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With regard to the publication:

“Women in top echelon positions and their effects on sustainability: a review, synthesis and future research agenda”, published in Journal of Management and Governance (2021), doi: 10.1007/s10997-021-09604-7

Mariasole Bannò, Emilia Filippi and Sandro Trento

DECLARE

under their personal responsibility that the article is the outcome of their common considerations. Specifically:

“1 Introduction” is attributable to Mariasole Bannò and Sandro Trento

“2 Literature review methodology” is attributable to Mariasole Bannò

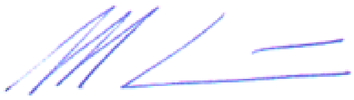
“3 Results of the review” is attributable to Emilia Filippi
“3.1 Methodological and empirical issues” is attributable to Emilia Filippi
“3.2 Thematic results” is attributable to Emilia Filippi

“4 Women in top echelon positions” is attributable to Mariasole Bannò

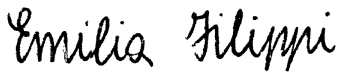
“5 Concluding remarks” is attributable to Mariasole Bannò and Sandro Trento
“5.1 Managerial and policy implications” is attributable to Mariasole Bannò and Sandro Trento
“5.2 Future research agenda” is attributable to Mariasole Bannò and Sandro Trento

Trento and Brescia, 10th October 2022

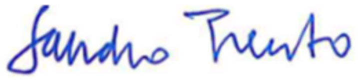
Mariasole Bannò



Emilia Filippi



Sandro Trento



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Women in top echelon positions and their effects on sustainability: a review, synthesis and future research agenda

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Abstract

This article aims to review and systematize prior works that investigate how the presence of women in top echelon positions of firms affects sustainability and to create an agenda to guide future research in this promising area. In contrast to previous reviews, ours examines how women in top echelon positions affect sustainability by distinguishing both the position women held in the firm (i.e. Board of Directors—BoD, top management team, CEO and relevant committees) and the specific elements of sustainability (i.e. activity, performance, and disclosure). Our structured systematic review resulted in 187 publications retrieved from Web of Science and Scopus and revealed that the presence of women in top echelon positions is associated with greater engagement in social and environmental projects. Their presence also positively influences the environmental and social performance and increases the level, quality, and transparency of sustainability disclosure. Furthermore, the presence of women in top echelon positions and the implementation of sustainable activities improve both the firm financial performance and value. However, conflicting results have also emerged. On the basis of these findings, research gaps and future research agenda are identified and presented.

Keywords Gender · Board of directors · Managers · Sustainability · Systematic literature review

1 Introduction

In 1987, the concept of sustainable development, defined as the "development that satisfies the needs of the present generations without compromising the ability of the future ones to fulfill their own needs", was introduced (Sharma & Henriques, 2005; WCED, 1987). Since 1987, sustainability, which refers to the balance

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of social, environmental, and economic criteria in business (e.g. Almeida & Melo, 2017; Khan et al., 2016; Montiel, 2008; Saunila et al., 2019) has received increased attention in managerial practices and academia (e.g. Boyd et al., 2007; Walker et al., 2014). Firms need to meet the growing demands of consumers and stakeholders for sustainable initiatives and more detailed reporting on them (Baumgartner & Ebner, 2010; Johnsen et al., 2017). Given the attention received in management practices, researchers are placing emphasis on understanding how sustainability is pursued and its activities are reported (Walker et al., 2014). As a result, a number of studies analysing this topic have emerged.

At the same time, the role of women in top echelon positions (Brunninge et al., 2007) has gained importance. In this review, the term "women in top echelon positions" is used with the goal of including all relevant positions in the firm that can be held by women. Specifically, in line with Brunninge et al. (2007), by top echelon positions we mean these roles: Board of Directors (BoD), top management team, CEO, and other relevant committees. Specifically, the composition of BoDs has been investigated since it is not only one of the main corporate governance instruments in the supervision of managerial actions, but also the body where decisions are taken on the strategic objectives of firms, including those related to sustainability (Akhmetshin et al. 2018; Ferramosca & Verona, 2020). Instead, the composition of the top management team has been analysed with the aim to understand why organizations act and perform in a certain way (Hambrick, 2007; Hambrick & Mason, 1984).

Capabilities and competencies of people in top echelon positions are, of course, unrelated to gender. However, the gender composition of BoDs and top management teams has widely attracted the attention of researchers and has been studied from numerous perspectives (for a review see e.g. Khatib et al., 2020; Tshetshema & Chan, 2020), being sustainability one of these.

Recent studies have generally found that female directors positively affect firm sustainability and social responsibility, play a key role in ethically managing the sustainable activities of the firm and promote the adoption of ethical policies (see e.g. Gulzar et al., 2019; Nadeem et al., 2017). However, some authors state that board gender diversity has no effect on sustainability (Ajaz et al., 2020) or reduces the participation in sustainable development projects (Loukil et al., 2019). Regarding sustainability performance, several studies find that it is positively affected by board gender diversity (e.g. Elmagrhi et al., 2019; Hafsi & Turgut, 2013; Provasi & Harasheh, 2020; Yaseen et al., 2019). However, other authors find that board gender diversity improves the economic but not the environmental and social dimensions (Reyes Bastidas and Briano-Turrent, 2018). As concerns disclosure, while some studies state that the presence of female directors negatively influences sustainability disclosure (e.g. Fuadah et al., 2018) or does not impact on it (e.g. Dyduch & Krasodomska, 2017; Khan, 2010; Mousa et al., 2018), other studies find positive effects on disclosure (e.g. Anazonwu et al., 2018; Formigoni et al., 2020) and specifically on its level (e.g. Al Fadli et al., 2019; Campanella et al., 2021; Dienes & Velte, 2016; Ullah et al., 2019), quality (e.g. Said et al., 2018) and transparency (Garcia-Torea et al., 2017). Finally, while board gender diversity may increase firm value through sustainability (e.g. Atif et al., 2021; Bektur & Arzova, 2020; Qureshi et al., 2020), other studies find contrasting results (e.g. Ajaz et al., 2020; Bristy et al., 2020). Similar conflicting results also emerge when considering the studies that analyse the presence of women as managers or CEOs (e.g. Buil-Fabrega et al., 2017; Martínez León et al., 2011; Pan et al., 2020).

In the literature there are already some reviews and meta-analyses that focus on the effect of corporate governance or BoDs on sustainability and CSR.[1] For example, Naciti et al. (2021) conduct a review that analyses the evolution of corporate governance rules regarding sustainability. Regarding BoD, the review of Rao and Tilt (2016b) examines how its diversity (e.g. in terms of gender, age, nationality, and functional background) affects CSR. Considering CSR reporting, Velte (2017) reviews existing studies to examine how board composition affects its quantity and quality, while the review of García-Sánchez (2020) focuses on how various factors including board composition and its diversity affect CSR disclosure and its external assurance. Regarding gender diversity, the review of Nguyen et al. (2020) examines the effect of female directors on corporate non-financial performance and observes that the majority of analysed studies yield a positive relationship between the two. Finally, in their review Amorelli and García-Sánchez (2020b) investigate how board gender diversity affects firm commitment to sustainability and stakeholder engagement focusing on some CSR dimensions (e.g. sustainability investment and performance), the theoretical frameworks adopted, and the moderating factors of the role of female directors.

Existing meta-analyses show that there is a positive relationship between the presence of female directors and the implementation of sustainable activities (Endrikat et al., 2020), sustainability performance (Byron & Post, 2016), and disclosure (Guerrero-Villegas et al., 2018; Lagasio & Cucari, 2019; Majumder et al., 2017). In addition, the context in which the firm operates plays a role as country-level factors (e.g. institutions) moderate the relationship of female directors on sustainability (Endrikat et al., 2020; Majumder et al., 2017).

In comparison to existing reviews and following the future agenda advanced by Amorelli and García-Sánchez (2020b) who call for further analyses focused on specific elements of CSR, our review goes beyond and investigates how women in top echelon positions affect sustainability by distinguishing both the position women take in the firm (i.e. Board of Directors, top management team, CEO and relevant committees) and the specific elements of sustainability (i.e. activity, performance, and disclosure).

Given the relevance of the topic depicted also by the 2030 Agenda and the 17 Sustainable Development Goals (including gender equality), the contrasting conclusions yielded by previous studies and the limitations of previous literature reviews, this paper identifies and systentizes existing literature on the presence of women in top echelon positions and its effect on sustainability with the purpose to compare and contrast the findings of prior studies. Thus, our literature review provides

[1] As explained in more detail in the methodology section, the concepts of sustainability and CSR are converging (Montiel, 2008).

readers with a state-of-the-art understanding of the research topic, by identifying research gaps and signalling future research avenues.

More in detail, a structured systematic review was performed yielding 187 publications, retrieved through Web of Science and Scopus. Without foreclosing our analysis on any topic and taking an exploratory and deductive approach, our review revealed four main topics of analysis on which women in top echelon positions have an effect: (1) Sustainable activities and strategies (both social engagement and environmental); (2) Sustainability performance (both social and environmental); (3) Sustainability disclosure (level or extent, quality, and transparency); (4) Sustainability effects on firm performance and value (through the moderating role of women in top echelon positions on sustainable activities, performance, and disclosure).

Our review contributes to the academic debate on the issue in three ways. We consider women in all top echelon positions, without restricting the analysis on female directors, as in previous reviews on the topic. We bring clarity and order by offering a novel perspective of existing studies through the identification of four main topics. Furthermore, we contribute to the theoretical advancement by identifying the major research gaps and suggesting future research avenues. These aspects are essential for advancing the study of how the presence of women in top echelon positions affects sustainability.

The remaining part of this paper is structured as follows. In Sect. 2, the methodology used is outlined. Section 3 presents the descriptive statistics of the selected publications and an overview of prior research. Finally, the discussion of managerial and policy implications and future research is outlined in Sect. 4.

2 Literature review methodology

Based on Tranfield et al. (2003), a structured systematic literature review was performed. For identifying potential sources for reviewing, we select the Web of Science (WoS) and Scopus databases.[2]

The search was not subject to publication time criteria and was performed on 1st June 2021.

To identify relevant publications, we first decided the search strings to use. Search strings to be included or excluded in the final search were discussed among the authors with regular meetings; this has helped us overcome the lack of a preliminary "scoping study" that is recommended by Tranfield et al. (2003) with the aim of evaluating the size and relevance of the literature and obtaining objective criteria for delimiting the topic of the review (Nguyen et al., 2020). The final search string was composed by three parts: the first focuses on female presence using *female* OR wom*n OR gender*; the second focuses on the role of women using *bod OR board*

[2] These databases have many advantages: they are readily updated; they offers the most valuable collection of data; they are considered as the most reliable, relevant and prestigious database for literature reviews; they ensure that all types of publications are manually selected and scanned with the aim to include only high-impact studies (see e.g., Caputo et al., 2018; Falagas et al., 2008; Naciti et al., 2021).

OR corporate AND governance OR manager OR management*; the third focuses on sustainability using *sustainab* OR CSR OR corporate AND social AND responsibility*. We preferred to use very general terms so as to conduct a research that would remain broad and open-ended. Explaining the themes of analysis in the keywords would in fact have generated limitations in the research.

Search strings had to be contained in the title, abstract and keywords.[3] The studies selected in this way needed to relate to one of these areas: Business, Business Finance, Economics, Environmental Science, and Management. Furthermore, the search was carried out with inclusion criteria (i.e. both quantitative and qualitative studies) and exclusion criteria (i.e. publications whose abstract is not written in English, public media like editorials) (Tshetshema and Kai-Ying Chan, 2020).

For this review, the concepts of sustainability and corporate social responsibility (CSR) must be distinguished. Sustainability refers to the balance of social, environmental, and economic criteria in business, while CSR "encompasses the economic, legal, ethical, and discretionary expectations that society has of organizations at a given point in time" (Carroll, 1979). However, according to Montiel (2008), these two concepts are converging because of "their shared environmental and social concern (…) despite their paradigmatic differences". For this reason, in our literature review, the term *sustainability*, as defined by WCED (1987) is preferred and adopted.

