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The 2030 Agenda and sustainable development in tourism firms: Board gender diversity and environmental policy on natural resource use

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Abstract

This study examines whether gender diversity on the board of directors determines the performance of tourism firms in terms of their use of natural resources. A variable measuring environmental performance in response to the targets of the Sustainable Development Goals (SDGs) is created for the first time. The creation of this variable represents the main contribution of this study. Focusing on the under-researched environmental dimension of natural resource use also contributes to the literature. A third contribution is the choice of the tourism sector, since its performance from the perspective of the SDGs has not been assessed in previous literature. Data correspond to a sample of 163 tourism companies over the period 2015–2020. Fixed effects estimation provides robust evidence of the importance of including female talent on the board of directors. Women's inclusion on the board can promote environmental policies that seek sustainable development.

KEYWORDS
board gender diversity, environmental performance, resource use, sustainable development, Sustainable Development Goals, tourism companies

1 | INTRODUCTION

Urgent action to protect the planet is needed in a world where human activity is destroying the natural environment and depleting the planet's limited resources. This urgent need has prompted responses from numerous organisations (McDonald & McCormack, 2021). One example is the adoption of the 2030 Agenda, which is built on five pillars (People, Planet, Prosperity, Peace and Partnership) and consists of 17 goals. Collectively, these goals are known as the Sustainable Development Goals, or SDGs (United Nations, 2015). One of the main challenges set out in the 2030 Agenda is the environmental emergency facing humanity. This challenge, which is part of the Planet pillar (United Nations, 2015), is specifically addressed in SDG 6 (Clean Water and Sanitation), SDG 12 (Responsible Consumption and Production), SDG 13 (Climate Action), SDG 14 (Life Below Water) and SDG 15 (Life on Land).

To address this environmental challenge and meet these SDGs, all business sectors must collaborate. The tourism sector is crucial in this sense due to its strategic role in the economy, its vital role in protecting the environment and its relevance in the 2030 Agenda (Jones et al., 2017). In the 2030 Agenda of the United Nations (2015), this sector is mentioned in some of the targets of SDG 8 (Decent Work and Economic Growth), SDG 12 (Responsible Consumption and Production) and SDG 14 (Life Below Water). The fact that the tourism

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sector is mentioned among the targets of these SDGs reflects its prominent role in the 2030 Agenda, which is justified for the following reasons. The relationship between tourism and the environment is acknowledged to be highly complex given the difficulty of finding a balance between economic development and the conservation of natural heritage. However, tourism is the third largest export category worldwide and provides millions of jobs. It therefore has a major impact on socioeconomic development, culture and the environment. Given its scope, well-managed tourism can offer a key vehicle to help countries fulfil the 2030 Agenda (World Tourism Organization [UNWTO], 2023b). This prominent role of tourism is supported by the UNWTO and the United Nations Development Programme [UNDP] (2017) and their commitment to economically and environmentally sustainable development. Despite this commitment and efforts to make tourism sustainable, the tourism sector is characterised by an intensive use of natural resources (Gössling & Petters, 2015). Irresponsible consumption and poor management of natural resources are among the biggest challenges facing the sector (UNWTO and UNDP, 2017). Hence, it is important to identify the factors that determine the effective management of these scarce resources in order to overcome the aforementioned challenges and propel the shift towards more sustainable tourism, as proposed in the SDGs.

According to Leisher et al. (2015), environmentally friendly business practices, such as reducing natural resource use and efficiently managing resources, may be conditioned by the gender of those who are responsible for their management. Therefore, gender diversity may be a key governance characteristic for companies' environmental performance (Kuzey et al., 2022). For instance, a greater presence of women on the board of directors contributes to making firms more aware of climate change and problems in the environment (Burkhardt et al., 2020; García-Martín & Herrero, 2020). Likewise, female managers display a more favourable attitude and intention towards environmental issues than male managers (Dalvi-Esfahani et al., 2019) because they are more concerned about environmental risks (Bord & O'Connor, 1997). Hence, some studies have shown that the presence of women on the board of directors has a positive effect on organisations' reduction of natural resource use (Atif et al., 2020; Biswas et al., 2018; Kuzey et al., 2022). Nevertheless, empirical evidence of such a relationship is scarce. In fact, there is virtually no evidence in the case of the tourism sector, for which there is only one study on this topic (Fernández-Torres et al., 2021). Moreover, despite the scope of the 2030 Agenda and its emphasis on sustainability, none of these studies have used the commitment of companies to the SDGs to measure their environmental performance.

To fill these gaps in the literature, a focus on tourism activity is required for two reasons. The first is the importance of this sector in relation to the 2030 Agenda and the resource use challenges it faces. The second is the scope of the implications of addressing gender issues in relation to the board of directors and its consequences for firms' environmental performance. Although women account for 54% of the labour force in the tourism sector (UNWTO, 2023a), they usually occupy low-qualified jobs at a low level of the organisational hierarchy with little prospect of professional development (Baum et al., 2016). Together with the male dominance of corporate boards, this situation highlights the need to continue working towards SDG 5 (Gender Equality) in tourism companies (United Nations, 2015). This SDG is critical because its attainment could help maximise the potential of the tourism sector (Baum et al., 2016) and eliminate the gender discrimination suffered by women in several areas, including work (Wamboye et al., 2015). Achieving SDG 5 could also help tourism companies fulfil the 2030 Agenda (Moreno-Alarcón & Cole, 2019) because a gender approach is needed for the development of sustainable tourism (Ferguson & Moreno-Alarcón, 2015).

Therefore, this study is justified for several reasons. First, tourism plays a key role in the urgent environmental actions proposed in the 2030 Agenda and thus contributes to its Planet pillar (Jones et al., 2017). Examples of these environmental actions include those related to the reduction of the use of natural resources in the form of consumption of energy and water and initiatives to achieve the efficient use of these resources. The tourism sector also contributes to the 2030 Agenda through the use of renewable energy, the recycling and reuse of natural resources, and the conservation of biodiversity (UNWTO and UNDP, 2017). Second, gender diversity on the board of directors plays a key role in driving actions to protect the planet, an area of great interest in the tourism sector. Third, there is scant evidence of the relationship between board gender diversity and environmental actions in terms of natural resource use. Fourth, it is important to consider the commitment of companies to the SDGs in the development of measures of environmental performance. Such measures would enable monitoring of the environmental actions that companies take to fulfil the 2030 Agenda. These measures would thus help evaluate firms' commitment to the SDGs and the implementation of measures that encourage such a commitment. Although the spread of SDG-related environmental practices could lead to greenwashing, studies have shown that the alignment of business goals with the SDGs supports the adoption of sustainable initiatives (Nishitani et al., 2016) and better environmental performance in terms of resource efficiency and waste production (Nishitani et al., 2021).

The aim of this research is to contribute to the scant literature in this area by determining whether board gender diversity exerts a significant influence on the fulfilment of the 2030 Agenda through performance that is conducive to the reduction of natural resource use in the tourism sector. A multi-theoretical framework built around agency theory, resource dependency theory, stakeholder theory, social role theory and critical mass theory forms the basis for this study. Data are sourced from an international sample of 163 tourism companies for the period 2015–2020. The analysis is based on a fixed effects model. The results provide robust evidence that greater female representation on the board of directors helps fulfil the 2030 Agenda through policies and practices that reduce natural resource use. Having one woman on the board is enough to exert a noticeable influence.

The main contribution of this research is the use of a novel SDG-based index created especially for this study. Specifically, a composite indicator is defined to capture practices aimed at improving organisational performance in terms of the reduction of the use of natural resources in response to targets from SDG 6 (Clean Water

and Sanitation), SDG 7 (Affordable and Clean Energy), SDG 9 (Industry, Innovation and Infrastructure), SDG 12 (Responsible Consumption and Production), SDG 13 (Climate Action) and SDG 15 (Life on Land). Several strong arguments support the contribution of the proposed indicator. First, this indicator differs from those proposed in previous studies in that it was created using variables that are all aligned with the achievement of the targets of the SDGs. Thus, this paper is the first to define an indicator of environmental performance in terms of natural resource use that assesses an organisation's commitment to the 2030 Agenda through the environmental actions it takes in this area. By focusing on the tourism sector, this study offers a novel way of addressing key issues in tourism that have not yet been tackled. Specifically, it provides a tool to enable the measurement and evaluation of tourism firms' commitment to the SDGs, as well as conditioning factors. This tool also offers the potential to measure and evaluate the behaviour of tourism businesses regarding one of their greatest responsibilities, namely the sustainable management of natural resources. In building this indicator, various practices related to natural resource use are considered. This approach differentiates this study from others that focus exclusively on the effect of board gender diversity on specific resource use actions. Examples include the studies of renewable energy use by Atif et al. (2020) and Khatri (2021) and waste recycling by Marchini et al. (2022). This paper also provides evidence of the effect of women's board representation on an under-researched environmental performance dimension for a sector that has received scant attention in the literature. It is only the second study of tourism companies, although it is the first to define environmental performance in line with the scope of the SDGs. Therefore, this paper is the first to provide awareness of the importance of ensuring board gender diversity in order to fulfil the 2030 Agenda through practices that promote a reduction in natural resource use by firms in general, particularly those in the tourism sector.

