Board Gender Diversity and Environmental Performance by Mediating Impact of Green Innovation

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Abstract

The study aims to analyze the impact of board diversity on environmental performance with the mediating role of green invocation. The study was conducted in China's environment. The data is collected from the financial statements provided by listed companies, such as the China Stock Exchange, on its website. For data validity, descriptive statistics are used to find outliers and differences in the variables by using variance analysis and for analyzing the multicollinearity correlation matrix. The results of descriptive statistics prove the validity of the data, and the correlation matrix explains that there is no issue of multicollinearity between dependent and independent variables. The GMM model is used to analyze the data. The study's results demonstrated that board diversity positively impacts environmental performance because female directors are more environmentally sensitive than male directors. However, board diversity hurts green innovation because the board members focus on utilizing current resources in a more productive way in which the company earns immediate profit. Investing in research and development with the intention of innovation may waste the investment, and companies may suffer losses. The researcher suggested that board diversity is needed in Chinese companies for environmental performance. The results prove the resource dependency theory, which explains that innovations, research, and development depend on resource availability (Capital) in the organization. The researcher suggested that this study will be conducted in different environments, especially in the context of Pakistan, and that the researchers will accept, reject, or modify results.

Keywords: Board Diversity, Environmental Performance, Green Innovation, Resource Dependency Theory, Chinese listed Companies.

Introduction

A significant and rapidly growing trend in contemporary business is firm environmental performance, which illustrates the mutual influence of an organization's operations on the natural environment (Song et al., 2018). The shift to greener strategies is aided by institutional or internal factors like resources, capabilities, managerial attitude, and motivation, as well as contextual or external factors like government regulations, industry peers, humanitarian organizations, supply

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chain partners, customers, and other stakeholders (Terjesen et al., 2009). The key components of the developing firm's environmental performance research are examining environmental performance drivers and mediating this direct effect.

The second academic stream encompasses the current study. Environmental performance and board gender diversity have been the subject of a few recent studies in this area (Ud-Din et al., 2020). A sizable portion of this literature examines how a company's environmental performance is influenced by the composition and structure of its board (Singh et al., 2008) with particular attention to board size, the presence of independent directors, and gender diversity.

The impact of having women on corporate boards on companies' ability to use environmental performance has been examined in recent board gender diversity research (Sarwar et al., 2020). Because they are more socially conscious, interested in charitable work and community service, bring diverse viewpoints to the board, promote more candid discussions, and enhance decision-making regarding stakeholder needs and environmental performance, women directors are valued more than men, according to this study. As research on the subject reveals fragmented and sometimes conflicting empirical data, we may now have an imperfect grasp of the complexity of the relationship between board gender diversity and environmental performance. It is especially troubling because research has not examined how green innovation affects the relationship between environmental performance and board gender diversity. Therefore, by examining the role of green innovation as a mediating variable in the relationship between board gender diversity and environmental performance, this study fills a research gap. Reducing greenhouse gas emissions and improving carbon effectiveness require green technologies (Du & Li, 2019; Shi et al., 2021; Yan et al., 2020). Nevertheless, It is important to remember that the environmental effect of various forms of green innovation may vary. Therefore, the link between board gender diversity and environmental performance in China will be examined through green innovation.

According to resource dependence theory (RDT), businesses may enhance their environmental performance by utilizing resources like gender diversity. According to Scally and Byrne (2014) a corporation's competitiveness and organizational behavior are influenced by external environmental resources. RDT helps the company use its resources efficiently for organizational success and environmental sustainability. The board of directors allocates organizational resources and makes crucial decisions that contribute to environmental sustainability. When the right decisions are made at the right time, organizations should go forward. The board of directors will provide management with the proper guidance, and board members' social and human capital is crucial to management performance (Qiu et al., 2020). Therefore, the resource dependency hypothesis states that female directors are the organization's leading resource for impacting sustainability and external environmental performance. In order to accomplish strategic objectives and further social agendas, boards benefit from the diverse knowledge, creativity, and ideas that female directors bring to the table (Rennings and Rammer, 2011). Board members with natural environment experience will help maintain environmental interdependence, and women are competent in this area (Porter & Kramer, 2011). Creating, especially in businesses that have an ecological effect. Because women are specialists in this field, RDT suggested actions that boost organizational credibility.