The following information was extracted from the selected publications:

1. Bibliographic reference (author, year of publication, journal);
2. Gender-related findings, gender effect and topic;
3. Type of female involvement (i.e. Board of Directors, top management team, CEO and relevant committees);
4. Lens theory (i.e. theoretical approach);
5. Methodology (e.g. qualitative, quantitative) and data (e.g. cross-sectional, panel data);
6. Sample characteristics (sample size, firm characteristics[4]);
7. Year and country of analysis.

The search in Web of Science and Scopus yielded 902 and 329 publications, respectively. From the combination of the two databases, carried out in order to eliminate duplicates, an initial set of 1169 publications was obtained. Following Moher et al. (2009), the publications were first filtered by reading the title and abstract. If this analysis did not lead to a final decision regarding inclusion, the whole text was

[3] There are two popular methods for determining highly convenient inclusion criteria (Paul and Criado, 2020); in the first one, keywords decided by the authors are generally found directly in the title, abstract or list of keywords;in the second one, keywords can be also found in the full text of the article, apart from in its title or abstract.

[4] In our review we also found samples made of data on: banks, financial institutions and mutual funds; hotels; board members and managers; business directors and purchasing professionals; appointment announcements for chief executives of the sustainability area to existing or newly created positions by US listed firms.

Fig. 1 Literature selection process and results, updated on 1st June 2021. Our elaboration from Moher et al. (2009)

read and analysed. We used our knowledge, judgment and experience many times for deciding upon clear selection criteria (i.e. exclusion/inclusion) of publications in our sample. After exclusions based on abstract and an evaluation based on full text evaluation, we obtained the final set of 187 publications (see Fig. 1). Then, a black-box approach was used to conceptualise the relationship between the presence of women in top echelon positions and sustainability (Mengis, 2020). Specifically, to identify the main thematic results, we adopted an inductive approach. The inductive analysis "refers to approaches that primarily use detailed readings of raw data to derive concepts, themes, or a model through interpretations made from the raw data by an evaluator or researcher" (Thomas, 2006). We therefore allow our thematic themes to emerge from the analysis of the raw data (i.e. a careful reading of the selected publications), without imposing restrictions and having a priori expectations (Thomas, 2006). We categorized the sample literature based on the explicit construct addressed by each study. In doing this, any intermediate factors (e.g. control variables) were ignored because this research is specifically interested in the direct effects of female presence under various contextual conditions. The final categorization of the publications into the emerging themes was reached through discussions among the authors.

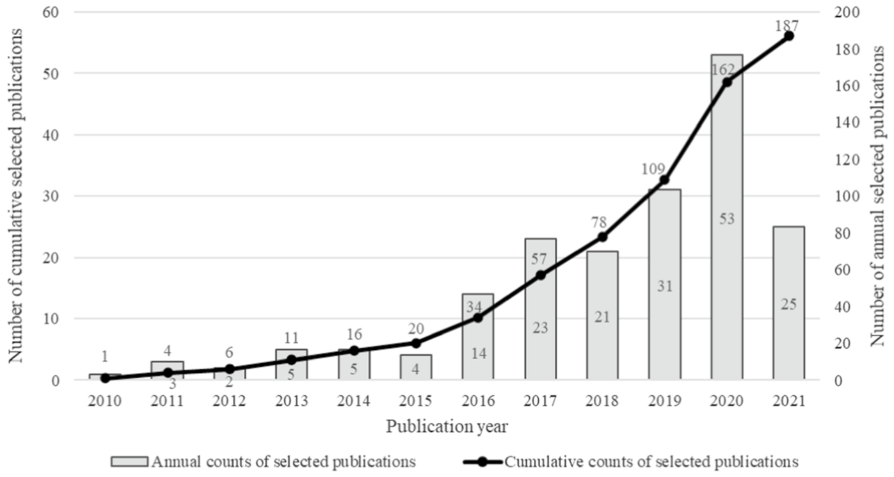


Fig. 2 Cumulative and annual counts of selected publications, updated on 1st June 2021. Our elaboration

3 Results of the review

In this section, we first offer a discussion of the main methodological and empirical issues. Then we elaborate the topics that emerged from our review of the literature into the thematic results by considering theoretical and empirical findings on female presence in top echelon positions and the effect on sustainability. We outline the selected publications in the Appendix.

3.1 Methodological and empirical issues

3.1.1 Bibliographic reference (author, year of publication, journal)

As Fig. 2 shows, literature on sustainability has grown exponentially since 2010.

The list of journals that published at least two of the selected publications is reported in Table 1. *Corporate Social Responsibility and Environmental Management*, *Sustainability*, and *Business Strategy and the Environment* published the most studies (31, 22, and 19, respectively), indicating a concentration in these three journals of 38% of the selected publications. Instead, there are 55 journals with only one selected publication each on gender and sustainability.

3.1.2 Type of female involvement (e.g. board of directors, top management team, CEO and relevant committees)

160 studies analyse the role of female directors (e.g. Guping et al., 2020; Pucheta-Martinez and Gallego-Alvarez, 2019; Rao & Tilt, 2016a); 24 examine the presence of female managers (e.g. J. Graafland, 2020; Lu et al., 2020a, 2020b); 13 consider

Table 1 Academic journals with more than one selected publications, updated on 1st June 2021

Publication Title	Number of selected publications
Corporate Social Responsibility and Environmental Management	31
Sustainability	22
Business Strategy and the Environment	19
Corporate Governance: The international journal of business in society	11
Journal of Business Ethics	11
Journal of Cleaner Production	10
Meditari Accountancy Research	4
Social Responsibility Journal	4
Academy of Accounting and Financial Studies Journal	3
Sustainability Accounting, Management and Policy Journal	3
Accounting & Finance	2
Australian Accounting Review	2
Estudios Gerenciales	2
International Journal of Disclosure and Governance	2
Journal of Corporate Finance	2
Management Decision	2
The Journal of Asian Finance, Economics and Business	2

Our elaboration

the role of female CEOs (e.g. Criado-Gomis et al., 2020; Kabongo et al., 2013; Przychodzen et al., 2018); instead only two studies focus on women in the audit committee (i.e. Appuhami & Tashakor, 2017; Bravo & Reguera-Alvarado, 2018) while only one on women in the CSR committee (Elmaghrabi, 2021).[5] Therefore, it emerges the greater attention paid to the role of female directors, which may be linked to the ease with which the data necessary for analysis can be obtained.

3.1.3 Lens theory

Several theories have been used in the field, however our literature review reveals seven main theoretical approaches that guided past research, based on the management literature. As can be seen from Table 2, the most common theoretical perspectives utilized in the literature are: Stakeholder theory (66 studies), Agency theory (53 studies), Resource dependence theory (37 studies), Legitimacy theory (24 studies), Upper echelons theory (24 studies), Critical mass theory (17 studies), Institutional theory (17 studies).

[5] Note: In this phrase, studies that examine multiple positions held by women are counted multiple times.

Table 2 Theoretical approach employed by the selected publications, updated on 1st June 2021

Theoretical approach	Number of selected publications	Percentage
Distribution of selected publications by number of theories used		
Paper relying on one theory	57	30
Paper relying on two theories	55	29
Paper relying on three theories	14	7
Paper relying on multiple theories (at least four)	27	14
Paper relying on no (explicit) theory	34	18
Total	187	100
Theories used in at least two selected publications		
Stakeholder theory	66	22
Agency theory	53	18
Resource dependence theory	37	13
Legitimacy theory	24	8
Upper echelons theory	24	8
Critical mass theory	17	6
Institutional theory	17	6
Gender socialization theory	9	3
Social role theory	8	3
Resource-based view	7	2
Signaling theory	5	2
Dependency theory	4	1
Complexity theory	3	1
Feminist care ethics	3	1
Neo-institutional theory	3	1
Resource-based theory	3	1
Diversity theory	2	1
Homophily	2	1
Social identity theory	2	1
Socioemotional wealth theory	2	1
Stakeholder-agency theory	2	1
Token theory	2	1
Total	295	100

Our elaboration

The gender-specific approaches include only two frameworks dedicated and originated as gender studies: the Critical mass theory (17 studies) and the Gender socialization theory (9 studies). What emerges is that most of the theories used in the selected publications to explain and frame gender issues are frameworks for explaining behavior based on values humans place on social group membership, but are not born and declined specifically for gender issues (i.e. social categorization theory, social identity theory, relational demography theory, self-construal theory).

They all refer to social perception that can generate prejudice, which is then used as an explanation of gender issues. Theories that are not gender-specific are then the most employed. Finally, we also found theories that look at heterogeneity but are not born and declined specifically for gender issues (i.e. diversity theory and complexity theory). These are theoretical approaches that, unlike social frameworks, emphasize the positive aspects generated by diversity/heterogeneity.

All these theories, both gender specific and non specific ones, are applied regardless of the position of women.

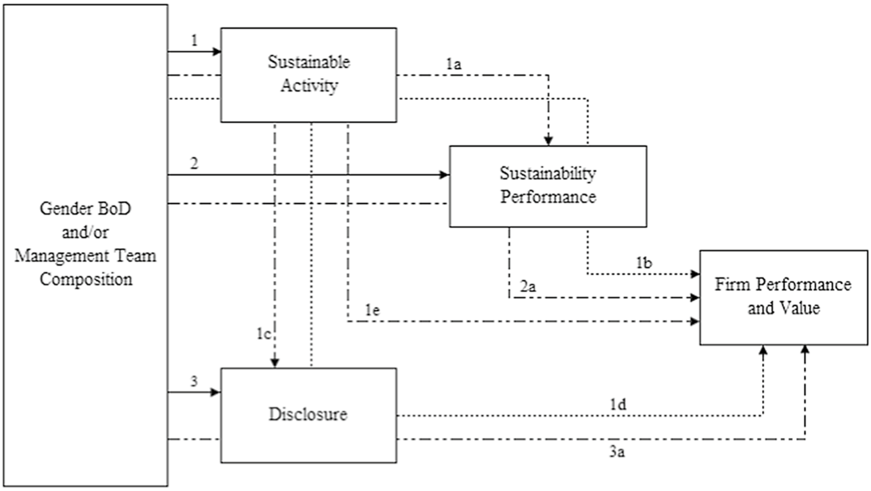
In total, 51 different theoretical perspectives are explicitly employed on this topic. Finally, there are 34 studies that do not explicitly rely on any theory.

3.1.4 Methodology (e.g. qualitative, quantitative) and data (e.g. cross-sectional, panel data)

The reviewed studies are mainly based on quantitative methods, with the exception of two qualitative studies (Cuadrado-Ballesteros et al., 2017; Rao & Tilt, 2020) and two studies that adopted a mixed method approach (Dwekat et al., 2020; Mahmood et al., 2018). The empirical studies apply a wide range of regression methods including, among others: ordinary least squares, probit, logit, ordered, binomial, 2SLS, generalized method of moments, fixed effects regressions, and structural equation model. Of the 183 quantitative studies, the majority of studies use cross-sectional data, while some employ panel data or longitudinal design (e.g. Fahad & Rahman, 2020; Ramon-Llorens et al., 2021; Shahbaz et al., 2020; Uyar et al., 2020). This review highlights, therefore, a lack of conceptual and qualitative studies on the way the presence of women in firms affects sustainability.

