Size	Observed r [a]	Number of r's Reported	Measure of CSP [b]	Measure of Firm Board Independence [c]
69	Rao and Tilt [134]	2016	345	0,050 (t)	1	Sustainability disclosures (D)	% of independent directors (IND)
70	Rao et al. [16]	2012	96	−0.062 to −0.111	2	Environmental disclosures (D)	% of independent directors (IND)
71	Rodríguez-Ariza et al. [135]	2014	3521	−0.025	1	Sustainability disclosures (D)	% of independent directors (IND)
72	Rodríguez-Domínguez et al. [136]	2009	351	0.078 to 0.212	3	Dichotomized Ethics code draw up (CP/V)	% of independent directors (IND)
73	Roitto [137]	2013	31	0.127 (t)	1	CSP Hub disclosure rating (SA/P/O)	% of independent directors (IND)
74	Rouf [138]	2011	93	0.569	1	Sustainability disclosures (D)	% of independent directors (IND)
75	Sahin et al. [75]	2011	96	0.101	1	Sustainability disclosures (D)	% of independent directors (IND)
76	Said et al. [139]	2009	150	−0.011	1	Sustainability disclosures (D)	% of non-executive directors (EX)
77	Said et al. [140]	2013	120	−0.126	1	Environmental disclosures (D)	% of independent and non-executive directors (IND, EX)
78	Sharif and Rashid [141]	2014	22	0.874	1	Social disclosures (D)	% of non-executive directors (EX)
79	Shaukat et al. [142]	2016	2028	0.270 to 0.720	2	ASSET 4 environmental and social performance scores (SA/P/O)	% of independent directors (IND)
80	Sundarasen et al. [17]	2016	450	−0.054 to 0.255	2	Sustainability disclosures (D)	% of independent and non-executive directors (IND, EX)
81	Tauringana and Chithambo [143]	2015	860	0.160	1	Greenhouse gas (GHG) disclosures (D)	% of non-executive directors (EX)
82	Walls and Berrone [19]	2015	1320	0.120	1	Trucost Environmental scores (SA/P/O)	% of outside directors (OUT)
83	Walls and Hoffman [144]	2013	1881	0.050	1	KLD environmental scores (SA/P/O)	% of outside directors (OUT)
84	Walls et al. [18]	2012	2002	0.130 to 0.250	2	KLD environmental scores (SA/P/O)	% of outside directors (OUT)
85	Wang et al. [145]	2012	446	0.020 to 0.061	2	Environmental disclosures (D)	% of independent directors (IND)
86	Williams [146]	2003	185	0.040	1	Social performance charitable contributions (SA/P/O)	Ratio between outside and inside directors (OUT)
87	Zhang [147]	2012	475	−0.230 to −0.110	4	KLD CSP institutional and technical scores (SA/P/O)	% of outside directors (OUT)

[a] (t): refers to transformation procedure, usually t-test statistic converted to PM r: in some cases, transformation of d to r, and regression coefficient to r. [b] Classification of CSP (in parentheses): D = disclosures/content analysis; R = reputational indices; SA/P/O = social audit, process and outcome measures; CP/V = other measures of corporate principles and values. [c] Classification of corporate board independence (in parentheses): EX = presence of executive/non-executive directors; OUT = presence of outside/inside directors; IND = presence of independent/non independent directors.

Choi et al. [92] conclude that the presence of independent members on companies' boards has a positive impact on companies CSP, measured by the KEJI Index, which has scores for the following categories: (i) companies' contributions to communities; (ii) employee and consumer protection and satisfaction; (iii) firms' environmental protection; and, (iv) companies' contributions to economic growth. Barako and Brown [83] analyzed a sample of 40 Kenyan banks and provided empirical evidence of a positive influence of board independence on CSP. Focusing on the largest 100 Australian firms, Rao et al. [16] found a positive relationship between board independence and CSP, measured by social and environmental disclosures. Furthermore, Zhang et al. [148], focused on the 500 largest companies listed on the U.S. stock exchanges and concluded that having more outside directors on a corporation's board raises CSP levels. Cuadrado-Ballesteros et al. [15] analyzed a sample of 1043 international companies and found that board independence has a positive effect on CSP. Zhang [147] focused on a sample of 475 publicly traded Fortune 500 companies and found that more outside directors has a positive influence on CSP. Post et al. [131] analyzed 78 Fortune 1000 firms and found a positive connection between board independence and CSP, measured by Kinder, Lydenberg and Domini (KLD) ratings.

However, several studies find a negative connection between the independence of a company's board and CSP [17]. Hanniffa and Cook [14], Nurhayati et al. [130], Walls et al. [18] and Ortiz-de-Mandojana et al. [130] all found that the presence of non-executive and independent directors on company boards has a negative influence on CSP. In addition, Rodríguez-Ariza et al. [135], Benomran et al. [85] and Walls et al. [19,144] found no significant association between board independence and CSP.

Based on the previous discussion, the following hypothesis is proposed for testing:

Hypothesis 1 (*H1*). *Companies with higher levels of board independence will exhibit superior corporate social performance.*

3.2. The Moderating Role of Approaches to the Measurement of Corporate Social Performance, Corporate Governance Systems, and the Economic Conditions

Although this paper contributes to the literature by providing a meta-analysis of the influence of the independence of companies' boards on CSP, some variables that are usually considered to have a significant impact on CSP will be treated as moderators of that relationship. The first moderating variable is related to the different approaches to CSP measurement used in previous research. Zahra and Pearce [149] found that the use of different methods of measuring CSP significantly affects how this concept is linked with other organizational processes and outcomes. Dixon-Fowler et al. [150] grouped the different measures of CSP into two categories: (i) self-report measures; and, (ii) externally-reported or archival data measures [150]. Self-reported measures of CSP are usually associated with social and environmental reports that companies disclose to their stakeholders. These reports show the positive and negative externalities that company processes and decisions have on the community, environment, and society as a whole. Externally-reported measures are related with CSP indicators that are commonly reported by external agencies (e.g., TRI, KLD, ASSET4, Bloomberg, Jantzi and HEXUN). CSP ratings and reputational rankings are also considered externally reported or archival measures of CSP. The difference between self-reported and externally-reported CSP measurement approaches is analogous to the difference between accounting and market based measures that are commonly used to measure CFP [64–68,150–152]. To test for the moderating effect of the CSP measurement approach, the sample was divided on the basis of the two categories. 52 of the 87 papers (59.77%) use self-reported measures and the other 35 papers use archival data measures (40.23%) (see Tables 2 and A1 in the Appendix A for more information). We anticipate that the relationship between the independence of a firm's board and CSP would be significantly affected by the approach adopted to measuring CSP. Therefore, the following hypothesis will be tested:

Hypothesis 2 (*H2*). *The positive link between the independence of a company's board and CSP will be higher when the latter is modelled using self-reported measures.*

The second moderating variable considered in the analysis is related to the corporate governance system existing in specific countries. Previous research on CSP has mainly addressed the influence of the role of the company in a given society on its commitment to stakeholder engagement, environmental preservation and community involvement [15,24,101,153]. It is expected that different corporate governance systems in different countries will have a significant effect on the relationship between the independence of firms' boards and CSP.

Corporate governance structures are considered to be one of the most relevant factors in the relationship between companies and their stakeholders [154]. Governance structures are conditioned by: (i) national cultural institutions; (ii) national legal systems [155]; and (iii) national business systems [156–158]. Haake [159] classified countries as individualistic or communitarian, which is consistent with the classification provided by Ball et al. [155] based on proxies for the legal systems [160]. Individualistic countries (i.e., those exhibiting a common-law legal system) are mainly found in the U.S. and other Anglo Saxon countries [161]. These countries have a shareholder orientation [162] because the primary purpose of their firms consists in maximizing shareholder wealth. Haake [159] (p. 720) defines individualistic business systems as systems "in which actors safeguard their individual autonomy through loose interfaces" and therefore have the power to define corporate responsibility for themselves [161], creating a lot of freedom for the shareholders. As a result, firms in common-law countries may have less pressure to improve their CSP. In contrast, communitarian countries (i.e., codified law countries) include many continental European countries. These countries tend to promulgate laws to protect the rights of workers and other stakeholders [161], and are societies based on close and stable relationships between actors. This situation generates key responsibilities not only towards shareholders [161]. Accordingly, these countries have a stakeholder orientation [162], and therefore are more likely to attain higher levels of CSP.

Cuadrado-Ballesteros et al. [15] differentiate four main corporate governance systems (i.e., legal systems) from a global perspective: (i) Anglo-saxon; (ii) Germanic; (iii) Latin; and, (iv) Asian. The main issues that differentiate these governance systems are: (i) the instrumentalist or institutionalist view of the company; (ii) the level of business concentration; (iii) the importance of the capital market in a given economy; and, (iv) the relationship between performance and executives´ remuneration. Other corporate governance systems have also been suggested by researchers. For example, Sanchez-Ballesta and García-Meca [68] considered the Anglo Saxon and continental systems in a study of the influence of corporate ownership structure on CFP. Similarly, Garcia-Meca and Sánchez-Ballesta [50] considered the Anglo Saxon, continental and Asian systems to study the links between the independence of a firm's board, ownership concentration and voluntary disclosure. Siddiqui [65] used a more restricted classification and grouped corporate governance systems into two categories: (i) common law systems; and, (ii) civil or codified law systems. We follow this broad approach because it is consistent with the approach used in most previous research on CSP and board independence, and because the use of two categories means there will be enough companies in each group to permit a robust empirical analysis.

Based on the previous discussion, we propose to test the following hypothesis:

Hypothesis 3 (*H3*). *The positive link between the independence of a company's board and CSP will be higher for companies in codified law systems.*

Previous research found significant variations in CSP during different market cycles [163,164]. The underlying idea is that CSP is an organizational outcome, which is influenced by companies' strategic management decisions. If CSP is significantly different in a bull market from in a bear market, the link between the independence of a firm's board and CSP should also be different in different market/economic conditions. To determine the role of the market conditions in this relationship, we must be able to differentiate between bull and bear market cycles for the studies

included in the meta-analysis. The first period, from 1999 to 2001, is characterized by consistent economic growth in most economies of the world. Several economics scandals occurred at the end of the twentieth century (e.g., Enron, Tyco, Worldcom and Parmalat, among others), which stimulated government regulation [2] intended to change the structure of firms' boards to ensure their efficiency [165]. Zhang et al. [148] found that the Sarbanes-Oxley Act had a great impact on the structure of corporate boards and has produced an increase of outsider and women directors. This informs the second time-period considered, from 2002 to 2006. The second cutoff point is placed in 2007, and the global financial crisis and the sovereign debt crisis in Western Europe. Thus, the third period considered in the empirical analysis runs from 2007 to 2009. Dividing the studies between these three periods will make it possible to test whether the relationship between the independence of companies' boards and CSP is influenced by the different economic conditions. In fact, the European Commission [166] detected some shortcomings in CG (e.g., lack of board diversity) that have played an important role in the financial crisis. Previous research has indicated that firms' boards pay special attention to shareholders during bear market conditions, giving priority to financial and economic performance over CSP [167]. Research [164] also reveals that companies tend to decrease their attention to CSP-related issues during market downturns in order to reduce costs [168]. However, other works argue the opposite, indicating that corporations are more likely to focus on CSP practices during economic recessions in order to strengthen their relationships with their stakeholders and to ameliorate their CFP levels [169]. Finally, the last time-period studied is from 2010 to 2017, when most of the developed world economies began to recover from the negative consequences of the financial crisis. Based on the previous reasoning, the following hypothesis is proposed for testing:

Hypothesis 4 (*H4*). *The positive link between the independence of a company's board and CSP will be weaker in bear market periods.*

4. Meta-Analytic Procedure

The main advantage of meta-analyses is that they make it possible to summarize and quantify the often conflicting evidence found in different studies that focus on a specific topic. A meta-analysis aims to obtain a set of objective, replicable and accurate statistical data [170] that provide additional evidence that is drawn from the entire sample of the studies analyzed, and that it could not be obtained from individual studies [171,172]. Two main statistical models have been applied in previous meta-analyses: (i) the fixed effects model; and, (ii) the random effects model [173,174]. The fixed effects approach assumes that all studies in the sample are studying the same effect size (i.e., correlation coefficient in this case) and the observed variability is exclusively attributable to the sampling error. The random effects approach considers the factors moderating the relationship between the variables and assumes that the studies included in the sample are not homogeneous. The random effects model has the ability to differentiate subgroups in which the effect size differs. Because we expect that the associations between the independence of a firm's board and CSP will not be the same in different circumstances, this paper adopts a random effects model.

Another key issue in meta-analysis econometrics is the measurement of the effect size, which reveals the magnitude of the relationship between two studied variables [171]. Taking data contained in the papers included in the sample, the effect size is measured using the average correlation coefficient, and this will inform conclusions about the influence of board independence on CSP. This paper implements the Hedges and Olkin [173–175] meta-analytic technique (HOMA), which is described below.

The average correlation coefficient of the relationship between the independence of a firm's board and CSP is computed as a weighted average of the observed correlations obtained from the papers in the sample. Observed correlation coefficients are first converted to a standard normal metric (i.e., Fisher´s z; Zr), calculated by the following expression.

$$z_{r_i} = \frac{1}{2}\log_e\left(\frac{1+\ r_i}{1-\ r_i}\right) \quad (1)$$

where r_i is the correlation coefficient between the independence of a firm's board and CSP found in study i. The transformed effects are used to compute the weighted average effect, as given by Equation (2):

$$\bar{z}_r = \frac{\sum_{i=1}^{K} w_i z_{r_i}}{\sum_{i=1}^{K} w_i} \quad (2)$$

where k is the number of studies in the meta-analysis and w_i is the weight of each study [176]. The average correlation coefficient, $\bar{z}_r$, and standard deviation, $SE(\bar{z}_r)$ are used compute the appropriate confidence interval (in this case at a 95% confidence level) as shown in Equation (3):

$$[(\bar{z}_r) - 1.96 \times SE(\bar{z}_r);\ (\bar{z}_r) + 1.96 \times SE(\bar{z}_r)] \quad (3)$$

To convert the Fisher's z values (average effect and confidence interval) back to a correlation, the following expression is used:

$$\bar{r} = \frac{e^{2\bar{z}} - 1}{e^{2\bar{z}} + 1} \quad (4)$$

To analyze the homogeneity of the observed correlations, the Cochram's Q statistic [172,177] is computed by Equation (5):

$$Q = \sum_{i=1}^{k} w_i(z_{r_i} - \bar{z}_r) \quad (5)$$

If the correlations are homogeneous, the Q statistic follows Pearson´s χ^2 distribution with $K - 1$ degrees of freedom. If the calculated value exceeds the tabulated one for the specified level of significance, the hypothesis that the correlations are homogeneous must be rejected. The main limitation of this approach is that, although provides evidence about the possible existence of heterogeneity in the studied correlations, it does not quantify it. To measure the level of heterogeneity, the Higgings and Thompson I^2 statistic is computed [178], using Equation (6).

$$I^2 = \frac{Q - (K-1)}{Q} \quad (6)$$

In order to test the significance of the moderating effects, the full sample has been divided into different sub-samples according with the values of the discrete variables (i.e., moderating variables). The meta-analytical approach described above is then applied to each sub-sample to investigate possible differences in the influence of board independence on CSP between groups identified using the moderating variables.

5. Research Design: Inclusion Criteria, Search Process, Study Coding and Variables' Measurement

Different search techniques have been implemented to identify and select the relevant papers included in the sample [176]:

- First, relevant electronic databases (e.g., Proquest, EBSCO, Emerald, Wiley, Sciencedirect and Google scholar) are examined by different searches with different combinations of the following keywords: (i) corporate social performance; (ii) corporate environmental performance; (iii) corporate governance; (iv) board structure; and, (v) board independence. This step provided a total of 300 studies.
- In a second step, the initial searches were refined by further examining the different issues of academic journals that publish most of the papers addressing the influence of CG approaches on CSP (e.g., Journal of Business Ethics, Corporate Governance: An International Review, Journal

of Financial Economics, International Journal of Economics and Financial Issues). 28 additional papers were included in the sample, giving a total of 328 works.

- In the third step, only those papers focusing on the influence of board independence on CSP from an empirical point of view were selected. After this step, 168 papers were removed from the sample, producing a total of 160 studies.
- In a final step, those empirical studies that did not provided the required statistical data (i.e., correlation coefficients between the variables or the corresponding data to obtain them using Lipsey and Wilson´s [171] conversion method) were removed (73). The final sample included 87 papers.

For those papers providing various effect sizes (i.e., reporting two correlation coefficients between the independence of a firm's board and environmental performance and social performance respectively), we followed the approach adopted by Hunter and Schmidt [172] of computing the average correlation [67]. Articles included in the final sample were coded by addressing the following issues: (i) authors; (ii) year of publication; (iii) CSP measurement model; (iv) correlation coefficient (observed or calculated); (v) countries covered by the sample; (vi) CG systems covered by the sample; and, (vii) sample period (see Table A1 in the Appendix A for detailed information).

One of the most important biases in meta-analytic studies is related with the publication bias [179]; studies with less significant results between the variables studied are more difficult to publish than the studies that show significant results, both as a result of the reluctance of publishers [180], and as a result of the non-delivery/presentation of such results by the researchers [181]. In order to test for the presence/absence of publication bias, the tolerance index of null results provided by Rosenthal (Fail-safe N) is computed. This approach estimates the number of unpublished studies that that would be necessary to reduce the effect size to a negligible level. We also used funnel plot analysis to visually identify outliers for removal.

Finally, this paper addresses previous discussions on how to measure the two studied variables (i.e., board independence and CSP) appropriately. On the one hand, the independence of a firm's board has been defined as the extent to which the board of directors operates independently from executive directors [182] and it has been usually measured as the percentage of board members who are non-executive directors, outside directors and independent directors [49,50,67,183]. On the other hand, Dunn and Sainty [74] state that "the essence of CSP is the recognition or awareness that there are multiple stakeholders against which a business has responsibility towards in the longer term". This definition involves broadening the focus on financial targets and including social and environmental targets, producing a need to measure and assess economic, social and environmental performance. Therefore, CSP not only addresses companies' economic success, but also includes the effects of the companies' activities on the environment and society as a whole [184]. This is consistent with the definition used by Orlitzky et al. [34], who, in their meta-analysis, used the definition of CSP provided by Wood [30] (p. 693), who indicated that CSP is a construct comprising "a business organization's configuration of principles of social responsibility, processes of social responsiveness, and policies, programs, and observable outcomes as they relate to the firm's societal relationships".

6. Results and Discussion

Table 2 presents the estimates obtained by applying HOMA meta-analytic method that will provide the required information to test the working hypotheses. The estimate for the direct effect (i.e., impact of the independence of a company's board on CSP) is positive ($\bar{r}$ = 0.1258). This result indicates that the independence of company boards is positively connected with CSP, the greater the independence, the higher their level of CSP. The significance of the relationship is evaluated by through examining the size effect confidence interval. As the confidence interval [0.0946, 0.1566] does not include the value zero, it indicates that the effect is significant. Therefore hypothesis H1 cannot be rejected, implying that the presence of outside and independent directors on company boards have a positive influence on CSP. Additional tests need to be conducted to ensure the robustness of the result.

First, the value of the Q statistic indicates that the results reported are not homogeneous. Second, the I^2 statistic indicates that the observed positive influence of board independence on CSP is very variable and, the introduction of moderating variables should be considered to reduce the variability. The value of the Rosenthal Fail-safe is higher than 12,000, indicating that the number of unpublished papers required to reduce the observed direct size effect to negligible is very large, so it is unlikely that there is any publication bias present. Finally, Figure 1 shows the Funnel plot, which also indicates an absence of publication bias, thus reinforcing the robustness of the observed global effect.

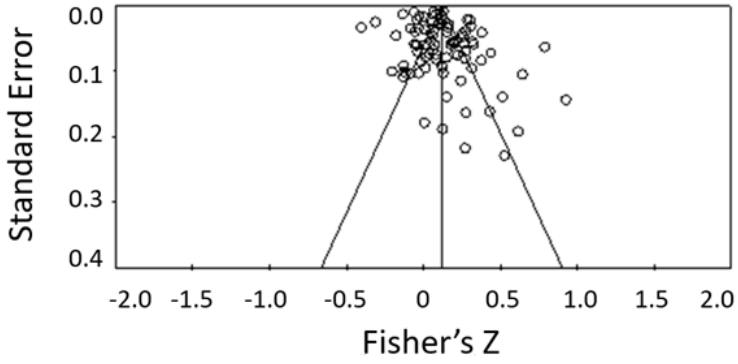

Figure 1. Funnel plot of standard error by Fisher's Z.

The observed positive connection between the independence of a company's board and CSP is in line with previous research findings [96]. The positive influence of the presence of outside and independent directors on company boards on CSP is in line with the assumptions of the instrumental stakeholder theory, because companies with more independent boards are more likely to consider the concerns and claims of their stakeholders. This produces a strategic management model that is more closely linked with sustainability, environmental preservation and society's well-being. The observed heterogeneity in the main size effect suggests that further examination of the moderating role of variables in the relationship is needed.