Consequently, this study differs from previous research in several ways. First, most studies that examine the effect of board gender diversity on environmental performance use composite indicators that include a range of types of environmental practices. This approach limits the ability to identify the effect of this facet of corporate governance on specific environmental dimensions, which is important given the conceptual differences between these dimensions. Moreover, when using these indicators, the importance of commitment to the SDGs has always been overlooked. Second, the vast majority of studies of this topic address general environmental performance. Studies of specific dimensions of environmental performance have most commonly examined emissions reductions and environmental innovation. In contrast, the environmental dimension addressed by the current study is under-researched. Finally, in general, studies have used multisector samples (De Masi et al., 2022; Sá de Abreu et al., 2023). Very few studies have used samples from specific sectors such as banking (Fakoya & Nakeng, 2019; Gangi et al., 2023) and tourism (Fernández-Torres et al., 2021).

This article has four further sections. The second section provides the theoretical foundations for the influence of women board members on natural resource use. It also provides a review of the literature on this relationship. The third section describes the sample, variables and method. The fourth section presents and discusses the results. Finally, the fifth section outlines the conclusions of the study, its limitations and future lines of research.

2 | THEORETICAL FRAMEWORK AND HYPOTHESES

2.1 | Women's participation on the board of directors and environmental performance: theoretical underpinnings

This study uses a multi-theoretical framework built around agency theory (Jensen & Meckling, 1976), resource dependency theory (Pfeffer & Salancik, 1978), stakeholder theory (Freeman, 1984), social role theory (Eagly, 1987) and critical mass theory (Kanter, 1977). Such a framework is used because no single theory provides full justification of the influence of board gender diversity on environmental performance (Issa & Zaid, 2021; Shahab et al., 2022) and thereby on a reduction in natural resource use (Kuzey et al., 2022; Marchini et al., 2022). The fact that these theories are based on different concepts shows that there is no single route through which the presence of women on the board of directors influences environmental performance. The complexity of this relationship implies a need to consider a range of aspects (the functions of the board, the interests of a range of stakeholders, gender-based differences and the need for minimum representation of minority groups). Consequently, it is important to consider all of these theories in the conceptual framework used to justify this relationship. These theories complement each other, thus providing a more solid theoretical foundation (Issa & Zaid, 2021; Kuzey et al., 2022; Shahab et al., 2022).

First, according to agency theory (Jensen & Meckling, 1976), the separation of ownership and control of a firm gives rise to a lack of alignment between the interests of shareholders and managers, resulting in agency costs. The board of directors plays an essential role in reducing these costs given its function of overseeing and monitoring the business strategy (Zahra & Pearce, 1989). Greater female representation on the board gives it greater diversity and so improves its critical role in overseeing and monitoring corporate social responsibility (CSR) strategies and actions (Huse et al., 2009). This monitoring enables women board members to contribute to improving environmental performance and reducing the use of natural resources (Biswas et al., 2018; Jizi, 2017).

Second, according to resource dependency theory (Pfeffer & Salancik, 1978), firms operate under constant uncertainty and dependence on their environment. These conditions can be mitigated thanks to the board of directors because it plays an important role in linking the organisation with its surroundings and in endowing it with critical resources (Pearce & Zahra, 1992). Women bring unique skills and values to the board through their talent and experience, leading to better decisions. These decisions include those related to

environmental practices (García-Martín & Herrero, 2020) such as natural resource use reduction, emissions reduction and environmental innovation (Kuzey et al., 2022).

Third, according to stakeholder theory (Freeman, 1984), besides protecting the interests of shareholders, companies must also defend those of other stakeholders. The inclusion of women on the board of directors can increase the representation of different perspectives and voices in decision-making, helping push the debate beyond the discussion of financial performance (Biswas et al., 2018). The reason is that women's attitude is more oriented towards the well-being of others (Beutel & Marini, 1995). Together with women's concern for environmental risk (Bord & O'Connor, 1997), this attitude leads to a greater focus on non-financial performance. Hence, a company's response to stakeholders' demands is reflected in environmental actions (Post et al., 2011), including the implementation of policies on energy efficiency (Jizi, 2017) and a reduction in the consumption of water (García-Martín & Herrero, 2020; Van Hoang et al., 2021).

Fourth, according to social role theory (Eagly, 1987), there are differences in behaviour between men and women due to traditional social roles. These differences, which influence the leadership style adopted by members of each gender, are important for the performance of certain functions of the board of directors (Yukl, 2002). According to Masud et al. (2017), women are more receptive to and have greater awareness, risk perception and knowledge of climate change. Therefore, greater female representation on the board of directors supports the implementation of practices and policies to reduce natural resource use (Biswas et al., 2018), including greater consumption of renewable water (Atif et al., 2020; Khatri, 2021).

Finally, according to critical mass theory (Kanter, 1977), minority groups within a larger group, as is the case of women on the board of directors, must achieve a minimum level of representation within this larger group so that they are listened to and included. In the words of Kristie (2011, p. 22), "one is a token, two is a presence, and three is a voice". This idea implies that the inclusion of only one woman in a group made up of men would merely be symbolic. In contrast, the presence of three women would allow their influence to contribute to better organisational outcomes (Torchia et al., 2011) in terms of financial performance (Joecks et al., 2013; Qayyum et al., 2021) and sustainability (Khatri, 2023; Yarram & Adapa, 2021). Female representation of at least three board members positively influences the environmental performance of firms (Post et al., 2011; Shoham et al., 2017). This positive effect has been observed in the specific cases of renewable energy consumption (Atif et al., 2020), the reduction of greenhouse gas (GHG) emissions (Nuber & Velte, 2021) and Carbon Disclosure Project (CDP) participation (Ben-Amar et al., 2017).

Although these corporate theories do not directly address the differences in environmental performance derived from the inclusion of women on the board of directors, they can provide useful perspectives and conceptual frameworks to understand how this inclusion can influence a firm's environmental performance and decisions.

2.2 | Board gender diversity and natural resource use: a literature review

Corporate governance mechanisms are closely linked to the environmental engagement of firms (Gangi et al., 2019). More effective boards of directors contribute to a greater extent to the adoption of environmental strategies and are therefore crucial in improving firms' environmental performance (Gangi et al., 2019; Tseng et al., 2020). This effectiveness of the board increases with its independence or diversity (Arayakarnkul et al., 2022; Sá de Abreu et al., 2023). Moreover, the inclusion of board members with an attitude aligned with care for the environment supports the adoption and implementation of environmental strategies (Cosma et al., 2021). Many studies have highlighted the key role of women board members in pushing environmental initiatives (Issa & Zaid, 2021; Wang et al., 2021) because women show a more caring attitude towards the planet (Wehrmeyer & McNeil, 2000). Women prefer to use renewable energy (Longstreth et al., 1989) and select socially responsible suppliers with a minor environmental impact (Ruel & Fritz, 2021). Nevertheless, few studies have explored the influence of board gender diversity on the environmental performance of companies. Even fewer have addressed the environmental performance dimension of the reduction of natural resource use. Specifically, only seven studies could be identified that provide evidence of the impact of gender diversity on the reduction of natural resource use, considering a series of practices that make up this environmental dimension. Generally, these studies imply that greater female representation on the board of directors promotes the adoption of environmental practices to reduce natural resource use. The results of these studies are based on samples from different contexts. Sá de Abreu et al. (2023) employed a sample of Latin American firms. Biswas et al. (2018) studied 407 Australian non-financial firms, whereas Orazalin and Baydauletov (2020) considered European firms. In contrast, Gangi et al. (2023) took a sample of banks from around the world, and Kuzey et al. (2022) selected a global sample of logistics firms. De Masi et al. (2022) found that promoting gender diversity on the board of directors did not influence the reduction of natural resource use in a sample of Italian companies. Finally, Fernández-Torres et al. (2021) studied an international sample of tourism companies, showing that a greater presence of women on the board of directors of these companies worsened environmental performance (i.e. increasing emissions and the use of natural resources) but contributed to greater environmental innovation.