3.1.5 Sample characteristics (sample size, firm characteristics) and year and country of analysis

Our review highlights that the subject of analysis is generally medium to large publicly listed firms (e.g. Arayssi et al., 2020; Kilincarslan et al., 2020; Rejeb, 2017; Zahid et al., 2020), with three exceptions that examined small and medium enterprises (i.e. Courrent et al., 2016; Graafland, 2020; Sancho et al., 2017). Fifty-five studies use multi country data (e.g. García-Sánchez et al., 2020b; Valls Martínez et al., 2020), of which 9 studies focusing only on European contexts (e.g. Ben Fatma & Chouaibi, 2021; Gangi et al., 2021; Nuber & Velte, 2021). 132 studies analyse the data of only one country; the most considered countries are geographically distributed and include: United States (26 studies), China (15 studies), Australia (12 studies), Spain (11 studies), Malaysia (7 studies), United Kingdom (7 studies), France (7 studies), Bangladesh (6 studies), Pakistan (5 studies), Italy (5 studies), Canada (4 studies). This degree of internationality is perhaps not surprising given the fact that sustainability is crucially important in many economies around the world (Amorelli and García-Sánchez, 2020a). However, there are a number of important regions where research in gender and sustainability is underrepresented in the journal literature, including Eastern Europe, Africa, Latin America, and Asia, despite the



Note:

1 *Sustainable Activity*

1a *Sustainable Activity - Sustainability Performance*

1b *Sustainable Activity - Sustainability Performance - Firm Performance and Value*

1c *Sustainable Activity - Disclosure*

1d *Sustainable Activity - Disclosure - Firm Performance and Value*

1e *Sustainable Activity - Firm Performance and Value*

2 *Sustainability performance*

2a *Sustainability performance - Firm Performance and Value*

3 *Disclosure*

3a *Disclosure - Firm Performance and Value*

The thematic result *Firm Performance and Value* is included in 1b, 1d, 1e, 2a, and 3a; the direct relationship analysis between gender and firm performance and value is not the object of our literature review.

Fig. 3 Framework for organizing selected publications on gender and sustainability. Our elaboration

importance of these regions to understanding the role of female presence in different contexts (Khan et al., 2019a, 2019b).

3.2 Thematic results

Following the procedure described in Sect. 2, the influence of women in top echelon positions on sustainability was categorized with reference to these topics: (1) sustainable activities and strategies, (2) sustainability performance, (3) sustainability disclosure, (4) sustainability effects on firm performance and value. As regards topic 4, we should specify that under this label we consider the effect that one or more sustainability dimensions (i.e. sustainable activities and strategies, sustainability performance, sustainability disclosure) have on the firm performance and value. The emergence of the four issues is consistent with the terms used in the meta-analyses on the topic that were identified and set forth in the introduction.

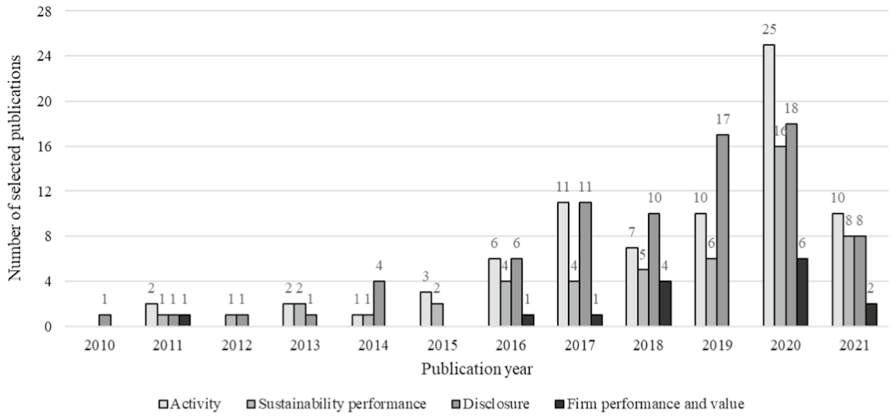


Fig. 4 Number of selected publications for each topic, updated on 1st June 2021. Source: Our elaboration

The main findings presented in the literature were translated into a framework shown in Fig. 3, while Fig. 4 reports the distributions of the identified topics from 2010 to 2021. The rest of the section presents a review of research on each of these thematic results.

3.2.1 Sustainable strategy and activities

Seventy-nine studies investigate the relationship between gender in top echelon positions and sustainable activities, of which 50 find a positive relationship, 4 a negative relationship, 14 mixed results and 11 no relationship. Almost all analysed studies examine the effects of the presence of women on sustainable activities by distinguishing according to their position.

Many studies reveal a positive relationship between the presence of female directors and sustainable activities (see e.g. Beji et al., 2020; Rehman et al., 2020; Saheed Olanrewaju et al., 2020). Female directors not only positively affect corporate sustainability, but they also play a key role in "enabling firms to ethically manage their social responsibilities and sustainable practices" (Yasser et al., 2017) and in promoting the adoption of equality, diversity and inclusion policies (Bruna et al., 2014). While having a positive effect on CSR, female directors also decrease corporate social irresponsibility (Boukattaya & Omri, 2021). Arayssi et al. (2016) state that the presence of female directors "favourably influences on a firm's risk and performance through promoting a firm's investment in effectual social engagements and reporting on them". Female directors facilitate the use of the firm's scarce resources towards social projects that maximize value (Jizi, 2017) and encourage the firm's affiliation with the United Nations Global Compact (Martínez-Ferrero et al., 2020).[6]

[6] In the case of banks, those with more female members on their boards incline toward socially responsible behaviour, especially in greater regulatory and stronger investor protection environments (García-Sánchez et al., 2018). Gender diversity increases sustainability expenditure of banks (Hosain, 2020) while it decreases their energy usage (Fakoya and Nakeng, 2019). On the contrary, Gallego-Sosa et al. (2020) find no significant differences between banks' commitment to the planet on the basis of board gender diversity.

The educational background, talent, and experience of female directors is important in the adoption of sustainable environmental initiatives (García Martín & Herrero, 2020): therefore the presence of talented women in the firm allows them to manage social responsibility and sustainable practices in an appropriate way (Setó-Pamies, 2015).

On the contrary, Loukil et al. (2019) state that "the presence of female independent directors reduces firm involvement in sustainable development projects". Instead, some studies find that board gender diversity has no effect on sustainability (e.g. Ajaz et al., 2020; Ardito et al., 2020; Zaid et al., 2020). Finally, other studies find mixed results. For example, it results that female directors are beneficial for sustainability engagement only if they are not members of the controlling family, while they foster philanthropic engagement only if they are members of the controlling family (Campopiano et al., 2019). According to Cullinan et al. (2019), while female independent directors are positively associated with sustainability, this is not true for female executive directors.

While Yarram and Adapa (2021) observe that gender diversity positively influences total sustainability but not its individual components, other studies find that female directors influence both environmental and social sustainable activities.

Regarding environmental sustainability, many studies find that female directors are positively related to attitudes towards environmental protection (e.g. Cosma et al., 2021), the pursuit of environmentally friendly strategies (Glass et al., 2016), carbon reduction initiatives (Haque, 2017), corporate environmental investment (Hu & Yang, 2021), and a higher probability that the firm takes part in sustainability-themed alliances (Post et al., 2015).[7] Environmental sustainability initiatives are positively influenced by gender diversity, in both demographic (i.e. the percentage of women on the BoD or in top management positions) and structural terms (i.e. firm policies and practices that enable or reinforce gender diversity) (Kassinis et al., 2016). According to Shoham et al. (2017), firms increase their involvement in environmental sustainability as soon as they appoint a woman to the BoD; however, this decision is strongly influenced by the culture of the countries in which the organization operates (Xie et al., 2020). Moreover, the likelihood of a firm to create pollution is moderated by the positive relationship between the presence of female directors and the environmental policy of the firm (Li et al., 2017). All these positive effects of female directors on environmental sustainability can explain the choice of majority family owners and dual-class owners to appoint female directors with the charge to advance "their personal preferences for environmental corporate social responsibility" (Cordeiro et al., 2020).

On the contrary, Galbreath (2011) highlights that despite the important role of women in sustainable activities, it could happen that due to sex-based biases and stereotyping, men directors ignore the suggestions from female directors on aspects regarding environmental quality with the consequence that female directors are not significantly associated with environmental quality. Wei et al. (2017) specify that when there are only one or two female directors on the board, no significant

[7] The positive association between gender diversity and environmental sustainability is also valid in the case of banks (Birindelli et al., 2019).

relationship on environmental investment can be seen; however, when the number of female directors reaches at least three, they have a significantly positive effect on it but only in state-owned firms and firms from heavily-polluting industries.

Moving to social activities, the presence of female directors (as well as in top and middle management) has a positive effect on sustainable activities with gender equality objectives (Larrieta-Rubín de Celis et al., 2015).

The effect of gender diverse boards on sustainability dimensions varies depending on the type of stakeholder: this diversity positively affects sustainability dimensions that are associated with stakeholders with less power (e.g. the environment, contractors, and the community), but it does not affect sustainability dimensions that are related to stakeholders with more institutionalized power (e.g. employees and customers) (Francoeur et al., 2019). In the interaction with various stakeholders, female directors are able to talk with them and to satisfy their needs, reducing the risk of their negative reactions, which can damage firm profits (Galbreath, 2011).

Finally, female participation on BoDs has an effect on specific aspects. Together with board independence, board gender composition affects sustainable supply chain responsibility through three channels: CEO duality, sustainability committee, and sensitive industries (Benjamin et al., 2019).

Focusing on female managers, conflicting results emerge. According to some studies, environmental and social commitments are greater for female managers (Buil-Fabrega et al., 2017). Female managers positively affect "corporate sustainable competitive advantage, which included both the inhibiting effect on unethical environmental behavior and the stimulating effect on proactive environmental strategies" (Pan et al., 2020). Moreover, compared to men, female managers tend to implement diversity and labor flexibility policies related to work schedule and flexible work as part of their sustainability (Arredondo Trapero et al., 2013). On the contrary, according to Q. Lu et al., (2020a, 2020b), the relationship between the presence of female top managers and sustainability is negative especially for firms in a market with a low marketization level. Instead, some studies find that the presence of women on the top management team does not affect sustainability practices (e.g. Prudêncio et al., 2021), both regarding sustainability as a whole or each of its dimensions (economic, social and environmental) (Martínez León et al., 2011). More in detail, Courrent et al. (2016) show how manager characteristics like gender, age, experience, and training do not influence a firm's pursuit of social activities, while their personal values (measured using ethics and local territorial belonging) do influence these activities. For example, in the purchase of products, it seems that on average, purchasing managers are willing to pay a premium for products that are compliant with the United Nations Global Compact; this willingness is not affected by the gender of the purchasing managers (Goebel et al., 2018). Finally, mixed results were found by Wu et al. (2019), according to which while existing female executives or top managers stimulate corporate philanthropy (and this relationship is influenced by the firm controller and the degree of industry competition), they do not affect the scale of philanthropy.

Regarding female CEOs, Galbreath and Tisch (2020) find that women in the operations manager role foster environmentally sustainable practices, while women in the CEO role do not. However, when women are in both CEO and operations manager roles in the same firm, the relationship with environmentally sustainable practices is positive.

If we analyse the relationship between the presence of women and sustainable activities and strategies considering the role they play, it emerges that the literature is almost unanimous in stating that female directors have a positive effect on sustainable activities. Conversely, when analyzing the position as manager, the results are mixed, perhaps due to the small number of studies. One common finding from the analyses on the effect of women in the two positions (i.e. in BoD or top management team) is that the results are positively influenced by the demographic, educational, and cultural characteristics of the women (Courrent et al., 2016; Kassinis et al., 2016; Xie et al., 2020). Instead, too few studies are related to the CEO and other committee positions to draw conclusions.

3.2.2 Sustainability performance

Fifty studies investigate the relationship between women in top echelon positions and sustainability performance, of which 37 find a positive relationship, 2 a negative relationship, 7 mixed results and 4 no relationship. Of course, the environmental and social performance depends on various factors (Fig. 3). First of all, strategies regarding sustainability play a key role: "firms with more effective CSR strategies exhibit better environmental and social performance" (Orazalin & Baydauletov, 2020). However, sustainability performance also depends on both BoD characteristics (e.g. size, independency, diversity, and activity) and corporate characteristics (e.g. firm size, leverage, and growth opportunities), which, when properly combined, lead to high levels of social responsibility performance (Cuadrado-Ballesteros et al., 2017).

Biswas et al. (2018) confirm this result, finding that "firms with higher board gender composition, greater board independence and sustainability committees tend to have better social and environmental performance". Furthermore, even board gender diversity alone positively affects the sustainability performance as confirmed by several studies (e.g. Chams and Garcia-Blandon, 2019; Govindan et al., 2021; Lu & Herremans, 2019; Romano et al., 2020; Uyar et al., 2021). The positive relationship between female directors and sustainability performance is higher when there are female chairs within the board CSR committee (Eberhardt-Toth, 2017) and when the firm has a consumer market orientation (Hyun et al., 2016) or operates in a male-dominated industry (Zaichkowsky, 2014) or has an environmental and social risk exposure (Naveed et al., 2021).