Table 2 also shows the information to test the other working hypotheses (*H2*, *H3* and *H4*). *H2* predicts that the positive influence of the board's independence on CSP is higher when CSP is measured trough companies' self-reported data. The estimates show that the parameter associated with the self-reported CSP measures ($\bar{r}$ = 0.1386) is higher than that observed for the external CSP data measures ($\bar{r}$ = 0.1096). Both size effects are significant because their confidence intervals do not include the value of zero (i.e., [0.0966, 0.1800] and [0.0612, 0.1575] respectively). These findings mean that the positive influence of the board's independence on CSP is higher when CSP is measured by self-reported data. This provides empirical evidence that different CSP measurement approaches act as a moderator in the main relationship, providing support for *H2*.

H3 predicts that the positive impact of board independence on CSP is greater in companies operating in civil law countries. The estimates show that the parameter associated with civil law countries ($\bar{r}$ = 0.1838) is higher than the observed for common law countries ($\bar{r}$ = 0.1293) and for countries with mixed systems ($\bar{r}$ = 0.1217). The three size effects are significant because their confidence intervals do not include the value of zero (i.e., [0.0828, 0.2811], [0.0869, 0.1712] and [0.0537, 0.1887] respectively). These findings indicate that the positive influence of board independence on CSP is higher for companies in codified law countries. This finding is consistent with the view that companies in civil law countries exhibit a more stakeholder oriented management approach [36], instead of the shareholder oriented management model that is usually attributed to firms in common law countries [41,185]. In fact, the result suggests that, the selection of directors in stakeholder-oriented management models is more effective in reinforcing their advice function [186], and ultimately having a greater influence on CSP levels. On the other hand, companies operating in common-law countries often select their board members with the aim of improving CFP [149], resulting in lower levels of

CSP. The results provide empirical evidence that the different corporate governance systems moderate the link between board independence and CSP, and provide support for *H3*. Further empirical evidence of the significance of this moderator variable is that the heterogeneity decreases in two of the four sub-samples.

Table 2. Influence of the independence of companies' boards on corporate social performance.

		N	K	$\bar{r}$	−95% CI	+95% CI	Q-Stat	I^2-Stat	Rosenthal Fail-Safe
	Direct effect								
1	Impact of board independence on CSP	100.359	87	0.1258	0.0946	0.1566	1749.24 ***	95.6108	12.736
	Moderating effects								
	Corporate Social Performance measurement								
	Self-reported CSP measures	28.418	52	0.1386	0.0966	0.1800	559.31 ***	90.8816	
	External CSP data measures	77.542	35	0.1096	0.0612	0.1575	1189.55 ***	97.1418	
	Corporate governance systems								
2	Civil law	6.732	9	0.1838	0.0828	0.2811	112.79 ***	92.9072	
3	Common law	75.624	46	0.1293	0.0869	0.1712	1031.57 ***	95.6377	
4	Mixed law	5.414	21	0.1217	0.0537	0.1887	290.93 ***	95.7885	
5	Other CG systems	12.589	11	0.0752	−0.0139	0,1631	237.45 ***	93.1254	
	Economic conditions								
8	From 2010 to 2017	5.214	16	0.1844	0.1085	0.2581	157.08 ***	90.4507	
9	From 2007 to 2009	5.608	19	0.1688	0.0977	0.2382	227.78 ***	92.0975	
10	From 2002 to 2006	13.596	17	0.1096	0.0373	0.1808	390.53 ***	95.9030	
11	Before 2002	1.759	6	0.0710	−0.0509	0.1907	14.28 *	64.9888	
	Multi-period papers	74.182	29	0.0951	0.0429	0.1468	897.42 ***	96.8800	

This table provides the results of the meta-analytic study. N is the total sample size; K is the number of effect sizes; $\bar{r}$ shows the mean effect size; −95% CI and +95% CI are the limits of the mean size effect confidence intervals; Q-stat is the homogeneity test; and finally, I^2-stat shows the ratio of the study variance due to heterogeneity. * and *** represent statistical significance at the 10% and 1% significance levels, respectively.

The last hypothesis, *H4*, predicts that the positive influence of board independence on CSP is lower during bear market periods. The estimates for each period show significant variations in the connection between the independence of a company's board and CSP. With the exception of the papers focusing on samples earlier than 2002, a positive and significant connection between the variables is observed through all the time-periods that were considered. The link between board independence on CSP is not significant for the studies prior to the scandals at the beginning of the century ($\bar{r}$ = 0.0710, with a 95% CI of [−0.0509, 0.1907]) and positive and significant in studies in the following period ($\bar{r}$ = 0.1096, with a 95% CI [0.0373, 0.1808]), which was characterized companies adopting new CG models that led companies' boards to increase their independence ratio. Moreover, the strength of the link between board independence and CSP is greater during the global economic recession period, from 2007 to 2009, following the financial crisis ($\bar{r}$= 0.1688, with a 95% CI of [0.0977, 0.2382]). Finally, the strongest relationship is observed for the last period considered, from 2001 to 2007, which was mainly characterized by sustained economic growth in the main developed economies of the world. These findings suggest that there is a positive trend in the strength of the connection between the independence of a firm's board and CSP in the different samples considered; papers focusing on recent time-periods find a stronger connection between board independence and CSP than those focusing on earlier samples. Although these findings indicate that the economic conditions, of bull and bear markets, do moderate the relationship between the variables, they do not support *H4*.

7. Conclusions

This paper provides, to the best of the authors' knowledge, the first meta-analysis of evidence about the influence of the independence of a company's board on CSP. The potential effects of some moderating variables are investigated, with the aim of obtaining a better understanding of

the connection between board independence and CSP. Specifically, the role of the different CG systems, the different approaches to measuring CSP and the economic conditions are examined.

The results indicate that the independence of a firm's board is positively connected with CSP, and that the more independent the board is the higher their levels of CSP. In line with instrumental stakeholder theory, this finding can be explained because companies with more independent boards are more likely to commit to CSR issues and stakeholder engagement, thus attaining a higher degree of CSP. The overall effect of having an independent board on CSP is very heterogeneous, suggesting the existence of additional moderating variables that play a significant role in the relationship. This paper addresses the issue by introducing a number of moderating variables into the model. The results show that the relationship between board independence and CSP is stronger when CSP is measured using self-reported data. Although this moderating variable is significant, this finding should be interpreted with caution because self-reported CSP measures may have social desirability bias [187]. That is to say, self-reported levels of CSP may be higher than those measured with external CSP measures, because company boards have greater control over the provision of the former. The results also show that the positive influence of the independence of a firm's board on CSP is greater in companies in codified law countries. In general, previous research has found that companies operating in civil law countries adopt a stakeholder-oriented management model, with more focus on environmental and social issues. Our findings are in line with this idea, indicating that the presence of outside and independent directors on company boards acts as a positive driver of their CSP levels. Our results also provide evidence of notable variations in the strength of the connection between board independence and CSP in different market conditions. Although a positive and significant influence of board independence on CSP is found in all the time-periods examined (except for the period before 2002), the strength of the connection grows over time. This contradicts the anticipated idea that companies operating in adverse economic settings will reduce their focus on CSR issues and place more attention on cost reduction.

This paper provides interesting insights for future research in the field. As a number of moderating variables have been shown to be significant in the relationship between board independence and CSP, further moderating effects should be examined. The size of a company's board, whether the CEO and Chair of the Board are the same person, characteristics of ownership, the concentration of shareholding and the participation of institutional investors in the decision-making process are likely candidates for inclusion, and would provide a more comprehensive overview of the relationship. Future research could also analyze the connection between the independence of an organization's board and CSP by implementing a meta-regression approach, and that might provide additional and complimentary empirical evidence about the relationship.

The present research is not free from limitations. Although the meta-analytical research design includes most of the previous literature about the influence of the independence of a firm's board on CSP, it could not detect endogeneity or reverse causality if the original papers did not control for this effect [183]. The limited number of papers in some sub-samples when testing for moderating effects is another limitation of the current research.

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Appendix A

Table A1. Details of the moderating variables for each study included in the meta-analysis.

Code	Authors	Year	Sample Size	Sample Period	Countries	CSP Measurement Model	CG System
1	Amran et al. [77]	2014	113	2010	Global	Self-reported	Others
2	Amran et al. (B) [78]	2014	111	2008	Global	External-reported	Others
3	Arayssi et al. [79]	2016	975	2007–2012	UK	Self-reported	Common-law
4	Arena et al. [80]	2015	288	2008–2010	US	External-reported	Common-law
5	Arora and Dharwadkar [81]	2011	1522	2001–2005	US	External-reported	Common-law
6	Barakat et al. [82]	2015	101	2011	Palestine/Jordan	Self-reported	Mixed-law
7	Barako and Brown [83]	2008	40	2007	Kenya	Self-reported	Common-law
8	Bear et al. [9]	2010	51	2009	US	External-reported	Common-law
9	Ben-Amar et al. [84]	2015	541	2008–2014	Canada	Self-reported	Common-law
10	Benomran et al. [85]	2015	162	2006–2012	Libya	Self-reported	Mixed-law
11	Berrone and Gómez-Mejía [86]	2009	2088	1997–2003	US	Self-reported	Common-law
12	Boulouta [87]	2013	820	1999–2003	US	External-reported	Common-law
13	Bowrin [88]	2013	96	2010	Caribe	Self-reported	Mixed-law
14	Brammer et al. [89]	2009	199	2002	UK	External-reported	Common-law
15	Burke et al. [90]	2017	11458	2003–2013	US	External-reported	Common-law
16	Cho et al. [91]	2015	10297	2003–2011	US	External-reported	Common-law
17	Choi et al. [92]	2013	2042	2002–2008	Korea	External-reported	Civil-law
18	Cormier et al. [93]	2011	137	2005	Canada	Self-reported	Common-law
19	David et al. [94]	2007	730	1992–1998	US	External-reported	Common-law
20	De Villiers [22]	2011	5997	2003–2004	US	External-reported	Common-law
21	Deschênes et al. [95]	2015	192	2004–2008	Canada	External-reported	Common-law
22	Ducassy [96]	2015	41	2011	France	External-reported	Civil-law
23	Dunn and Sainty [74]	2009	174	2002, 2004–2006	Canada	External-reported	Common-law
24	Esa et al. [97]	2012	54	2005–2007	Malaysia	Self-reported	Mixed-law
25	Fernández-Gago et al. [98]	2016	145	2005–2010	Spain	External-reported	Civil-law
26	Frias-Aceituno et al. [99]	2013	1575	2008–2010	Global	Self-reported	Others
27	Galbreath [100]	2011	161	2004	Australia	Self-reported	Common-law
28	Galbreath [23]	2016	300	2012	Australia	External-reported	Common-law
29	García-Sánchez et al. [101]	2015	5380	2003–2009	Global	Self-reported	Mixed-law
30	García-Sánchez [102]	2014	686	2004–2010	Spain	Self-reported	Civil-law
31	Ghazali and Weetman [103]	2006	87	2001	Malaysia	Self-reported	Mixed-law
32	Gupta et al. [104]	2015	1153	2012	US	External-reported	Common-law
33	Habbash [105]	2016	267	2007–2011	Saudi Arabia	Self-reported	Mixed-law
34	Hafsi and Turgut [106]	2013	95	2005	US	External-reported	Common-law
35	Haldar and Mishra [107]	2015	24	2014	India	Self-reported	Common-law
36	Haniffa and Cook [14]	2005	278	1996, 2002	Malaysia	Self-reported	Mixed-law
37	Harjoto et al. [20]	2015	9001	1999–2010	US	External-reported	Common-law
38	Hogan et al. [108]	2014	540	2003–2011	US	External-reported	Common-law
39	Hoje and Harjoto [109]	2011	13389	1993–2004	US	External-reported	Common-law
40	Htay et al. [110]	2012	120	1996–2005	Malaysia	Self-reported	Mixed-law
41	Huang [111]	2010	297	2006–2007	Taiwan	Self-reported	Civil-law
42	Hussain et al. [112]	2016	152	2007–2011	US	Self-reported	Common-law
43	Ienciu et al. [113]	2012	54	2009	Global	Self-reported	Others
44	Janggu et al. [114]	2014	100	2010	Malaysia	Self-reported	Mixed-law
45	Javaid Lone et al. [115]	2016	250	2010–2014	Pakistan	Self-reported	Mixed-law
46	Jizi [116]	2017	1155	2007–2012	UK	External-reported	Common-law
47	Jizi et al. [117]	2014	291	2009–2011	US	Self-reported	Common-law
48	Johnson and Greening [12]	1999	252	1993	US	External-reported	Common-law
49	Khan et al. [118]	2013	580	2005–2009	Bangladeshi	Self-reported	Mixed-law
50	Khan [119]	2010	30	2007–2008	Bangladeshi	Self-reported	Mixed-law

Table A1. *Cont.*

Code	Authors	Year	Sample Size	Sample Period	Countries	CSP Measurement Model	CG System
51	Kiliç et al. [120]	2015	3106	2008–2012	Turkey	Self-reported	Civil-law
52	Kock et al. [121]	2012	657	1998, 2000	US	Self-reported	Common-law
53	Li et al. [122]	2013	613	2009–2010	China	External-reported	Mixed-law
54	Liao et al. [123]	2015	329	2011	UK	Self-reported	Common-law
55	Lim et al. [124]	2007	181	2001	Australia	Self-reported	Common-law
56	Lu [125]	2013	2098	2007–2011	US	External-reported	Common-law
57	Mallin et al. [76]	2013	221	2005–2007	US	External-reported	Common-law
58	Martínez-Ferrero et al. [126]	2015	877	2004–2010	Global	External-reported	Mixed-law
59	Michelon and Parbonetti [13]	2012	114	2005–2007	Global	self-reported	Mixed-law
60	Mohamad et al. [127]	2011	795	2005–2007	Malaysia	self-reported	Mixed-law
61	Musteen [128]	2010	324	2000	US	External-reported	Common-law
62	Ntim and Soobaroyen [73]	2013	600	2002–2009	South Africa	self-reported	Mixed-law
63	Nurhayati et al. [129]	2015	285	2010–2012	India	self-reported	Common-law
64	Ortiz de Mandojana et al. [130]	2016	210	2008	Global	self-reported	Mixed-law
65	Post et al. [131]	2011	78	2007	US	self-reported	Common-law
66	Post et al. [72]	2015	180	2004–2008	US	self-reported	Common-law
67	Prado-Lorenzo et al. [132]	2009	288	2004–2006	Spain	self-reported	Civil-law
68	Prado-Lorenzo and García-Sánchez [133]	2010	283	2007	Global	External-reported	Mixed-law
69	Rao and Tilt [134]	2016	345	2009–2011	Australia	self-reported	Common-law
70	Rao et al. [16]	2012	96	2008	Australia	self-reported	Common-law
71	Rodríguez-Ariza et al. [135]	2014	3521	2004–2009	Global	self-reported	Mixed-law
72	Rodríguez-Domínguez et al. [136]	2009	351	2009	Global	self-reported	Mixed-law
73	Roitto [137]	2013	31	2012	Finland	External-reported	Civil-law
74	Rouf [138]	2011	93	2007	Bangladesh	self-reported	Mixed-law
75	Sahin et al. [75]	2011	96	2007	Turkey	self-reported	Civil-law
76	Said et al. [139]	2009	150	2006	Malaysia	self-reported	Mixed-law
77	Said et al. [140]	2013	120	2009	Malaysia	self-reported	Mixed-law
78	Sharif and Rashid [141]	2014	22	2005–2010	Pakistan	self-reported	Mixed-law
79	Shaukat et al. [142]	2016	2028	2002–2010	UK	External-reported	Common-law
80	Sundarasen et al. [17]	2016	450	2011–2012	Malaysia	self-reported	Mixed-law
81	Tauringana and Chithambo [143]	2015	860	2008–2011	UK	self-reported	Common-law
82	Walls and Berrone [19]	2015	1320	2001–2007	US	External-reported	Common-law
83	Walls and Hoffman [144]	2013	1881	2002–2008	US	External-reported	Common-law
84	Walls et al. [18]	2012	2002	1997–2005	US	External-reported	Common-law
85	Wang et al. [145]	2012	446	2008	China	self-reported	Mixed-law
86	Williams [146]	2003	185	1991–1994	US	self-reported	Common-law
87	Zhang [147]	2012	475	2007–2008	US	External-reported	Common-law

This table shows the main details of the moderating variables of the papers included in the final sample of the meta-analysis.

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5.3 ARTICLE 3: The effect of the size of the board of directors on corporate social performance: A meta-analytic approach.

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RESEARCH ARTICLE

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The effect of the size of the board of directors on corporate social performance: A meta-analytic approach

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Abstract

This paper examines the influence of the size of firms' board of directors on corporate social performance through a meta-analytic perspective. To that end, a sample of 80 articles that draw on evidence from more than 80,000 international companies, published between 1997 and 2018, was examined. This paper analyzes the moderating effect of a set of corporate governance mechanisms such as board composition and corporate governance systems on the hypothesized relationship between the size of firms' board and corporate social performance. Our central results reveal that larger and more independent boards better represent stakeholders' sensitivities and allow companies to achieve their social objectives. Moreover, that connection is more positive and stronger in companies with more independent boards and in countries that have codified law, which often have fewer mechanisms to protect shareholders' interests.

KEYWORDS

corporate governance, corporate social performance, size of boards, sustainable development

1 | INTRODUCTION

In last few years, corporate governance (CG) has emerged as one of the most significant keys to the so-called "sustainable revolution" (Elkington, 1997). In fact, the need to incorporate sustainability-related issues into the CG agenda is motivated by (a) the view of firms' management as a driver of change towards sustainable development (Elkington, 2006; Galbreath, 2012) and (b) the need for companies to engage in a dialog with their stakeholders. Among CG mechanisms, board diversity has received considerable attention from academics (Luoma & Goodstein, 1999; Mallin, Michelon, & Raggi, 2013). This is mainly motivated by the view that larger boards facilitate stakeholder participation in firms' decision-making processes and thus stimulating firms to contribute to sustainability. De Villiers, Naiker, and van Staden (2011) argue that those companies with larger boards of directors are more likely to increase the richness of expertise required to enhance corporate social performance (CSP). Accordingly, the size of the board has been considered a CG variable that affects corporate financial and social efficiency (Cuadrado-Ballesteros, García-Rubio, & Martínez-Ferrero, 2015; Post, Rahman, & Rubow, 2011; Tauringana & Chithambo, 2015).

Previous research has extensively analyzed the effect of board size on CSP, often providing vexing, contradictory, and inconclusive results (see García Martín & Herrero, 2019). Jain and Jamali (2016) conducted a systematic review of 94 academic articles focused on addressing the impact of several CG mechanisms on CSP, and they reported contradicting results. Although some studies found a positive connection between board size and CSP (De Villiers et al., 2011; Hillman, Keim, & Luce, 2001; Marquis & Lee, 2013; McGuinness, Vieito, & Wang, 2017; Oh, Chang, & Cheng, 2016; Tauringana & Chithambo, 2015), others concluded that board size negatively affects CSP (Bai, 2013; Kassinis & Vafeas, 2002; Prado-Lorenzo & Garcia-Sanchez, 2010). Moreover, the existing literature also includes studies reporting no relationship between board size and CSP (see Beiner, Drobetz, Schmid, & Zimmermann, 2006; Cheung, Jiang, Limpaphayom, & Lu, 2010; Kaczmarek, Kimino, & Pye, 2012).

In the context of this controversy, this paper contributes to the literature in several ways. First, this paper contextualizes past research about the connection between firms' board size and CSP from a meta-analytic perspective. Second, this study complements previous research that connects board size and corporate financial performance

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(CFP; Dalton, Daily, Johnson, & Ellstrand, 1999; Van Essen, van Oosterhout, & Carney, 2012) by addressing the social outcomes of increasing the board's diversity. Third, we respond to a call made by previous research (Dalton et al., 1999; Van den Berghe & Levrau, 2004) for the analysis of the mutual dependence and complementarity between different CG mechanisms, in order to identify those approaches that have a real influence on organizational outcomes. To that end, this study analyzes different moderating variables (i.e., board composition, CG systems, and shareholder protection measures) from the bundle of governance mechanisms perspective (Rediker & Seth, 1995), in which it is considered that the optimal governance structure is a combination of different mechanisms, rather than being dependent on the effectiveness of a particular governance standard or practice.

This paper is organized as follows. Section 2 introduces the theoretical background, including the literature review and establishes the research hypotheses. Section 3 describes the data collection procedures, inclusion criteria, and econometric notations of the meta-analytic and meta-regression approach. Section 4 presents and discusses the results of the empirical study. Finally, Section 5 includes the conclusions, limitations, and avenues for future research.