In addition to these seven studies that consider the reduction of natural resource use as a set of practices, other studies have addressed certain specific aspects of natural resource use. Specifically, three studies were found concerning the consumption of water resources and waste production. Based on a sample of 644 non-financial firms in the European Union, García-Martín and Herrero (2020) found that female directors promote waste reuse and less use of water resources. Van Hoang et al. (2021) partially corroborated these results for a multisector sample of 361 U.S. eco-innovative companies. They found that greater female board representation contributes to a reduction in water consumption but has no effect on waste production. In Italy, Marchini

et al. (2022) reported the need to implement quotas of 20% women board members to promote waste recycling.

Finally, six studies were identified that provide evidence of the impact of board gender diversity on energy resource consumption. Jizi (2017) reported that a higher proportion of women on the board supports the adoption of energy efficiency policies. Atif et al. (2020), García-Martín and Herrero (2020), Khatri (2021) and Zhang et al. (2021) argued that such diversity promotes the use of renewable energy. However, the effect of gender diversity on energy resource consumption may differ depending on the legal system. Studies suggest that this effect is positive in civil law countries but negative in common law countries (Zhang et al., 2021). Fakoya and Nakeng (2019) studied a sample of 28 South African banks. They reported that unlike other board characteristics (e.g. board member independence), which help reduce energy use, gender diversity does not play a decisive role in this regard.

Table 1 provides a summary of the existing evidence of the influence of board gender diversity on the reduction of natural resource use. According to the dependent variable of the study, the table indicates whether the evidence is for this environmental performance dimension in general or for specific actions.

In short, although some studies provide evidence to the contrary, most indicate that board gender diversity exerts a positive influence on the reduction of natural resource use based on the theories described in Section 2.1. Two hypotheses are proposed based on the previous evidence. The first hypothesis is also based on the arguments supporting the idea that women board members contribute to better oversight of environmental actions (agency theory), the provision of critical resources required by the board (resource dependency theory), better defence of stakeholder interests (stakeholder theory) and the encouragement of pro-environmental behaviours (social role theory). Given that the conceptual framework for this study is also based on critical mass theory, a second hypothesis is proposed to capture these arguments.

> **Hypothesis 1.** Greater gender diversity on the board of directors positively influences tourism firms' contribution to the 2030 Agenda through enhanced environmental performance based on practices to reduce natural resource use.

> **Hypothesis 2.** A critical mass of women on the board of directors is needed so that the presence of these women can exert a positive influence on tourism firms' contribution to the 2030 Agenda through enhanced environmental performance based on practices to reduce natural resource use.

3 | SAMPLE, VARIABLES AND METHODOLOGY

3.1 | Sample

The sample was drawn from the group of all listed tourism companies for which Thomson Reuters (Refinitiv, 2022) provided data on environmental, social and governance (ESG) performance at the time of conducting the study on 11 January 2022 (258 firms). However, only companies with data for at least 4 years were included in the final sample. This requirement was necessary to ensure a panel of data that allowed the use of lags of explanatory variables as instruments to verify and, if necessary, correct for endogeneity (Fernández-Torres et al., 2021). Therefore, the final sample comprised 163 companies from 32 countries across five continents: 81 from America, 30 from Asia, 30 from Europe, 16 from Oceania and 6 from Africa. According to the classification by type of activity (Refinitiv, 2022), these firms operated in four subsectors: 57 in Restaurants and Bars, 34 in Hotels, Motels and Cruise lines, 49 in Casinos and Gaming and 23 in Leisure and Recreation (see Table 2). The study spanned the broadest possible period, which ran from 2015 to 2020. The year 2020 was the last year for which data were available at the time of performing the study. The year 2015 was when the 2030 Agenda was adopted (United Nations, 2015). Therefore, it was the first year for which the SDGs were recognised and data were generated. Finally, listed companies were selected because they have greater resources to address the 2030 Agenda. In addition, they are more likely to disclose information on their responsible practices in compliance with regulations (Carvajal et al., 2022).

3.2 | Dependent variable (*IndRU*)

Most studies that measure environmental performance as a whole or one or more of its three dimensions (resource use, emissions and environmental innovation) use scores from databases such as the Kinder, Lydenberg, and Domini (KLD) database (Post et al., 2011), Bloomberg (Van Hoang et al., 2021) and Thomson Reuters (Kuzey et al., 2022; Orazalin & Baydauletov, 2020). However, some studies have used a proprietary indicator based on firms' emissions reduction initiatives (Haque, 2017) and environmental innovation (Nadeem et al., 2020). In contrast, the present study adopts a novel alternative approach, using a proprietary composite indicator of companies' commitment to the 2030 Agenda through practices to reduce natural resource use.

To construct this composite indicator, 17 initial variables were selected. These 17 variables form the entire set of variables offered by Thomson Reuters (Refinitiv, 2022) that meet the two conditions of (i) addressing the environmental dimension of resource use and (ii) being directly related to the SDG targets. They are dichotomous variables that take the value 1 if the company performs a certain action (e.g. adoption of resource use efficiency policies or goals) and 0 otherwise (see Table A1). They are linked to targets of SDG 6 (Clean Water and Sanitation), SDG 7 (Affordable and Clean Energy), SDG 9 (Industry, Innovation and Infrastructure), SDG 12 (Responsible Consumption and Production), SDG 13 (Climate Action) and SDG 15 (Life on Land).

These variables were subjected to the multivariate technique of principal component analysis (PCA) to create an indicator consisting of the most relevant information. This process entails the creation of structures of interdependence between the variables called principal

TABLE 1 Evidence of the relationship between board gender diversity and resource use reduction.

Relation	Variable of natural resource use performance	Authors	Objective	Sample and methodology
+	Natural resource use	Biswas et al. (2018)	To examine the impacts of board gender composition, board independence and the existence of a board sustainability committee on the corporate social and environmental performance.	Australia: 407 multisector companies (2004–2015). Ordinary Least Squares (OLS)
		Orazalin and Baydauletov (2020)	To examine the effects of CSR strategy and board gender diversity on environmental and social performance.	Europe: 5125 firm-year observations from multisector companies (2010–2016). Fixed effects
		Kuzey et al. (2022)	To investigate whether board gender diversity stimulates eco-friendly practices.	Cross-country: 924 firm-year observations companies (2002–2019). Fixed effects.
		Gangi et al. (2023)	To investigate whether and how board gender diversity causes higher engagement in corporate environmental responsibility.	Cross-country: 132 banks (2009–2019). Fixed effects
		Sá de Abreu et al. (2023)	To identify the effect of board diversity on environmental policy.	Latin America: 181 multisector companies (2011–2020). Two Stage Least Squares (2SLS)
	Renewable energy consumption	Atif et al. (2020)	To examine the effect of board gender diversity on renewable energy consumption.	United States: 1491 multisector companies (2008–2016). OLS
		Khatri (2021)	To investigate whether board gender diversity affects firms' renewable energy use.	United States: 102 multisector companies (2004–2019). Generalised Method of Moments (GMM)
		Zhang et al. (2021)	To investigate firms' use of renewable energy, paying special attention to factors in internal corporate governance and also external governance.	Cross-country: 1027 multisector companies (2004–2018). OLS
	Energy efficiency policy	Jizi (2017)	To examine how board composition relates to a firm's social and environmental disclosure as well as the implementation of social policies.	United Kingdom: 1155 multisector companies (2007–2012). Fixed effects
	Recycled waste	Marchini et al. (2022)	To study the relationship between the implementation of mandatory gender quotas on boards and companies' environmental indicators.	Italy: 40 multisector companies (2010–2018). Fixed effects
+ + 0	Renewable water usage Recycled waste / Total waste Energy consumption	García-Martín and Herrero (2020)	To explore the relationship between board characteristics and environmental performance.	Europe: 644 non-financial companies (2002–2017). Fixed effects
0	Natural resource use	De Masi et al. (2022)	To investigate how the significance of women directors in enhancing environmental performance varies with the nature of their nomination background.	Italy: 38 multisector companies (2008–2017). Fixed effects
	Energy consumption	Fakoya and Nakeng (2019)	To examine the influence of board characteristics on environmental (energy usage) sustainability performance.	South Africa: 28 banks (2007–2017). Random effects
−	Natural resource use	Fernández-Torres et al. (2021)	To analyse the influence of tourism companies' board gender diversity on these firms' environmental practices.	Cross-country: 120 tourism companies (2002–2019). Fixed effects
− 0	Total water usage Disposed waste/ Total revenues	Van Hoang et al. (2021)	To understand how corporate governance can impact environmental transparency and performance.	United States: 361 multisector companies (2007–2016). OLS

Note: "+" denotes a positive effect, "0" no effect and "−" a negative effect.
Source: Authors based on the cited studies.