Other studies find opposite results. Specifically, Fakir and Jusoh (2020) and García-Sánchez et al. (2020a) find no relationship between female directors and sustainability performance. Two studies demonstrate a return on investment in sustainable activities decreasing with the proportion of female directors (Bristy et al., 2020; Zhuang et al., 2018). Finally, mixed results are found by for example Alazzani et al. (2019) and Ardito et al. (2020). Zhang (2012) finds that while there is a positive relationship between board gender diversity and institutional strength and technical strength of sustainability, the relationship is not significant when considering the weakness ratings of sustainability performance.

Some studies consider the environmental and social performance achieved by firms. While these two aspects of sustainability are usually pursued together, it could happen that one aspect is more important than the other due to the influence of culture and institutional context. For example, the Malaysian culture drives firms to place more importance on the social performance strictly linked to human orientation than on other dimensions (e.g. economic, environmental and marketplace aspects) (Alazzani et al., 2017). Considering both the environmental and social performance, Shaukat et al. (2016) find that the board gender diversity enables a more proactive and comprehensive sustainability strategy, thus leading to a higher environmental and social performance. On the contrary, according to Reyes Bastidas and Briano-Turrent (2018) female directors (or CEOs) positively affect the economic dimension, but worsen the environmental and social dimensions.

Focusing on environmental performance, some studies find a positive relationship between female directors and environmental performance (e.g. Lopatta et al., 2020; Orazalin & Mahmood, 2021). As anticipated in the previous section, the participation in sustainability-themed alliances, associated with a high representation of women on the BoD, positively affect the corporate environmental performance (Post et al., 2015).[8] Considering both sustainability strategy and environmental performance, Orazalin and Baydauletov (2020) find that the positive relationship between these two aspects is negatively affected by the board gender diversity. Finally, Nadeem et al. (2020) and Nguyen et al. (2021) find no relationship between female directors and environmental performance.

Considering the social performance, while according to Landry et al. (2016) female directors increases the probability of the firm to appear on lists measuring ethics or organizational quality (e.g. the Most Admired Companies, the Most Ethical Companies, the Best Companies to Work for, and the Best Corporate Citizens), according to Sanan (2016) there is no significant association between gender diversity of boards and social performance.

A greater gender balance in top-management increases sustainability performance (McGuinness et al., 2017). Female managers also positively affect the firm's environmental performance with the "development of eco-friendly products and commitment to resource reduction" (Burkhardt et al., 2020). On the contrary, Lu et al. (2019) find that a U-shaped relationship between female managers and sustainability performance exists.

Regarding female CEOs, it was found that they positively affect sustainability performance (Huang, 2013). This positive effect is evident both in polluting and non-polluting firms, which are able to significantly reduce pollutant emissions (Jiang & Akbar, 2018).

[8] In the case of banks, Jahid et al. (2020) and Matuszak et al. (2019) find that female directors have a significant positive effect on sustainability disclosure. On the contrary, Buallay et al. (2020) and Birindelli et al. (2018) find that the relationship between women on the board of directors and a bank's sustainability performance is an inverted U-shape. A nonlinear relationship has also been found between the presence of female directors and the environmental performance of the bank; this relationship is highly shaped by female CEOs (Birindelli et al., 2019).

If we analyse the effect of women on sustainability performance considering the role they play, it emerges how female directors lead to mixed results in this case. Specifically, the role of women in other committees emerges in this regard. On the other hand, if one analyses the position as manager, the results are mostly in agreement in detecting positive effects. Also in this case, there exist too few studies in relation to the position of CEO to draw considerations.

3.2.3 Sustainability disclosure

The presence of women in top echelon positions also has an effect on sustainability disclosure through "documents intended to inform all stakeholders of the economic, social and environmental impacts of corporate performance, with respect to a given period of time" (García-Sánchez et al., 2019). Seventy-seven studies investigate this relationship, of which 55 find a positive relationship, 5 a negative relationship, 8 mixed results and 9 no relationship.

The presence and number of female directors positively affects firm's disclosure (e.g. Alia & Mardawi, 2021; Frias-Aceituno et al., 2013; Girón et al., 2020; Peng et al., 2021). Several aspects are positively affected: the level or extent of disclosure (e.g. Issa & Fang, 2019; Ong & Djajadikerta, 2018), its quality (e.g. Khan, Khan, & Senturk, 2019a, 2019b; Mahmood & Orazalin, 2017; Vitolla et al., 2020), its transparency (Garcia-Torea et al., 2017), its lower risk of impression management strategies (i.e. the risk that these reports are a "result of opportunistic behaviour, by which managers can disclose biased information"; García-Sánchez et al., 2019). Finally, female participation on BoDs is among the factors that predict the engagement of firms in the assurance regarding sustainability disclosure, which is recognized as a means to increase its reliability, and that affect the choice of the provider with a preference towards auditing professionists (Buertey, 2021; Liao et al., 2018). On the contrary, some studies state that the presence of female directors negatively influences sustainability disclosure (e.g. Cucari et al., 2018; Gallego-Alvarez and Pucheta-Martinez, 2020b) or does not have any effect on it (Giannarakis, 2014; Giannarakis et al., 2014; Yusoff et al., 2019). Finally, other studies find mixed results: according to Biswas et al. (2021) female directors who are affiliated to the governing family, founders and other board members reduce disclosure in family firms; instead, unaffiliated female directors enhance disclosure both in family and non-family firms.

According to critical mass theory (Dahlerup, 2006), the number of female directors that produces significant effects on firm's disclosure is identified as at least three by for example Amorelli and García-Sánchez (2020a) and De Masi et al. (2021). In this regard, Alazzani et al. (2017) suggest that the (insufficient) number of female directors considered in their analysis may have led to the conclusion that there is a "moderate relationship between board gender diversity and CSR disclosure". Instead, according to Manita et al. (2018), even when the critical mass (three female directors) is reached, no significant relationship between board gender diversity and sustainability disclosure is found.

Regarding the quality of disclosure, García-Sánchez et al. (2019) state that female directors produce "more balanced, comparable and reliable information", even if at the same time they are associated with "less precise and clear information, given their narrative character"; these effects are larger in more stakeholder-oriented countries. Al-Shaer and Zaman (2016) specify that when female directors are independent, the quality of sustainability reporting is amplified with respect to the presence of non-independent female directors. However, Amorelli and García-Sánchez (2020a) highlight that the positive role of women on voluntary information disclosure does not remain when they become CEO: in fact, when they reach this position, female directors start to adopt a "a male stereotype regarding voluntary information disclosure", regardless of the human capital of the directors.

Focusing on environmental disclosure, there is a positive relationship between the presence of female directors and environmental disclosure (Rao et al., 2012; Yusoff et al., 2016), including the likelihood of disclosing information regarding climate change (Ararat & Sayedy, 2019; Ben-Amar et al., 2017), carbon (Hossain et al., 2017), corporate greenhouse gas emissions (Hollindale et al., 2019; Tingbani et al., 2020).[9] The board gender diversity is among the factors that determines the quality of environmental disclosure (Baalouch et al., 2019). On the contrary, according to Kılıç and Kuzey (2019), the presence of female directors is not associated with the carbon disclosure index and the decision of a firm to respond to the Carbon Disclosure Project. A similar result is found by Post et al. (2011), according to which reaching this critical mass does not affect the disclosed environmental corporate social responsibility.

Regarding the effect of female managers, Dilling and Caykoylu (2019) find a significant negative correlation between integrated report quality and the ratio of female executives.[10]

Gender diversity in the audit committee characteristics has a significant positive influence on the level of CSR disclosure and on the CSR environmental disclosure (Appuhami & Tashakor, 2017). It also increases the quality of voluntary sustainability reporting both in terms of comprehensiveness and relevance, as women may operate as monitoring mechanisms in the increasing commitment to provide valuable sustainability information and to display greater stakeholder orientation (Bravo and Reguera-Alvarado, 2018).[11]

If we analyse the role of women on sustainability disclosure considering the position they held, it emerges that the literature is almost unanimous in stating that female directors have a positive effect on sustainability disclosure albeit with due

[9] The positive effect of female directors on environmental disclosure has also been found in the case of banks. Specifically, Gallego-Alvarez and Pucheta-Martinez (2020a) find that female directors of banks encourage the reporting of environmental information in countries with coordinated market economies.

[10] Regarding other entities, Garde Sánchez et al. (2017) observe that the gender of the manager in state owned enterprises is not statistically significant in influencing the disclosure of CSR information. In the case of banks, Prabowo et al. (2017) find that the presence of female executives positively affects CSR disclosure, especially in banks listed on the stock market. The effect of female managers is observed only in medium and larger banks and in banks without government ownership (Prabowo et al., 2017).

[11] Some studies also consider the effects that female directors produce on the sustainability disclosure of particular entities. For example, according to Tapver et al. (2020), the positive association between the proportion of women on the board and sustainability disclosure also exists in the case of banks. In the case of state-owned enterprises, when female directors are the majority, it seems (i.e. there are weak indications) that the total sustainability information disclosed decreases (Argento et al., 2019).

specification. This relationship is, in fact, the most analysed in the literature and, therefore, the most exhaustive and articulated in describing how the characteristics of the board enter into the relationship. The same considerations apply to the committees that in this case are more investigated. Therefore, a similar relationship emerges between women in the BoD and relevant committees and sustainability disclosure. Viceversa, if one considers the position as manager, the results are mixed, perhaps, once again, due to the small number of studies.

3.2.4 Sustainability effects on firm performance and value

Only 15 studies analyse the relationship between the presence of women in top echelon positions (in which they moderate sustainable activities, performance, and disclosure) and the financial performance of the firm and its value. Of these studies, 9 find a positive relationship, 2 a negative relationship, 3 mixed results and one no relationship.[12] Among others, Chong et al. (2018) highlight the need of firms to "engage in sustainable development to maximise the firms' value" and stress the essential role of women in defining the strategy regarding these activities.

Board gender diversity can increase firm value by promoting renewable energy consumption (Atif et al., 2021) or by promoting sustainability disclosure (Bektur & Arzova, 2020). In fact, sustainable activities will be appreciated by the stakeholders and lead to "more beneficial contracting and opening new avenues of growth" (Qureshi et al., 2020), which will be valued on the market and result in higher stock prices. In this mechanism, board gender diversity is extremely important, as firms with higher diversity tend to disclose more regarding sustainable activities, as exposed in the previous section. Furthermore, Arayssi et al. (2016) demonstrate that the presence of female directors "favorably influences on a firm's risk and performance through promoting a firm's investment in effectual social engagements and reporting on them".

Contrasting results are reported in few studies. Ajaz et al. (2020) state that there is a negative relationship between board gender diversity, sustainability performance and a firm's financial performance, while there is no significant relationship with the firm's reputation. Bristy et al. (2020) demonstrate that the return on investment in sustainable activities decreases with the proportion of female directors.

In the case of managers, it has been found that gender diversity in top management teams increases the level of implementation of sustainability, with an effect on firm performance (Quintana-García et al., 2018).

Female CEOs and CFOs also have a positive effect on firm performance through the promotion of sustainability. The appointment of a chief executive in the area of sustainability can improve the financial performance, as the "company shows its commitment to sustainability and social responsibility to its stakeholders" and this positive image "may have signaling effects for its customers, employees, and shareholders" (Wiengarten et al., 2017). The greatest benefits can be obtained if this female executive has a

[12] The direct relationship analysis between gender and firm performance and value is not the object of our literature review.

background in functions related to sustainability (Wiengarten et al., 2017) and is an independent director rather than a male executive director (Atif et al., 2020).

Female CFOs also improve firm performance such as debt cost saving as they conduct more environmentally responsible activities, whose effects are more prominent in high risk firms (Wang et al., 2021).