2 | LITERATURE REVIEW AND HYPOTHESES

Stakeholder theory argues that a larger and more diverse board brings greater opportunities for more links to other stakeholders, introducing social welfare objectives, environmental concerns and commitments, values, and ethical approaches that complement merely financial goals (Hillman et al., 2001). In this vein, De Villiers et al. (2011) recognized the size of board as a measure of the board's experience-based human capital, embracing background and expertise, as directors' characteristics that enable the board to access additional resources. Instrumental stakeholder theory (Jones, 1995) has been the principal theoretical foundation for explaining the effect of several CG measures on CSP. CSP engagement is multi-faceted, reflecting the diverse interests of many stakeholders (Neubaum & Zahra, 2006). In general, stakeholder theory and the instrumental perspective in particular assert that long-term performance is conditioned by the ability of companies to manage, maintain, and improve sustainable relationships with all relevant stakeholders (Clarkson, 1995). These relationships provide firms with the resources they need to establish and retain competitive advantage (Jones, 1995).

Under the instrumental stakeholder premises, some meta-analyses have tried to investigate connections between some CG mechanisms, CSP, and CFP. For example, Byron and Post (2016) analyzed the influence of firms' board diversity on CSP, and Lagasio and Cucari (2019) analyzed a sample of 24 studies and captured the effect of some CG mechanisms (e.g., board independence, board size, women directors, board ownership, and CEP duality) on environmental, social, and governance (ESG) disclosure. Other studies (Ortas, Álvarez, & Zubeltzu, 2017) only focus on one CG mechanisms (i.e., board independence) to capture its impact on CSP. Recently, Jain and Jamali (2016) developed a systematic multi-level review aimed at capturing which CG mechanisms have an influence on corporate social responsibility (CSR) outcomes. Individual studies, such as that conducted by Mallin et al. (2013), find that stakeholder-oriented governance mechanisms of larger and diverse boards lead to higher corporate environmental performance (CEP), and Zattoni (2011, p. 268) states that "a board representing stakeholders' groups that provide critical contributions has higher decision-making abilities and can achieve a cooperative bargaining agreement among all constituents." By including directors representing a wide range of stakeholders' interests, organizations are highlighting their engagement with social and environmental issues, thus increasing a firm's linkage to relevant resources (Hillman et al., 2001). In fact, Dalton et al. (1999) state that larger boards make it possible to represent more types of directors (outsider/internal, non-executive/executive, and shareholders/stakeholder representatives), thus increasing board diversity. This allows companies to incorporate into the decision-making process social objectives that may ultimately increase their CSP. In contrast, firms with less diversity are more likely to prioritize CFP issues over social issues. Based on the previous reasoning, the following hypothesis will be tested:

H1 *: Companies with larger boards achieve superior CSP.*

2.1 | The moderating role of CG mechanisms

2.1.1 | The effect of board independence

The relationship between CSP and the independence of a firm's board has been the object of many empirical studies (Dunn & Sainty, 2009; Jo & Harjoto, 2012; Macaulay, Richard, Peng, & Hasenhuttl, 2018; Ntim & Soobaroyen, 2013) even from a meta-analytic perspective (Ortas et al., 2017). Most of these papers reveal that board independence improves the range of strategic key business policies that respond to the needs of their stakeholders (Milliken & Martins, 1996), giving companies the ability to strengthen their connections with their stakeholders (Daily, Dalton, & Cannella, 2003; Hermalin & Weisbach, 2003; Van den Berghe & Levrau, 2004) and increase corporate social outcomes (Freeman & Evan, 1990).

Dalton et al. (1999) found that the combination of larger boards and independence can enhance CSP even more. According to stakeholder theory, companies with larger boards and greater participation of independent directors are more likely to take into account sensitivities and interests other than those of managers and the majority of shareholders (Ayuso & Argandoña, 2009). Furthermore, increased board independence is expected to positively moderate the relationship between board size and CSP. This is because larger boards with more independent directors better represent the "social contract" of the company. Based on the previous reasoning, the following hypothesis will be tested:

H2 *: The positive influence of the size of firms' boards on CSP is more positive and stronger in companies with more independent boards.*

2.1.2 | The role of CG systems

Aguilera and Jackson (2003) found that CG practices differ across countries and that their dispersion is not homogenous mainly due to a divergent evolution of financial systems (Owen, Kirchmaier, & Grant, 2006; Weimer & Pape, 1999). Previous research indicates a connection between countries' systems of governance and firms' CG approaches (Ball, Kothari, & Robin, 2000). For example, Haake (2002) states that companies in codified law countries have greater shareholder concentration and give greater representation and orientation to the interests of their stakeholders (Kock & Min, 2016). On the other hand, companies operating in common law or individualistic countries (Haake, 2002) have a greater dispersion of shareholders (La Porta, Lopez-de-Silanes, & Shleifer, 1999; Owen et al., 2006) and face stronger conflicts of interest between managers and shareholders. Companies in common law countries have traditionally been considered to have a strong orientation to protect the interests of their shareholders. In those countries, rules and legal protection mechanisms facilitate the presence of shareholders on the board of directors, fulfilling the functions of control over managers. Thus, increasing the size of the board does not mean increasing the diversity of the board as it does in firms in civil law systems. Based on the previous reasoning, the following hypothesis will be tested:

H3 *: The positive influence of the size of firms' boards on CSP is more positive and stronger in companies operating in civil law countries.*

The governance system of a given country contributes to strengthen/weaken the available mechanisms to protect the interests of investors. Given that those concepts are closely linked, this paper will conduct additional analyses to ascertain how national governance systems moderate the relationship between size of firms' boards and CSP. To that end, the empirical analysis will consider shareholder protection mechanisms as an additional moderator variable.

3 | METHOD AND SAMPLE FEATURES

3.1 | Sample

The sample was selected using the following method. First, some of the most important scientific databases (e.g., Web of science, Proquest, EBSCO, and Emerald electronic) were investigated with different combinations of keywords such as sustainability, social, social performance, corporate social performance with board size, and board diversity for the period between 1997 and 2018. Second, the main journals that publish articles on the variables analyzed were examined (e.g., *Business Strategy and Environment*; *Corporate Governance: An International Review*; *Corporate Social Responsibility and Environmental Management*; *Journal of Business Ethics*; *Strategic Management Journal*; and *Sustainability Accounting, Management and Policy Journal*). This process resulted in 180 studies. In a third step, the database was cleaned in the following way: (a) those works that did not analyze the relationship between firms' board size and CSP were removed (23 papers); (b) those works that did not consider CSP were removed (47 papers); and (c) those papers that did not report correlation coefficients between the studied variables, or sufficient statistical data for conversion, were removed from the sample (30 articles). As a result, the final dataset comprises 80 papers that were published between 1997 and 2018. These studies were coded in order to conduct the meta-analysis (see Table A.1. for further details).

3.2 | Econometric approach

This paper uses a meta-analytic approach, which has been conceptualized as a methodological approach for the integration of prior empirical research on the same subject, for the purpose of creating generalizations based on the application of statistical methods (Botella-Ausina & Sánchez-Meca, 2015; Cooper, Hedges, & Valentine, 2009; Lipsey & Wilson, 2001). Unlike the primary studies, in a meta-analysis, the input data are the results of the studies, conveniently transformed into a common metric, called effect size, that allows their integration, numerical comparison, and analysis (Lipsey & Wilson, 2001). In our study, the effect size measures the magnitude of the association between the size of a firm's board and CSP. For papers that reported more than one effect size—correlation coefficients in our case—between board's size and CSP, the average correlation was computed following the approach adopted by Hunter and Schmidt (Rhoades, Rechner, & Sundaramurthy, 2000; Schmidt & Hunter, 2014). This results in a single correlation coefficient per study, to meet the independence condition.

The Hedges and Olkin technique was implemented. Specifically, the random effects model was constructed to test the three working hypotheses. This model has been selected for the following reasons: (a) We evaluate discrete variables; (b) there are moderators that are expected to have an influence in the relationship between the size of a firm's board and CSP; and (c) the studies in the sample are not homogeneous (i.e., there are different subgroups in which the population effect size diverges). This model allows us to make some inferences outside the sample (Lipsey & Wilson, 2001). The statistical significance of the different moderating variables is tested following the approach described in Borenstein, Higgins, and Rothstein (2009) and Lipsey and Wilson (2001). Specifically, different *Z* tests were computed to evaluate if the different subgroups' effect sizes are statistically different (Busch & Friede, 2018; O'Boyle, Pollack, & Rutherford, 2012).

This paper also conducts supplementary analyses to confirm the results provided to test the last working hypothesis (i.e., H3). Specifically, a measure of countries' mechanisms to protect investors' interests was considered. We included the strength of shareholder protection index (SSPI) as a proxy for the aforementioned variable.

This is a continuous variable, and thus, a different econometric approach must be implemented. Accordingly, a meta-regression was estimated (Borenstein et al., 2009; Essen, Carney, Gedajlovic, & Heugens, 2015; Lipsey & Wilson, 2001). As with the discrete variables, a random effects model was estimated through maximum likelihood. Under this approach, each study-level effect size is weighted by the inverse of its variance (Aguinis, Gottfredson, & Wright, 2011; Borenstein et al., 2009).

3.3 | Measurement of variables

Measures of dependent, independent, and moderating variables were selected according to previous research evidence. For example, the main independent variable (i.e., firms' board size) is defined as "the total number of directors on the proxy statement date" (Larmou & Vafeas, 2010). Although there is controversy about how to measure CSP (i.e., the dependent variable in this paper), Orlitzky identified four main proxies: (a) CSP reputation ratings; (b) CSP disclosures; (c) managerial CSP principles and values; and (d) social audits, CSP processes, and observable outcomes. A look at the papers in the dataset reveals that CSP has been measured based on objective and non-objective data and criteria (Dixon-Fowler, Slater, Johnson, Ellstrand, & Romi, 2013), such as (a) pollution indicators (e.g., toxic release inventory); (b) social audits made by independent organizations (e.g., KLD, ASSET4, Bloomberg, Jantzi, and HEXUN); and (c) the extent of firms' social reporting. Following Dixon-Fowler et al. (2013), Sharfman (1996), and Sharma (2001), we considered CSP measures along two dimensions of social performance separately: (a) self-report CSP measures and (b) CSP externally reported or archival data. Thirty-eight of the 80 papers (47.5%) use self-reported CSP measures, and the other 42 use externally reported data (52.5%). In line with this classification, we conducted additional analyses to test whether the use of different CSP measures acts as a methodological moderator in the relationship between board size and CSP. Similar analyses have been developed previously by other studies focused on related areas (see Albertini, 2013; Busch & Friede, 2018; Byron & Post, 2016; Dixon-Fowler et al., 2013; Orlitzky, Schmidt, & Rynes, 2003; Ortas et al., 2017).

Following Siddiqui (2015) and Ortas et al. (2017), countries governance systems have been measured in the empirical study by creating a discrete variable that takes the following values: (a) 1 for those papers analyzing firms exclusively from civil law countries; (b) 2 for those papers discussing companies exclusively from common law countries; (c) 3 for those papers examining firms from mixed law countries; and (d) 4 otherwise (i.e., companies from different governance systems).

Previous research acknowledges the fact that there is no consensus about what firms' board independence means (Brennan & McDermott, 2004). However, many authors used the wording "outside directors" to identify those directors who are independent from management (Ajinkya, Bhojraj, & Sengupta, 2005). We partially follow this approach and define board independence as the percentage of outside directors as a proportion of the whole board. We created a discrete variable that takes the value of 1 for those papers that describe companies with an above average level of board independence and the value of 2 otherwise.

The intensity of countries' commitment to protect shareholders' interests has been measured by the SSPI, provided by the World Bank (2015). This index reflects the effort of different countries to defend the interests of the shareholders from the firm's managers (i.e., the level measures to protect shareholders from conflicts of interests). The papers in the sample have been coded according to the values assigned to each country on the SSPI.

4 | RESULTS AND DISCUSSION

4.1 | Hypotheses testing

Table 1 shows the results that test the working hypotheses. First, the main direct effect is positive ($\acute{r} = .22$) and significant because its confidence interval [0.186, 0.254] does not include the value of zero. The positive effect of boards' size on CSP is consistent with instrumental stakeholder theory, because larger and more diverse boards are more likely to represent the aims, interests, and wishes of a company's stakeholders, facilitating and promoting the adoption of proactive environmental and social strategies, which has a direct and positive effect on CSP. This result is line with previous research that found a positive association between the two constructs (De Villiers et al., 2011; Jamali, Safieddine, & Rabbath, 2008; Jizi, 2017; Lagasio & Cucari, 2019; Pucheta-Martínez & Gallego-Álvarez, 2019). The robustness of this finding was evaluated using the statistics Q test and I^2. Both statistics reveal that the positive and significant observed direct effect is highly heterogeneous and that the variability of the results is due to the existence of moderating variables. The value of the Rosenthal fail-safe is 53.360, which indicates that the number of unpublished papers required to make the observed effect size negligible is very large and the presence of any publication bias is unlikely. These results provide support for H1 that firms with larger boards exhibit higher levels of CSP.

Table 1 also contains the required estimates to test the hypothesized moderating effects. H2 predicted that the positive influence of firms' board size on CSP is more positive and stronger in companies with higher levels of boardroom independence. The results show a positive and significant effect size related with the influence of larger and more independent boards on CSP ($r\ \bar{c} = .24$, $p < .01$). Although the estimate related with firms' boards with lower levels of independence is positive ($r\ \bar{c} = .154$, $p < .01$), the z test ($z = 1.87$; $p < .1$) reveals that the positive effect of board size on CSP is greater in companies with higher levels of independence. Accordingly, H2 cannot be rejected. These findings are consistent with prior research indicating that CSP is higher in firms that have larger boards and a larger representation of independent directors (Burke, Hoitash, & Hoitash, 2019; de Villiers et al., 2011; Lagasio & Cucari, 2019). These findings are also in line with the premises established by instrumental stakeholder

TABLE 1 Meta-analysis results

	N	*K*	$\bar{r}$	*z*	−95% CI	+95% CI	*Q* test	I^2	*Z* test	*p* value
Direct effect										
Board sizes impact on CSP	80,912	80	.220***	12.12	0.186	0.254	1,808.99	95.63		
Moderating effects										
Corporate governance systems										
Civil law	9,823	16	.321***	7.9	0.303	0.339	218.10	93.13	Reference category	
Common law	52,657	41	.208***	7.06	0.199	0.216	1,162.42	96.56	11.33	.000***
Global studies	12,145	10	.231**	3.08	0.214	0.247	40.01	77.51	7.22	.000***
Mixed law	6,287	13	.271***	5.81	0.240	0.294	251.80	95.23	3.37	.001***
Board composition										
Boards with low independence	16,764	24	.1538***	4.43	0.086	0.220	498.49		Reference category	
Boards with high independence	45,164	26	.2402***	7.63	0.180	0.298	746.63		1.87	.061*
CSP measurement approach										
Self-reported	18,899	39	.258***	9.82	0.208	0.307	516.25	92.6	Reference category	
Externally reported	222,613	41	.186***	7.42	0.137	0.233	1,228.07	96.7	2.05	.041**

Note: This table provides the results of the meta-analytic study. *N* refers to the total sample size (number of companies); *K* is the number of effect sizes (that were variance weighted); *r* shows the mean effect size; −95% CI and +95% CI are the limits of the mean size effect confidence intervals; *Q* stat is the homogeneity test; I^2 stat shows the ratio of the study variance due to heterogeneity; and *Z* test capture differences between subgroups.
*Statistical significance at 10% level.
**Statistical significance at 5% level.
***Statistical significance at 1% level.

theory, which predict that larger and more independent boards are more likely to include stakeholders' interests in corporate management and thus be more sensitive to social issues, resulting in increased CSP (Aguilera & Desender, 2012; Rediker & Seth, 1995).

H3 states that the positive influence of a larger board on CSP will be stronger in those companies in codified law systems. The results show that the estimated effect size associated with companies operating in civil law countries is positive and significant ($r\ \bar{c}$ = .321, p < .01). Furthermore, this effect size is greater than that for companies in other governance systems (i.e., $r\ \bar{c}$ = .208, p < .01 for common law countries, $r\ \bar{c}$ = .231, p < .05 for global systems, and $r\ \bar{c}$ = .271, p < .01 for mixed law systems). Although these differences do not guarantee statistical differences between companies in different legal systems, the *z* tests suggest that these observed differences are significant. These results indicate that the positive influence of board size on CSP is greater in companies operating in civil law countries, which in general show a strong orientation towards stakeholders.

Finally, we test for the possible existence of a methodological moderator, which is related with the different ways of measuring the CSP construct. The results show that the positive effect of board size on CSP is greater when it is measured through self-reported data ($r\ \bar{c}$ = .258, p < .01). This estimate is also positive when CSP is measured through externally reported proxies ($r\ \bar{c}$ = .186, p < .01). However, the *z* test indicates that using self-report CSP measures strengthen the relationship between size of firms' boards and CSP (z = 2.05; p < .05).

For robustness purposes, the models were re-estimated through the Schmidt and Hunter (2014) random effects approach meta-analysis using the macros provided by Lipsey and Wilson (2001). The results obtained were not significantly different than those provided in this section. They have been omitted for brevity purposes, but they are available upon request from the corresponding author.

4.2 | Supplementary analysis

As in other CG meta-analysis (see Byron & Post, 2016), we conducted supplementary analyses to establish more firmly the moderating effect of GC systems. In fact, these are closely related with the countries' commitment to protect investors' interests. Thus, we included the Shareholders' protection mechanisms variable and estimated the meta-regression. The estimates are shown in Table 2.

The main size effect is positive and significant, thus confirming that the larger the firm's board, the greater their CSP. As predicted by H3, the meta-regression results show that the effect of board size on CSP is weaker for companies in countries with stronger shareholder protection mechanisms, a common profile of common law countries. This is because the regression coefficient is negative and significant (β = −.0376; p < .05). Thus, strong investor protection mechanisms do not favor the incorporation of different stakeholders' interests on firms' boards by preventing stakeholders–directors from performing their functions efficiently. Accordingly, these findings suggest that companies in countries with stronger mechanisms to protect shareholders' interests have a shareholder orientation rather than a stakeholder orientation. This result confirms the findings of the Hedges and Olkin technique model presented in the previous section.

TABLE 2 Meta-regression results

Overall size effect	
Intercept	0.4923***
	(0.1161)
Moderator	
Shareholders' protection mechanisms	−0.0376***
	(0.0154)
Model additional data	
K	69
I^2	94.74%
R^2	.09
Q	1,489.19 [0.00]
Q model (*p*)	214.77
	[0.00]
Q residual (*p*)	1,274.42
	[0.00]

Note: This table shows the estimates of the meta-regression analysis. This model only considers a sample of 61 articles because the rest ones comprised companies from different countries, thus exhibiting divergent SSPI values. Unstandardized regression coefficients are reported. Standard errors are in parentheses, and *p* values are in brackets. *K* refers to the total number of effect sizes; *Q* refers to the homogeneity statistic.
*Significant at 10% level.
**Significant at 5% level.
***Significant at 1% level.

5 | CONCLUDING REMARKS

The existing literature has extensively analyzed the effect of the size of firms' boards on CSP without achieving a consensus. This paper addresses this connection and provides a meta-analysis in order to summarize previous research on the topic. Our central results show a positive effect of board size on CSP. However, this positive connection is of different magnitude when CSP is measured through self- and externally related proxies. The positive effect is stronger when CSP is measured through self-related proxies. This can be explained because higher self-reported CSP scores can be a result of managerial misconduct. Thus, this results must be interpreted with some caution because self-reported CSP scores may include a social desirability bias (Podsakoff & Organ, 1986). This paper also finds that the positive effect of board size on CSP is more positive and stronger when firms exhibit higher levels of board independence. The results suggest that different CG mechanisms are mutually dependent and complementary. These findings are consistent with stakeholder theory, which predicts a positive association between those constructs because larger boards represent in a better way the diversity and the involvement of a firm's stakeholder interests (Dalton et al., 1999; De Villiers et al., 2011; Tauringana & Chithambo, 2015). Accordingly, independent and larger boards are more likely to have wider connections with strategic stakeholders, achieving more positive social outcomes (De Villiers et al., 2011; Hillman et al., 2001. The paper also finds that the positive effect of board size on CSP is greater in civil law countries. This is mainly explained because codified law countries have a stakeholder orientation, rather than prioritizing shareholders' claims, as is the case in common law countries. Companies in civil law countries are more likely to adopt a stakeholder management approach.

These findings raise an important issue for extending previous research on the effect of CG measures on CSP. They are also important for regulators, company managers, shareholders, and stakeholders concerned with the implications for CSP of board related internal CG mechanisms. These findings are of special importance for corporate strategy. The results suggest that a firm's strategic considerations are consistent with a stakeholder-based view of the firm, according to which directors' interconnections (independent or outside directors) and organizational diversity (board size) create competitive social advantage. Inclusion of financial and non-financial outcomes requires leadership and support from the board. The consideration of CSP as a complementary corporate outcome makes it necessary to refocus board characteristics, so the size and independence of the board have a positive effect on CSP. Finally, this work complements previous studies from the bundle of CG approach and provides guidance for regulators, stakeholders, and managers, suggesting larger boards with more independent and diverse board members to meet the triple bottomline objectives.