TABLE 2 Sample distribution by country of origin and type of activity.

Region	Country	Number of firms	Percentage	S1	S2	S3	S4
America		81	49.69	36	18	15	12
	Brazil	1	0.61	0	1	0	0
	Canada	3	1.84	1	2	0	0
	Mexico	1	0.61	1	0	0	0
	Uruguay	1	0.61	1	0	0	0
	United States	75	46.01	33	15	15	12
Asia		30	18.40	5	5	15	5
	Bahrain	1	0.61	0	0	0	1
	Hong Kong	8	4.91	1	1	5	1
	Japan	4	2.45	1	2	1	0
	Korea	2	1.23	0	0	2	0
	Macau	3	1.84	0	0	3	0
	Malaysia	3	1.84	0	0	3	0
	Mainland China	4	2.45	1	2	0	1
	Philippines	1	0.61	1	0	0	0
	Singapore	1	0.61	0	0	1	0
	Sri Lanka	1	0.61	0	0	0	1
	Taiwan	1	0.61	0	0	0	1
	Thailand	1	0.61	1	0	0	0
Africa		6	3.68	2	0	3	1
	South Africa	5	3.07	2	0	2	1
	Zimbabwe	1	0.61	0	0	1	0
Europe		30	18.40	11	6	8	5
	France	3	1.84	2	0	0	1
	Germany	1	0.61	0	1	0	0
	Gibraltar	1	0.61	0	0	1	0
	Greece	1	0.61	0	0	1	0
	Ireland	1	0.61	0	0	1	0
	Isle of Man	2	1.23	0	0	2	0
	Italy	1	0.61	1	0	0	0
	Malta	1	0.61	0	0	1	0
	Spain	2	1.23	0	1	0	1
	Sweden	1	0.61	0	1	0	0
	United Kingdom	16	9.82	8	3	2	3
Oceania		16	9.82	3	5	8	0
	Australia	14	8.59	2	5	7	0
	New Zealand	2	1.23	1	0	1	0
Total		163	100	57	34	49	23

Abbreviations: S1, restaurants and bars; S2, hotels, motels and cruise lines; S3, casinos and gaming; S4, leisure and recreation.
Source: Authors based on Thomson Reuters (Refinitiv, 2022).

components. These principal components capture most of the variation in the original variables (Rao, 1964). Before applying this procedure, several checks were made (Pérez-López, 2004). First, non-zero correlation between the variables was confirmed using Bartlett's test of sphericity. This test indicated whether it would be possible to carry out PCA. Second, the suitability of PCA was tested using the Kaiser-Meyer-Olkin (KMO) test. Possible values for this test lie in the interval between 0 and 1. Values close to 1 show greater suitability (Kaiser, 1974). The values for the test in this study were at least 0.81, so the application of PCA was considered acceptable.

Next, the number of principal components was defined. This number was determined using the arithmetic mean criterion. The aim

was to select components with a variance that was greater than the average variance of the original variables, which is equivalent to having an eigenvalue greater than 1 (Rao, 1964). The principal components matrix was then rotated using the Varimax method with Kaiser normalisation to obtain principal components that were highly correlated with some of the original variables (Pérez-López, 2004). Next, a relative weight was assigned to each selected principal component, given that not all of them contributed to explaining the variance of the original variables to the same proportion. Each weight was calculated as the value of the eigenvalue of each selected principal component divided by the sum of the eigenvalues of the selected principal components. This procedure is described by Pulido-Fernández and Sánchez-Rivero (2009). Finally, for each firm and year, the weighted sum of the scores for the selected principal components was calculated. This procedure gave a single score for the composite indicator used as the dependent variable in this study. This indicator differs from those used in previous studies because it centres on factors that explain a greater proportion of the variance of the original variables. It is expressed in points. The descriptive statistics in Table 3 show that the indicator takes values between −0.86 and 1.5. However, these values can only be interpreted qualitatively, with higher values indicating better environmental performance in terms of reduced natural resource use.

For the application of PCA, cross-sectional data are needed. Hence, this process was carried out six times (one for each year in the study). If data were missing for one of the original variables in any period, the average value of that variable in that period for the other companies was used to impute the missing value.

3.3 | Independent variables

3.3.1 | Gender variables

Eight variables were used to measure board gender diversity (*Dum1*, *Dum2*, *Dum3*, *Dum30*, *Dum40*, *Nwom*, *Pwom* and *Blau*). These variables were chosen on the basis of arguments in the literature. The number of board gender diversity variables ensured that the results would be robust.

The first three variables (*Dum1*, *Dum2* and *Dum3*) were dichotomous. They took the value 1 when the board of directors had at least one, two and three women, respectively. Otherwise, they took the value 0. Their use was supported by critical mass theory (Kanter, 1977), according to which a minimum number of women directors is important in order for the benefits that women bring to the decision-making process to be noticeable. The inclusion of only one woman on the board may be considered token representation. The use of these variables determined whether the presence of at least one woman on the board of directors would be sufficient or whether minimum representation of two or three would be necessary to notice their influence on environmental performance. The literature provides evidence of the need to use these measures. For example, it has been shown that the actions of women result in better environmental performance (Post et al., 2011; Shoham et al., 2017) and the implementation of renewable energy use practices (Atif et al., 2020) only if there are at least three women on the board. Atif et al. (2020) reported the need for at least two women to be present on an organisation's board of directors to ensure that their influence on decision making contributes to a higher consumption of renewable energy by the organisation. However, studies have also shown that the presence of just one woman on the board improves environmental performance (Issa & Zaid, 2021; Kyaw et al., 2017; Wang et al., 2021) and encourages initiatives aimed at regenerating and protecting biodiversity and reducing the impact of corporate activity on biodiversity (Carvajal et al., 2022).

The variables *Dum30* and *Dum40* took the value 1 if women represented at least 30% and 40%, respectively, of total board members. Otherwise, these variables took the value 0. The use of both variables was also justified by the arguments of critical mass theory (Kanter, 1977). According to these arguments, ensuring a minimum proportion of women on the board of directors is important to be able to notice their influence on board decision making. Consequently, studies based on critical mass theory have examined not only the number of women directors but also the proportion in relation to the size of the entire board. The evidence suggests that a minimum representation of 30% of women on the board helps enhance return on equity (Joecks et al., 2013) and the deployment of ethical and socially responsible practices (Isidro & Sobral, 2015). Similarly, Lafuente and Vaillant (2019) showed that reaching a minimum threshold of 40% of women directors boosts return on assets. Fernández-Torres et al. (2021) provided the only existing evidence of the effect of at least 30% and 40% representation of women on the board on natural resource use, finding that reaching these thresholds has a negligible influence. The implementation of gender quotas on the board of directors is considered an important step in developing initiatives to encourage waste recycling (Marchini et al., 2022).

Finally, the analysis also included the number of women board members (*Nwom*), the proportion of women board members (*Pwom*) and the Blau (1977) diversity index (*Blau*).[1] *Nwom* was included to control for the number of women directors, given that the size of a group can determine its scope of influence (Kanter, 1977). Several studies have shown that a higher number of women on the board of directors encourages companies' use of renewable energies (Atif et al., 2020; Zhang et al., 2021). *Pwom* was included to complement the previous measure. Considering only the number of women would overlook an important detail, namely whether women represent a minority or majority group on the board. In groups, majorities exert a greater influence than minorities (Asch, 1955). Studies that have used this measure have shown that a higher proportion of women directors contributes to better environmental performance of companies (Issa & Zaid, 2021) through lower water consumption (Van Hoang

[1]The Blau index is calculated as $1-\sum_{i=1}^{n} P_i^2$, where P_i is the proportion of women and men on the board and n is the number of categories. In this case, $n=2$ because the analysis examined gender. This index takes values ranging from 0 and 0.5. A value of 0 indicates perfect homogeneity in terms of board members' gender. A value of 0.5 indicates that there is the same proportion of board members of each gender (Blau, 1977).

et al., 2021), greater use of renewable energies (Atif et al., 2020) and the protection of biodiversity (Carvajal et al., 2022). Finally, the Blau (1977) index (*Blau*) was included given its recognition in the literature as an effective measure of diversity. Studies that have used this measure have shown that greater board gender diversity promotes better environmental performance (Issa & Zaid, 2021). It also supports the implementation of initiatives related to caring for biodiversity, such as regenerating or protecting biodiversity and reducing the impact of business activity on biodiversity (Carvajal et al., 2022).