The goal of the current study is to contribute in several ways to the dynamic literature. This is the first time that the gender diversity of its board has explained a publicly listed Chinese company's environmental performance. The study looked at the connections between environmental performance, environmental reporting traits, and board gender diversity. For instance, gender diversity on boards has a negative correlation with environmental reporting but a positive

correlation with environmental performance. It demonstrates how several proxies for the environmental performance of Chinese businesses produce various results. Second, the study finds that the connection between environmental performance and board gender diversity is mediated by green innovation. Lastly, the study provides RKS ratings of listed Chinese companies to assess environmental performance using 21651 observations of crime data from 2010 to 2022 (Khan et al., 2021). This study accounts for likely endogeneity in a sizable and up-to-date punishment dataset using the generalized moments method (GMM) and the fixed effect strategy. The methodology's distinctiveness evaluates if the possible influence of gender diversity on boards on environmental performance and reporting is maintained over time.

Literature Review

Board Gender Diversity and Environmental Performance

The number of female directors on a company's board is considered gender diversity (Sarwar et al., 2020). Resource dependency theory states that gender diversity on boards (BGD) enhances board effectiveness through various abilities, including strategic decision-making and innovation, increasing environmental performance. Because of their social networks and vast experience serving on several boards, female board members are more socially aware and capable of allocating tasks than their male counterparts. Businesses have less financial hardship when their boards are gender-diverse (Singha et al., 2020). Female board members actively engage in environmental activity (Oliva et al., 2019), are environmentally conscientious and have a good awareness of environmental threats.

Research has revealed a conflicting relationship between environmental performance (EP) and board gender diversity (BGD). Several BGD-dependent constructs were used in the studies, including environmental performance (Nuber & Velte, 2021) social performance classification, CSR reporting (Naveed et al., 2022), greenhouse emissions (Hussain & Stefania, 2022) and social and environmental disclosure. According to most studies, environmental performance and board gender diversity are positively correlated. Women offer distinct viewpoints on enhancing corporate environmental performance, and their presence on the board enhances the caliber of environmental decision-making debates. Orazalin and Mahmood (2018) BGD and environmental performance have a positive, linear, and robust association (Nuber & Velte, 2021). When gender diversity and environmental connectedness are connected by two majority ownership in a company, Cordeiro et al. found a significant association between the two (Moussa et al., 2020). Board gender diversity and environmental performance are significantly positively correlated, according to content analysis of director biographies in companies with an environmental effect. It was shown that female board directors make decisions on environmental sustainability and are more concerned with how companies perform environmentally. By guaranteeing that female directors participate in board meetings, gender diversity promotes sustainable growth, directly affecting the company's social and environmental performance (Miller & Del Carmen Triana, 2009). According to resource dependence theory, companies should use their resources to balance the number of male and female directors on their boards. Female directors are more creative and environmentally conscientious when implementing the company's principles.

Although several viewpoints positively impact gender diversity and environmental performance, women tend to prioritize stakeholders, whereas men are more inclined to prioritize shareholders. Women can influence environmental performance despite their lack of care for the environment. Women's environmental performance is only marginally related to environmental concerns. (Manzaneque et al., 2016). Compared to males, female directors communicate less asymmetrical

information with stakeholders and possess more excellent psychological traits. Therefore, there is a direct positive correlation between ESG (environment, social, and governance) and female directors, with negligible moderating effects. Only in industries that directly influence the environment do women directors directly correlate with environmental performance; this correlation is negligible in less ecologically significant industries, such as retail.