This paper is not free from limitations. The results presented are subject to common biases shown by the meta-analytical studies (Murphy, 2017; Walker, Hernandez, & Kattan, 2008). This approach cannot detect endogeneity, because few articles in the sample controlled for this bias (Samaha, Khlif, & Hussainey, 2015), and the number of studies in some subgroups is small. Future studies should consider other variables of moderation and mediation between board size and CSP such as (a) gender diversity, (b) ownership concentration, and (c) institutional participation.

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APPENDIX A

TABLE A1 Articles characterization

Authors	Journal	Sample size	Observed r^a	Corr. reported	Countries	CG system[a]	CSP measure[b]
Alazzani, Hassanein, & Aljanadi, 2017	*The International Journal of Business in Society*	303	.17 to .32	2	Malaysia	M	S-r
Amran, Lee, & Devi, 2014	*Business Strategy and the Environment*	113	.064	1	Global	G	S-r
Amran, Periasamy, & Zulkafli, 2014	*Sustainable Development*	111	.15388	1 t	Global	G	S-r
Arayssi, Dah & Jizi., 2016	*Sustainability Accounting, Management and Policy Journal*	975	−.2939	1	United Kingdom	Co	E-r
Arena, Bozzolan, & Michelon, 2015	*Corporate Social Responsibility and Environmental Management*	288	.143 to .32	2	United States	Co	E-r
Bai, 2013	*Journal of Business Ethics*	1,939	−.07 to .13	2	United States	Co	E-r
Barakat, Pérez, & Ariza, 2015	*Review of Managerial Science*	101	.42	1	Palestine/Jordan	Ci	S-r
Ben-Amar, Chang, & McIlkenny, 2017	*Journal of Business Ethics*	541	.1	1	Canada	Co	S-r
Benomran, Haat, Hashim, & Mohamad, 2015	*Journal of Environment and Ecology*	162	−.03	1	Libya	M	S-r
Bernardi & Threadgill, 2010	*Electronic J. of Bus. Ethics & Organization Studies*	429	.23	1	United States	Co	S-r
Bernardi, Bosco, & Columb, 2009	*Corporate Reputation Review*	500	.113	1	United States	Co	E-r
Brammer, Millington, & Pavelin, 2009	*British Journal of Management*	199	.245	1	United Kingdom	Co	E-r
Burke et al., 2019	*Journal of Business Ethics*	11,458	.23 to .37	3	United States	Co	E-r
Cho, Jung, Kwak, Lee, & Yoo, 2017	*Journal of Business Ethics*	10,297	.106	1 t	United States	Co	E-r
Choi, Lee, & Park, 2013	*Corporate Governance: An International Review*	2,042	.31	1	Korea	Ci	E-r
Cormier, Ledoux, & Magnan, 2011	*Management Decision*	137	.22 to .3	2	Canada	Co	S-r
Cuadrado-Ballesteros et al., 2015	*Spanish Accounting Review*	5,380	.2295	1	Global	G	E-r
De Villiers et al., 2011	*Journal of Management*	5,997	.16	1	United States	Co	E-r
Deschênes, Rojas, Boubacar, Prud'homme, & Ouedraogo, 2015	*Corporate Governance: The International Journal*	192	.097	1 t	Canada	Co	E-r
Dienes & Velte, 2016	*Sustainability*	34	.241	1	Germany	Ci	E-r
Esa & Anum Mohd Ghazali, 2012	*Corporate Governance: The international journal*	54	.333 to .596	2	Malaysia	M	S-r
Frias-Aceituno, Rodriguez-Ariza, & Garcia-Sanchez, 2013	*Corporate Social Responsibility and Environmental Management*	1,575	.166	1	Global	G	S-r

(Continues)

TABLE A1 (Continued)

Authors	Journal	Sample size	Observed r[a]	Corr. reported	Countries	CG system[a]	CSP measure[b]
Fuentes-Medina, Marrero, & Martel, 2018	*Inter. Journal of Management & Social Studies*	49	.19	1	Spain	Ci	E-r
Galbreath, 2011	*Journal of Management and Organization*	161	.13 to .27	2	Australia	Co	S-r
Galbreath, 2018	*Business & Society*	300	.41	1	Australia	Co	E-r
Garcia-Sanchez, Cuadrado-Ballesteros, & Sepulveda, 2014	*Management Decision*	686	.4893	1	Spain	Ci	S-r
Godos-Díez, Cabeza-García, Alonso-Martínez, & Fernández-Gago, 2018	*Review of Managerial Science*	398	.483	1	Spain	Ci	S-r
Gupta, Lam, Sami, & Zhou, 2014	*Working Paper, Social Science Research Network*	1,153	−.05 to .35	2	United States	Co	E-r
Hafsi & Turgut, 2013	*Journal of Business Ethics*	95	.12	1	United States	Co	E-r
Haldar & Mishra, 2015	*Information Management and Business Review*	24	.267	1	India	Co	S-r
Halme & Huse, 1997	*Scandinavian Journal of Management*	140	.14 to .16	2	European Union	Ci	S-r
Haque, 2017	*The British Accounting Review*	2,315	.34	1	United Kingdom	Co	S-r
Hillman et al., 2001	*Business and Society*	247	.128	1	United States	Co	E-r
Hogan, Olson, & Sharma, 2014	*Journal of Leadership, Accountability and Ethics*	540	.06 to .07	2	United States	Co	E-r
Htay, Ab Rashid, Adnan, & Meera, 2012	*Asian Journal of Finance & Accounting*	120	−.1	1	Malaysia	M	S-r
Huse, Nielsen, & Hagen, 2009	*Journal of Business Ethics*	371	.22	1	Norway	Ci	S-r
Hussain, Rigoni, & Orij, 2018	*Journal of Business Ethics*	152	−.1044 to −.18	2	United States	Co	S-r
Ienciu, Popa, & Ienciu, 2012	*Procedia Economics and Finance*	54	.09	1	Global	G	E-r
Janggu, Darus, Zain, & Sawani, 2014	*Procedia Social and Behavioral Sciences*	100	.377	1	Malaysia	M	S-r
Javaid Lone, Ali & Khan, 2016	*Corporate Governance: The International Journal*	250	.67	1	Pakistan	M	S-r
Jia & Zhang, 2011	*The International Journal of Human Resource*	1,320	.1 to .14	2	China	M	S-r
Jizi, 2017	*Business Strategy and the Environment*	1,155	.0682	1 t	United Kingdom	Co	E-r
Jizi, Salama, Dixon, & Stratling, 2014	*Journal of Business Ethics*	291	.282317647	1 t	United States	Co	S-r
Karlsson & Bäckström, 2015	*Master's Thesis Uppsala University*	1,015	.52	1	Sweden	Ci	S-r
Kiliç, Kuzey, & Uyar, 2015	*Corporate Governance*	3,106	.227	1	Turkey	Ci	S-r
Kimball, Palmer, & Marquis, 2012	*Academy of Management Proceedings, SSRN*	657	.18	1	United States	Co	E-r
Liao, Luo, & Tang, 2015	*The British Accounting Review*	329	.42	1	China	M	E-r
Lim, Matolcsy, & Chow, 2007	*European Accounting Review*	181	.247	1	United Kingdom	Co	E-r

(Continues)

TABLE A1 (Continued)

Authors	Journal	Sample size	Observed r^a	Corr. reported	Countries	CG system[a]	CSP measure[b]
Lu, 2016	*Doctoral Dissertation University of Texas*	2,098	.1243	1	Australia	Co	S-r
Lu, Abeysekera, & Cortese, 2015	*Pacific Accounting Review*	83	.244	1	United States	Co	E-r
Macaulay et al., 2018	*Journal of Business Ethics*	577	.29	1	United States	Co	E-r
Mallin & Michelon., 2011	*Accounting and Business Research*	221	−.1022 to .1960	6	United States	Co	E-r
Marquis & Lee, 2013	*Strategic Management Journal*	2,100	.253	1	United States	Co	E-r
Martínez-Ferrero, Vaquero-Cacho, Cuadrado-Ballesteros, & García-Sánchez, 2015	*Investigaciones Europeas de Dirección y Economía de la Empresa*	877	.2371	1	Global	G	E-r
McGuinness, Vieito & Wang., 2017	*Journal of Corporate Finance*	2,412	.29	1	China	M	E-r
Michelon & Parbonetti, 2012	*Journal of Management & Governance*	114	.217 to .233	3	Global	G	S-r
Musteen, Datta, & Kemmerer, 2010	*British Journal of Management*	324	.2	1	United States	Co	E-r
Ntim & Soobaroyen, 2013	*Corporate Governance: An International Review*	600	.12	1	South Africa	M	S-r
Oh, Chang & Cheng., 2016	*Journal of Business Ethics*	1,332	.41	1	United States	Co	E-r
Orozco, Vargas, & Galindo-Dorado, 2018	*European J. of Manag. and Business Economics*	84	.039	1	Colombia	Ci	E-r
Ortiz-de-Mandojana, Aguilera, & Morales-Raya, 2016	*Business Strategy and the Environment*	210	−.08	1	United States	Co	E-r
Post et al., 2011	*Business & Society*	78	.00 to .23	3	United States	Co	S-r
Prado-Lorenzo, Sánchez, & Gallego-Álvarez, 2009	*Revista Española de Financiación y Contabilidad*	288	.621	1	Spain	Ci	S-r
Prado-Lorenzo & Garcia-Sanchez, 2010	*Journal of Business Ethics*	283	.06125	1	Global	G	E-r
Rao, Tilt and Leste., 2012	*Corporate Governance: The International Journal*	96	.16 to .36	2	Australia	Co	S-r
Rao & Tilt, 2016	*Meditari Accountancy Research*	345	.063132	1 t	Australia	Co	S-r
Rodríguez-Ariza, Aceituno, & Rubio, 2014	*Spanish Accounting Review*	3,521	.288	1	Global	G	S-r
Sahin, Basfirinci, & Ozsalih, 2011	*African Journal of Business Management*	96	.074	1	Turkey	Ci	S-r
Said, Hj Zainuddin, & Haron, 2009	*Social Responsibility Journal*	150	.232	1	Malaysia	M	S-r
Said, Omar, & Nailah Abdullah, 2013	*Social Responsibility Journal*	120	.037	1	Malaysia	M	S-r
Siciliano, 1996	*Journal of Business Ethics*	240	.1726	1	United States	Co	S-r
Veronica Siregar & Bachtiar, 2010	*International Journal of Islamic and Middle Eastern Finance and Management*	87	.422049	1 t	Indonesia	Ci	S-r
Tauringana & Chithambo, 2015	*The British Accounting Review*	860	.39	1	United Kingdom	Co	S-r

(Continues)

TABLE A1 (Continued)

Authors	Journal	Sample size	Observed r[a]	Corr. reported	Countries	CG system[a]	CSP measure[b]
Velte, 2016	*Journal of Global Responsibility*	1,019	.24	1	Austria/Germany	Ci	E-r
Walls & Hoffman, 2013	*Journal of Organizational Behavior*	1,881	.18	1	United States	Co	E-r
Walls, Berrone, & Phan, 2012	*Strategic Management Journal*	2,002	.18	1	United States	Co	E-r
Wieland & Flavel, 2015	*Journal of Management & Governance*	294	.108 to .201	4	Germany	Ci	E-r
Yuanhui Li, Li, Zhang, & Foo, 2013	*Chinese Management Studies*	613	.43 to .6	4	China	M	E-r

Note: This table shows the main data obtained when coding the considered studies included in the meta-analysis.
[a]Governance system identification: (a) Co refers to common law; (b) Ci refers to civil law; (c) M refers to mixed law; and (d) G refers to multi-legal system samples.
[b]CSP measurement approaches: (a) E-r refers to external-reported CSP measure and (b) S-r refers to self-reported CSP proxies.

5.4 ARTICLE 4: Shedding light on the determinants of eco-innovation.

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RESEARCH ARTICLE

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Shedding light on the determinants of eco-innovation: A meta-analytic study

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Abstract

In the past decade a stream of studies has analyzed the determinants of eco-innovation. Four main clusters of drivers have been identified in the literature: "technology push," "market pull," "regulatory push-pull," and "firm specific factors." Nevertheless, the empirical quantitative and comparative analysis of those clusters is rare, scattered and inconclusive. This article aims to fill this gap by analyzing the determinants of eco-innovation on the basis of a meta-analytic study of quantitative empirical studies published over the period 2006 to 2017—a meta-analysis which accounts for a total of 211,123 firms. The findings show that firms with collaborative networks and/or more environmental concern are more prone to eco-innovate, emphasizing the role of "technology push" as the main cluster of determinants, regardless of whether a typology of eco-innovation is included as a moderator in the meta-analysis. Based on the results of the meta-analytic study, the paper discusses several courses of action to foster eco-innovation and achieve environmental benefits.

KEYWORDS

determinants, eco-innovation, environmental innovation, meta-analysis, sustainability

1 | INTRODUCTION

In recent years, environmental and social concerns have made eco-innovation (EI) an important issue for researches and practitioners (Hojnik & Ruzzier, 2016). Transitioning to sustainable societies, apart from changes in consumption patterns, requires substantial innovation (Del Río, Peñasco, & Romero-Jordán, 2016). Cai and Zhou (2014) underlined that EI strategies provide both customer and company competences to shift to a more sustainable development and enable a reduction in negative environmental impacts. Both innovation and environmental sustainability should be considered by firms in their management and coordination activities (Bossle, Dutra de Barcellos, Vieira, & Sauvée, 2016). Ghisetti and Pontoni (2015) pointed out that many authors have characterized EI as an essential element in decoupling environmental pressure and economic growth. Like innovation—which has been one of the driving forces of the economy in the medium to long term—EI should be central to guaranteeing a more sustainable economy and society (Carrillo-Hermosilla, Del Río, & Könnölä, 2010). In addition, platforms such as the Eco Innovation Observatory (EIO) and diverse initiatives by national and international public bodies have stressed the relevance of this type of innovation when combining competitiveness and sustainability. For example, the 7th Environment Action Programme (EAP) adopted by the European Parliament and the Council of the European Union (EU) identifies three priority areas where more action is required. One concerns the conditions that promote a shift to a resource-efficient, low-carbon economy, which will require improvements in the environmental performance of products, among other things (European Commission, 2012).

EI may be defined as the "production, assimilation or exploitation of a good, service, production process, organizational structure, or management or business method that is novel to the firm or user and which results, throughout its lifecycle, in a reduction of environmental risk, pollution and the negative impacts of resources use (including energy use) compared to relevant alternatives" (Kemp & Pearson, 2007, p. 7). Rennings (2000) characterized EI by a so-called "double externality problem, which results in two positive externalities: on the one hand, it reduces the generation of negative environmental impacts that are partly appropriated by society and, on the other, it might produce positive knowledge externalities in that part of the knowledge created by firms developing and/or adopting EIs might be beneficial to others (De Marchi, 2012; Ghisetti & Pontoni, 2015). As a result, a growing interest in the driving forces of ecologic innovations among countries (macro level), sectors/regions (meso level) and firms (micro level) has emerged. As EI is a "special

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innovation," understanding of which requires particular attention (Rennings, 2000), several authors have aimed to shed light on the drivers of corporate environmental innovative performance (Amores-Salvadó, Castro, & Navas-López, 2014; Cainelli, De Marchi, & Grandinetti, 2015; Ghisetti, Marzucchi, & Montresor, 2015; Horbach, 2008, 2016; Marzucchi & Montresor, 2017; Triguero, Moreno-Mondéjar, & Davia, 2013). A set of studies trace how EIs differ from general innovations in their externalities and drivers (Porter & Van der Linde, 1995; Rennings, 2000).

At the micro or corporate level, several studies have examined the determinants of EI, but the evidence is scattered and inconclusive. For example, it is unclear whether clusters of potential determinants such as market-, technological-, firm-specific and regulatory drivers challenge enterprises in the same way when generating or adopting EI. Triguero et al. (2013) point out that studies that distinguish between particular drivers of different EI types are scarce and very few studies have carried out a cross-country analysis of EI at the firm level (Bönte & Dienes, 2013; Horbach, 2016; Triguero et al., 2013). Most studies focus only on developed economies (e.g., Berrone, Fosfuri, Gelabert, & Gomez-Mejia, 2013; Ghisetti et al., 2015; Horbach, 2008).

This article aims to bridge this gap in the academic literature by shedding light on the determinants of the adoption or generation of EI at the firm level. More specifically, the definition, typology and determinants of EI are reviewed, together with a meta-analysis of 37 empirical quantitative studies published in the period 2006–17 that account for a total of 211,123 firms, from both developed and developing countries. This paper contributes to the previous literature in several ways. First, additional quantitative evidence is provided regarding the determinants for corporate EI based on a meta-analysis of the broad spectrum of contributions that apply econometric methods in this field. In particular, after a qualitative literature review on the econometric analyses of firm-level determinants of EI we conduct a meta-analysis of selected articles in the field. Second, empirical studies use very diverse data sources, model specifications and variables, so to overcome this heterogeneity, previous empirical literature is systematically reviewed and structurally analyzed. The commonalities and the differences are summarized and quantified, producing outcomes that could not be obtained from individual studies. Third, to test for differences between drivers of EI, two relevant dimensions of EI (Triguero et al., 2013), namely eco-product and eco-process, are considered. Fourth, in an attempt to offer a meta-analytic synthesis of the drivers of EI, the reasons underlying the ambiguous results of previous empirical studies are empirically evaluated. Finally, the drivers for companies from developed and developing countries are considered in the analysis, a category has been given surprisingly little attention before.

The remainder of the paper is structured as follows. The next section describes the relevant literature on different types of EI determinants and the main hypothesis of this paper. The third section describes the approach adopted for collecting and analyzing data. In the fourth section the main statistical results are presented together with a summarized discussion of them. Finally, the conclusions presents the main contributions, implications and avenues for further research arising from the paper.

2 | LITERATURE REVIEW: DEFINITION, TYPES AND DETERMINANTS OF EI

2.1 | Eco-Innovation: Definition and typology

There is no consensus in the scholarly literature on the concepts and terminology used to describe the type of innovations that reduce negative impacts on the environment. Adjectives and/or prefixes such as "green," "eco," "environmental" and "sustainable" are the most commonly used terms. In their exploratory literature review, Schiederig, Tietze, and Herstatt (2012) point out that the definitions of the above four terms are very similar. They underline that the main difference is that "sustainable innovation" includes social aspects as well as economic and environmental ones. According to Ekins (2010), EI was conceived as a subclass of innovation that is associated with economic activities that improve both the economic and the environmental performance, whereas environmental innovation is constrained to the environmental effects.

Kemp and Pearson (2007, p. 7) defined EI as "the production, assimilation or exploitation of a product, production process, service or management or business methods that is novel to the firm (or organization) and which results, throughout its life cycle, in a reduction of environmental risk, pollution and other negative impacts of resources use (including energy use) compared to relevant alternatives". Álvarez, Fernández, and Romera (2014) define EI as innovation that is intended to measure, avoid, limit, minimize or correct environmental damage to natural resources as well as issues related to waste, noise or impacts on ecosystems. In other words, EI includes activities whose ultimate objective is to protect the environment. This implies that it includes new productive processes, new goods and services and new organizational systems. The same idea is emphasized by the Eco-Innovation Observatory (EIO, 2011, p. 16) as it considers "the introduction of new or significantly improved product (good or service), process, organisational change or marketing solution that reduces the use of natural resource (including material, energy, water and land) and decreases the release of harmful substances across the whole life-cycle" and by different definitions compiled by Carrillo-Hermosilla et al. (2010, p. 1074) who concluded that EIs are related with those activities that reduce environmental impact. The vast majority of relevant studies mentioned focus on the environmental aspect rather than the economic effects that may derive from them (Ghisetti & Pontoni, 2015). Therefore, in this analysis we will refer to "green innovation," "environmental innovation" and EI as synonymous terms.

According to Dong, Wang, Jin, Qiao, and Shi (2014), a typology for EI is needed when conducting research. In the scholarly literature two different ways for categorizing the types of EI have been proposed. The first uses the scheme found in the innovation literature. For example, Rennings (2000) categorized activities into technological, organizational, social and institutional types. Del Río, Carrillo-Hermosilla, and Könnölä (2010) considered whether the environmental benefits arise during the production process or after use, that is, eco-product innovation. Eco-product innovations develop goods and services that are new or significantly improved as regards to their characteristics or intended uses (Triguero et al., 2013). Eco-process innovations develop products and services which cause positive (or less negative) externalities on the

environment compared to alternative production processes (Rennings, 2000). The second way of categorizing EI takes account of the environmental performance. For example, OECD (2011) classified four types of EI: "pollution management," "clean technologies and products," "natural resource management," and "eco-friendly products." The Community Innovation System (Eurostat, 2014), an EU-wide survey on innovation at the firm level, differentiated two main types of EI: innovations with impacts that arise during the production process (EIPROC) and innovations with product related impacts (EIPROD) (Ghisetti & Pontoni, 2015; Horbach, Rammer, & Rennings, 2012).