3.3.2 | Control variables

Control variables were included to improve the specification of the econometric model. Nine control variables were chosen based on the arguments from the research on the relationship between gender and environmental performance. Three of these variables captured board characteristics, three corresponded to the economic and financial characteristics of the company and three captured features of the socioeconomic and institutional context of the company's home country. Data for the first two groups of control variables were gathered from Thomson Reuters (Refinitiv, 2022). Data on the third group were collected from DataBank (World Bank Group, 2022).

For the board characteristic control variables, the approach of Orazalin and Mahmood (2021) was followed. First, the percentage of board members with prior knowledge and experience in the sector or in finance was included (*BSkills*). The second control variable in this group was a dichotomous variable that took the value 1 if there was a CSR committee and 0 otherwise (*CSRCom*). Finally, following the indications of Fernández-Torres et al. (2021), a variable measuring the average tenure of the board members was included (*Ten*).

The second group consisted of three variables. The first was firm size, measured by the natural logarithm of market capitalisation in USD (*FSize*). The second variable was an indicator of productivity, calculated as the ratio of total sales to total employees (*SalesEmp*). The third control variable was a measure of short-term solvency. This measure, known as the current ratio, was the ratio of current assets to current liabilities (*CurrRat*). Shoham et al. (2017), Kamran et al. (2023) and Kuzey et al. (2022) used the first, second and third of these control variables, respectively.

Finally, the third group also consisted of three variables. The first (*GDPper*) was the country's GDP per capita expressed in USD (Shoham et al., 2017). The second was an indicator of institutional quality in terms of government effectiveness. This indicator captured perceptions in four areas: quality of public services; quality of civil service and its independence from political pressures; quality of policy formulation and implementation; and credibility of the government's commitment to such policies. Government effectiveness (*GovEff*) was measured as a score ranging from 0 to 100. A score of 100 meant maximum effectiveness. This variable was used by Orazalin and Mahmood (2021). The third variable was the ratio of male to female births (*BirthRat*), as used by Wang et al. (2021).

3.4 | Methodology

To meet the stated research aim, the following equation was estimated for each of the gender measures. Following the method applied in studies that have confirmed the relationship between gender diversity and environmental performance (Jizi, 2017; Kuzey et al., 2022; Orazalin & Baydauletov, 2020), this equation was linear static.

$$\begin{aligned}\mathrm{IndRU}_{it} = {} & \beta_1 + \beta_2\,\mathrm{Bgd}_{it} + \beta_3\,\mathrm{BSkills}_{it} + \beta_4\,\mathrm{CSRCom}_{it} + \beta_5\,\mathrm{Ten}_{it} \\ & + \beta_6\,\mathrm{FSize}_{it} + \beta_7\,\mathrm{SalesEmp}_{it} + \beta_8\,\mathrm{CurrRat}_{it} + \beta_9\,\mathrm{GDPper}_{it} \\ & + \beta_{10}\,\mathrm{GovEff}_{it} + \beta_{11}\,\mathrm{BirthRat}_{it} + \tau_t + \nu_{it} + \eta_i + \epsilon_{it}.\end{aligned}$$

For firm *i* in period *t*, Bgd_{it} represents each of the eight gender measures. The term τ_t represents the time dummies, which were included to control for unobservable factors that could influence the behaviour of the dependent variable over time. The term ν_{it} represents the sector dummies, which were included to control for effects derived from belonging to a certain subsector. The term η_i represents the individual unobservable effect, and ϵ_{it} is the random error term.

Because this study used panel data, the previous equation could be estimated using one of two procedures: fixed effects or random effects. The choice of procedure depends on whether there is correlation between the independent variables and the individual unobservable effect. The existence of such a correlation is examined using the Hausman test. If the hypothesis of absence of correlation is rejected, the only consistent estimator is the fixed effects estimator. In contrast, if this hypothesis is not rejected, both the fixed effects and the random effects estimators give consistent estimators. The difference is that the random effects estimator is the efficient estimator (Pérez-López, 2006). In the present study, the results of the Hausman test, which are provided in Table 5 under "*p* value (Hausman: FE/RE)", indicate that fixed effects estimation should be used.

There is also evidence of possible endogeneity in the model due to the omission of relevant variables (Boulouta, 2013) or the bidirectional relationship between the dependent variable and the independent variables (Kassinis et al., 2016; Liu, 2018). However, for the fixed effects estimator to be consistent, the assumption of exogeneity of the explanatory variables must be met (Pérez-López, 2006). Hence, the absence of correlation between the explanatory variables and the error term must be verified (i.e. assumption of exogeneity). For all estimates, the results in Table 5 for "*p* value (Hausman: FEIV/FE)" verify the absence of endogeneity (Hausman test). The first lag of the independent variables was used as an instrument for the independent variables. Its suitability for this purpose was first checked by the Hansen test (Arellano & Bond, 1991). The results appear in Table 5 under "*p* value (Hansen)". Finally, estimation was based on a matrix of variances and covariances of errors that was robust to heteroscedasticity between individuals and to serial correlation of errors for the same individual.

4 | RESULTS AND DISCUSSION

Before reporting the results of the analysis used to address the study aim, descriptive statistics for the variables of the estimated model are presented (Table 3). These descriptive statistics provide an overview of the characteristics of the companies in the sample and the countries where they are located.

The interpretation of the descriptive statistics first focuses on the gender measures. Although in 88.2% of observations, tourism companies have at least one woman on the board (*Dum1*), the average number of female board members is approximately two (*Nwom*), with just 20.8% average representation (*Pwom*). In only 24.4% of observations, women represent at least 30% of the total number of board members (*Dum30*). These figures help explain the values of the Blau index (*Blau*). According to the results for this index, the sampled companies are still a long way from achieving a gender balance on the board.

Next the descriptive statistics for the control variables are analysed. In general, board members lack knowledge and experience in the sector or in finance (*BSkills*), and their average tenure is approximately 8 years (*Ten*). Almost half of the observations (46.8%) reflect the existence of a CSR committee (*CSRCom*). On average, current assets cover current liabilities (*CurrRat*). The companies are located in countries with an average GDP per capita of 48,810.49 USD (*GDPper*). These countries have high institutional quality (*GovEff*), and male births marginally outnumber female births (*BirthRat*).

To dismiss possible problems of multicollinearity, the matrix of linear correlations between the variables in the model was calculated. It is shown in Table 4. For each estimation, the mean value of the variance inflation factor (VIF) is given. The values of the VIF in Tables 5, 6, 7 range from 1.55 to 1.60. These values are well below 10, which is the threshold to indicate multicollinearity (Belsley, 1991).

4.1 | The relationship between gender diversity and natural resource use

Table 5 shows the results of the eight estimated equations, one for each gender variable. All models are statistically significant at the 99% confidence level, as reflected by "*p* value (F)". For four of the eight gender variables (*Dum1*, *Nwom*, *Pwom* and *Blau*), the coefficients are statistically significant at the 95% and 90% confidence levels. In all cases, these coefficients are positive. Hence, the following conclusions can be drawn.

Companies with at least one woman on the board are able to implement practices that help reduce their use of natural resources more than companies with no women board members (*Dum1*). This improvement in environmental performance also occurs when the number of women on the board (*Nwom*) and the proportion of women on the board (*Pwom*) increases. It likewise occurs when there is a greater gender balance on the board (*Blau*). The items of the composite indicator of environmental performance provide insights in this regard. The reduction in the use of natural resources is achieved by adopting policies and practices related to the efficient use of water and energy and the use of renewable energies. The reduction in natural resource use is also accomplished thanks to initiatives to reduce the use of toxic substances and the impact of business activity on the local surroundings, the use of sustainable packaging, the environmental training of employees, and the evaluation of the environmental impact of suppliers when hiring their services. These actions address specific SDG targets. Therefore, the statistical evidence from the analysis suggests that boosting female representation on the board of directors results in better performance in the environmental actions captured in the 2030 Agenda. This result is robust to the use of different gender indicators.

The positive effect of greater board gender diversity on performance in relation to the reduction of natural resource use has already been reported by Biswas et al. (2018), Orazalin and Baydauletov (2020) and Sá de Abreu et al. (2023). If the existing evidence is broken down by specific resources, the role of women on the board has been found to be important in promoting renewable energy consumption (Atif et al., 2020; Zhang et al., 2021), recycling waste (García-Martín & Herrero, 2020; Marchini et al., 2022) and reducing the use of water resources (Van Hoang et al., 2021). However, the present study differs from previous ones in its use of a proprietary ad hoc dependent variable, which, for the first time, captures environmental performance measures that address specific SDG targets.