The current study demonstrates that women directors are a significant company resource, which enhances the firm's performance and gives it a competitive profile, per resource dependency theory. However, empirical research has shown that women on the Board of Directors prioritize social issues over environmental ones. Accordingly, the organization's environmental performance has been quantified due to gender diversity (Siddique et al., 2021). Few studies indicated a negligible impact, but most identified a positive relationship between gender diversity and environmental performance. Thus, the following options are put forth:

Hypotheses 1: Board gender diversity and a firm's environmental performance have a positive association.

Board Gender Diversity and Green Innovation

As the world's top producer and emitter of greenhouse gases, China is the nation most suited to address global warming issues. China's energy sector is the world's most significant producer of coal and emitter of greenhouse gases. China thus faces several climate-related issues. To become carbon neutral by 2060, China has started several green projects and technologies (James et al., 2020). China's development strategy, which is being carried out at the national level to achieve zero carbon tolerance by 2060, now includes green technology (renewable energy); these policies are generally accepted in China (Hillman & Dalziel, 2003). The Chinese government would implement policies that encourage the private sector to engage in green innovation more than the public sector. Green innovation would increase when businesses had no financial problems, but it would decline in the private sector due to financial constraints (Hartmann & Vachon, 2018).

Products or procedures that support environmental sustainability in companies may be examples of green innovation (Jiang et al., 2018; Zhai et al., 2022). Green technology and green management are two aspects of green innovation. A firm's resources have the strategic potential to become the best in their field, such as through green innovation, according to resource dependency theory (RDT). Green product innovation (Qiu et al., 2020), corporate finance (Javeed et al., 2022), green innovation performance (Naveed et al., 2022), corporate green innovation (Naveed et al., 2022; Yu et al., 2022), board gender diversity (Naveed et al., 2020), and green finance, knowledge level, and government support in policy making are some of the constructs that have been used in studies as dependent on green innovation. Board members give strategic direction that affects environmentalism, and green innovation is included in strategic decision-making at board meetings (Naveed et al., 2022). Therefore, a board of directors provides environmentalist and decision-making benefits from various board members. Diversity in gender on boards promotes innovation, flexibility, and efficient information processing. Diverse strategic decision-making improves the environmental component, and corporate governance by women directors positively affects environmental plans. However, the currently available data reveals contradictory findings on gender diversity on boards and green innovation. Carbon performance, which different board members examine, determines carbon emission levels, and gender diversity affects carbon performance (Fujii et al., 2013). Women board members are psychologically stronger than male directors in decision-making, and due to these distinct values, women directors have a variety of decision-making dimensions (Galbreath, 2011).Women's strength on board is positively correlated

with attractive environmental sectors. The firm's green performance improves when the number of female directors rises (Naveed et al., 2022). The number and quality of green innovation are positively correlated with gender diversity, and the connection between green innovation and gender diversity on boards is mediated by government policy (Farag & Mallin, 2017). Therefore, companies looking to enhance environmental sustainability and green innovation can benefit significantly from having female directors (Naveed et al., 2022). However, there is a negative correlation between gender diversity and green innovation in companies with large board sizes (Scally & Byrne, 2014). Thus, China invests the most in green innovation and moves quickly to achieve the goal by 2060. The quality and quantity of green innovation regarding board gender diversity are examined in the current study based on this research. The following theories are developed:

Hypothesis 2: Board gender diversity and green innovation have positive associations.

Green Innovation and Environmental Performance

The resource dependence theory states that businesses utilize resources for their operations and outputs and encourage others to use resources most appropriate for environmental requirements. Environmentally impactful organizational resources, goods, and processes will be used to meet legal environmental obligations. The best environmental performance is the key to achieving environmental sustainability, and organizational operations and product development support environmental sustainability. Green innovations, eco-friendly products, and eco-friendly processes are some of the components that make up environmental performance (Oliva et al., 2019; Chen et al., 2015).