Although there are various types of EI and each has its own determinants (Damanpour, Walker, & Avellaneda, 2009) previous empirical studies have mostly focused on environmental impacts and factors that predict EI (Demirel & Kesidou, 2011; Ghisetti & Rennings, 2014; Horbach, 2016; Rehfeld, Rennings, & Ziegler, 2007). Little evidence has been collected on the differences in the effect of a given set of EI drivers on each type of EI. For example, Del Río et al. (2010) show that certain environmental policies directed at firms are more effective for process EIs while measures directed at final consumer demand are more suitable for product EIs. Wagner (2007) found that the implementation of environmental management systems (EMSs) is positively associated with eco-process innovation but does not drive eco-product innovation.

On the basis of the previous arguments, the first research hypothesis is proposed:

> **Hypothesis 1.** ***(H1):*** *Eco-product and eco-process innovation are not affected in the same way by the different determinants of EI.*

2.2 | Determinants of eco-innovation

A recent strand of literature has emerged with the purpose of understanding the elements triggering success in EI uptake. Investigating its determinants will be helpful for policy-makers and managers who wish to promote its adoption and diffusion (Ghisetti & Pontoni, 2015) and will reinforce the "double externality" issue (Rennings, 2000).

Various academic works have analyzed the determinants of EI, but they have studied different drivers (Del Río et al., 2016) and applied different methods. Cainelli, Mazzanti, and Zoboli (2008) analyzed the intensity of CO_2, NOx and SOx emissions in the economic growth of 61,219 Italian companies between 2000 and 2004. They found that firms' investments in greener technologies have positive economic results for companies and also for the sector as a whole. The works of Antonioli and Mazzanti (2009) and Cainelli, Mazzanti, and Montresor (2012) are similar. Others authors, using anecdotal evidence or case studies, have found that environmental regulation can motivate firms to innovate (Ghisetti & Rennings, 2014; Porter & Van der Linde, 1995). However, Jaffe and Palmer (1997) argued the opposite, that is, environmental regulation does not affect environmental innovation. So, the effect of environmental regulation on innovation activities depends on the level of study (Kozluk & Zipperer, 2013). Firm-specific factors mean companies start from different places in their environmental innovation activities (Rehfeld et al., 2007), which makes it important to consider firms' age and size as determinants of EI.

Results are limited mainly due to the difficulty of finding appropriate indicators to measure environmental policy in an econometric approach. Among those studies that report econometric results, Demirel and Kesidou (2011) identified several influential factors in stimulating EI, including environmental concern (such as equipment upgrade or ISO14001 certification), command and control instruments (government regulations) and social pressure (cost savings). Triguero et al. (2013) demonstrated that economic incentives influence the decision to adopt or generate EI activities for European firms. They also concluded that different drivers have different effects on product and process EIs, and that collaboration with other market agents, such as research institutes, agencies and universities and customers and suppliers (the demand for green products), have significant positive impacts. Rehfeld et al. (2007), based on an empirical study of the German manufacturing sector, showed that some factors such as environmental concern (e.g., environmental management system, waste disposal or take back systems) have a significant positive effect on EI.

Several authors have proposed that the drivers of EI can be categorized as internal and external (Del Río González, 2009; Horbach, 2008; Testa & Iraldo, 2010). Del Río González (2009) pointed out that internal factors related to the characteristics of the company facilitate their participation in adopting technology that protects the environment. EMSs are an important internal capacity for the company to generate/adopt EI measures continuously (Wagner, 2007), together with training activities for employees (De Marchi, 2012). External factors relate to the incentives and stimuli received from different actors and the factors that put pressure on companies such as interactions with other institutions, the market and social actors (Del Río González, 2009).

Given the range of factors that may influence EI, a recent consensus has emerged on the relevance of a set of elements which jointly stimulate its adoption (Barbieri, Ghisetti, Gilli, Marin, & Nicolli, 2016). Horbach (2008) and Horbach et al. (2012) reported that EI determinants can be grouped into the following four clusters: "market pull," "technology push," "regulatory push/pull," and "firm-specific features." Expectations of future turnover, previous economic performance, consumer pressure, pressure from non-geovernmental organizations (NGOs) and demand for new eco-products are categorized as market pull determinants. Those determinants that belong to technology push are related to research and development (R&D) investment and activities, organizational capabilities and organizational innovation. New (environmental) standards, and existing or future policies inducing (environmental) innovations as well as the economic incentive instruments (subsidies and taxes) are drivers of intercluster labeled regulatory push/pull. Finally, firm-specific features include firm-level factors, such as size, age, sector and location.

Based on the aforementioned work, the drivers of EI studied here have been divided into four main groups: (i) market pull, (ii) technology push, (iii) regulatory push/pull and (iv) firm-specific features. Each group has been differentiated into several subgroups: (i.1) social pressure, (i.2) firm performance, (ii.1) environmental concern, (ii.2) R&D, (ii.3) external network (collaboration), (iii.1) command and control

instruments, (iii.2) economic incentives instruments, (iv.1) firm size and (iv.2) firm age (see Table 1 for an overview).

Although there is a widespread agreement on the groups of drivers, the different empirical studies conducted to date have failed to define the most relevant of them. Based on the reviewed scholarly literature, and more specifically following the classification of EI drivers summarized in Table 1, the following hypotheses are posited:

> **Hypothesis 2.** ***(H2):*** *The effectiveness of the market pull, technology push, regulation stringency and firm-specific factors clusters in stimulating EI is significant but not equal.*

The stimulation of EI is not affected equally by each component of the four main EI determinant clusters (i.e., customer and supplier performance and firm performance as maket pull stimulation factors; collaboration, environmental concern and R&D as technology push stimulation factors; command and control instruments and economic incentives instruments as regulatory stringency; size and age as firm-specific stimulation factors). The following subhypotheses are posited:

> **Hypothesis 2a.** *Customer and supplier performance and firm performance do not affect in the same way to the stimulation of EI.*

> **Hypothesis 2b.** *Collaboration, environmental concern, and R&D do not affect in the same way to the stimulation of EI.*

> **Hypothesis 2c.** *Command and control instruments and economic incentives instruments do not affect in the same way to the stimulation of EI.*

> **Hypothesis 2d.** *Size and age do not affect in the same way to the stimulation of EI.*

3 | META-ANALYSIS (METHOD)

3.1 | Articles included in the study

To select the articles to be reviewed a multiple step procedure (Botella & Gambara, 2006; Field & Gillett, 2010) to construct the database of empirical papers was performed. First, the Web of Science, Scopus and Google Scholar databases were searched using a set of relevant keywords. The main keywords were: "eco-innovation," "ecoinnovation," "environmental innovation," "green innovation," "sustainable innovation," "determinants" and "drivers." We allowed for keywords to appear either in the abstract, title, keywords or the text (in all fields) of the articles. Data collection was limited to before January 2017, so any paper published after this date was not included in the sample; at this stage 347 works were selected.

For the second step we adopted additional criteria to include studies as part of the sample: (i) working papers were also included and (ii) only studies published in English were taken into account.

The third step in selection consisted of carefully reading the abstracts and (when necessary) the papers to exclude from the selection: (i) those papers that were not devoted to the analysis of the determinants of EI specified in Table 1; (ii) those studies that did not provide adequate statistical data to codify or calculate the effect size (i.e., correlation coefficients between the variables or the required data to obtain them using conversion methods (Borenstein,

TABLE 1 Several eco-innovation determinants grouped into four main clusters

Market pull variables	
Customer and supplier performance	• New demand for eco-products (Rehfeld et al., 2007) • Customer benefits (Kammerer, 2009) • Suppliers (Cainelli et al., 2012; Horbach, 2008; Lin, Tan, & Geng, 2013)
Firm performance	• Turnover expectation • Past economic performances (Horbach, 2008) • Cost-savings (Bohas & Poussing, 2016; Demirel & Kesidou, 2011; Triguero et al., 2013)
Technology push variables	
Collaboration	• Cooperation (Horbach, 2008) • Number of cooperation
Environmental concern	• Organizational innovation and schemes (Rennings, Ziegler, Ankele, & Hoffmann 2006; Wagner, 2008, Rehfeld et al., 2007) • Training • Resource commitment • Equipment upgrade • Awareness
R&D	• Engagement in R&D (Ghisetti & Pontoni, 2015) • Knowledge capital endowment (Horbach, 2008)
Regulatory stringency	
Command and control instruments	• Environmental regulation • Regulatory pressure (Bonzanini-Bossle, Dutra de Barcellos, Marques-Vieira, & Sauvée 2016; Dong et al., 2014; Li, 2014; Rehfeld et al., 2007)
Economic incentives instruments	• Subsidies, taxes • Public support to firms innovation, national subsidies, EU subsidies (Ghisetti & Quatraro, 2013; Kunapatarawong & Martínez-Ros, 2016)
Firm-specific factors	
Size	Rehfeld et al. (2007)
Age	Rehfeld et al. (2007)

Source: Own elaboration.

Hedges, Higgins, & Rothstein, 2009; Peterson & Brown, 2005) following Lipsey and Wilson (2000) who suggest that a study is included in a meta-analysis if it provides the correlation coefficients between the analyzed variables or sufficient statistical information that allows the calculation or estimation of the effect size; and (iii) those papers with an empirical analysis of EI determinants but were not centered at the micro level. After excluding studies that did not match these criteria, the references of the remaining articles were checked, to ensure that no relevant studies had been missed (Field & Gillett, 2010), but it was found that all the relevant studies had been included in the sample (Ghisetti & Pontoni, 2015). This led us to a final sample of 37 empirical papers and 39 models/samples, shown in Table 2

TABLE 2 Papers included in the study

				Type of EI		Cluster of EI drivers			
					EIPROC	m	t	f	r
N	(Authors, year)	obs	Geographic scope	EIPROD		1 C&SP 2 FP	1 EC 2 R&D 3 Net	1 Size 2 Age	1 CCI 2 EEI
1	(Bossle et al., 2016)	581	Brazil			1	1		1
2	(Amores-Salvadó et al., 2014)	157	Spain	$X^{m,t,f}$		2	1	1	
3	(Berrone et al., 2013)	326	United States			1	2	1	1
4	(Cai & Zhou, 2014)	1266	China			1	3		
5	(Cainelli et al., 2015)	4,829	Spain				2	1	
6	(Cheng, Yang, & Sheu, 2014)	121	Taiwan	$X^{m,f}$		2		2	
7	(Demirel & Kesidou, 2011)	289	UK		$X^{m,t,f,r}$	2	1	1	2
8	(Dong et al., 2014)	245	China	$X^{m,t,r}$	X^{f}	2	1	1	1
9	(Ghisetti & Quatraro, 2013)	456	Italy		$X^{t,r}$		2		2
10	(Ghisetti & Rennings, 2014)	1,063	Germany		$X^{m,t,f,r}$	2	2	1	
11	(Ghisetti et al., 2015)	14,366	EU countries			2	2		2
12	(Hojnik & Ruzzier, 2016)	223	Slovenia		$X^{m,t,r}$	1	1		1
13	(Jackson, Gopalakrishna-Remani, Mishra, & Napier, 2016)-sample 1	152	United States	$X^{m,t}$		2	1		
14	(Jackson et al., 2016)- Sample 2	300	United States	$X^{m,t}$		2	1		
15	(Jakobsen & Clausen, 2016)	2,949	Norway			1	3		
16	(Kunapatarawong & Martínez-Ros, 2016)	5,135	Spain			1		1	2
17	(Lee & Min, 2015)	1842	Japan			2	2	1	
18	(Li, 2014)	148	China			1	1		1
19	(Lin, Zeng, Ma, Qi, & Tam, 2014)	791	China	$X^{m,t,f,r}$		1	1	1	1
20	(Lin et al., 2013)	208	Vietnam	$X^{m,t}$		2	1		
21	(Ezzi & Jarboui, 2016)	96	Tunisia		$X^{m,t,f}$	2	2	2	
22	(Marzucchi & Montresor, 2017)	4,729	Spain	$X^{m,t,r}$	X^{f}	1	2	1	2
23	(Sáez-Martínez et al., 2016, 2016)	212	Spain				2	1	
24	(Antonioli, Mancinelli, & Mazzanti, 2013)	555	Italy				3		
25	(Askildsen, Jirjahn, & Smith, 2006)	1978	Germany		$X^{t,f}$		1	1	
26	(Brouhle, Graham, & Harrington, 2013)	5,588	United States			1	2	1	1
27	(Horbach, 2008)	753	Germany	$X^{m,t,f,r}$		2	2	2	2
28	(Wagner, 2007)	342	Germany		X^{t}		1	1	
29	(Horbach, 2016)	121,395	EU countries	$X^{m,t,f,r}$		2	1	1	2
30	(Triguero et al., 2013)	4,947	EU countries	$X^{m,t,f,r}$		1	3	1	1
31	(Bohas & Poussing, 2016)	815	Luxembourg		$X^{m,t}$	2	1		
32	(Bönte & Dienes, 2013)	15,268	EU countries			1	2	1	
33	(De Marchi, 2012)	6,047	Spain			1	2	1	2
34	(Hammar & Löfgren, 2010)	477	Sweden		$X^{m,t,f}$	2	2	1	
35	(Kammerer, 2009)	92	Germany	$X^{m,t,f,r}$		1	1	1	1
36	(Rehfeld et al., 2007)	371	Germany	$X^{m,t,f,r}$		1	2	1	1
37	(Garcia-Pozo, Gémar, & Sevilla-Sevilla, 2016)-Sample 1	8,646	Spain			1	3	1	2
38	(Garcia-Pozo et al., 2016)-Sample 2	3,301	Spain			1	3	1	2
39	(Leoncini, Montresor, & Rentocchini, 2016)	185	Italy		$X^{m,t,f,r}$	1	1	2	1

EIPROD: product eco-innovation, EIPROC: process eco-innovation, m: market pull, t: techno push, f: firm-specific factor, r: regulation push/pull, C&SP: customer & supplier performance, FP: financial performance, EC: environmental performance, R&D: research and development, Net: network, collaboration, CCI: command and control instruments, EII: economic incentives instruments.

Source: Own elaboration.

3.2 | Method

Because different empirical studies included in the sample use an assortment of data sources, model specifications and variables, the results reported by those studies that comprise the sample are diverse. So the aim of this meta-analytic study[1] is to give meaning and interpret the causes of the diversity of the results (Borenstein et al., 2009) and look for values of the moderator variables analyzed, that is, EI measurement and EI determinants, for which we attempt to find more homogeneous results (Botella & Sánchez-Meca, 2015).

Therefore it is helpful to use a technique that systematically reviews empirical findings on a specific subject. A meta-analysis, by reviewing previous studies in a systematic and structured way and aggregating the results of various studies, makes it possible to summarize and quantify the commonalities and the differences identified (Van Vliet et al., 2016) providing additional evidence that could not be obtained from an individual study (Stanley & Doucouliagos, 2012). Meta-analytic studies are based on one of two statistical models, a fixed effects model and a random effects model (Borenstein et al., 2009; Botella & Sánchez-Meca, 2015; Hedges & Vevea, 1998; Hunter & Schmidt, 2000). In the fixed effects model, the set of papers included in the sample are considered to try to estimate the same size effect (here the correlation coefficient) and the observed variability is due to the sampling error. By contrast, in the random effects model, two sources of the observed variability are considered: (1) sampling error and (2) the meta-analysis design (here different ways of measuring the drivers of EI). A set of subgroups are then found, in which the value of the effect size differs. As the associations between the adoption or generation of EI and the determinants of EI are not homogeneous in different circumstances, this paper adopts a random effects model.

In a meta-analytic study the effect size measures the magnitude of the relationship between two variables (Lipsey & Wilson, 2000). In this study, the correlation coefficient represents an approximation to the degree of connection between EI adoption or generation and its determinants. The literature on techniques of meta-analysis allows the researcher to choose among various options. Here we follow the technique of Hedges and Olkin[2] by following a multistep procedure to perform the meta-analysis, as described below.

First, the weighted average correlation coefficient of the relation between EI and its different drivers was calculated transforming the correlation coefficients into a normalized metric, that is, Fisher's *Zr* (Field & Gillett, 2010)—calculated by the following expression:

$$z_{r_i} = \frac{1}{2}\log_e\left(\frac{1+r_i}{1-r_i}\right) \tag{1}$$

where r_i is the correlation coefficient between EI and its different drivers found in study *i*. Second, the weighted mean ($\overline{z_r}$) was calculated using the transformed effect:

$$\overline{z_r} = \frac{\sum_{i=1}^{K} w_i z_{r_i}}{\sum_{i=1}^{K} w_i} \tag{2}$$

where *K* is the total number of studies included in the metaanalysis and w_i the weight value of each study. Third, to compute the appropriate confidence interval (CI) at the 95% confidence level $\overline{z_r}$ and standard deviation SE($\overline{z_r}$) are used:

$$CI = \lfloor \overline{z_r} - 1.96SE(\overline{z_r}); \overline{z_r} + 1.96SE(\overline{z_r}) \rfloor \tag{3}$$

Fourth, Fisher's *Zr* values (average effect and CI) are converted back into correlation coefficients using the following expression:

$$\bar{r} = \frac{e^{2\bar{z}} - 1}{e^{2\bar{z}} + 1} \tag{4}$$

To analyze the homogeneity of empirical correlations two different statistics can be used: (i) Cochram's *Q*, which indicates heterogeneity[3] or homogeneity and is calculated from

$$Q = \sum_{i=1}^{K} w_i (z_{r_i} - \overline{z_r}) \tag{5}$$

or (ii) Higgins' I^2 which measures in percentage terms the degree of heterogeneity using the expression

$$I^2 = \frac{Q - (K-1)}{Q} \tag{6}$$

As shown in Table 2 the papers included in the study are heterogeneous. All of them report at least the relationship between one EI determinant and EI adoption or generation at the firm level and some papers specify that relationship with one type of EI, eco-product or eco-process. In our analysis, two moderator variables were considered. The aim of the first moderator is to study whether the EI determinants show a significant difference with respect to the overall EI adoption or generation when differentiating types of EIs: eco-product and eco-process. The second moderator aims to analyze whether the way of classifying factors of EI moderates the relationship between these factors and the generation or adoption of EI actions in companies, differentiating the four clusters of EI determinants defined previously. In addition, the full sample has been divided into different subsamples and the above described meta-analytic approach is then applied to each subsample to study the possible differences in the effectiveness on EI among groups identified.

Articles included in the sample have been coded in the following way: distinguishing characteristics of the geographic scope, data period, types of EI and focused on a cluster of determinants of EI, that is, "market-pull," "technology-push," firm-specific factors" and "regulation."

Most selected studies did provide correlation coefficients as the effect size metric for the meta-analysis. In addition, statistics from

[1]Various web forums/blogs exist for reference on how to do a meta-analysis: http://meta-analysis.ning.com/; http://www.um.es/metaanalysis/presentation.php; https://www.meta-analysis.com/index.php?cart=BSAG1007350; http://mason.gmu.edu/~dwilsonb/ma.html

[2]This method has been widely used in numerous meta-analytic studies related to the environmental and business area (Byron & Post, 2016; Field, 2005; Van Essen, van Oosterhout, & Carney, 2012; Wagner, Block, Miller, Schwens, & Xi, 2015).

[3]Under the hypothesis of homogeneity the statistic *Q* follows Pearson distribution with *K* − 1 degrees of freedom. If the calculated value of the statistic exceeds the value in tables for the significance level set, the hypothesis of homogeneity is rejected. This statistic is considered to have little statistical power for small sample sizes ($k < 30$; Sanchez-Meca & Marín-Martínez, 1997).

regression analyses were coded. Some regressions reported standardized regression coefficients (β) which were transformed into correlation coefficients following the recommendation of Peterson and Brown (2005), as $r = \beta + .05\lambda$ where λ is an indicator variable that equals 1 when β is non-negative and 0 when β is negative. Also, logit and probit regression coefficients were used after being transformed into correlation coefficients. When an empirical study provided more than one size effect (i.e., correlation coefficient) the average correlation was computed, following the approach adopted by Hunter and Schmidt (2000).

4 | RESULTS

The results obtained are reported in Table 3.