It is difficult to analyse the effect of women in top echelon positions on firm performance and value considering the role they play, given the small number of studies. However, it seems to emerge that the effect tends to be positive regardless of position in the Bod, top management team, as CEO or in relevant committees.

4 Women in top echelon positions

Table 3 is a summary table showing the effect that women in the various positions held in the firm (BoD, managers, CEO) are able to exert on the various dimensions of sustainability (i.e. sustainable activities and strategies; sustainability performance; sustainability disclosure; sustainability effects on firm performance and value). As can be observed, most studies identify a positive relationship between women and sustainability: women, whatever position they hold in the firm, have a positive effect on sustainability, whether measured by sustainable activities and strategies, sustainability performance, sustainability disclosure, or sustainability effects on firm performance and value.

The relationships between women in the BoD and the four sustainability topics are not only the most numerous, but they are also those studied paying more attention to other aspects besides the gender variable. Specifically, regardless of the relationship analysed, socio-demographic and educational (e.g. García Martín & Herrero, 2020), cultural (e.g. Alazzani et al., 2017), institutional (e.g. García-Sánchez et al., 2019), firm (e.g. Hyun et al., 2016; Naveed et al., 2021), and industry (e.g. Zaichkowsky, 2014) factors were also considered in the analysis. Specific cases relating to particular sectors (e.g. food sector as in García-Sánchez et al., 2020a; oil, gas and mining as in Saheed Olanrewaju et al., 2020); logistics as in Govindan et al., 2021; electronics and chemical as in Post et al., 2011) and specific types of business (e.g. family firms as in Campopiano et al., 2019) were also explored in this report. Probably, as already mentioned, such attention and scientific production is also due to the greater availability of data.

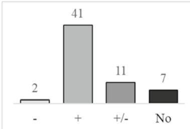
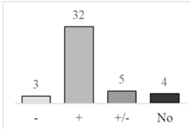
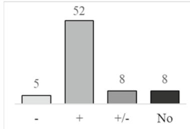
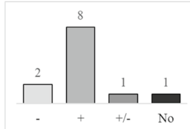
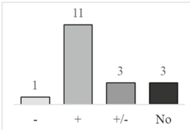
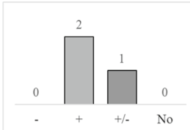
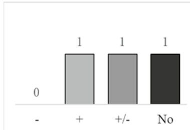
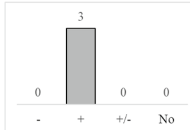
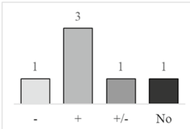
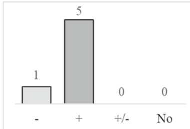
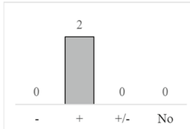
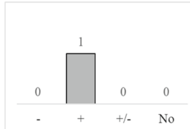
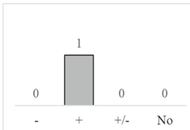
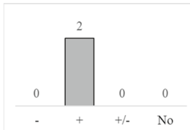
5 Concluding remarks

A subject advances when prior studies are logically synthesized based on their findings (Kumar et al., 2020). After doing this, we developed a comprehensive future research agenda with reference to methodology and empirical issues, theory constructs, and thematic issues. Before revealing the agenda, we present managerial and policy implications.

5.1 Managerial and policy implications

The analysis revealed that generally the presence of women, whatever position they hold in the firm, is associated with a greater engagement in social and environmental projects

Table 3 Women in governance positions and their impact on each topic, updated on 1st June 2021

<table>
<tr><th></th><th>Dimension</th><th></th><th></th><th></th></tr>
<tr><th>Gender level of analysis</th><th>Sustainable activity</th><th>Sustainability performance</th><th>Disclosure</th><th>Firm performance and value</th></tr>
<tr><td>BoD
TOTAL: 190 papers</td>
<td>
TOTAL: 61 papers</td>
<td>
TOTAL: 44 papers</td>
<td>
TOTAL: 73 papers</td>
<td>
TOTAL: 12 papers</td></tr>
<tr><td>Managers
TOTAL: 27 papers</td>
<td>
TOTAL: 18 papers</td>
<td>
TOTAL: 3 papers</td>
<td>
TOTAL: 3 papers</td>
<td>
TOTAL: 3 papers</td></tr>
<tr><td>CEO
TOTAL: 15 papers</td>
<td>
TOTAL: 6 papers</td>
<td>
TOTAL: 6 papers</td>
<td>
TOTAL: 2 papers</td>
<td>
TOTAL: 1 paper</td></tr>
<tr><td>Relevant committees
TOTAL: 3 papers</td>
<td>Relationship not analysed</td>
<td>
TOTAL: 1 paper</td>
<td>
TOTAL: 2 papers</td>
<td>Relationship not analysed</td></tr>
</table>

Studies that examine multiple themes and multiple positions are counted multiple times. Source: Our elaboration

Table 4 Suggested direction for future research

Theoretical approach	
Methodological and empirical issues	
Suggestion 1	Search for a unified theory
Suggestion 2	Use of both qualitative and mixed methods
Suggestion 3	Consideration of women in some top echelon positions (e.g. CEO and relevant committees)
Suggestion 4	Consideration of women in non-top echelon positions
Suggestion 5	Analysis of underrepresented contexts: regions (i.e. Eastern Europe, Africa, Latin America, and Asia) and firm governance and size (i.e. family firms and small firms)
Thematic issues	
Suggestion 6	Analysis of the impact of women in top echelon positions on firm performance and value
Suggestion 7	Further analysis of how women in top echelon positions positively or negatively impact sustainability
Suggestion 8	Investigation of the types of sustainable activities (e.g. innovation) promoted by women
Suggestion 9	Consideration of the influence of the institutional context on the relationship between gender and sustainability
Suggestion 10	Consideration of the level of disclosure required by different countries

Our elaboration

(e.g. Činčalová & Hedija, 2020; Galbreath, 2016; Prudêncio et al., 2021), positively influences their performance (e.g. Deschênes et al., 2015; Jouber, 2021), increases the level and the quality of their disclosure (e.g. Javaid Lone et al., 2016; Tamimi & Sebastianelli, 2017), and contributes to enhancing firm performance and value (e.g. Atif et al., 2021; Bektur & Arzova, 2020). On the basis of the central issues and key results that have emerged, important managerial and policy implications are highlighted.

Firms can observe how the presence of women in top echelon positions may have a positive effect on their sustainability. Our results could therefore inspire a new path for women inside businesses: increasing the number of women on BoD or, more in general, in other top echelon positions.

Furthermore, findings suggest that policymakers should consider the presence of women on the BoD when designing laws affecting environmental and social sustainability and when deciding whether to participate in private firms. As both gender diversity and/or the presence of a critical mass in top echelon positions may foster sustainability, policy makers should implement specific actions to stimulate such a virtuous relationship.

5.2 Future research agenda

5.2.1 Methodological and empirical issues

Our discussion of the main methodological and theoretical findings on female presence in top echelon positions and sustainability allowed us to identify some important gaps that can be analysed in future research. A summary is offered in Table 4.

5.2.1.1 Suggestion 1 Despite the fact that many studies have considered the relationship between women in top echelon positions and social and/or environmental sustainability, there is no unified theory behind the commitment to sustainability. We argue that the theoretical support for the possible link between gender in top echelon positions and sustainability comes from the two most prominent theories and a specific gender theory: Stakeholder theory (as for sustainability), Upper echelons theory (as for characteristics of BoD and/or top management teams) and Gender socialization theory (as for gender).

5.2.1.2 Suggestion 2 Our review highlights a lack of conceptual and theoretical studies on the way the presence of women in firms affects sustainability. Only two studies employed a qualitative approach and two a mixed method. For these reasons, the first item on our agenda aims to assess how the inclusion of both qualitative (e.g. interviews, case studies and longitudinal studies) and a mixed methods design will improve our understanding of the interplay between gender and sustainability. Usually, the analysis of both phenomena is performed using quantitative methods because data collection is usually indirect. However, this can limit understanding of the interplay we seek to explore (Creswell & Plano Clark, 2018). For example, only with qualitative studies it would be possible to investigate in more detail how women influence two relevant aspects: the decision making process of BoD that leads or not to the pursuing of sustainability in the firm; and the implementation of sustainable activity and disclosure with its effects. As a consequence, the combination of quantitative statistical trends and in-depth understanding given by qualitative research techniques can create a stronger research methodology than a single approach (Bryman, 2008).

5.2.1.3 Suggestion 3 The analysis of the effect of women on sustainability considering some top echelon positions they hold is scarce. Specifically, while the studies about the BoD are proliferating since 2010, almost scarce are the ones analysing the top management team, CEO and relevant committees. We argue that there is a need to better understand the influence of the demographic, educational, and cultural characteristics of the women in these unexplored specific positions. Currently, too few studies are related to the relevant committee as CEO and in relevant committees to draw conclusions.

5.2.1.4 Suggestion 4 Although it is people in top echelon positions that generally strongly influence the decisions of a firm and their implementation, it may be interesting to examine how women in other positions (particularly staff level female workers) influence the sustainability of the firm. To the best of our knowledge, no study has focused on the effect of women in non-top echelon positions on firm sustainability. Female workers, together with male workers, may play a key role in the execution of sustainable activities decided at higher firm levels, with a significant effect on the performance of these activities (on the contrary, they have no effect on disclosure, which remains the sole responsibility of the higher bodies). The influence of the lower corporate levels on sustainable activities may be particularly relevant in smaller organisations with a less hierarchical structure, in which employees are more empowered, responsible and autonomous, as they can directly propose solutions and ideas, take decisions, and solve firm issues. For this reason, it is possible that the best ideas, which are then implemented, come from the most skilled workers that are not on the BoD or top management teams.

5.2.1.5 Suggestion 5 There are a number of important regions where research in gender and sustainability is underrepresented in the literature; as such we suggest exploring the contexts of: Eastern Europe, Africa, Latin America, and Asia. We believe that analysing the influence of women in top echelon positions in different contexts could advance the field given that country-level factors (e.g. institutions) moderate the effect of female directors on sustainability (Endrikat et al., 2020; Majumder et al., 2017). Furthermore, the analysed samples are almost exclusively representative of medium and big listed firms. We suggest further analysis considering firm heterogeneity, and specifically that related to governance and size, which can help shed further light on the issue. Both the dimension (smaller firms) and the ownership structure (family concentrated or not) should be taken into account as they both represent more than 80% of world wide firms (Family Firm Institute, 2020).

5.2.2 Thematic issues

The framework used to reveal the emerging findings allowed the identification of some important topics that should be analysed in future research. A summary is offered in Table 4.

5.2.2.1 Suggestion 6 Among the four identified thematic issues (i.e. sustainable activities and strategies, sustainability performance, sustainability disclosure), the effect that women have on firm performance and value is underexplored. In fact, the majority of studies (126 out of 187) examine the effect of women only on sustainable activities or disclosure, without assessing the effect on performance. Instead, 61 studies estimate achieved performance (either at the sustainability or firm level), but only 15 assess how women, through sustainability, effect on performance at the firm level. This is surprising because if on the one side sustainability is a central issue, on the other one performance and continuous growth is the main goal of every firm (Goyal et al., 2013). Today, it is more correct to talk about sustainable growth as sustainability is the only viable way to continue doing business in the coming decades. Therefore, our suggestion is to further analyse the relationship between the presence of women in top echelon positions, sustainability and firm performance and value.

5.2.2.2 Suggestion 7 Among the four topics, there is not a dominant controversial theme. However, each of the thematic results confirm a non-unanimously-positive effect of the presence of women in top echelon positions. This is particularly true when analysing the roles women play. Therefore, we suggest deepening the topics concerning sustainable activities and strategies, sustainability performance, sustainability impact on the firm performance and value by considering the specific role of women in the top management team, CEO and relevant committees.