According to Li et al. (2020), green innovation is also being studied through innovation in many processes to minimize air pollution, energy conservation, organizational waste, and the use of coal, oil, and electricity. Due to its extensive usage of coal and gas emissions, China is the primary cause of the global warming issues facing the world. To become carbon neutral by 2060, China has started several green projects and technologies (Setó-Pamies, 2015). Green innovation in organizational goods and processes is essential to firm performance (Quan-Jing et al., 2022.), sustainability performance (Pfeffer & Salancik, 1978) and environmental performance (Kraus et al., 2020). Research indicates that organizations use green goods and processes to enhance environmental performance and lessen adverse environmental effects on businesses, leading to better social and financial outcomes. Green innovation improves an organization's social and financial performance by reducing waste and costs (Pan et al., 2021).

According to earlier studies, green innovation via new green products and management-implemented green processes not only saw the company as a reactive strategy to draw stakeholders but also enhanced environmental performance to get a competitive edge (Nugrahanti et al., 2020). According to Singh et al. (2020), green innovation has emerged as a management agenda item at director meetings and encourages environmental sustainability. Nadeem and Zaman (2017).discovered a positive correlation between environmental performance and green innovation. Although resources are scarce in developing countries, green innovation enhances environmental performance over the long run (Imran & GaoJingzu, 2022). Green innovation has significant mediating effects between financial resources and financial performance, and financial resources have a positive relationship with environmental performance through a partly mediating role in the process (Khan et al., 2021). By lessening the impact of green HRM, green innovation and environmental performance significantly impact them (Siddique et al., 2021). Therefore, green

innovation improves environmental performance by allocating resources in line with resource dependency theory (Khan et al., 2023). Thus, the theory is presented in the current study.

Hypothesis 3: Green innovation and environmental performance have positive associations among them.

The Mediating Effect of Green Innovation

Prior studies have demonstrated a clear relationship between environmental performance and gender diversity in firms. However, the third construct has to be found as a mediator between board gender diversity and environmental performance in order to predict the direct impact of gender diversity on environmental performance. The study looks at how gender diversity and environmental performance are indirectly impacted by green innovation. Environmental performance is linked to green innovation after gender diversity. Accordingly, research was done on green innovation's direct and indirect consequences (Preacher & Hayes, 2008). Resource dependency theory states that the company's environmental performance is improved by resource allocation, and female directors are psychologically strong decision-makers with innovative ideas for organizing procedures and outputs (Lin et al., 2022). Therefore, gender diversity and environmental performance are indirectly impacted by green technology, even if diversity is suitable for any organization's environment. This criterion assumed that gender diversity and environmental performance were mediated by green innovation.

Prior studies have demonstrated a clear correlation between environmental performance and the gender diversity of boards. For instance, James et al. (2020) discovered a strong correlation between environmental performance in companies with an environmental effect and the gender diversity of the board. Although there is little study on how female board members affect a company's environmental performance, female board directors are more concerned with environmental sustainability and make decisions about environmental performance (Miller et al., 2009). They suggested that by lessening the effects of green innovation, gender diversity in board meetings enhances a business's environmental performance. Products or procedures that support environmental sustainability in companies may be examples of green innovation (Jiang et al., 2018; Zhai et al., 2020). The number and quality of green innovation are positively correlated with gender diversity, and the connection between green innovation and gender diversity on boards is mediated by government policy. Therefore, companies looking to enhance environmental sustainability and green innovation can benefit significantly from having female directors (Naveed et al., 2022). According to Pfeffer and Salancik (1978), resource dependency theory offers a theoretical framework for making efficient and cost-effective use of resources, such as the involvement of female directors in strategic decision-making.