Regarding the specific context of the tourism sector, studies have shown that gender equality contributes to more sustainable tourism (Ferguson & Moreno-Alarcón, 2015) and encourages tourism firms to strive to fulfil the 2030 Agenda (Moreno-Alarcón & Cole, 2019). Together with the results of the present study, these findings are important because even though most of the labour force in the tourism sector consists of women, many occupy low-pay positions (UNWTO, 2023a). Also, the percentage of women who participate in decision making is low, as shown in Table 3. Therefore, the research confirms the need to remove the barriers that women face in climbing the corporate ladder in tourism firms in order for the sector to progress in environmental protection and the achievement of the SDGs. These advances would in turn ensure the long-term survival of tourism firms by enabling them to address some key problems facing the sector, namely irresponsible consumption and poor management of natural resources.

Therefore, the results of this study, shown in Table 5, confirm the arguments presented in Section 2.1 derived from a range of theories supporting the positive influence of board gender diversity on the environmental performance of organisations. This positive influence may be because such diversity improves the board's monitoring and oversight of environmental practices (agency theory). Likewise, the inclusion of women on the board can provide it with skills and values that lead to better decision making (resource dependency theory). Greater female representation can also lead the board to pay more attention to the interests of a range of stakeholders (stakeholder theory). Finally, the differences in behaviour between men and women can enrich decision making within the organisation given their different leadership styles (social role theory).

TABLE 3 Descriptive statistics (2015–2020).

Variables	Mean	SD	Min	Max	P25	P50	P75	*N*
IndRU	7.82e−08	0.6323	−0.8670	1.5036	−0.6535	−0.0099	0.5456	898
Dum1	0.882	0.321	0	1	1	1	1	895
Dum2	0.554	0.497	0	1	0	1	1	895
Dum3	0.294	0.456	0	1	0	0	1	895
Dum30	0.244	0.430	0	1	0	0	0	895
Dum40	0.089	0.285	0	1	0	0	0	895
Nwom	1.927	1.376	0	7	1	2	3	895
Pwom	0.208	0.133	0	0.8	0.111	0.2	0.285	895
Blau	0.294	0.144	0	0.5	0.197	0.32	0.408	895
BSkills	5.540	1.891	0	100	4.285	5.555	6.666	834
CSRCom	0.468	0.499	0	1	0	0	1	901
Ten	7.983	4.346	0.25	2.603	4.85	7.1	10.35	889
FSize	7.68e+9	1.61e+10	2.27e+7	1.60e+11	7.55e+8	2.34e+9	7.03e+9	960
SalesEmp	262448.9	344999.1	2395.226	3,151,765	65916.45	121652.9	300520.1	763
CurrRat	1.326	1.336	0.113	1.448	0.643	0.998	1.470	957
GDPper	48810.49	18624.87	1214.51	89112.67	41272.36	56863.37	63064.42	964
GovEff	87.444	11.574	10.576	100	87.019	91.346	92.788	960
BirthRat	1.053	0.015	1.02	1.138	1.047	1.047	1.055	954

Abbreviations: Mean, arithmetic mean; Min, minimum value; Max, maximum value; *N*, number of observations; P25, 25th percentile; P50, 50th percentile; P75, 75th percentile; SD, standard deviation.
Source: Authors using Stata.

TABLE 4 Correlation matrix.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) IndRU	1.0000									
(2) Dum1	0.1698***	1.0000								
(3) Dum2	0.1972***	0.4065***	1.0000							
(4) Dum3	0.2089***	0.2358***	0.5801***	1.0000						
(5) Dum30	0.1304***	0.2075***	0.5105***	0.7774***	1.0000					
(6) Dum40	0.0635*	0.1142***	0.2810***	0.4672***	0.5504***	1.0000				
(7) Nwom	0.2939***	0.5107***	0.7761***	0.8159***	0.7214***	0.5090***	1.0000			
(8) Pwom	0.1356***	0.5691***	0.7422***	0.7340***	0.7604***	0.6275***	0.8703***	1.0000		
(9) Blau	0.1816***	0.7459***	0.7866***	0.6593***	0.6461***	0.4059 ***	0.8466***	0.9137***	1.0000	
(10) BSkills	−0.0891	−0.0070	−0.1342***	−0.1287***	−0.1404***	−0.1301***	−0.2084***	−0.1294***	−0.1074***	1.0000
(11) CSRCom	0.3904***	0.1566***	0.1717***	0.1547***	0.0767**	0.0650*	0.2501***	0.1162***	0.1613***	−0.1027***
(12) Ten	0.0603*	−0.1232***	−0.0592*	0.0169	−0.0568	−0.0582*	−0.0525	−0.0955***	−0.1153***	0.1451***
(13) FSize	0.4079***	0.1318***	0.1742***	0.1705***	0.0368	−0.0193	0.2196***	0.0429	0.1143***	−0.0370
(14) SalesEmp	−0.1850***	−0.1020***	−0.1601***	−0.1689***	−0.1482***	−0.2022***	−0.2202***	−0.1949***	−0.1915***	−0.0304
(15) CurrRat	−0.0377	−0.3261***	−0.2118***	−0.1473***	−0.1285***	−0.0749**	−0.2410***	−0.2543***	−0.3028***	0.0535
(16) GDPper	−0.2546***	0.0974***	0.1313***	0.0630*	0.0585*	0.0080	0.0648*	0.1315***	0.1428***	0.1163***
(17) GovEff	−0.1391***	0.0540	0.0572*	0.0597*	0.0965***	0.0420	0.0582*	0.1165***	0.1167***	0.1182***
(18) BirthRat	0.0357	−0.0852**	−0.1429	−0.1663***	−0.1042***	−0.0665**	−0.1587***	−0.1344***	−0.1351***	0.0750**

	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
(11) CSRCom	1.0000							
(12) Ten	−0.0016	1.0000						
(13) FSize	0.2943***	−0.0010	1.0000					
(14) SalesEmp	−0.1356***	−0.0170	0.1006***	1.0000				
(15) CurrRat	−0.0136	0.1601***	0.0118	0.1321***	1.0000			
(16) GDPper	−0.2780***	−0.1446***	0.0771**	0.1078***	−0.0741**	1.0000		
(17) GovEff	−0.1689***	−0.1131***	0.1018***	0.1798***	−0.0140	0.0163	1.0000	
(18) BirthRat	−0.0043	0.0222	0.2068***	−0.0120	0.0782**	0.3265***	−0.2880***	1.0000

Note: *** significant at the 99% level, ** significant at the 95% level, and * significant at the 90% level.
Source: Authors using Stata.

TABLE 5 Fixed effects estimation for the dependent variable *IndRU*.

	Variables	Dum1	Dum2	Dum3	Dum30	Dum40	Nwom	Pwom	Blau
Gender variable	Bgd	0.1294**	0.0285	0.0288	0.0426	0.0460	0.0420*	0.3860*	0.3776*
Control variables	BSkills	0.0024**	0.0025**	0.0026**	0.0025**	0.0025**	0.0027**	0.0025**	0.0025**
	CSRCom	0.3258***	0.3392***	0.3413***	0.3434***	0.3390***	0.3320***	0.3352***	0.3303***
	Ten	0.0275**	0.0271**	0.0276**	0.0277**	0.0273**	0.0300**	0.0283**	0.0279**
	FSize	0.0644	0.0665	0.0679	0.0657	0.0687	0.0611	0.0618	0.0604
	SalesEmp	−0.0786*	−0.0730	−0.0757	−0.0740	−0.0771	−0.0724	−0.0763	−0.0759
	CurrRat	−0.0019	−0.0031	−0.0043	−0.0044	−0.0041	−0.0030	−0.0042	−0.0031
	GDPper	3.36e−06	3.12e−06	3.08e−06	3.00e−06	3.08e−06	2.79e−06	2.91e−06	2.99e−06
	GovEff	−0.0097	−0.0084	−0.0084	−0.0086	−0.0088	−0.0090	−0.0096	−0.0098
	BirthRat	−10.9412	−10.8105	−10.6467	−10.8700	−10.8604	−11.2478	−11.0742	−10.9267
	Observations	626	626	626	626	626	626	626	626
	R^2 (Within)	0.2420	0.2333	0.2334	0.2345	0.2335	0.2407	0.2397	0.2417
	p value (F)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	p value (Hausman:FE/RE)	0.0004	0.0014	0.0008	0.0005	0.0014	0.0015	0.0009	0.0007
	p value (Hausman:FEIV/FE)	0.9334	0.8685	0.9218	0.9709	0.9503	0.9432	0.9693	0.9559
	p value (Hansen)	0.2459	0.9563	0.7621	0.8237	0.6566	0.5864	0.7437	0.6558
	Mean VIF	1.56	1.56	1.56	1.55	1.55	1.60	1.56	1.57

Note: *** significant at the 99% level, ** significant at the 95% level, * significant at the 90% level. Time dummies are omitted for reasons of brevity and practicality. The estimation was performed with errors that are robust to heteroscedasticity and autocorrelation.