5.2.2.3 Suggestion 8 With regard to sustainable activities, it would be interesting to examine through which activities the firm seeks to achieve superior sustainability performance. Specifically, innovation can play a key role in achieving this goal (Lopatta et al., 2020; Nadeem et al., 2020). For example, in the case of environmental sustainability, it could be interesting to understand to what extent the presence of women in the firm increases innovation aimed at obtaining less polluting finished products or at producing with a lower environmental impact (i.e. by acting on the productive aspect). The implications of these changes on the firm's environmental performance should then be examined.

5.2.2.4 Suggestion 9 BoDs and top management teams play a critical role in implementing sustainable activities and policies and their gender composition may have important consequences on that (Kabir & Thai, 2021; Yasser et al., 2017). For example, Nielsen and Huse (2010) note that "women may be particularly sensitive to—and may exercise influence on—decisions pertaining to certain organizational practices, such as corporate social responsibility and environmental politics". In addition to gender, the institutional context should be considered as it has a prominent role in shaping both individual differences in personality traits (Wood and Eagly, 2002) and individual perceptions of others. We argue that other studies are needed in order to understand the different possible effects of women in top echelon positions on sustainability, for example by comparing egalitarian versus male oriented contexts. Indeed, just a few studies analysed the effects of a stereotypical view within the organization on sustainability (e.g. Galbreath, 2011). We suggest considering the social constructs of gender in different institutional contexts (i.e. egalitarian versus non-egalitarian) and how stereotyped views may affect their attitude toward sustainability. This suggestion is particularly important when studying the presence and therefore the role of women according to their position.

5.2.2.5 Suggestion 10 In the analysis of sustainability disclosure, future research should consider the context to a greater extent. Specifically, since the laws that require firms to provide information on non-economic aspects differ among countries and in different contexts and given that firms may disclose non-economic information for different reasons, it may be interesting to understand how the presence of women in top echelon positions influences sustainability disclosure by comparing the level of disclosure required by law and that offered by firms (Fernandes et al., 2018). In fact, existing studies (e.g. Fernandez-Feijoo et al., 2014) consider only the presence or absence of laws of this kind, but not the level of disclosure that they require of firms. It could also be interesting to analyse the reasons and factors underlying the emerging higher levels of disclosure provided by firms (de Villiers & Dimes, 2021) in comparison to that required by law.

Appendix

Author	Gender-related findings	Gender effect	Topic	Theoretical approach	Method	Sample	Years	Country
Ajaz et al. (2020)	Gender diversity in the BoD has no significant relationship with CSR, financial performance, and the reputation of a firm No significant relationship between the presence of women in BoD and a firm's reputation	No	Sustainability performance; Firm performance and value	Stakeholder theory	Quantitative, fixed-random effects regression	100 index firms listed on the Pakistan Stock Exchange	2010–2015	Pakistan
Al-Shaer and Zaman (2016)	Gender diverse BoD are associated with higher quality sustainability reports Independent female directors have greater effect on sustainability reporting quality than female directors	+	Disclosure	None	Quantitative, regression ordered Probit specification	333 firms listed in the UK FTSE350	2012	United Kingdom
Alazzani et al. (2017)	Positive association between social performance and the presence of female directors on BoD No association between environmental performance and the presence of female directors on BoD Female directors pay more attention to social issues than to environmental ones	±	Sustainable activity; Sustainability performance	Upper echelon theory	Quantitative, regression	133 firms listed in Bursa Malaysia	2009	Malaysia

Author	Gender-related findings	Gender effect	Topic	Theoretical approach	Method	Sample	Years	Country
Alazzani et al. (2019)	A moderate relationship between BoD gender diversity and CSR disclosure, this is probably because of insufficient number of women on BoD	+	Disclosure	Upper echelon theory	Quantitative, regression	133 firms listed in Bursa Malaysia	2009	Malaysia
Amorelli and García-Sánchez (2020a)	Positive impact of gender board diversity on voluntary socially responsible disclosure by examining the presence of at least three women on the board There is a greater effect when the board's background, skills, and experience are greater The female role does not remain when women achieve the position of chairperson; that is, female directors adopt a male stereotype regarding voluntary information disclosure when they are also the chairperson of the firm, independently of the human capital of the board members	±	Disclosure	Critical mass theory	Quantitative, panel data regression	9,744 firms	2007–2016	Multy Countries
Anazonwu et al. (2018)	The proportion of women directors significantly influence sustainability reporting	+	Disclosure	None	Quantitative, fixed effects regression	43 manufacturing firms on the Nigerian Stock Exchange	ante 2018	Nigeria

Author	Gender-related findings	Gender effect	Topic	Theoretical approach	Method	Sample	Years	Country
Arayssi et al. (2016)	The presence of woman in BoD favorably influences on firm's risk and performance through promoting a firm's investment in effectual social engagements and reporting on them The desirable effect of woman in BoD on the ESG-performance relationship leads to increased risk-adjusted and buy-and-hold abnormal returns and reduced firm risks, measured by both volatility of returns and systematic risk	+	Sustainable activity; Disclosure; Firm performance and value	Multi-theories: agency theory, institutional theory, stakeholder theory	Quantitative, regression	1,018 firms listed in the Financial Times Stock Exchange 350 index	2007–2012	United Kingdom
Ardito et al. (2020)	Female representation in the BoD is not beneficial for each specific CSR dimension, albeit it is beneficial at an aggregate level It is positively associated with customers' management and community engagement It is negatively related to environmental performance and employees' well-being It is not significantly associated with ethical governance	±	Sustainable activity; Sustainability performance	Social role theory, upper echelon theory	Quantitative, Poisson regression	422 or 246 Certified Benefit Corporations (B Corps), depending on data availability (246 B Corps for performance related to customer management; 422 B Corps for environmental performance)	2017	Europe and United States
Argento et al. (2019)	Having a majority of female directors on the BoD decreases the total sustainability information disclosed	-	Disclosure	None	Quantitative, content analysis, regression	45 state-owned enterprises	2016	Sweden

Author	Gender-related findings	Gender effect	Topic	Theoretical approach	Method	Sample	Years	Country
Atif et al. (2020)	There is a positive relationship between female directors and sustainable investment BoDs with two or more female directors have a pronounced impact on sustainable investment Female independent directors have a stronger impact on sustainable investment than female executive directors It was found a higher value for firms with the presence of female directors and sustainable investment	+	Sustainable activity; Firm performance and value	Gender socialization theory	Quantitative, OLS and lagged OLS regressions	1,491 S&P 1500 indexed firms	2004–2016	United States
Baalouch et al. (2019)	Gender diversity in BoD and environmental performance play significant roles in explaining variations in quality of environmental disclosure	+	Disclosure	Multi-theories: Human capital theory, neo-institutional theory, resource dependence theory, stakeholders theory	Quantitative, panel data regression	570 listed firms in SBF120	2009–2014	France
Bektur and Arzova (2020)	The relationship between women on BoDs, firm performance, and ESG is not analysed adequately	±	Disclosure; Firm performance and value	None	Quantitative, panel data regression	15 firms	2014–2019	Turkey
Ben-Amar et al. (2017)	The likelihood of voluntary climate change disclosure increases with women percentage on BoDs Evidence that supports critical mass theory with regard to BoD	+	Disclosure	Critical mass theory	Quantitative, instrumental variable, probit regression	541 publicly listed firms	2008–2014	Canada

Author	Gender-related findings	Gender effect	Topic	Theoretical approach	Method	Sample	Years	Country
Benjamin et al. (2019)	Board gender composition and board independence are positively associated with sustainable supply chain responsibility Three channels (i.e. CEO duality, sustainability committee and sensitive industries) through which board gender composition and board independence affect sustainable supply chain responsibility, where board gender composition consistently explains the effect Compared with independent female directors who continue to display significant associations with sustainable supply chain responsibility, independent male directors do not engender sustainable supply chain responsibility	+	Sustainable activity	Agency theory, stakeholder theory	Quantitative, ordered-probit regression	2,559 S&P 500 firms	2010–2015	United States
Birindelli et al. (2019)	Nonlinear relationship between women directors and the environmental performance of banks Female CEOs play a strategic role in shaping this relationship, by confirming the homophily perspective for the banking sector Leader gender diversity is an important driver of environmental sustainability in banks	+	Sustainability performance	Critical mass theory, homophily	Quantitative, regression	96 listed banks in the EMEA (Europe, Middle East and Africa)	2011–2016	Multi Countries: Europe, Middle East and Africa

Author	Gender-related findings	Gender effect	Topic	Theoretical approach	Method	Sample	Years	Country
Biswas et al. (2018)	Firms with higher board gender composition, greater board independence and sustainability committees tend to have better social and environmental performance Positive association of these variables on the sub-dimensions of social and environmental performance	+	Sustainability performance	Stakeholder theory	Quantitative, regression, account for self selction and endogeneity	2,188 Australian Securities Exchange listed firms—11 year observations (407 individual firms)	2004–2015	Australia
Bravo and Reguera-Alvarado (2018)	Positive association between gender diversity in the audit committee and the quality of voluntary ESG reporting, which results in greater comprehensiveness and relevance The busyness of the AC negatively moderates the influence of female audit committee members	+	Disclosure	Agency theory,stakeholder theory	Quantitative, panel data regression	375 listed firms in the Madrid Stock Exchange	2012–2015	Spain
Bristy et al. (2020)	The return on investment in CSR decreases with the proportion of female directors on the BoD It is important to consider gender in furthering the understanding of how firms address the CSR-corporate financial performance nexus	-	Sustainable activity; Sustainability performance; Firm performance and value	Gilligan's two voices theory, social role theory	Quantitative, two-stage least squares (2SLS) and generalized method of moments (GMM) approach	1,527 firms	1996–2014	United States

Author	Gender-related findings	Gender effect	Topic	Theoretical approach	Method	Sample	Years	Country
Buallay et al. (2020)	Board diversity tends to be higher with banks endowed with low financial leverage and high assets The gender board diversity is a causal factor of the corporate governance disclosure When female board members account for 22–50% of the BoD, a positive significant effect on the level of ESG disclosure results; at levels above 50%, negative returns to scale manifest on ESG disclosure	±	Disclosure	Institutional theory, stakeholder theory	Quantitative, regression	2,116 stock-exchange-listed banks	2007–2016	Multy Countries: Central America, Europe, Australia
Burkhardt et al. (2020)	Firms with more women in top management exhibit higher environmental performance Women in top management are associated with several key indicators such as development of eco-friendly products and commitment to resource reduction The influence of women is weaker in firms with a lower environmental performance and in firms with high-growth opportunities because these firms are likely to prioritize their own development. This suggests, in line with social role theory, that women also adapt into the role that organizations expect from them	+	Sustainability performance	Gender socialization theory	Quantitative, cross-sectional regression	86 firms	2006–2017	France

Author	Gender-related findings	Gender effect	Topic	Theoretical approach	Method	Sample	Years	Country
Chong et al. (2018)	In terms of sustainability practices, firms have to engage in sustainable development to maximise the firms' value, not ignoring the vital role of women in strategising business performance. However, the effect of sustainability practices on firms' risk-taking is still not noticeable	+	Sustainable activity; Firm performance and value	None	Quantitative, regression	290 firms listed on Bursa Malaysia	2010–2014	Malaysia
Cordeiro et al. (2020)	Majority family owners and dual-class owners likely choose women directors to help advance their personal preferences for environmental corporate social responsibility These two majority ownership types interact with board gender diversity to positively influence corporate environmental performance	+	Sustainability performance	Multi-theories: Resource dependence theory, secondary agency theory, socioemotional wealth theory	Quantitative, regression	2,755 firms	2010–2015	United States

Author	Gender-related findings	Gender effect	Topic	Theoretical approach	Method	Sample	Years	Country
Courrent et al. (2016)	While the owner-managers' gender, age, experience and training do not explain their adherence to the business case argument for their firms' involvement in social responsibility (SR), personal values measured in terms of ethics and local territorial belonging, as well as an objective for the long term survival of the business, are positively linked to the business case argument for SR	No	Sustainable activity	None	Quantitative, regression	188 small firms	2011	Canada
Cuadrado-Ballesteros et al. (2017)	CSR performance depends on a complex configuration of some board characteristics, such as size, independency, diversity and activity, and other corporate attributes	+	Sustainability performance	Complexity theory	Qualitative, fuzzy set qualitative comparative analysis	471 non-financial firms	2008–2010	United States
Cucari et al. (2018)	Women on BoDs is negatively correlated to CSR disclosure while the age of the board is not significant	-	Disclosure	None	Quantitative, panel data regression	54 listed firms	2011–2014	Italy