Additionally, studies have shown a connection between environmental performance and the gender diversity of boards (Muhammad & Migliori, 2022). Women's power on boards is positively correlated with attractive environmental sectors. Since women's decisions appeal to stakeholders while men's decisions appeal to shareholders, having more female directors enhances a company's green performance (Naveed et al., 2022). Because women's actions benefit, the corporate environment and green innovation enhance a company's environmental performance, green innovation, whether in process or product, positively impacts gender diversity (Naveed et al., 2022). Since female directors have greater strategic decision-making capacity than male directors, these studies help to recognize that balancing the contributions of male and female board directors may improve any company's environmental performance. The resource dependency hypothesis states that improved resource use enhances a company's environmental performance. The relationship between board gender diversity and environmental performance will strengthen due

to green innovation, whether it takes the shape of green products or processes. Research on green innovation as a mediator between environmental resources and board gender diversity is new. Therefore, it is possible to predict:

Hypotheses 4: Green innovation mediated the association between board gender diversity and environmental performance

Research Methodology

From 2010 to 2021, it looked at a sample of Chinese A-share listed businesses. China's two central databases were used to gather environmental, financial, and nonfinancial statistics. We initially collected each company's recurring green patent purchases using Chinese Research Data Services to calculate the GI goal for all Chinese listed businesses (Pan et al., 2021). Second, we assessed several financial and non-financial factors using the China Stock Market and Accounting Research database. We evaluate the environmental performance of Chinese listed companies using 20651 firm-year observations on Rankins Ratings (RKS) from the HEXUN website.

Table 1: Variable descriptions

Variables	symbols	measurement of variable
Dependent variable		
Environmental Performance	EP	Continuous variables, ranging from 0 to 100 (lowest to highest rating score), are downloaded from the HEXUN dataset.
Environmental Reporting	ER	measured through a dummy variable that returns one if a firm has disclosed its environmental activities in a given year and zero otherwise.
Mediating variable		
Green Innovation	GI	Number of green patents acquired by the firm during the year (Berrone et al., 2013)
Independent variables		
Board Gender Diversity	BGD	measured through the proportion of female members on the corporate board (Naveed et al., 2021)
Control variables		
Firm Size	FS	Calculate by taking the natural log of the firm's total assets (Shahab et al., 2018)
Firm Leverage	FL	Measured by the ratio of total liabilities divided by total assets (Shahab et al., 2018)
Return on assets	ROA	Obtained by taking the ratio of the net income of a firm to its total assets (Yeh, 2018)
Board Size	BS	Total members on the board of directors (Yeh, 2018)
Board Independence	BI	The ratio of independent directors to the total no. of directors (Yeh, 2018)

Econometric Model

The first model demonstrates a relationship between environmental performance and board gender diversity when control factors are included (H1). The structure is as follows:

$$EPi,t=\beta_0+\beta_1 \text{Board gender diversity}_{i,t}+\sum\beta_{i,t}\,\text{Control}+\varepsilon i,t \quad (1)$$

Board gender diversity refers to the overall gender diversity of the board, where environmental performance (EP) is the dependent variable. Control also refers to the control variables that affect the analysis. The following control variables are included in this analysis to minimize apparent correlations between variables and specification errors in the estimated model and to account for the impact of board gender diversity on environmental performance (Udin et al., 2017). Previous studies have concluded that the control variables include board size (BS), board independence

(BI), return on assets (ROA), firm size (FS), and firm leverage (F Lev). The meanings of these variables are given in Table 2.

To test our H2 hypothesis (the effect of board gender diversity on green innovation), it is estimated in the following equation model:

$$GI_{i,t}=\beta_0+\beta_1 \text{Board gender diversity}_{i,t}+\sum\beta_{i,t}\,\text{Control}+\varepsilon i,t \quad (2)$$

In the above equation, two green innovations denote GI. Control variables provide the same six firm-specific and board-specific control variables used in Eq. (1). Board gender diversity of Chinese firms refers to the number of women working as directors.