Abbreviations: R^2 (within), coefficient of determination of the transformed model; *p* value (F), *p* value of the test of model significance; *p* value (Hausman: FE/RE), *p* value of the Hausman test under the null hypothesis of absence of correlation between the explanatory variables and the individual unobservable effect; *p* value (Hausman: FEIV/FE), *p* value of the Hausman test under the null hypothesis of absence of correlation between the explanatory variables and the error term; *p* value (Hansen), *p* value of the Hansen test under the null hypothesis of absence of correlation between the instruments and the error term; Mean VIF, mean value of the VIF.

Source: Authors using Stata.

However, the results reveal a small number of discrepancies with some studies. For example, Fakoya and Nakeng (2019), found that board gender diversity does not influence an organisation's use of energy resources. They reported that the ongoing underrepresentation of women on the board prevents their opinion from being considered, thus preventing the adoption of the environmentally friendly initiatives they propose. Fernández-Torres et al. (2021) argued that this characteristic of corporate governance worsens companies' adoption of policies and practices aimed at reducing natural resource use. Their argument is based on a possible increase in conflicts on the board of directors when there is a greater presence of women because the board tends to be a predominantly male domain. This increase in conflicts would have a negative impact on decision making in general, also affecting decisions related to the environment.

In contrast, the coefficients of four variables are not statistically significant (*Dum2*, *Dum3*, *Dum30* and *Dum40*). These results imply that there are no differences in performance regarding natural resource use reduction between companies with at least two and three women on their boards, a minimum representation of at least 30% women directors and a minimum representation of at least 40% women directors and those that fail to meet these levels of diversity. Consequently, this study cannot confirm the need for a critical mass of women on the board in order for their actions to influence companies' environmental policies. This finding is contrary to what is posited under critical mass theory (Kanter, 1977). Although scholars have reached similar conclusions (Cordeiro et al., 2020; Fernández-Torres et al., 2021), the results reported here suggest that it is enough to have at least one woman on the board in order for their influence to be noticed in decisions on environmental action.

Finally, a higher percentage of board members with prior finance- or sector-related knowledge (*BSkills*), the existence of a CSR committee (*CSRCom*) and longer-serving board members (*Ten*) all lead to improved performance in terms of a reduction in natural resource use by the sampled companies.

In summary, the results of the current study suggest that Hypothesis 1 is supported, which is not the case for Hypothesis 2. It is important for companies to have gender-diverse boards in order to improve their commitment to the 2030 Agenda in terms of environmental actions based on the reduction of natural resource use. However, although this commitment becomes greater as female representation on the board increases, the fact that women reach a certain minimum level of representation on the board is not a requirement for better performance in targeting the SDGs.

4.2 | Robustness testing

To confirm the robustness of the results, two further analyses were performed. The first was based on the use of an alternative econometric procedure, and the second was based on the use of a different dependent variable. First, the estimates outlined in the previous section were replicated using random effects estimation with instrumental variables (Table 6). In addition, all equations were estimated again using fixed effects estimation (Table 7) and taking the dependent variable to be a composite indicator of environmental performance in natural resource use reduction (*ResUse*) provided by Thomson Reuters (Refinitiv, 2022). This indicator captures the performance and ability of each company to reduce the use of materials, energy and water and to find more eco-efficient solutions by improving supply chain management. For the gender variables, the four coefficients that were positive and statistically significant in the first estimation (*Dum1*, *Nwom*, *Pwom* and *Blau*) were once again found to be so at the 90%, 95% and 99% confidence levels in both analyses. Hence, the robustness of the results on the role of women on the board is confirmed.

5 | CONCLUSIONS, LIMITATIONS AND FUTURE RESEARCH

The aim of this study was to determine whether the board gender diversity of tourism companies makes a significant contribution to fulfilling the 2030 Agenda by addressing SDG targets aimed at reducing natural resource use. A global sample of 163 listed tourism companies was selected. Data for the period 2015–2020 were collected. A fixed effects model was estimated. The results of this estimation were then complemented by robustness analysis using random effects and another variable for environmental performance in natural resource use reduction. The use of a proprietary ad hoc composite environmental performance indicator makes this study the first to use a dependent variable consisting of an indicator that reflects the engagement of tourism companies with SDG targets linked to reducing natural resource use.

The results provide robust evidence of the importance of encouraging the representation of women on the board of directors. Promoting board gender diversity can enhance performance in terms of the policies and practices of tourism companies aimed at natural resource use reduction. It can thus contribute to the achievement of the targets of several SDGs (6, 7, 9, 12, 13 and 15). Specifically, the positive effect of board gender diversity on environmental performance was confirmed for four of the eight gender measures used. This positive effect was confirmed in the robustness analysis. The role of women board members is therefore crucial for companies that wish to fulfil the 2030 Agenda through better natural resource use management.

These conclusions add to the scant evidence of companies' actions in terms of natural resource use. However, the findings in this regard are still insufficient in the case of the tourism sector. The few studies that have examined this topic mostly agree that women directors exert a positive influence on the reduction of natural resource use, although the dependent variables used in those studies differ from the one used in the present study.

The findings can be explained by arguments derived from the multiple theories that provide the basis for the relevant literature and the theoretical framework for this study. Women board members contribute to improved oversight of CSR strategies (agency theory), provide unique resources that lead to better decision making

TABLE 6 Random effects estimation with instrumental variables for the dependent variable *IndRU*.

	Variables	Dum1	Dum2	Dum3	Dum30	Dum40	Nwom	Pwom	Blau
Gender variable	Bgd	0.4217*	0.1747	0.1560*	0.1752	0.0658	0.0967***	0.7385**	0.8338**
Control variables	BSkills	0.0028	0.0021	0.0024	0.0017	0.0022	0.0026	0.0018	0.0020
	CSRCom	0.6412***	0.6316***	0.6710***	0.6773***	0.6501***	0.6447***	0.6710***	0.6626***
	Ten	0.0081	0.0061	0.0049	0.0066	0.0066	0.0063	0.0068	0.0068
	FSize	0.1206	0.1185***	0.1138***	0.1169***	0.1277***	0.1016***	0.1178***	0.1124***
	SalesEmp	−0.0774*	−0.0251	−0.0484	−0.0527	−0.0568	−0.0360	−0.0527	−0.0556
	CurrRat	0 0.0347	−0.0497	−0.0232	−0.0227	−0.0283	−0.0089	−0.0135	0.0004
	GDPper	−2.38e−06	−3.86e−06	−1.68e−06	−1.55e−06	−3.19e−06	−6.64e−07	−2.02e−06	−1.87e−06
	GovEff	−0.0048	−0.0028	−0.0057	−0.0055	−0.0029	−0.0082	−0.0058	−0.0065
	BirthRat	−1.0583	−1.6569	−0.7839	−0.7702	−2.1541	0.3881	−0.7146	−0.3743
	Observations	484	484	484	484	484	484	484	484
	p value (Hausman: REIV/RE)	0.1558	0.0171	0.0262	0.0008	0.0609	0.0001	0.0000	0.0000
	p value (Hansen)	0.8361	0.8811	0.7325	0.4601	0.7891	0.7356	0.4695	0.5056
	Mean VIF	1.56	1.56	1.56	1.55	1.55	1.60	1.56	1.57

Note: The Hausman test indicated the existence of endogeneity. Therefore, the explanatory variables were instrumentalised with their first lag. The validity of the instruments was previously confirmed using the Hansen test. *** significant at the 99% level, ** significant at the 95% level, * significant at the 90% level. *p* value (Hausman: REIV/RE) refers to the *p* value of the Hausman test under the null hypothesis of absence of correlation between the explanatory variables and the error term. *p* value (Hansen) refers to the *p* value of the Hansen test under the null hypothesis of absence of correlation between the instruments and the error term. Time and sector dummies are omitted for reasons of brevity and practicality. The estimation was performed with errors that are robust to heteroscedasticity and autocorrelation.
Abbreviation: Mean VIF: mean value of the VIF.
Source: Authors using Stata.

TABLE 7 Fixed effects estimation for the dependent variable *ResUse*.