First, all the predictors have a positive and significant relationship with the adoption of EI. In particular, at a more aggregate level, the strongest positive effects are obtained for the "technology push" and the "market pull" clusters of EI determinants, which have mean correlation coefficients $\bar{r} = 0.3532$ and $\bar{r} = 0.2337$, respectively. This shows that the determinants of the "market pull" and the "technology push" clusters are positively connected with EI activities at the firm level. The significance of the relationship is tested by studying the effect size CI, that is, that the confidence intervals do not include zero: [0.3112; 0.3939] and [0.1890; 0.2775] for "technology push" and "market pull," respectively. Therefore the reported effects are significant. These results provide support for Hypothesis 2, implying that the effectiveness of the "market pull," "technology push," "regulation stringency" and "firm-specific factors" clusters in stimulating EI are significant but not equal.

To test the robustness of the findings, both Q and I^2 statistics are reported. The value of the Q statistic indicates that the results reported are not homogeneous for the four clusters of EI determinants. The I^2 statistic indicates that the observed positive relationship of each cluster of EI determinants and EI adoption is heterogeneous, and the introduction of moderating variables should be considered to reduce the variability. The value of the Rosenthal fail-safe is between 2,153 (firm-specific factor cluster) and 72,777 (technology push cluster), which indicates that the number of unpublished papers required to make the observed effect size negligible is very large and the presence of any publication bias is unlikely.

Table 3 also reports the information to test the other research hypotheses (H1 and H2a, H2b, H2c and H2d). H1 predicts that eco-product and eco-process innovation are not affected in the same way by the different EI determinants. The estimated values are higher for eco-product innovation in each EI determinant cluster than for eco-process innovation. Moreover, for eco-product innovation the four effect sizes are significant. The same is not true for eco-process innovation. Although the four clusters have a positive influence, only market pull- and technology push-related drivers are significant because their confidence intervals do not include the value zero ([0.0978; 0.3337] and [0.0238; 0.3164] for technology push and market pull respectively). This finding indicates that regulation, market pull and technology push factors have a positive effect on both EI types and, particularly, higher positive effectiveness on eco-product innovation. This provides empirical evidence that different types of EIs act as

TABLE 3 Meta-analysis for the relationship between determinants of EI and EI adoption at firm level

	N	K	TE(r^2)	−95% CI	+95% CI	Q-test	*p*-value	I^2	Rosenthal fail-safe N
EI—market pull	202,872	33	**0.2337**	0.1890	0.2775	2.116.26	0.00	98.4879	13,684
Customer and supplier performance	60,593	18	0.1959	0.1291	0.2609	712.67	0.00	97.6146	
Firm performance	142,279	15	0.2866	0.2140	0.3561	1.134.34	0.00	98.7658	
EIPROD—market pull	134,261	13	0.3728	0.2733	0.4644	877.43	0.00	98.6324	
EIPROC—market pull	3,148	7	0.1739	0.0238	0.3164	152.37	0.00	96.0622	
EI—techno push	205,988	37	**0.3532**	0.3112	0.3939	2.553.44	0.00	98.5901	72,777
Environmental concern	127,901	16	**0.4259**	0.3456	0.5000	359.23	0.00	95.8244	
R&D	56,423	15	0.2335	0.1421	0.3209	944.26	0.00	98.5174	
Network (collaboration)	21,664	6	**0.4546**	0.3303	0.5633	1.230.01	0.00	99.5935	
EIPROD—techno push	134,140	12	0.4197	0.3218	0.5088	927.66	0.00	98.8142	
EIPROC—techno push	5,924	10	0.2189	0.0978	0.3337	154.74	0.00	94.1840	
EI—regulation	178,614	21	**0.1635**	0.1202	0.2063	850.31	0.00	97.6479	9,209
CCI	13,497	11	0.2251	0.1627	0.2858	154.10	0.00	93.5108	
EII	165,117	10	0.1084	0.0480	0.1681	605.21	0.00	98.5129	
EIPROD—regulation	133,323	8	0.1825	0.1004	0.2621	193.04	0.00	96.3738	
EIPROC—regulation	1,153	4	**0.1025**	−0.0227	0.2247	109.24	0.00	97.2538	
EI—firm-specific factors	189,225	27	0.0650	0.0269	0.1029	926.55	0.00	97.1939	2,153
Size	188,070	23	0.0672	0.0266	0.1075	919.77	0.00	97.6081	
Age	1,155	4	**0.0470**	−0.0686	0.1614	6.76	0.08	55.6280	
EIPROD—firm-specific factors	128,627	8	0.1070	0.0178	0.1945	142.79	0.00	95.0977	
EIPROC—firm-specific factors	9,404	9	0.0538	−0.0300	0.1368	146.22	0.00	94.5288	

N: no. of observations, *K*: no. of effect sizes, TE: mean effect size (correlation coefficient), −95% CI and +95% CI: limits of the mean size confidence interval, *Q*-test: homogeneity test; I^2: the ratio of the study variance due to heterogeneity.

Source: Own elaboration.

a moderator in the main relationship for each cluster of EI determinants. Therefore, H1 would be accepted considering the mentioned evidence.

At a more disaggregated level, H2a, H2b, H2c and H2d predict that each subgroup of "market pull," "technology push," "regulation stringency" and "firm-specific factors" differs in its effect on stimulating EI. The two subgroups of "technology push,", that is, cluster network ($\bar{r} = 0.4546$) and environmental concern ($\bar{r} = 0.4259$) show the highest significant effect on EI adoption at the firm level with a 95% CI of [0.3303; 0.5633] and [0.3456; 0.500] respectively. The relationship between the subgroups of market pull, technology push and regulation, that is, firm performance ($\bar{r} = 0.2866$), R&D ($\bar{r} = 0.2335$) and command and control instruments ($\bar{r} = 0.2251$) also have positive and significant correlation with EI adoption. Finally, although both subgroups of the firm-specific factors have a small but positive effect on EI adoption, for the subgroup age the relationship is not significant ($\bar{r} = 0.047$, with a 95%CI of [−0.0686; 0.1614]). These findings suggest that different subgroups act as a moderator in the main relationship for each cluster of EI determinants, which provide support for H2a, H2b, H2c and H2d.

5 | DISCUSSION AND CONCLUDING REMARKS

Previous empirical studies of the scholarly literature have analyzed the relationship between the determinants that influence the uptake of EI, but have produced no conclusive evidence. Very diverse concepts, determinants and approaches have been used to try to shed light on the topic. To fill this gap, this article has identified the main clusters of determinants of EI and examined their implications for the adoption of green innovations.

The main results of the meta-analysis contribute to the existing literature as follows. First, a positive and significant correlation has been demonstrated between the four clusters of determinants of EI identified in the literature and the generation or adoption of the underlying innovation activities. More specifically, the findings show that the "market pull" and "technology push" clusters are more likely to produce EI than the other clusters. Second, at a more disaggregated level, those subgroups of "technology push" cluster, namely firms' networks and environmental concern, are identified as the group of drivers with more influence on innovation incorporating environmental benefits at the firm level. Third, when the sample differentiates the two main typologies of EI (EIPROD and EIPROC), a positive and significant correlation is found between the "technology push" and "market pull" clusters of determinants. That positive correlation is higher for the innovations that develop goods and services that are new or significantly improved or which cause less negative environmental impact (EIPROD) than with process innovations aimed to reduce negative externalities on the environment (EIPROC). Fourth, the above-mentioned results are based on cross-country firm-level empirical findings.

This paper has several implications for firms, scholars and public policy-makers. On the one hand, regarding the applicability of the empirical findings, this study confirms the finding of Sáez-Martínez, Díaz-García, and González-Moreno (2016, 2016) who argued that firms should consider the effect of their technological trajectory on EI, as the "technology push" determinant is, in general terms, the most highly correlated with EI adoption. On the other hand, from the scholars' perspective, the present study contributes to the literature as it reviews and sheds light on whether and the extent to which the determinants of a firm's EI have an effect in stimulating EI. This study shows that those firms with collaborative networks with other market players such as universities, research institutes and public agencies are more likely to engage in EI. Managers should consider the possibility of using these networking options to develop their strategy to foster the environmental innovation in their companies. Finally, public decision-makers and policy-makers should promote the creation of these networks among firms and other market players, that is, universities, governments and consumers. Also, as Triguero et al. (2013) suggested, governments should support different measures related to the adoption of international reference standards for EMSs such as EMAS or ISO14001.

In relation to environmental regulatory influences, neither economic incentives, such as access to subsidies and fiscal incentives, nor command and control instruments seem to enhance EI as much as "technology push" determinants, which is line with the results reported by Triguero et al. (2013) and Horbach (2016).

This analysis suffers from a set of conventional limitations common to most meta-analytic studies. This methodology only studies the association between the variables—here the correlation coefficient between factors and the generation or adoption of EI activities—without being able to study causality. A second limitation is due to the number of studies available considering the criteria for inclusion and exclusion. Finally, another potential limitation is the lack of analysis of other relevant driving factors considered in scholarly articles excluded from the review. Nevertheless, the risk for this bias is small because of the reviewing procedure, where additional main scholarly works were sought by cross-checking the reference lists of the selected works.

The results and the potential limitations of this work provide directions for further research in this area. First, at the firm level, the review and analysis of the impact of more detailed and/or qualitative determinants for EI would help to integrate the scattered and inconclusive results described in the literature. Second, further moderating effects should be examined, such as the time-period effect. Third, future research could analyze the relationship between EI determinants and EI adoption by implementing a metaregression analysis approach, which might provide additional and complementary empirical evidence.

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5.5 ARTICLE 5: ISO 14001, EMAS and environmental performance: a Meta-Analysis.

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RESEARCH ARTICLE

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ISO 14001, EMAS and environmental performance: A meta-analysis

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Abstract

The adoption of voluntary environmental certifications such as ISO 14001 and Eco-Management and Audit Scheme (EMAS) has gained momentum in the last two decades. The scholarly literature has analyzed in depth the performance implications of the adoption of these certificates. Yet the findings are scattered and inconclusive. This article aims to shed light on this issue by meta-analyzing the influence of the adoption of voluntary environmental certifications on corporate environmental performance, drawing on a sample of 53 scholarly studies analyzing a total of 182,926 companies. The findings show a positive influence of ISO 14001 and EMAS certifications on corporate environmental performance. A set of underlying moderating effects are also identified, such as a more pronounced positive effect for adoptions based on environmental innovation and for firms with a more mature certification. Implications for scholars, managers, and other stakeholders are discussed.

KEYWORDS

EMAS, environmental management systems, environmental performance, ISO 14001, meta-analysis, voluntary environmental certification

1 | INTRODUCTION

In the last two decades, the dissemination of voluntary environmental certifiable reference standards to implement environmental management systems (EMSs) has gained momentum. These standards specify sets of internal organizational environmental practices and a system for third-party audits to certify the commitment to the standard's requirements, but no performance levels (Boiral, 2011; Chiarini, 2017; Delmas, 2002; Iatridis & Kesidou, 2018; King, Lenox, & Terlaak, 2005). The ISO 14001 voluntary environmental certifiable standard is the main reference model (Boiral, Heras-Saizarbitoria, & Testa, 2017; Daddi, Testa, Frey, & Iraldo, 2016) and has been adopted by more than 360,000 organizations worldwide (ISO, 2018). Other alternative reference standards also proliferated (Granly & Welo, 2014; Heras & Arana, 2010), in particular the Eco-Management and Audit Scheme (EMAS) promoted by the European Commission and mainly disseminated in the European Union (Iraldo, Testa, & Frey, 2009; Testa et al., 2014).

Despite the popularity of ISO 14001 and EMAS, the impact of these voluntary certifiable standards is still widely debated by scholars

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and practitioners. As underlined by Boiral, Guillaumie, Heras-Saizarbitoria, and Tayo Tene (2018), although the impact of these standards has been the object of many empirical studies, the proliferation of these studies, often with scattered and contradictory findings, does not necessarily lead to a better understanding of the subject. As a result, there is a gap in the scholarly literature, and accordingly, there is also a gap of knowledge in two relevant fields for the dissemination of these standards, namely, the practitioner field (Haider, 2016) and the public decision maker fields (Testa, Heras-Saizarbitoria, Daddi, Boiral, & Iraldo, 2016). Although recent literature works have reviewed the impact outcomes of the two main voluntary certifiable standards, namely, ISO 14001 (Boiral et al., 2018; Sartor, Orzes, Touboulic, Culot, & Nassimbeni, 2019) and EMAS (Heras-Saizarbitoria, Saez Vegas, & Artaraz, 2014), these studies have led to contradictory results and have not adopted a meta-analytical perspective. A meta-analysis can help to give a more structured, developed, and comprehensive view of the main findings reported in the scholarly literature (Borenstein, Higgins, & Rothstein, 2009; Botella-Ausina & Sánchez-Meca, 2015). Meta-analyses review previous studies in a systematic and structured way and aggregate the results of various studies, making it possible to summarize and quantify the commonalities and the differences identified (Van Vliet et al., 2016). Furthermore, meta-analyses provide additional evidence that could not be obtained from an individual study (Stanley & Doucouliagos, 2012).

Considering the gap in the literature, this article sheds more light on this issue by providing a meta-analysis of the influence of the adoption of voluntary environmental certifications on corporate environmental performance (CEP). A meta-analysis, in contrast to a literature review, consists a systematic quantitative analysis of empirical research, which uses both objective criteria for the selection of articles and statistical tools, and identifies a systematic pattern across studies (Stanley & Doucouliagos, 2012). The specific research question may be summarized as follows: What has the empirical scholarly literature concluded on the linkage between voluntary environmental certifications (e.g., ISO 14001 and EMAS) and CEP from a quantitative systematic analysis perspective?

This paper contributes to the literature in at least four ways. First, for the first time in the literature, additional quantitative evidence is provided based on a meta-analysis of the impact on voluntary environmental certifications on CEP. Second, as the reviewed empirical studies use a very diverse data sources, methodological specifications, and variables, this heterogeneity is overcome by systematically reviewing and structurally analyzing the literature. Third, the study is focused on the integrative analysis of the performance of the two main standards, namely, ISO 14001 and EMAS, and with very few exceptions (Morrow & Rondinelli, 2002; Neugebauer, 2012; Testa et al., 2014), the outcomes of these standards have been studies separately. Fourth, a set of suggestions for further scholarly research and a discussion relevant for the practitioner and public decision maker fields are provided.

The remainder of the article is structured as follows. In Section 2, the literature review and the hypotheses to be analyzed are defined. In Section 3, the methods of the meta-analysis are explained. In Section 4, the main findings of the meta-analysis are summarized. In Section 5, the findings are discussed, and the main concluding remarks are presented.

2 | LITERATURE REVIEW

In their recent systematic review of 94 scholarly articles focused on the adoption of ISO 14001, Boiral et al. (2018) evidenced the following main outcomes of this standard (Boiral et al., 2018; p. 417):

- environmental management outcomes (rigor and effectiveness of practices, regulatory compliance, documentation control, greening of supply chain, performance monitoring, etc.),
- environmental indicators (environmental performance in general, air pollution, waste minimization and management, environmental risks and safety issues, energy and resource consumption, water contamination, etc.), and
- environmental awareness and social aspects (image and stakeholder relationships, employee involvement, employee training and knowledge, managers' involvement, etc.).

Boiral et al. (2018) found that although ISO 14001 is designed to improve the environmental management practices of organizations, around 20% of the papers analyzed mainly focus on its socioeconomic rather than environmental outcomes. Similarly, the papers that focused on environmental outcomes were found to be very heterogeneous. Among the main outcomes, the following five were identified (Boiral et al., 2018): “Rigor and effectiveness of practices” (21% of the articles); “Waste minimization and management” (20%); “Air pollution” (17%); “Environmental performance in general” (15%); and “Regulatory compliance” (15%). This review showed that outcomes related specifically—“Waste minimization and management” and “Air pollution”—and in more general terms—“Environmental performance in general”—to CEP, where outcomes that were considered most frequently. Whatever the focus for of measuring CEP, Boiral et al. (2018) found that in the majority of the cases, the relationship between the adoption of ISO 14001 and the environmental performance was positive. This positive relationship was also reported in the review by Sartor et al. (2019) for ISO 14001 and by Heras-Saizarbitoria et al. (2014) and Tourais and Videira (2016) in their reviews for the case of EMAS. Therefore, based on the empirical consideration found in the scholarly literature, the following general hypothesis (H1) is suggested:

H1. *The overall relationship between the firm's EMS certification (e.g., ISO 14001 and EMAS) and improved CEP is positive.*

Despite the general positive impact of EMS certification on improved CEP, the review by Boiral et al. (2018) also demonstrated a lack of consensus about the relationship between EMS certification and improved CEP, depending on the way CEP was

measured. For example, these authors showed that 84% of the articles focused on "Waste minimization and management" outcomes, 63% focused on "Air pollution," outcomes and 71% focused on "Environmental performance in general" proposed a positive relationship. Therefore, the following hypothesis (H2) relating to the moderation relation between certified EMS and CEP is suggested:

H2. *The influence of the firm's EMS certification (e.g., ISO 14001 and EMAS) on improved CEP is moderated by the type of CEP measurement (i.e., resource efficiency and emissions).*

ISO 14001 and EMAS are the two main international certifiable standards to adopt EMSs. As it is underlined in the literature (Iraldo et al., 2009; Merli & Preziosi, 2018; Morrow & Rondinelli, 2002; Testa et al., 2014), these standards have a quite similar structure and adoption process, but there are also important differences. For instance, EMAS is seen as more demanding than ISO 14001.

Testa et al. (2014) state that EMAS sets more stringent requirements on external communication as certified organizations have to publish annually an externally validated, annual environmental statement, including key environmental objectives and performance indicators and other relevant information about their EMS. Similarly, Neugebauer (2012) pointed out that EMAS requirements go beyond those of ISO 14001 because, among other things, certified firms are required to continuously improve their environmental performance under EMAS and to publish an environmental statement or report to demonstrate this improvement, whereas ISO 14001 only requires continuous improvement of the EMS without any publication requirements.

As stated, the outcomes of ISO 14001 and EMAS standards have been extensively analyzed, but they have normally been studied separately (e.g., Heras-Saizarbitoria, Arana, & Boiral, 2016; Iraldo et al., 2009; Neugebauer, 2012; Rennings, Ziegler, Ankele, & Hoffmann, 2006). A notable exception is the work by Testa et al. (2014), which sheds light on the different effect of ISO 14001 and EMAS on environmental performance by analyzing the CO_2 emissions of 229 energy-intensive plants in Italy. The adoption of ISO 14001 seems to be accompanied by greater improvements in environmental performance in the short term compared with the long term, whereas the impact of EMAS seems to be more associated to long-term outcomes. Therefore, drawing on the limited evidences from the empirical literature and the theoretical analysis of the content and requirements of ISO 14001 and EMAS, the following hypothesis (H3) is proposed:

H3. *The influence of the firm's EMS certification (e.g., ISO 14001 and EMAS) on improved CEP is moderated by the international reference standard adopted (either EMAS or ISO 14001).*

In their review of the literature, Boiral et al. (2018) and Sartor et al. (2019) found that the scholarly works focused on the outcomes of ISO 14001 are largely based on quantitative studies (i.e., surveys). For example, 74% of the reviewed works used this type of method (Boiral et al., 2018). Furthermore, these authors found that 81% of the reviewed papers aimed to analyze the environmental impact of ISO 14001 were based on perceptions (i.e., opinions of the respondents), and only 14% of the papers were based on external rating. External rating used databases such as Toxin Releases Inventory of the American Environmental Protection Agency or the National Pollutant Release Inventory provided by the Canadian Government.