Moreover, we construct the following regression model to evaluate the effects of green innovation on environmental performance (H3):

$$EP_{i,t}=\beta_0+\beta_1 \text{Green innovation}_{i,t}+\sum\beta_{i,t}\,\text{Control}+\varepsilon i,t \quad (3)$$

In Eq. (3), GI stands for green innovation as the explanatory variable, while EP stands for environmental performance as a dependent variable. We also control six company and board features, as shown in Equations (1) and (2).

Finally, to analyze the mediating impact of green innovation on the association between board gender diversity and environmental performance, we estimate the following empirical model:

$$EP_{i,t}=\beta_0+\beta_1 \text{Board gender diversity}_{i,t}+\beta_2 \text{Green innovation}_{I,t}+\sum\beta_{i,t}\,\text{Control}+\varepsilon i,t \quad (4)$$

Where GI stands for green innovation, the mediating variable. Board gender diversity refers to the proportion of women who serve as directors in Chinese corporations. Lastly, to consider outliers and extreme values, all continuous variables were minorized at the 5th and 95th percentiles. The measurements for each study variable utilized in the above-mentioned empirical models are listed in table 2.

Results and Discussion

The statistical studies were carried out to confirm that the selected sample had no abnormalities in the model. Second, this study excluded the banking and real estate industries from the industry classification of listed businesses. As a result, the sectors described below have financial implications for firm investment. The study also excludes samples of businesses with inadequate information, notable treatment corporations, and delisted firms. This is due to the businesses' aberrant management condition, which does not adequately represent their green innovation status. Furthermore, the statistics are severe across the whole sample.

Table 2: Descriptive short detail

Variable	Obs	Mean	Std. Dev.	Min	Max
Dependent variable					
Environmental Performance	20652	0.8976	0.6472	(0.5146)	1.9713
Environmental Reporting	20643	0.0010	0.1495	0.0009	1.0000
Mediating variable					
Green Innovation	20652	0.0245	0.013	0.0000	0.2769
Independent variables					
Board Gender Diversity	20652	0.1289	0.1026	0.0000	0.3456
Control variables					
Firm Size	20652	21.9432	1.1945	16.4956	28.1945
Firm Leverage	20652	0.4723	0.2193	0.1389	0.8234
ROA	20652	0.0309	0.4269	-48.2345	8.4356
Board Size	20652	8.5756	1.7231	0.0000	19.9783
Board Independence	20652	0.3673	0.0523	0.0000	0.7965

Note: Please see table 2 for variable definitions.

Table 2 shows the variables assessed in the study. We tested our hypothesis using three important variables (H1-H4). As is often the case with women in management and the professions, "proportional scarcity" can make it challenging for them to hold important positions in organizations or functional groups. Blau (1977, p. 276) defines variety as "the broad range of different statuses among which a population is distributed." For categorical variables like gender diversity (2017), Ben-Amar et al. (2017) and Miller and Del Carmen Triana (2009) employed Blau's index as a stand-in for diversity. When there is just one woman on the board, Blau's index is zero; when men and women are equally represented, it is 0.5.

Table 3: Correlation matrix

Variables	VIF	BGD	EP	GI	FS	FL	ROA	BS	BI
BGD	-	1.0000							
EP	1.1211	0.2701	1.0000						
GI	1.0322	0.0479*	0.0378*	1.0000					
FS	1.6783	0.0335*	0.0468*	0.0223*	1.0000				
FL	1.9596	0.0478*	0.0178*	0.0293*	0.0598*	1.0000			
ROA	1.1234	0.0167*	0.0276*	0.0278*	0.0178*	0.0292*	1.0000		
BS	1.4231	0.0657*	0.0309*	0.0392*	0.0293*	0.0273*	0.1495*	1.0000	
BI	1.3222	0.0897*	0.0698*	0.0492*	0.0345	0.0656	0.0293	0.2572	1.0000

Note: Please see Table 2 for variable definitions.

*Significant at 5% level.