Author	Gender-related findings	Gender effect	Topic	Theoretical approach	Method	Sample	Years	Country
Dwekat et al. (2020)	Gender diversity positively affects the high CSR disclosure level	+	Disclosure	Complexitytheory	Qualitative and quantitative, fuzzy set qualitative comparative analysis	69 firms (207 observations)	2016–2018	12 European countries (France, United Kingdom, Germany, Switzerland, the Netherlands, Spain, Italy, Sweden, Denmark, Finland, Norway, and Belgium)

Author	Gender-related findings	Gender effect	Topic	Theoretical approach	Method	Sample	Years	Country
Elmagrhi et al. (2019)	The proportion and age of female directors have a positive effect on the overall corporate environmental performance The proportion and age of female directors also have a positive effect on the three individual environmental performance components, namely, environmental strategy, implementation, and disclosure No evidence that suggests that the level of education of female directors has any impact on environmental performance, neither the overall environmental performance measure nor its individual components	+	Sustainability performance	Multi-theories: Agency theory, legitimacy theory, neo-intuitional theory, resource dependence theory, stakeholder theory, tokenism theory	Quantitative, panel data regression	383 Chinese publicly listed firms listed A-shares	2011–2015	China
Fahad and Rahman (2020)	Women on BoDs weakens CSR disclosure	-	Disclosure	Agency theory, stakeholder theory	Quantitative, panel data regression	386 firms listed in the BSE 500 index	2007–2016	India

Author	Gender-related findings	Gender effect	Topic	Theoretical approach	Method	Sample	Years	Country
Fakir and Jusoh (2020)	No support for the direct association between board gender diversity and sustainability performance Contextual factors, such as, male-dominant BoD, appointment of female directors based on family ties, lack of education and expertise etc. may discount gender diversity direct influence on sustainability performance Enterprise risk managementuse mediates the relationship of board gender diversity and sustainability performance in full	No	Sustainability performance	Contingency theory, resource dependence theory	Quantitative, partial least square technique of Structural Equation Modelling (SEM) approach	166 Dhaka Stock Exchange listed firms	2017	Bangladesh
Fernandez-Feijoo et al. (2014)	In countries with a higher proportion of BoD with at least three women, the levels of CSR reporting are higher Countries with higher gender equality have more companies with BoD with at least three women	+	Disclosure	Critical mass theory	Quantitative, regression	2,400 firms	2008, 2011	Multy Countries: 22 Nations

Author	Gender-related findings	Gender effect	Topic	Theoretical approach	Method	Sample	Years	Country
Formigoni et al. (2020)	Women on BoD positively impact the disclosure practices of CSR	+	Disclosure	None	Quantitative, probit regression model	Two different population samples: 550 firms listed on BM&FBOVESPA Stock Exchange (Brazil) and 169 firms listed on Madrid Stock Exchange (Spain)	2008–2011	Multy Countries: Brazil and Spain
Francoeur et al. (2019)	Gender diverse boards (GDB) are positively related to CSR dimensions that are related to less powerful stakeholders such as the environment, contractors, and the community GDB do not appear to have a significant impact on CSR dimensions that are associated with stakeholders who benefit from more institutionalized power, such as employees and customers	±	Sustainable activity	Institutional theory, stakeholder theory	Quantitative, regression generalized method of moments	1,632 firm-year observations (unbalanced panel dataset)	2007–2013	United States
Frias-Aceituno et al. (2013)	Growth opportunities, the size of a company and its management bodies, together with gender diversity, are the most important factors in the integrated dissemination of information	+	Disclosure	Stakeholder theory	Quantitative	568 non-financial multinational firms	2008–2010	Multy Countries: 15 Nations

Author	Gender-related findings	Gender effect	Topic	Theoretical approach	Method	Sample	Years	Country
Galbreath (2011)	Boards that have a strong complement of gender diversity offer more effective monitoring of agents, as well as offer more stringent enforcement of ethical conduct, thereby minimizing affects of subversion of shareholder funds that can be detrimental to their returns A positive link between women on boards and economic growth Because of their relational abilities, women on boards are more likely able to engage with multiple stakeholders and respond to their needs, resulting in an avenue for demonstrating social responsiveness Due to their backgrounds and work experiences, sex-based biases and stereotyping might exist in BoD with men directors discounting input from women directors on issues relating to environmental quality Women directors are not significantly associated with environmental quality	±	Sustainable activity; Firm performance and value	None	Quantitative, regression	200 publicly listed firms	2004	Australia

Author	Gender-related findings	Gender effect	Topic	Theoretical approach	Method	Sample	Years	Country
Galbreath (2016)	Outside directors and women on BoD are complementary in that their multiplicative effect incrementally influences CSR above their individual, independent effects Board resources can be complementary within the boardroom context and complementary to management in positively affecting firm outcomes	+	Sustainable activity	Complementary asset perspectives, resource based view	Quantitative, regression	295 public firms	2005–2009	Australia
García Martín and Herrero, B (2020)	Gender diversity and the existence of a CSR committee are positively associated with the firms' environmental performance The educational background, talent, and experience of women help promote sustainable environmental initiatives	+	Sustainable activity; Sustainability performance	Agency theory, stakeholder theory	Quantitative	644 non-financial firms	2002–2017	Multy Countries: European Nations

Author	Gender-related findings	Gender effect	Topic	Theoretical approach	Method	Sample	Years	Country
García-Sánchez et al. (2019)	There is a positive externalities associated with the presence of women in supervisory and senior management positions BoD with greater female representation decrease the risk of impression management strategies on sustainability disclosure Female directors are positively associated with more balanced, comparable and reliable information; although, they are also associated with less precise and clear information, given their narrative character These effects are greater in firms located in more stakeholder-oriented countries	±	Disclosure	Institutional theory, social identity theory	Quantitative	273 firm-year observations	2006–2014	Multy Countries
Garcia-Torea et al. (2017)	The presence of women on BoDs improves transparency of CSR information	+	Disclosure	None	Quantitative, regression	128 listed firms	2009–2011	Spain

Author	Gender-related findings	Gender effect	Topic	Theoretical approach	Method	Sample	Years	Country
García-Sánchez et al. (2020a)	Gender diversity of directors is not a significant factor in implementing eco-innovation and eco-design projects	No	Sustainable activity	Multi-theories	Quantitative, Tobit regression	321 agri-food firms	2002–2017	44 countries
García-Sánchez et al. (2020b)	Female directors increase the probability of voluntary reporting on gender issues The greater reporting on gender issues that female directors achieve is even higher when firms are located in stakeholder-oriented countries	+	Disclosure	Neo-institutional theory	Quantitative, logistic regression for panel data	8,609 firm-year observations	2007–2016	United States, Europe, the Middle East, Africa, Asia
Girón et al. (2020)	Operating in the manufacturing sector and having a higher percentage of women directors in the company's management structure are positively related to the adoption of sustainability reporting	+	Disclosure	None	Quantitative, logit and regression model	366 large firms	2017	Asia, Africa
Glass et al. (2016)	Firms characterized by gender diverse leadership teams are more effective than other firms at pursuing environmentally friendly strategies	+	Sustainable activity	Gender homophily perspective, gender socialization theory	Quantitative, negative binomial regression with fixed effects	473 Fortune 500 firms	2001–2010	United States

Author	Gender-related findings	Gender effect	Topic	Theoretical approach	Method	Sample	Years	Country
Goebel et al. (2018)	Purchasing managers on average are willing to pay a price premium for manuals that demonstrate compliance with the United Nations Global Compact This willingness to pay is mostly influenced (negatively) by self-enhancement (on the individual level) and/or obedience to authority (on the organizational level), but the effects of company, affiliation with the United Nations Global Compact, gender, or years of experience have no influence	No	Sustainable activity	Transaction cost	Quantitative, choice-based analysis and binary logistics regression	59 purchasing professionals	2009	Germany
Graafland (2020)	Having more women in management positions improves the sustainability of SMEs The effect is nonlinear and sustainability reaches its maximum when the proportion of women managers is 54%	+	Sustainable activity	Critical mass theory, gender socialization theory, social role theory	Quantitative, structural equation modeling (SEM) with maximum likelihood as estimation technique	3,663 SMEs	2011	Europe
Haque (2017)	Board independence and board gender diversity have positive associations with carbon reduction initiatives	+	Sustainable activity	Agency theory, resource dependence theory	Quantitative, fixed effects regression	256 non-financial firms	2002–2014	United Kingdom

Author	Gender-related findings	Gender effect	Topic	Theoretical approach	Method	Sample	Years	Country
Hollindale et al. (2019)	Companies with multiple female directors make greenhouse gas emissions related disclosures that are of higher quality	+	Disclosure	Board capital theory, institutional theory	Quantitative, logit and tobit regression	406 firms	2007	Australia
Huang (2013)	CEO tenure and gender are shown to affect firms' CSR performance	+	Sustainability performance	Stakeholder theory	Quantitative, regression	661 firms	2005–2010	Not available
Issa and Fang (2019)	A statistically significant relationship between the number of female directors and the level of CSR disclosure Board gender diversity is positively associated with the level of CSR reporting in two countries A weak positive relationship between the presence of women on the boards and CSR reporting index in Oman, Qatar, Saudi Arabia and the UAE	+	Disclosure	Institutional theory	Quantitative, regression, content analysis	244 non-financial listed firms	2012–2014	Multi Countries: six Arab Gulf states, Saudi Arabia, Oman, Kuwait, Bahrain, Qatar and the UAE
Javaid Lone et al. (2016)	Independent directors, women directors and board size positively affect the extent of CSR disclosure	+	Disclosure	None	Quantitative, content analysis, regression	50 firms from eight different sectors	2010–2014	Pakistan

Author	Gender-related findings	Gender effect	Topic	Theoretical approach	Method	Sample	Years	Country
Jizi (2017)	Female participation on BoD is favorably affecting CSR engagement and reporting as well as the establishment of ethical policies BoDs with higher female participation and independence boost the legitimacy of CSR reporting Board gender diversity and independence facilitates directing part of the firm's scarce resources toward value maximizing social projects and subsequent reporting on these	+	Sustainable activity; Disclosure	Agency theory	Quantitative, fixed effects regression	350 FTSE firms	2007–2012	United Kingdom
Kassinis et al. (2016)	Both demographic' and structural' gender diversity are significant predictors of a firm's environmental sustainability initiatives Gender diversity is a sustainability issue as well	+	Sustainable activity	None	Quantitative, panel data regression	296 publicly traded firms	2008–2012	United States
Khan, Khan, Saeed (2019a)	Gender, nation, and tenure diversity are resources improving the quality of corporate social responsibility disclosure There is no universal law of CSR supportive board diversity, due to the unique characteristic of various institutional contexts	±	Disclosure	Resource based view	Quantitative, panel data regression	86 firms listed in Pakistan Stock Exchange	2010–2017	Pakistan

Author	Gender-related findings	Gender effect	Topic	Theoretical approach	Method	Sample	Years	Country
Khan, Khan, Senturk (2019b)	Gender and national diversities are the firms' valuable resources, having the potential to promote the quality of corporate social responsibility disclosure	+	Disclosure	Resource based view	Quantitative, regression	57 firms	2010–2017	Pakistan
Kilincarslan et al. (2020)	Gender diversityin BoDs impacts positively on firms' voluntary environmental disclosures	+	Disclosure	Neo-institutional theory	Quantitative, regression	121 publicly listed (non-financial and non-utility) firms	2010–2017	11 Middle East and Africa countries
Li et al. (2017)	Gender diversity on BoD has a positive relationship with firms' environmental policy Firm character in terms of pollution creation likelihood moderates the relationship between gender diversity on boards and firms' environmental policy Gender diversity is important for the development of good firm environmental policy as well as for the improvement of corporate governance The more likely firms in a given industry are to cause environmental pollution, the more salient will be the beneficial effect of gender diversity on boards on firms' environmental policy in the industry	+	Sustainable activity	Institutional theory, upper echelon theory	Quantitative, hierarchical multiple regression	865 publicly listed firms	Starting from 2010	United States