Most of the findings in the literature relied on perceptions, in particular the opinions of environmental managers on their own professional activity. As the scholarly literature on the adoption of EMSs reports (Aravind & Christmann, 2011; Darnall, Jolley, & Handfield, 2008; Demirel, Iatridis, & Kesidou, 2018; Dogui, Boiral, & Heras-Saizarbitoria, 2014; Iraldo et al., 2009), these perceptions might be influenced by a social desirability bias or a self-reporting bias (Arnold & Feldman, 1981). This issue could also affect the impact of the adoption of EMSs based on voluntary certifiable standards, but this issue has not been addressed yet by the scholarly empirical literature. In order to shed light on this issue and based on the previous considerations of the literature, the following hypothesis (H4) is proposed:

H4. *The influence of the firm's EMS certification (e.g., ISO 14001 and EMAS) on improved CEP is moderated by the source of CEP measurement (external rating agent or firm's disclosure).*

The impact of both the maturity and the level of internalization of the EMS on the relationship of the certified EMS with CEP has been also analyzed in the literature. Empirical works (e.g., Daddi, Magistrelli, Frey, & Iraldo, 2011; Inoue, Arimura, & Nakano, 2013; Iraldo et al., 2009; Testa et al., 2014) revealed positive effects of the length of time since the first certification of the EMS on CEP. As pointed out by Inoue et al. (2013), firms having more experience with certified EMS are more likely to find opportunities for environmental improvement. However, some studies also led to contrasting conclusions. For instance, Zobel (2013) performed a comparison between improvement in CEP over a 6-year period prior to an ISO 14001 certification and the corresponding improvement for uncertified firms but did not find any statistical differences in terms of CEP between the ISO 14001 certified and noncertified firms. Similarly, Hertin, Berkhout, Wagner, and Tyteca (2008) revealed no consistent and significant positive evidence of a better performance among the certified firms compared with the noncertified ones. Then, the following hypothesis (H5) is posited:

H5. *The influence of the firm's EMS certification (e.g., ISO 14001 and EMAS) on improved CEP is moderated by the maturity (i.e., experience of use) of certified EMS.*

Similarly, according to the scholarly literature (e.g., Boiral, 2011; Boiral et al., 2018; Castka & Prajogo, 2013; Heras-Saizarbitoria & Boiral, 2013; Iatridis & Kesidou, 2018; Qi, Zeng, Li, & Tam, 2012;

Testa, Boiral, & Iraldo, 2018), the level of internalization of the EMS influences the relationship between EMS certification and improved CEP. Overall, it has been suggested that the more the organizational uses the EMS in the daily practices—that is, the more substantial the adoption of the EMS—the more positive the influence of the certified EMS on CEP. For example, Florida and Davison (2001) suggested that firms with a deeper EMS adoption showed a better performance for the reduction of community environmental risks. Additionally, Kawai, Strange, and Zucchella (2018) found that a proactive approach to environmental management led firms to better identify potential sources of improvement for CEP. This type of effect has also been found for other meta-standards such as ISO 9001 (e.g., Allur, Heras-Saizarbitoria, & Casadesus, 2014; Bello-Pintado, Heras-Saizarbitoria, & Merino-Díaz-de-Cerio, 2018; Heras-Saizarbitoria & Boiral, 2015; Tari, Heras-Saizarbitoria, & Pereira, 2013). Then, the following hypothesis (H6) is proposed:

H6. *The influence of the firm's EMS certification (e.g., ISO 14001 and EMAS) on improved CEP is moderated by the level of internalization of the certified EMS.*

3 | METHODS

3.1 | Data collection

In order to select the articles to be reviewed, a multiple step procedure (Botella & Gambara, 2006; Field & Gillett, 2010) to construct the database of empirical papers was performed. In the first step, the Web of Science, Scopus, and Google Scholar databases were searched using a set of relevant keywords. The main keywords were: "environmental management system," "EMS," "EMAS," "ISO 14001," "ISO 14000," and "environmental performance." We allowed for keywords to appear either in the abstract, title, keywords, or the text (in all fields) of the articles. Data collection was limited to before March 2019, so any paper published after this date was not included in the sample.

In the second step, we filtered the sample against a set of several inclusion/exclusion criteria. First, to be included as part of the sample, a study was required to be published in English. Second, we included studies that provided enough statistical data (i.e., correlation coefficients between the variables) or the required data to obtain them using conversion methods (Borenstein et al., 2009; Peterson & Brown, 2005). However, we excluded event studies due to their fundamentally different methodology (Endrikat, Guenther, & Hoppe, 2014). Third, we excluded papers involving an empirical analysis that did not report the relationship between the variables of interest for the present study (i.e., voluntary environmental certifications and CEP). Finally, the references of the remaining articles were checked to ensure that no relevant studies had been missed (Field & Gillett, 2010), but it was found that all the relevant studies had already been included in the sample (Ghisetti & Pontoni, 2015). By applying these criteria, we yielded a final sample of 53 empirical studies analyzing 182,926 companies, from which we calculated a total of 59 effect sizes (K = 59).

3.2 | Data analysis

Because different empirical studies used a diverse data sources, model specifications, and variables, the results reported are diverse. Therefore, it is helpful to use a technique that systematically reviews empirical findings on a specific subject.

This study has applied meta-analysis as its main research method. The term meta-analysis was proposed and defined by Glass (1976) as "the statistical analysis of a large number of empirical study results in order to integrate the findings presented." It is similar to a type of survey research in which the subjects surveyed consist of previous empirical works that require a careful coding process for extracting the relevant information (Lipsey & Wilson, 2001) to be converted into a common metric called effect size that allows for its integration and quantitative comparison (Botella-Ausina & Sánchez-Meca, 2015).

Meta-analysis is therefore considered as a statistical method that allows to integrate previous empirical research whose object of research is common and to summarize and quantify the evidence gathered in these empirical studies (Lipsey & Wilson, 2001).

The statistical methods applied in empirical studies are analogous to those used in meta-analyses. In empirical studies, means, standard deviations, and correlation coefficients of the subjects under study are published, along with variance analyses or multiple regressions. Similarly, meta-analytical studies report the mean values and estimated standard deviations of the considered effect size and are complemented as in the present study with a variance analysis, which evaluates the moderating capacity of different variables and allows to explain the heterogeneity of empirical study results (Borenstein et al., 2009; Botella-Ausina & Sánchez-Meca, 2015; Lipsey & Wilson, 2001; Schmidt & Hunter, 2014).

Meta-analytic studies are based on one of two statistical models, namely, a fixed effects model and a random effects model (Borenstein et al., 2009; Botella-Ausina & Sánchez-Meca, 2015; Hedges & Vevea, 1998; Hunter & Schmidt, 2000). In the fixed effects model, the set of papers included in the sample are considered in order to try to estimate the same size effect (the correlation coefficient in this case), and the observed variability is due to the sampling error. On the other hand, in the random effects model, two sources of the variability observed are considered: (a) sampling error and (b) the meta-analysis design (i.e., EMS type, different ways of measuring CEP, and EMS certification's maturity). A set of subgroups are then found, in which the value of the effect size differs. As the associations between EMS adoption and environmental performance are not homogeneous in different circumstances, this paper adopts a random effects model.

In a meta-analytic study, the effect size measures the magnitude of the relationship between two variables (Lipsey & Wilson, 2001). In this study, the correlation coefficient represents an approximation of the degree of connection between EMS adoption and firm's environmental performance. The technique of Hedges and Olkin meta-analysis (HOMA; 1990) is applied by following a multistep procedure to perform the meta-analysis, as described below. We employed Comprehensive Meta-Analysis software (version 3.3.070) for the analysis.

Most meta-analysts do not perform syntheses on the correlation coefficient itself because the variance depends strongly on the correlation. Rather, the correlation is converted to the Fisher's scale, and all analyses are performed using the transformed values. The results, such as the summary effect and its confidence interval, would then be converted back to correlations for presentation

First, the weighted average correlation coefficient of the relation between EMS adoption and the firm's environmental performance is calculated by transforming the correlation coefficients into a normalized metric—that is, Fisher's *Zr* (Field & Gillett, 2010)—calculated by the following expression Equation (1):

$$z_{r_i} = \frac{1}{2}\log_e\left(\frac{1+r_i}{1-r_i}\right) \quad (1)$$

where r_i is the correlation coefficient between EMS adoption and the firm's environmental performance found in study *i* of the sample. Our study did not perform syntheses of the correlation coefficient itself because the variance is highly dependent on the correlation (Borenstein et al., 2009).

Second, the weighted mean ($\bar{Z}_r$) was calculated using the transformed effect Equation (2):

$$\bar{z_r} = \frac{\sum_{i=1}^{K} w_i z_{r_i}}{\sum_{i=1}^{K} w_i} \quad (2)$$

where *K* is the total number of studies included in the meta-analysis and$w_i$the weight value of each study.

Third, in order to compute the appropriate confidence interval (CI) at 95% confidence level, $\bar{Z}_r$and standard deviation $SE\ (\bar{z_r})$ were used Equation (3):

$$CI = \lfloor \bar{z_r} - 1.96SE(\bar{z_r}); \bar{z_r} + 1.96SE(\bar{z_r}) \rfloor \quad (3)$$

Fourth, Fisher's *Zr* values (average effect and CI) were converted back into correlation coefficients using the following expression Equation (4):

$$\bar{r} = \frac{e^{2\bar{z}} - 1}{e^{2\bar{z}} + 1} \quad (4)$$

In order to analyze the homogeneity of empirical correlations, two different statistics can be used: (a) Cochran's *Q* that indicates heterogeneity[1] or homogeneity was calculated by Equation (5):

$$Q = \sum_{i=1}^{K} w_i (z_{r_i} - \bar{z_r}) \quad (5)$$

or (b) Higgins' I^2 (Higgins & Thompson, 2002) that measures in percentage the degree of heterogeneity using the expression of Equation (6). Higher values indicate a greater likelihood of moderators.

$$I^2 = \frac{Q-(K-1)}{Q} \quad (6)$$

In order to evaluate the moderating influence of moderator variables, we carried out a *Z* test (Busch & Friede, 2018; O'Boyle, Pollack, & Rutherford, 2012; Wagner, Block, Miller, Schwens, & Xi, 2015) based on statistical methods described in Borenstein et al. (2009) and Lipsey and Wilson (2001). If the different subgroups are statistically different, we can affirm that this variable moderates the relationship and explains part of the variability of the results, and we can estimate an efficient effect size for each value of the moderating variable.

As shown in Table A1, the papers included in the study are heterogeneous. All of them report at least the relationship between EMS adoption and the firm's environmental performance, and some papers specify the relationship for one of the two main EMS standards (ISO 14001 or EMAS). In our analysis, as stated in the hypotheses, a set of moderating variables were considered. The aim of the first moderator is to evaluate whether the type of performance analyzed in the CEP may moderate the relationship. Considering the works included in Table A1, the type of analyzed CEP where categorized as follows: (a) resource utilization efficiency, (b) emissions, and (c) environmental innovations. The second moderator intends to study whether different EMS types (ISO 14001 or EMAS) show significant difference with respect to the overall environmental performance. The third moderator aims to explore whether the way CEP is measured moderates the relationship between CEP and EMS certification by distinguishing two measurement approaches: self-reported and externally reported. The fourth and fifth moderators analyze the impact of the maturity and the internalization of the EMS, respectively. Finally, we controlled for journal quality standards using a binary variable that takes the value of 0 if the paper is published in a journal with an *h*-factor lower than the median of the *h*-factor of all the sample and 1 otherwise.

Most selected studies did provide correlation coefficients as the effect size metric for the meta-analysis. In addition, statistics from regression analyses were coded. Some regressions reported standardized regression coefficients (β) that were transformed into correlation coefficients following the recommendation of Peterson and Brown

[1]Under the hypothesis of homogeneity, the statistic *Q* follows a Pearson distribution with *K*-1 degrees of freedom. If the calculated value of the statistic exceeds the value in the table for the significance level set, the hypothesis of homogeneity is rejected. This statistic is considered to have little statistical power for small sample sizes ($k < 30$; Sánchez-Meca & Marín-Martínez, 1997).

TABLE 1 Results of the meta-analysis

	N	K	$SE(\bar{r})$	SD	−95% CI	+95% CI	Z value	p value	Q test	p value	I^2	Z test	p
(H1) Direct effect													
Impact of EMS certification on CEP	182,926	59	.2598	0.3109	0.2072	0.3109	9.3659	.0000	6.063.99	.00	99.03		
Moderating effects													
(H3) EMS type													
ISO 14001	145,123	43	.2574	0.0347	0.1894	0.3229	7.2119	.0000	5.525.04	.00	99.2217	RC	
EMAS	33,216	8	.1570	0.0783	0.0036	0.3032	2.0059	.0449	73.86	.00	90.5221	−1.17	.2411
(H4) CEP measurement (source)													
External agent rating	74,890	15	.2656	0.0540	0.1597	0.3654	4.8033	.0000	2.333.33	.00	99.4000	RC	
Firm's disclosure	108,166	44	.2591	0.0332	0.1941	0.3218	7.5832	.0000	3.170.56	.00	98.6438	−0.10	.9185
(H2) CEP measurement (type)													
Resource utilization efficiency & emissions	37,692	9	.1380	0.0742	−0.0074	0.2777	1.8614	.0627	62.63	.00	87.2270	RC	
Resource utilization efficiency	97,998	21	.2919	0.0529	0.1882	0.3891	5.3520	.0000	2.801.24	.00	99.2860	1.69	.0912
Emissions	7,834	8	.3008	0.0778	0.1484	0.4393	3.7807	.0002	610.67	.00	98.8537	1.52	.1297
Environmental innovation	32,757	10	.3045	0.0674	0.1724	0.4258	4.3930	.0000	541.25	.00	98.3372	1.66	.0966
(H5) EMS qualification													
Certified EMS/Not certified	179,305	46	.2340	0.0307	0.1739	0.2924	7.4472	.0000	5.685.65	.00	99.2085	RC	
Certified EMS/Maturity	2,840	9	.2145	0.0686	0.0801	0.3412	3.1026	.0019	90.16	.00	91.1273	−0.26	.7947
(H6) EMS implementation level													
Certified EMS/Level of implementation	781	4	.5850	0.0777	0.4326	0.7048	6.3466	.0000	76.06	.00	96.0557	1,01	.3104
Journal impact													
Below average impact journals	75.139	20	.2876	0.0454	0.1986	0.3720	6.1259	.0000	1.651.35	.00	98.8494	RC	
Above average impact journals	107.787	39	.2447	0.0348	0.1765	0.3106	6.8579	.0000	3.513.45	.00	98.9184	−0.75	.4530

Note. Developed by the authors based on the analyzed data. This table provides the results of the meta-analytic study. *N* is the total sample size; *K* is the number of effect sizes; *SE*(*r*) shows the mean effect size. All effect sizes were variance weighted. Significance is based on a *z* test; −95% CI and + 95% CI are the limits of the mean size effect confidence intervals; *Q*-stat is the homogeneity test; and finally, I^2-stat shows the ratio of the study variance due to heterogeneity. *Z* test contrasts whether differences between subgroups are statistically significant. Source: Own elaboration.

(2005), as $r = \beta + 0.5\lambda$ where λ is an indicator variable that equals 1 when β is nonnegative and 0 when β is negative. Logit and probit regression coefficients were also used after being transformed into correlation coefficients. When an empirical study provided more than one size effect (i.e., correlation coefficient), the average correlation was computed, following the approach adopted by Schmidt and Hunter (2014).

4 | RESULTS

Table 1 provides the HOMA method results that evaluate the EMS-improved CEP relationship.

H1 states that the effect of the firm's EMS certification on its improved environmental performance is positive. The estimated direct effect is positive ($\bar{r}$ = .26, p < .01) and significant as the CI does not include zero [0.21, 0.311]. The observed results imply that the effect of the firm's EMS certification over its environmental performance is positive. Therefore, H1 cannot be rejected.

We evaluated the heterogeneity of the results analyzing the statistics Q test and I^2 indicating that the observed direct results are not homogeneous. The variability of the results is due to the existence of moderating variables for which the observed direct effect varies.

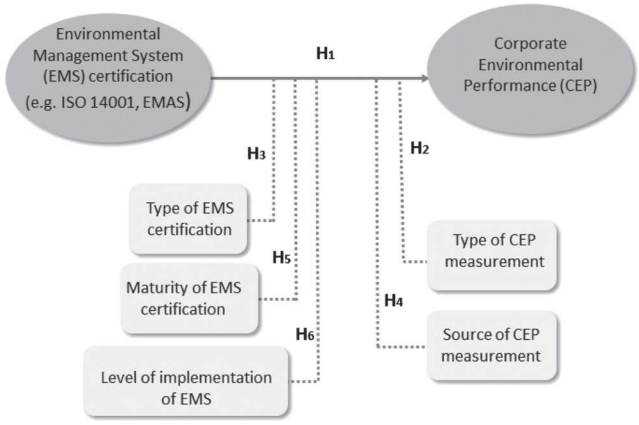
We performed a double method to test for potential publication bias in the HOMA analyses. This method consists of two tests: (a) The value of the Rosenthal fail-safe is 36.257, which indicates that the number of unpublished papers required to make the observed effect size nonsignificant is very large, and the presence of any publication bias is unlikely. (b) For robustness purposes, a funnel plot (see Figure 1) including Duval and Tweedie's (2000a, 2000b) trim and fill was provided to further test for the existence of a publication bias (Figure 2).

The funnel plot based on Duval and Tweedie's (2000a, 2000b) trim and fill illustrated the possible missing studies. The funnel is not symmetrical, and the trim and fill sensitivity analysis concludes that seven studies should have been included, with positive results that do not change direction of the results. In addition, the magnitude of the estimated association is somewhat stronger ($\bar{r}$ = .3; CI [0.23, 0.36]).

Table 1 also contains data to test moderate variables analyzed in H2, H3, H4, H5, and H6 research hypotheses.

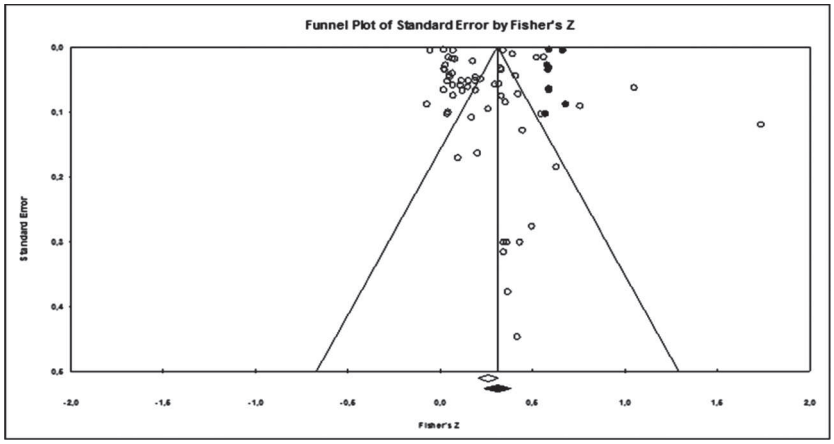
H2 distinguishes the overall effect depending on the CEP's output type. The estimated effect size associated with environmental innovation ($\bar{r}$ = .305, p < .01) is higher than the one observed for resources utilization efficiency ($\bar{r}$ = .292, p < .01) and waste emissions limitation ($\bar{r}$ = .3, p < .01). The z test confirms that the results observed for the environmental innovation approach (z = 1.66; p < .1) are significantly different from the results observed for the emission control approach (z = 1.69; p < .1) but not for the resource utilization efficiency (z = 1.52; p = .12). These results demonstrate the moderating role of CEP strategical approach, providing support for H2.

H3 determines that the environmental performance is different between the firms certified by EMAS or by ISO 14001. The results show that the effect estimated for environmental performance of ISO 14001 certified firms ($\bar{r}$ = .26, p < .01) ($\bar{r} = 0.258, , p < 0.01$) is greater than the coefficient estimated for the firms certified by EMAS ($\bar{r}$ = .16, p < .5). Both results are significant, as the associated CIs do not include zero (i.e., [0.19, 0.32] and [0.01, 0.3],



Source: Developed by the authors.

FIGURE 1 Hypotheses being tested. Source: Developed by the authors



Source: Developed by the authors based on the analyzed data. Note: This figure shows a plot of the study size measures (standard error) as a function of effect size (Fisher´s Z). Open circles are original data and the solid circles represents the suspected missing studies.

FIGURE 2 Funnel plot of standardized error by Fisher's Z including Duval and Tweedie's trim and fill. Source: Developed by the authors based on the analyzed data. Note that this figure shows a plot of the study size measures (standard error) as a function of effect size (Fisher's Z). Open circles are original data, and the solid circles represent the suspected missing studies

respectively). In spite of this, the meta-analytic findings do not indicate a significant difference between ISO 14001 and EMAS (z = −1.17; p = .24).

This finding related to the relationship between EMAS certification and CEP should be interpreted with some caution because the number of effect sizes is relatively small. Nevertheless, small number of effect sizes is in line with other meta-analyses (Endrikat et al., 2014) and should not seriously affect the estimation results (Geyskens, Steenkamp, & Kumar, 2006).

H4 states that the effects of the firm's EMS certification on improved CEP are different if CEP is measured by an external rating agent rather than the firm's own disclosure. The HOMA results reveal that both measurement types of effect size are positive and significant: external agent measurement ($\bar{r}$ = .27, p < .01) and firm's disclosure measurement ($\bar{r}$ = .26, p < .01). However, the meta-analytic results in this case do not suggest a significant difference between external rating agent and the firm's own disclosure (z = −0.10; p = .91). Our earlier proposition that the type of measurement of improved CEP may moderate EMS certification/CEP relationship is therefore not supported.

H5 determines the EMS certification maturity's positive effect on improved CEP. The results indicate that the maturity does not bring any additional benefits to the improvement of the CEP. As a result, H5 is rejected.

H6 states that the EMS's level of implementation has positive effects on improved CEP. The results confirm that studies evaluating the level of implementation of EMS ($\bar{r}$ = .58, p < .01) show greater influence on the CEP than studies only assessing if the firm is certified or not ($\bar{r}$ = .23, p < .01). Furthermore, a z test indicates that the two subgroups are statistically different (z = 4.2; p < .01), providing support for H6.

Robustness checks were conducted to assess the reliability of the results, and we controlled for the journal quality or reputation standard, that is, whether journals with higher impact report different effect on the relationship between EMS and CEP. A journal's quality was measured by a binary variable that takes the value of 0 if the primary paper was published in a journal with an h-factor lower than the median of the h-factor of all the sample and 1 otherwise.