GI and EP correlate substantially and favorably with board gender diversity (Ali et al., 2022). In general, these correlation coefficients support hypothesis 1. Additionally, Table 4.2 demonstrates that board gender diversity has a significant positive link with green innovation, as predicted by H2. Likewise, as anticipated in H3, Table 4.2 statistics show that green innovation and environmental performance are positively correlated. As predicted in H4, GI also mediates the connection between BGD and EP. These correlations do not contradict the study hypothesis. Additionally, the study's independent and control variables had incredibly low correlation values, suggesting multicollinearity is implausible in the examined models.

Table 4: Mediation

Description of path	**T Statistic**	**p-value**	**Result**
BGD GI EP	2.875	0.0033	Positive mediation

Note: Please see table 1 for variable definitions. *** p<0.01, ** p<0.05, * p<0.1

According to H4, the association between board gender diversity and environmental performance is moderated by green innovation. The mediation approach principles proposed by Baron and Kenny (1986) and the hierarchical regression analysis were used to test the mediation: (1) the independent variable board gender diversity has a significant influence on the dependent variable environmental performance; (2) the independent variable board gender diversity has a significant influence on the mediating variable green innovation, and (3) the mediating variable green innovation has a si. After satisfying the two mediation conditions mentioned above, researchers look at the combined impact of the mediating variable green innovation and the independent variable board gender diversity on the dependent variable environmental performance. Table 5 demonstrates that the association between environmental performance and board gender diversity was mediated by green innovation (GI) (0.0796, P = 0.0110). The impact of mediation is evaluated

using the Sobel test (Sobel, 1982). Green innovation has a partial and considerable mediating effect on board gender diversity and environmental performance, according to the Sobel test results (Table 4). It illustrates how a company's female director inspires employees to be more creative with green ideas and perform better in the environment. There is little proof that the relationship between environmental performance and board gender diversity is mediated by green innovation.

Table 4: Fixed Effect Regression

Variables	EP (1)	GI (2)	EP (3)	EP (4)
BGD		0.2975***	0.4950***	0.4921***
		(0.03217)	(0.0294)	(0.0293)
GI	0.1038***			0.0796***
	(0.0109)			(0.0110)
FS	0.0139*	0.0521***	0.0244***	0.0293***
	(0.0081)	(0.0074)	(0.0079)	(0.0079)
FL	0.1787***	0.0497***	0.1941***	0.1231***
	(0.0312)	(0.0297)	(0.0393)	(0.0392)
ROA	0.6975***	0.3918***	0.6911***	0.7214***
	(0.0576)	(0.0493)	(0.0596)	(0.0592)
BS	0.2945***	0.0194	0.1926***	0.2734***
	(0.0597)	(0.0439)	(0.0595)	(0.0704)
BI	0.0439	0.0293	0.0437	0.0426
	(0.2352)	(0.0916)	(0.212)	(0.2194)
Constant	0.8794***	0.8909***	0.9733***	0.7961***
	(0.1955)	(0.1916)	(0.1926)	(0.3262)
Year dummies	Yes	Yes	Yes	Yes
Observations	20,652	20,652	20,652	20,652
Adjusted R2	0.3216	0.3915	0.3178	0.2976
No. of companies	1721	1721	1721	1721

Note: Please see Table 2 for variable definitions. The figures in parentheses are the standard errors.
*** p<0.01, ** p<0.05, * p<0.1

Using information gathered from 20652 Chinese organizations from Chinese sources CSMAR, CNRDS, and HUXUN, the association between panel representation by gender and environmental outcomes was predicted between 2010 and 2021. According to recent research, a corporation may perform better in proportion to its surroundings if it has more female directors (Birindelli et al., 2019; De Brauwer et al., 2018). It has been shown that environmental sustainability is improved as the percentage of female directors rises. When there are not enough female directors, hiring up-and-coming female directors might help them become more well-known and significantly enhance the company's environmental credentials. Additionally, the business's eco-friendly practices result in a smaller-than-anticipated profit.