Author	Gender-related findings	Gender effect	Topic	Theoretical approach	Method	Sample	Years	Country
Liao et al. (2018)	Firms with a large board size, more female directors, and separation of CEO and chairman positions are more likely to engage in CSR assurance Gender diversity also influences the CSR assurance provider choice	+	Sustainable activity	Critical mass theory, institutional theory	Quantitative, regression	2,054 listed firms	2008–2012	China
Lopatta et al. (2020)	Female labour representatives at the board level contributes to CSR and environmental performance	+	Sustainable activity; Sustainability performance	None	Quantitative, regression	24,485 firm-quarter observations	2001–2014	23 countries
Loukil et al. (2019)	The presence of female independent directors reduces company involvement in sustainable development projects	-	Sustainable activity	Multi-theories: Agency theory, resource dependence theory, upper echelon theory	Quantitative, regression	81 firms listed on the Paris Stock Exchange	2002–2012	France
Lu and Herremans (2019)	Gender diversity is positively associated with firms' environmental performance scores primarily in the more environmentally impacting industries	+	Sustainability performance	Resource dependence theory	Quantitative, propensity score matching and controlling for endogeneity, content analysis	837 firms	2009–2015	United States

Author	Gender-related findings	Gender effect	Topic	Theoretical approach	Method	Sample	Years	Country
Lu et al., (2020a, 2020b)	Female respondents highlighted different factors having impact on successful implementation of CSR initiatives Female managers were more convinced to the benefits of CSR practices than male ones For females, communication skills are the most important for implementing CSR strategy	+	Sustainable activity	None	Quantitative, descriptive statistics	72 medium-size enterprises	2019	Lithuania
Nadeem (2020)	Board gender diversity appear to have no impacts on undertaking supplemental environmental projects	No	Sustainable activity	Stakeholder theory	Quantitative, probit regression	226 firms	2002–2015	United States
Nadeem et al. (2020)	Board gender diversity has a significant positive association with environmental innovation This relationship is more pronounced in less profitable firms and in environmentally sensitive industries	+	Sustainable activity	Gender socialization theory, upper echelon theory	Quantitative, OLS and fixed effect regression	10,334 firm-year observations of listed firms	2002–2018	United States

Author	Gender-related findings	Gender effect	Topic	Theoretical approach	Method	Sample	Years	Country
Ong and Djajadikerta (2018)	Significant positive correlations were found between the extent of sustainability disclosures and the proportion of independent directors, multiple directorships and female directors on the BoD	+	Disclosure	None	Q uantitative, non-parametric Kendall's tau-b	133 firms listed on the Australian Securities Exchange (ASX)	2012	Australia
Orazalin and Baydauletov (2020)	Board gender diversity is positively associated with environmental and social performance The positive relationship between CSR strategy and environmental performance is negatively moderated by board gender diversity National governance quality and firm size are important underlying factors affecting corporate environmental and social performance	±	Sustainable activity; Sustainability performance	Resource dependence theory, upper echelon theory	Quantitative, panel data regression	2,624 firm-year observations from listed firms	2009–2016	Multy Countries: European Nations
Pan et al. (2020)	Female executives' participation had double positive effects on corporate sustainable competitive advantage, which included both the inhibiting effect on unethical environmental behavior and the stimulating effect on proactive environmental strategies	+	Sustainable activity	Mutli-teories: Ecofeminist theory, natural resource based theory, upper echelon theory	Quantitative, regression	496 female executives from listed 524 firms in the manufacturing sector	Ante 2020	China

Author	Gender-related findings	Gender effect	Topic	Theoretical approach	Method	Sample	Years	Country
Post et al. (2015)	The higher the representation of women on a firm's BoD, the more likely the firm is to form sustainability-themed alliances The higher the representation of independent directors on a firm's board, the more likely the firm is to form sustainability-themed alliances Such alliances, in turn, positively contribute to corporate environmental performance	+	Sustainable activity; Sustainability performance	Resource dependence theory, upper echelon theory	Quantitative, negative binomial regression (with random effects)	36 oil and gas firms	2004–2008	United States
Provasi and Harasheh (2020)	There is a significant association between female involvement on BoDs and corporate sustainability performance Firms that improved female representation had an ethical score upgrade There is an optimal level of gender quotas that maximizes sustainability performance	+	Sustainability performance	None	Quantitative, yearly regression analysis, pooled analysis, and differential analysis	40 firms of the FTSE-MIB	2016–2018	Italy

Author	Gender-related findings	Gender effect	Topic	Theoretical approach	Method	Sample	Years	Country
Qureshi et al. (2020)	A positive impact of sustainability disclosure and board gender diversity on firm value, suggesting that the best management practices, enhanced stakeholder trust, and female representation on boards improve firm value The firms with higher female representation on their boards present significantly superior environmental, social, and governance performance	+	Sustainability performance; Firm performance and value	Stakeholder theory	Quantitative	812 listed firms	2011–2017	Multy Countries: 22 European Nations
Rao and Tilt (2020)	There is a general perception that gender diversity has the potential to influence board level decisions This perception does not appear to translate to CSR decisions specifically There are several issues and moderating factors interact with the gender-CSR relationship	No	Sustainable activity	Resource dependence theory, upper echelon theory	Qualitative	13 in-depth semi-structured interviews with board members	Ante 2020	Australia

Author	Gender-related findings	Gender effect	Topic	Theoretical approach	Method	Sample	Years	Country
Rehman et al. (2020)	Firms with gender diverse boards are greener There is a positive and statistically significant but economically modest link between environment management systems and firm financial performance The inclusion of board gender diversity as moderator significantly improves the relationship between environment management systems and firm performance CEO gender is linked to better performance only in firms with low female board diversity	+	Sustainable activity; Firm performance and value	Gender socialization theory, diversity theory	Quantitative, Tobit regression	Around 3,000 firms	2006–2018	14 Asian and Middle Eastern countries
Reyes-Bastidas and Briano-Turrent (2018)	Women's participation has a positive impact on the economic dimension (profitability and liquidity) The environmental and social dimensions are decreased when women are in a leading position	±	Sustainability performance; Firm performance and value	Stakeholder theory	Quantitative, regression	491 listed firms	2011–2016	Multy Countries: Colombia and Chile

Author	Gender-related findings	Gender effect	Topic	Theoretical approach	Method	Sample	Years	Country
Said et al. (2018)	Female directors are unique governance determinant of enhanced CSR disclosure, systematically adding credence to the gender-based argument of having more female board representation	+	Disclosure	Critical mass theory	Quantitative, regression	151 firms from Australian Securities Exchange (ASX)	Starting from 2004	Malaysia
Setó-Pamies (2015)	Gender diversity has a positive influence on CSR Female talent can play a strategic role in enabling firms to manage their social responsibility and sustainable practices appropriately	+	Sustainable activity	Multi-theories: agency theory, critical mass theory, resource dependence theory	Quantitative, regression	94 firms	2011	Multy Countries
Shahbaz et al. (2020)	Board gender diversity is more influential on the sustainability performance in the environmental and governance aspects	+	Sustainability performance	Agency theory, stakeholder theory	Quantitative, pooled OLS, fixed effects regressions	2,081 firms	2011–2018	Multi Countries

Author	Gender-related findings	Gender effect	Topic	Theoretical approach	Method	Sample	Years	Country
Shoham et al. (2017)	Organizations become significantly more proactive in environmental sustainability with the appointment of even one woman to the BoD, regardless of the local culture The organization's level of disclosure increases with the number of women on the BoD A significantly negative relationship between various gender-based language indices and the presence of women on the BoD In cultures defined by a language that has clear grammatical gender markings, there is a tendency to appoint fewer women to boards of directors, thereby influencing indirectly the organization's attitude towards environmental sustainability	+	Sustainable activity; Disclosure	Micro-foundational approach	Quantitative	4,500 organizations for multiple years and industries	Multiple years	Multy Countries: 71 Nations
Tamimi and Sebastianelli (2017)	Higher ESG disclosure scores are observed for S&P 500 firms with larger BoDs, with BoDs that are more gender diverse, that allow CEO duality, and that link executive compensation to ESG scores	+	Disclosure	Stakeholder theory	Quantitative, nonparametric procedures	334 S&P 500 firms	Ante 2017	United States

Author	Gender-related findings	Gender effect	Topic	Theoretical approach	Method	Sample	Years	Country
Tapver et al. (2020)	A positive association between the proportion of women on BoDs and banks' CSR disclosure Positive association remains also after quota corrections for banks with either below- or above-quota female representation Adding more women to BoDs than required by quota could affect boards' CSR reporting in masculine countries but not in feminine countries	+	Disclosure	Agency theory, stakeholder theory	Quantitative, logistic regressions	285 commercial banks	2005–2017	Multy Countries
Tingbani et al. (2020)	A strong positive association between greenhouse gas voluntary disclosures and gender diversity Being diverse and open to a mixed-gender governance approach, a firm can better serve the demands of stakeholders and legitimise their green credentials, thus gaining more trust from a broad range of stakeholders other than their shareholders	+	Disclosure	Legitimacy theory, resource dependence theory, stakeholder theory	Quantitative	215 firms listed on the London Stock Exchange market	2011–2014	United Kingdom
Uyar et al. (2020)	Having a CSR committee and female directors on the BoD lead to superior CSR performance in all dimensions, including ESG	+	Sustainability performance	Resource dependence theory, upper echelon theory	Quantitative, panel data analysis	firms in hospitality and tourism	2011–2018	Multi Countries

Author	Gender-related findings	Gender effect	Topic	Theoretical approach	Method	Sample	Years	Country
Valls Martínez et al. (2019)	Female presence in management positions is positively linked to a voluntary disclosure of CSR reports and the inclusion in a sustainability index, which supports gender legislation	+	Disclosure	Multi-theories: Agency theory, legitimacy theory, resource dependence theory, socialization theory, stakeholder agency theory, stakeholder theory	Quantitative, probit models and instrumental variable estimation	326 (Global Reporting Initiative database) and 205 (Dow Jones Sustainability Index database) listed firms	2003–2017	Spain
Valls Martínez et al. (2020)	There is an increasing influence of women directors on CSR performance up to a limit Gender-diverse BoDs are favourable to the sustainable behaviour of companies	+	Sustainable activity; Sustainability performance	Multi-theories: Agency theory, legitimacy theory, resource dependence theory, social role theory, stakeholder agency theory, stakeholder theory	Quantitative, OLS and fixed effect regression	2,265 firms listed in the S&P 500 and 1,435 firms listed in Euro Stoxx 300 indices	2015–2019	Europe, United States
Wiengarten et al. (2017)	The greatest financial performance benefits can be achieved if the appointee is female and has a CSR functional background	+	Sustainable activity; Firm performance and value	Behavioral perspective	Quantitative, OLS regression	123 appointment announcements for chief executive of CSR to existing or newly created positions by US listed firms	2004–2012	United States

Author	Gender-related findings	Gender effect	Topic	Theoretical approach	Method	Sample	Years	Country
Xie et al. (2020)	Women on BoDs contribute to the promotion of proactive environmental strategies, including the pollution prevention strategy and the sustainable development strategy Women on BoDs can be seen as a key resource in the organizational process, which provides a shared vision of the future and strong moral leadership to the top management team	+	Sustainable activity	Resource based view	Quantitative, panel data regression	3,389 firms worldwide	2011–2016	Multy Countries
Yasser et al. (2017)	A significant relationship between board gender diversity and enhanced adoption of CSR in these emerging markets Female directors can play a strategic role in enabling firms to ethically manage their social responsibilities and sustainable practices has important policy implications for regulators and stakeholders	+	Sustainable activity	Institutional theory, stakeholder theory	Quantitative, multiple regression	1131 firm-year observations	2010–2014	Multy Countries: Malaysia, Pakistan, and Thailand

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Declarations

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