	Variables	Dum1	Dum2	Dum3	Dum30	Dum40	Nwom	Pwom	Blau
Gender variable	Bgd	0.4784**	4.7558**	4.9154**	3.5745**	4.3062	2.5455***	20.2521**	16.2423**
Control variables	BSkills	0.0028	0.0035	0.0140	0.0034	0.0053	0.0131	0.0040	0.0031
	CSRCom	20.1341***	19.9885***	20.3531***	20.4405***	20.0624***	19.6824***	19.9176***	19.7562***
	Ten	0.6687	0.6670	0.7440	0.7168	0.6812	0.8410*	0.7275	0.7025
	FSize	2.4037	1.9558	2.1804	2.1176	2.3643	1.9224	2.0306	2.0403
	SalesEmp	0.9006	1.3353	0.8900	1.0403	0.7696	1.1012	0.8736	0.8987
	CurrRat	0.1157	0.2045	−0.0049	0.0502	0.0628	0.1465	0.0809	0.1318
	GDPper	−0.1932	−0.1939	−0.2091	−0.2122	−0.2333	−0.2314	−0.2544	−0.2512
	GovEff	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
	BirthRat	−780.5922**	−804.7051**	−777.3788***	−797.2139***	−798.3502***	−815.2069***	−801.3092***	−791.0459***
	Observations	626	626	626	626	626	626	626	626
	R^2 (Within)	0.2614	0.2488	0.2744	0.2607	0.2637	0.2611	0.2542	0.2568
	p value (F)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	p value (Hausman: FE/RE)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	p value (Hausman: FEVI/FE)	0.9616	0.9953	0.9888	0.9884	0.9885	0.9902	0.9905	0.9879
	p value (Hansen)	0.8066	0.3023	0.8723	0.7845	0.4101	0.9654	0.8134	0.8539
	Mean VIF	1.56	1.56	1.56	1.55	1.55	1.60	1.56	1.57

Note: *** significant at the 99% level, ** significant at the 95% level, and * significant at the 90% level. Time dummies are omitted for reasons of brevity and practicality. The estimation was performed with errors that are robust to heteroscedasticity and autocorrelation.

Abbreviations: R^2 (within), coefficient of determination of the transformed model; *p* value (F), *p* value of the test of model significance; *p* value (Hausman: FE/RE), *p* value of the Hausman test under the null hypothesis of absence of correlation between the explanatory variables and the individual unobservable effect; *p* value (Hausman: FEIV/FE), *p* value of the Hausman test under the null hypothesis of absence of correlation between the explanatory variables and the error term; *p* value (Hansen), *p* value of the Hansen test under the null hypothesis of absence of correlation between the instruments and the error term; Mean VIF, mean value of the VIF.

Source: Authors using Stata.

(resource dependency theory) and pay more attention to stakeholder interests (stakeholder theory). The features of women board members are the result of women's leadership style. Women tend to be more committed in their attitude towards others. They are therefore more likely to engage in environmental practices (social role theory).

However, the study does not provide support for critical mass theory. No minimum number or proportion of women was identified as necessary for there to be an effect on environmental performance. According to the evidence derived from this study, it is enough to include at least one woman on the board in order to achieve a reduction in natural resource use.

In light of its findings, this study has relevant theoretical and practical implications for organisations in general, particularly those in the tourism sector. In terms of theory, it provides a novel measure of environmental performance. This measure can be used to continue developing the incipient literature on the actions of companies to address the 2030 Agenda and the conditioning factors in this regard. This analysis can be extended to different areas and sectors. Moreover, the development of this indicator addresses the need to measure and monitor the impact of business activity in relation to the SDGs. Another theoretical implication of this study is the evidence it provides regarding the need for further analysis of the factors that condition natural resource use in a key sector for the achievement of the targets set out in the 2030 Agenda (i.e. the tourism sector). This implication is relevant because of the intense focus on caring for the planet in the current context, with increasing concern for natural resource overexploitation and its consequences. Given the economic potential of tourism, if it is well managed, it can offer an important vehicle to move towards meeting the SDGs by generating more equitable sustainable economic growth and a better world for all. Driven by the challenges facing this sector, tourism management must move towards responsible consumption and efficient management of natural resources, as highlighted in the roadmap provided by UNWTO (2023b) to ensure that the tourism sector acts as a key driver of the SDGs. Consequently, knowledge is required to enable the proposal of actions that contribute to better natural resource use by tourism companies. This research provides such knowledge.

The practical implications of this study relate to governments as well as civil society and businesses. These actors must contribute to promoting women's representation in decision-making positions as a mechanism to fulfil the 2030 Agenda's environmental aims. First, governments can contribute to women's representation through regulations and the development of these regulations through actions with a long-term view to eliminate gender inequalities in education, employment and the family. Second, civil society can contribute by demanding change at the social and political levels, to remove the structural barriers that often constrain the lives of women and hinder their professional development and access to decision-making positions. Third, firms can contribute through measures that ensure equal opportunities between genders at all levels of the organisation. To this end, four goals are fundamental: (1) the strategic vision of the firm should have a gender focus; (2) awareness must be raised of the best practices in gender issues used by the best-performing firms in this area; (3) the basis for any initiatives must be a critical assessment of the company's record in terms of gender equality; (4) specific objectives must be established, accompanied by a monitoring plan. Another essential element is a human resource policy with a gender perspective. This policy should cover different human resource processes from selection and hiring to training and promotion. A mechanism for control and evaluation of this policy and its outcomes should also be implemented.

The promotion of gender at the board level and its implications are especially relevant in the tourism sector. Although women represent the majority of the labour force in this sector (UNWTO, 2023a), the present study shows that there is a wide gender gap in terms of representation on the board of directors, with men occupying more board positions than women. As this study shows, this gender gap has major consequences for society as a whole and for organisations in particular. Therefore, tourism companies and public institutions in general, as well as those tasked with promoting tourism, should strive to promote the implementation of business practices that empower women throughout the supply chain, along with female leadership programmes.

Finally, it is worth mentioning the limitations of this study. First, it considered only one of the three dimensions of environmental performance. Second, it covered only one of its possible conditioning factors. Therefore future research should focus on other environmental dimensions, as well as other possible explanatory factors for performance in these dimensions, such as context. Finally, future research should consider the moderating effect of internal or external organisational characteristics on the relationship between board gender diversity and natural resource use.

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APPENDIX A

TABLE A1 Description of the variables used to create the composite indicator, grouped according to their association with specific SDG targets.

SDGs	Target	Description
6	6.4	Does the company have a policy to improve its water efficiency? Has the company set targets or objectives to be achieved on water efficiency?
7	7.2	Does the company make use of renewable energy?
	7.3	Does the company have a policy to improve its energy efficiency? Has the company set targets or objectives to be achieved on energy efficiency?
9	9.1	Does the company report about environmentally friendly or green sites or offices?
12	12.2	Does the company set specific objectives to be achieved on resource efficiency?
	12.4	Does the company report on initiatives to reduce, reuse, substitute or phrase out toxic chemicals or substances?
	12.6	Does the company have a policy to improve its use of sustainable packaging?
13	13.2	Does the company have a policy for reducing the use of natural resources or to lessen the environmental impact of its supply chain? Does the company have a policy to include its supply chain in the company's efforts to lessen its overall environmental impact?
	13.3	Does the company have an environmental management team? Does the company train its employees on environmental issues? Does the company claim to use environmental criteria to source or eliminate materials? Does the company use environmental criteria in the selection process of its suppliers or sourcing partners? Does the company conduct surveys of the environmental performance or its suppliers? Does the company report or show to be ready to end a partnership with a sourcing partner, if environmental criteria are not met?
15	15.5	Does the company report on initiatives to reduce the environmental impact on land owned, leased or managed for production activities or extractive use?

Note: The definitions of the SGDs and their targets, according to the United Nations (2015), are as follows: SDG 6: Ensure availability and sustainable management of water and sanitation for all. SDG 7: Ensure access to affordable, reliable, sustainable and modern energy for all. SDG 9: Build resilient infrastructure, promote inclusive and sustainable industrialisation and foster innovation. SDG 12: Ensure sustainable consumption and production patterns. SDG 13: Take urgent action to combat climate change and its impacts. SDG 15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss. Target 6.4: By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity. Target 7.2: By 2030, increase substantially the share of renewable energy in the global energy mix. Target 7.3: By 2030, double the global rate of improvement in energy efficiency. Target 9.1: Develop quality, reliable, sustainable and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all. Target 12.2: By 2030, achieve the sustainable management and efficient use of natural resources. Target 12.4: By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimise their adverse impacts on human health and the environment. Target 12.6: Encourage companies, especially large and transnational companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle. Target 13.2: Integrate climate change measures into national policies, strategies and planning. Target 13.3: Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning. Target 15.5: Take urgent and significant action to reduce the degradation of natural habitats, halt the loss of biodiversity and, by 2020, protect and prevent the extinction of threatened species.

Source: Authors based on Refinitiv (2022) and United Nations (2015).