Even though large organizations are excellent at adjusting to environmental laws and regulations, a recent study found that gender diversity boosts the quantity and caliber of environmentally friendly innovations businesses produce. One aspect of ESG (environment, socialization, and governance) is green innovative behavior. The current study highlights the necessity of having women in higher management as part of an ecologically conscious, actively involved approach. The resource dependency theory, whose results are further investigated, is supported by empirical

evidence showing that women are more environmentally sensitive than men. According to resource dependence theory, women provide unique viewpoints and knowledge to business management because of the differences between men and women regarding demographic position, market expertise, parental section, and interactions with others.

Table 5: GMM regression results

Dependent Variables				
Variables	**EP**	**GI**	**EP**	**EP**
	(1)	**(2)**	**(3)**	**(4)**
Lagged of Dependent	0.2913***	0.3942***	0.3180***	0.2954***
	(0.0205)	(0.0193)	(0.0235)	(0.0235)
BGD		0.2084***	0.5367***	0.6221***
		(0.0581)	(0.0592)	(0.0543)
GI	0.1325***			0.0973***
	(0.0191)			(0.0193)
FS	0.0496**	0.0191**	0.0593***	0.0596***
	(0.0194)	(0.0095)	(0.0192)	(0.0191)
FL	0.7921***	0.6427***	0.6890***	0.6972***
	(0.0678)	(0.0433)	(0.0692)	(0.0692)
ROA	0.6910***	0.1454**	0.6937***	0.7010***
	(0.1322)	(0.0597)	(0.1342)	(0.1342)
BS	0.101	0.0134	0.1923	0.1094
	(0.1097)	(0.1123)	(0.1235)	(0.1310)
BI	0.3273	0.0609	0.3284	0.3965
	(0.2931)	(0.2193)	(0.2905)	(0.2956)
Constant	1.5934***	0.3129	1.5182**	1.4365**
	(0.4975)	(0.3844)	(0.4987)	(0.4987)
Industry Effect	Yes	Yes	Yes	Yes
Year Effect	Yes	Yes	Yes	Yes
AR(2)-p-value	0.4974	3.1972	4.9765	3.9851
	(0.0691)	(0.0010)	(0.0392)	(0.0012)
AR(2)-p-value	0.2932	0.1039	0.4986	0.3983
	0.4785	0.1978	0.3871	0.2943
Hansen's J (p-value)	0.2782	0.1987	0.2934	0.2955
Observations	20,647	20,647	20,647	20,647
No. of companies	1877	1877	1877	1877

Note: Please see table 2 for variable definitions. The figures in parentheses are the standard errors.

*** p<0.01, ** p<0.05, * p<0.1

Due to regulations, funding, and the requirement for a national environmentally friendly development strategy, experimental research also showed that board gender diversity has a negligible effect on the standard of environmentally friendly inventiveness. As a result, businesses prioritize different aspects of green innovation to achieve faster growth.

Conclusion

The results show that having a mix of genders on boards improves environmental performance. The study explored the fact that innovative green technology mediates the link between gendered diversity and environmental accomplishment. According to the current study, the BGD strategy

is also selected while discussing green innovation (GI) in establishing a company's overall strategic direction while considering leadership and financial perspectives (Naveed et al., 2021). Instead, this is evident. This is brought on by both the underrepresentation of women on boards and the increasing stress experienced by shareholders. Increasing the number of women on a company's board of directors may improve its environmental sustainability (Alazzani et al., 2017). In order to ensure gender diversity on boards and foster a green innovation ecosystem at home, it would be advantageous to promote and encourage exports to countries with stringent environmental regulations (Aguilera et al., 2007)). Although it usually falls short of what is reported in other developing nations, the environmental performance of the companies in the research seems to differ. Public discussions should offer a clear viewpoint on properly disclosing environmental performance to enhance the environmental information regulators and government representatives, including the Chinese government, give.

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