The results show that journal quality does not moderate the relationship between EMS certification and CEP. Studies published in a journal with an impact below average have greater influence ($\bar{r}$ = .288, p < .01) than studies published in a journal with an impact above average ($\bar{r}$ = .2447, p < .01). However, a z test indicates that the two subgroups are not statistically different (z = −.75; p = .45).

5 | DISCUSSION AND CONCLUSIONS

Based on a meta-analysis of 53 scholarly studies analyzing 182,873 companies in total, this article found a positive influence of ISO 14001 and EMAS certifications on CEP. Furthermore, the meta-analytic findings do not evidence a significant difference between ISO 14001 and EMAS. Regarding the relationship between the adoption of certifiable EMSs and CEP, the meta-analytic results do not support any significant differences between the outcomes of the studies based on external rating agent and the firm's own disclosure (i.e., information provided by the perceptions of the managers involved in the very process of adoption). Similarly, no significant moderation effect was found regarding EMS certification maturity (i.e., the number of years since the first EMS certification). Conversely, the meta-analysis confirmed the importance of the measurement of the internalization or level of implementation of the certified EMS on the relationship between EMS certification and improved CEP.

This paper contributes to the literature in four ways. First, new quantitative evidence is provided regarding the impact of voluntary environmental certifications on CEP based on a meta-analysis. Overall, the findings are in line with the dominant empirical literature with regard to the positive impacts of EMS on environmental performance (Boiral et al., 2018). Second, methodological specifications and variables used in the studies analyzed are reviewed and discussed. The findings confirm the heterogeneous effects of EMS depending on the CEP indicators measured and highlight the positive influence of certification on environmental innovation. Third, the study is focused on an integrative analysis of the performance of both ISO 14001 and EMAS, the two main certifiable standards on environmental management. The absence of any significant difference between the effects of ISO 14001 and EMAS on environmental performance may appear surprising, given the more stringent requirements of the EMAS standard (Neugebauer, 2012; Testa et al., 2014). Nevertheless, the implementation of the EMAS standard tends to be driven by external pressures and government incentives. As emphasized by the neo-institutional approach to certifiable standards, those pressures are conducive to symbolic and superficial rather than substantial adoption of an EMS. It seems reasonable to assume that such symbolic adoption tends to reduce the potential positive impacts of the more demanding requirements of the EMAS standard. Fourth, suggestions for further scholarly research, and a discussion of implications for practitioners and public decision makers, are provided.

The findings of this study also have important implications for managers, public decision makers, and other stakeholders concerned with the implications for CEP of ISO 14001, EMAS, and other voluntary certifiable standards for EMS. Considering the limitations of the present study and related findings in the literature, managers should be wary about taking for granted the benefits on CEP improvement of ISO 14001 and EMAS. As underlined in the scholarly literature (Boiral, 2011; Testa et al., 2014; Heras-Saizarbitoria et al., 2016; Boiral et al., 2018), such positive impacts are not automatic and mostly rely on various interrelated factors such as the drivers and internalization of the EMS. Given that the adoption of ISO 14001 and EMAS continues to be promoted by public administrators worldwide (for the case of the EU and EMAS, please see, for example, Testa et al., 2016), public decision makers should reconsider these policies by analyzing the real impact of these schemes on the improvement of CEP, as already suggested in the literature (Heras-Saizarbitoria, Dogui, & Boiral, 2013; Lannelongue & González-Benito, 2012).

The work has the conventional limitations of most meta-analytical studies underlined in the literature (Murphy, 2017; Walker, Hernandez, & Kattan, 2008), including incomplete selection of articles, inclusion of studies lacking the adequate validity, presence of articles with small sample, heterogeneity of methods used, and insufficient number of studies in some of the subgroups analyzed. Other limitations related to epistemological reasons may also lead to erroneous inferences and conclusions.

Another limitation is related to the design of the meta-analysis. For example, the selection of the moderating variables that could affect the relationship between the adoption of certified EMS and CEP has been made based on the main evidences of the literature, but a subjective bias in that selection should not been discarded. Future studies should consider the relevance of other moderating and mediating variables, such as the short-term, medium-term, and long-term effects of the adoption of EMS on CEP.

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APPENDIX A

TABLE A1 Overview of the studies included in the meta-analysis

Study name	Sample size	Number of *r*'s reported	No. of Art.	CEP measure	EMS type	EMS measure	CEP orientation[a]	Journal	Country
Agan, Acar, and Borodin (2013)	500	1	40 A	Self-reported	EMS	Certified/Not certified	1	*Journal of Cleaner Production*	Turkey
Amran, Periasamy, and Zulkafli (2014)	111	1	61	Self-reported	EMS	Certified/Not certified	Blank	*Sustainable Development*	Asia Pacific
Aravind (2012)	192	1	48 A	Self-reported	ISO 14001	Experience with EMS	0	*Journal of Engineering and Technology Management*	United States
Aravind and Christmann (2011)	72	1	24	Externally reported	ISO 14001	Certified/Not certified	2	*Business Ethics Quarterly*	United States
Arimura, Hibiki, and Katayama (2008)	792	1	69	Self-reported	ISO 14001	Certified/Not certified	1	*Journal of Environmental Economics and Management*	Japan
Arimura, Darnall, and Katayama (2011)	945	1	70	Self-reported	ISO 14001	Certified/Not certified	1	*Journal of Environmental Economics and Management*	Japan
Babakri, Bennett, Rao, and Franchetti (2004)	177	1	78	Self-reported	ISO 14001	Experience with EMS	1	*Journal of Cleaner Production*	United States
Barla (2007)	37	1	62	Externally reported	ISO 14001	Certified/Not certified	2	*Journal of Environmental Economics and Management*	Canada
Biscotti, D'Amico, and Monge (2018)	264	1	87	Externally reported	EMAS	Certified/Not certified	3	*Journal of Knowledge Management*	Europe
Boiral and Henri (2012)	303	1	6	Self-reported	ISO 14001	Certified/Not certified	0	*Journal of Environmental Management*	Canada
Cheng, Hu, and Zhou (2019)	253	1	81	Self-reported	EMS	Proficiency with EMS	3	*Journal of Cleaner Production*	
Daddi et al. (2016)	242	1	88 A	Externally reported	EMAS	Experience with EMS	3	*Journal of Environmental Management*	Europe
Demirel and Kesidou (2011)	289	1	28	Self-reported	ISO 14001	Certified/Not certified	1	*Ecological Economics*	United Kingdom
Franchetti (2011)	121	8	71 A	Self-reported	ISO 14001	Certified/Not certified	1	*Journal of Cleaner Production*	United States
Graafland (2018)	3,633	1	26	Self-reported	ISO 14001	Certified/Not certified	1	*Journal of Cleaner Production*	Europe
Gusmerotti, Testa, Amirante, and Frey (2012)	2,832	1	68	Externally reported	EMS	Certified/Not certified	0	*Journal of Cleaner Production*	Global
He and Shen (2017)	7,670	1	34 A	Self-reported	ISO 14001	Certified/Not certified	1	*Journal of Business Ethics*	China
He, Yang, and Choi (2018)	812	1	47 A	Self-reported	ISO 14001		Blank	*Journal of Business Ethics*	China

(Continues)

TABLE A1 (Continued)

Study name	Sample size	Number of r's reported	No. of Art.	CEP measure	EMS type	EMS measure	CEP orientation[a]	Journal	Country
						Certified/Not certified			
Heras-Saizarbitoria, Boiral, and Arana (2016)	361	1	90 A	Self-reported	EMAS	Experience with EMS	0	*Journal of Cleaner Production*	Spain
Heras-Saizarbitoria et al. (2016)	1,217	1	89 A	Self-reported	EMAS	Experience with EMS	0	*Business Strategy and the Environment*	Spain
Hrovatin, Dolšak, and Zorić (2016)	848	1	65	Self-reported	ISO 14001	Certified/Not certified	3	*Journal of Cleaner Production*	Slovenia
Iraldo et al. (2009)	101	1	91 A	Externally reported	EMAS	Experience with EMS	0	*Journal of Cleaner Production*	EU
Kawai et al. (2018)	123	1	82	Self-reported	EMS	Proficiency with EMS	3	*International Business Review*	United States and Europe
King et al. (2005)	46,052	1	7	Self-reported	ISO 14001	Certified/Not certified	1	*Academy of Management Journal*	United States
Kumar and Shetty (2018)	140	1	31	Self-reported	ISO 14001	Certified/Not certified	Blank	*Ecological Economics*	India
Leoncini, Montresor, and Rentocchini (2016)	185	1	105	Self-reported	EMS	Certified/Not certified	2	*Research Policy*	Italy
Li et al. (2017)	29,794	1	29 A	Externally reported	ISO 14001	Certified/Not certified	3	*Journal of Cleaner Production*	China
Li, Zhao, Zhang, Chen, and Cao (2018)	407	1	35 A	Self-reported	ISO 14001	Certified/Not certified	3	*Journal of Cleaner Production*	China
Link and Naveh (2006)	40	1	50 A	Self-reported	ISO 14001	Experience with EMS	Blank	*IEEE Transactions on Engineering Management*	Israel
Long and Lin (2018)	310	1	94 A	Self-reported	EMS	Proficiency with EMS	Blank	*Nankai Business Review International*	China
Luan, Tien, and Chen (2016)	599	1	32	Externally reported	ISO 14001	Certified/Not certified	Blank	*Asia Pacific Management Review*	Taiwan
Melnyk, Sroufe, and Calantone (2003)	911	1	76	Self-reported	ISO 14001	Certified/Not certified	1	*Journal of Operations Management*	United States
Miroshnychenko, Barontini, and Testa (2017)	3,490	1	39 A	Externally reported	ISO 14001	Certified/Not certified	Blank	*Journal of Cleaner Production*	Global
Montobbio and Solito (2018)	30,439	1	102	Externally reported	EMAS	Certified/Not certified	0	*Business Strategy and the Environment*	Europe
Nishitani, Kaneko, Fujii, and Komatsu (2012)	2,705	1	73	Externally reported	ISO 14001	Certified/Not certified	2	*Journal of Environmental Management*	Japan

(Continues)

TABLE A1 (Continued)

Study name	Sample size	Number of r's reported	No. of Art.	CEP measure	EMS type	EMS measure	CEP orientation[a]	Journal	Country
Ozusaglam, Kesidou, and Wong (2018)	36,445	1	30	Self-reported	ISO 14001	Certified/Not certified	1	*International Journal of Production Economics*	Europe
Pons, Bikfalvi, Llach, and Palcic (2013)	180	1	64 A	Self-reported	ISO 14001	Certified/Not certified	1	*Journal of Cleaner Production*	Europe
Potoski and Prakash (2005)	3,709	1	18	Externally reported	ISO 14001	Certified/Not certified	2	*Journal of Policy Analysis and Management*	United States
Prajogo, Tang, and A.,, and Lai, K. (2014)	286	1	95	Externally reported	ISO 14001	Experience with EMS	0	*International Journal of Operations & Production Management*	Australia
Prasad and Mishra (2017)	456	1	77	Self-reported	ISO 14001	Certified/Not certified	2	*Energy Policy*	India
Rehfeld, Rennings, and Ziegler (2007)	371	1	11	Self-reported	EMS	Certified/Not certified	3	*Ecological Economics*	Germany
Russo (2009)	530	1	19	Self-reported	ISO 14001	Certified/Not certified	2	*Business Strategy and the Environment*	United States
Scarpellini, Marín-Vinuesa, Portillo-Tarragona, and Moneva (2018)	87	1	101	Self-reported	EMS	Certified/Not certified	3	*Journal of Cleaner Production*	Spain
Simpson (2012)	220	1	27	Self-reported	ISO 14001	Certified/Not certified	1	*Journal of Cleaner Production*	United States
Singh, Brueckner, and Padhy (2015)	63	1	20	Self-reported	ISO 14001	Certified/Not certified	1	*Journal of Cleaner Production*	India
Teixeira, Jabbour, de Sousa Jabbour, Latan, and de Oliveira (2016)	95	1	53	Self-reported	ISO 14001	Proficiency with EMS	Blank	*Journal of Cleaner Production*	Brazil
Testa et al. (2014)	229	1	15	Self-reported	ISO 14001	Certified/Not certified	2	*Journal of Cleaner Production*	Italy
Testa, Iraldo, and Daddi (2018)	224	1	83 A	Externally reported	EMAS	Certified/Not certified	Blank	*Organization & Environment*	EU
Vílchez (2017)	1,961	1	46	Self-reported	ISO 14001	Certified/Not certified	0	*European Research on Management and Business Economics*	Global
Yin and Schmeidler (2009)	456	1	45	Self-reported	ISO 14001	Certified/Not certified	Blank	*Business Strategy and the Environment*	United States
Zhang, Lai, Wang, and Wang (2018)	96	1	66	Externally reported	ISO 14001	Certified/Not certified	2	*Resources, Conservation & Recycling*	China
Ziegler and Nogareda (2009)	368	2	67 B	Self-reported	ISO 14001/ EMAS	Certified/Not certified	Blank	*Research Policy*	Germany

Note. Developed by the authors based on the reviewed studies.

[a]0, resource utilization efficiency & emissions; 1, resource utilization efficiency; 2, emissions; 3, environmental innovation.

PART III

6. Conclusions

In this last section of the dissertation the main conclusions of each study are presented. The first study concludes that there is a mixed, contradictory and often vexing evidence about the convergence of corporate governance (CG) measures and corporate social responsibility (CSR) practices. Those studies addressing a positive connection between these concepts are in line with the stakeholder theory proposals (Freeman, 1984), and more specifically with its instrumental dimension (Jones, 1995), which considers CSR issues as a fundamental orientation to meet the needs of different social and economic agents linked to the company´s activity, and thus orientate the firms' strategy towards corporate sustainability. However, this study also identifies some articles addressing a negative (Bai, 2013; Haniffa & Cooke, 2005; Kassinis & Vafeas, 2002; Rodríguez-Ariza, Aceituno, & Rubio, 2014) or non-significant connection between CG mechanisms and a firm's CSR orientation (Beiner, Drobetz, Schmid, & Zimmermann, 2006; Cheung, Jiang, Limpaphayom, & Lu, 2010; Kaczmarek, Kimino, & Pye, 2012). Thus, further research aggregating through meta-analytical techniques (Borenstein et al, 2009) is required to ascertain the global relationship. This has been done in some of the following chapters.

In fact, the second study finds, through a meta-analytical perspective that firms' board independence is positively connected to firms' social and environmental performance. This conclusion is in line with stakeholder theory, which predicts that more independent boards are more likely to consider social and environmental issues, rather than only focusing on financial criteria (Ayuso & Argandoña, 2009; Freeman, 1984). Furthermore, countries' governance systems moderate the aforementioned relationship. In fact, the positive effect of board independence on corporate social and environmental performance is more positive and greater in those firms within codified law countries. This can be explained because these countries (mostly prevalent in continental Europe) present a stakeholder orientation are often show a higher commitment to develop mechanisms aimed at protecting firms' stakeholders´ interests (Kock & Min, 2016). This study also concludes that the financial crisis, which occurred at

the end of the first decade of this century, did not changed independent directors ability to strengthen firms' social and environmental focus.

The third study of this dissertation mainly concludes that firms' board size positively influence corporate social performance. Furthermore, this effect is of greater magnitude when other CG mechanisms are implemented by the enterprises (Aguilera & Desender, 2012; Rediker & Seth, 1995; Yoshikawa, Zhu, & Wang, 2014). Specifically, those companies exhibiting larger and more independent boards exhibit higher levels of corporate social performance. This study also finds that countries' legal systems and shareholder protection mechanisms moderate and determine the influence of board size on the commitment of the company to corporate social performance. All of these findings are in accordance with prior theorizations on companies' management, such as that provided by instrumental stakeholder theory (Jones, 1995).

The fourth study concludes that there are four main clusters of factors that determine companies' willingness to engage with eco-innovation initiatives. Interestingly, those factors related with organizational and strategic structure of the company are those that mostly influence the adoption of eco-innovation practices by the companies. Finally, the last study concludes that the implementation of an environmental management system (EMS) fosters companies' environmental performance. Moreover, it is worth to mention that firms' EMS internationalization enhances the aforementioned connection. This study also concludes that there is a heterogeneous effect of EMS on different measures of corporate environmental performance, and highlights the positive influence of certification on environmental innovation. This enhances the relevance of implementing environmentally proactive strategies and governance structures as necessary instruments to guide corporations towards more sustainable business models.

7. Conclusiones

En esta última parte de la tesis se presentan las principales conclusiones de cada estudio. El primer estudio concluye que existe una evidencia mixta, contradictoria y a menudo desconcertante sobre la incidencia de las medidas de gobierno corporativo (GC) sobre las prácticas de responsabilidad social corporativa (RSC). Los estudios que abordan una conexión positiva entre estos conceptos están en línea con la propuesta teórica de los stakeholders (Freeman, 1984) y, más concretamente, con su dimensión instrumental (Jones, 1995), que considera la RSC como una orientación estratégica que posibilita satisfacer las necesidades de los diferentes agentes sociales y económicos vinculados a la actividad de la empresa. Sin embargo, este estudio también identifica algunos artículos que abordan una relación negativa (Bai, 2013; Haniffa & Cooke, 2005; Kassinis & Vafeas, 2002; Rodríguez-Ariza, Aceituno, & Rubio, 2014) o no significativa entre los mecanismos de GC y la orientación hacia RSC de una empresa (Beiner, Drobetz, Schmid, & Zimmermann, 2006; Cheung, Jiang, Limpaphayom, & Lu, 2010; Kaczmarek, Kimino, & Pye, 2012). Por lo tanto, es necesario profundizar en la investigación empírica, a través de técnicas meta-analíticas (Borenstein et al, 2009) para poder determinar el signo y magnitud la relación global. Esto se ha hecho en algunos de los siguientes capítulos.

De hecho, el segundo estudio concluye, a través de una perspectiva meta-analítica, que la independencia de los consejos está conectada positivamente con su desempeño social y medioambiental. Esta conclusión está en línea con la teoría de los stakeholders, que predice que es más probable que los consejos de administración más independientes consideren cuestiones sociales y ambientales, en lugar de centrarse únicamente en criterios financieros (Ayuso & Argandoña, 2009; Freeman, 1984). Además, los sistemas legales y de gobierno de los países moderan la relación antes mencionada. De hecho, el efecto positivo de la independencia de los consejos de administración sobre el desempeño social y ambiental de las empresas es más positivo y mayor en los consejos de los países con sistemas legales civiles o codificados. Esto puede explicarse porque estos países (la mayoría de los cuales se encuentran en la Europa continental) presentan una orientación hacia sus stakeholders y a menudo

muestran un mayor compromiso con el desarrollo de mecanismos destinados a proteger los intereses de los stakeholders (Kock & Min, 2016). Este estudio también concluye que la crisis financiera, que ocurrió a finales de la primera década de este siglo, no cambió la capacidad de los directores independientes para fortalecer el enfoque social y ambiental de las empresas.

El tercer estudio de esta tesis concluye principalmente que el tamaño del consejo de administración de las empresas influye positivamente en el desempeño social de las mismas. Además, este efecto es de mayor magnitud cuando las empresas implementan otros mecanismos de GC (Aguilera & Desender, 2012; Rediker & Seth, 1995; Yoshikawa, Zhu, & Wang, 2014). Específicamente, aquellas compañías que presentan consejos de administración de mayor tamaño y con mayor grado de independencia exhiben niveles más altos de desempeño social corporativo. Este estudio también encuentra, que los sistemas legales de los países y los mecanismos de protección al accionista moderan y determinan la influencia del tamaño del consejo de administración en el compromiso de la empresa con el desempeño social. Todos estos hallazgos están en la línea con las teorías sobre la gestión de las empresas mencionadas previamente, como la que proporciona la teoría instrumental de los stakeholders.

El cuarto estudio concluye que existen cuatro grupos principales de factores que determinan la voluntad de las empresas de participar en iniciativas de eco-innovación. Curiosamente, los factores relacionados con la estructura organizativa y estratégica de la empresa son los que más influyen en la adopción de prácticas de eco-innovación por parte de las empresas. Finalmente, el último estudio concluye que la implementación de un sistema de gestión medioambiental (EMS en inglés) fomenta el desempeño medioambiental de las empresas. Por otra parte, cabe destacar que el grado de compromiso y el grado de desarrollo de las empresas con los EMS refuerza la conexión antes mencionada. Este estudio también concluye que existe un efecto heterogéneo del EMS ante diferentes formas de medir el desempeño medioambiental corporativo, y destaca la influencia positiva de la certificación en la innovación ambiental. Esto aumenta la importancia de implementar estrategias ambientalmente proactivas y estructuras de buen gobierno corporativo como instrumentos necesarios para guiar a las empresas hacia modelos de negocio más sostenibles.

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