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Media Attention, Environmental Information Disclosure and Corporate Green Technology Innovations in China's Heavily Polluting Industries

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ABSTRACT

Green technology innovation is an effective way to overcome the constraints of combining resources and environment. This paper focuses on the impacts of media attention and corporate environmental information disclosure on green technology innovation of China's 487 listed heavily polluting companies from 2007 to 2019. The corporate environmental information disclosure was measured using text analytics and data mining and considering the impacts of political connections. The results indicate that: (1) both positive and negative media attention and the quality of environmental information disclosure significantly contribute to corporate green technology innovation, with negative media attention having a more substantial impact than positive media attention; (2) The environmental information disclosure of China's heavily polluting industries acts as a mediator in the impact of negative media attention on enterprise green technology innovation; (3) Political connection as a moderating factor has a major suppressive impact on the mediating model. This paper enriches the research relevant to the drivers of green technology innovation in enterprises. It also provides new ideas for exploring the research on the influence on green technology innovation behavior from the perspective of political connections.

KEYWORDS

Green technology innovation; media attention; environmental disclosure; political connections

JEL CLASSIFICATION

G18; O32

1. Introduction

Along with China's sustained and rapid development in the wave of economic globalization, China also faces severe problems of high pollution and waste of resources (Miao et al. 2017). Achieving the balance between economic growth and environmental protection has led to extensive academic discussions. Still, the sloppy story has made the environment pay a considerable price and become a problem for people's livelihood. The crude development of heavily polluting enterprises gradually threatens reform and economic achievements. It reduces the public's quality of life and happiness. Especially the "PM2.5 explosion" in 2011 has made us pay extra attention to heavy polluting enterprises.

As an essential intermediary of social information and a crucial external monitoring mechanism, media attention can directly expose the weaknesses and current situation of environmental pollution of heavily polluting corporates, thus producing a positive governance promotion effect (Rambabu, Prasad, and Prasad 2020). As the main force in monitoring social opinion, the media also influences enterprises' choice of environmental strategies through their

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attention to environmental issues(González-Benito and González-Benito 2006). With the rapid development of media technology, its role in economic activities has become increasingly prominent, and its influence cannot be underestimated. Heavy polluters may gain insight into the environmental demands of stakeholders through the intermediary of media attention, and the media, as a public voice channel, influences the evaluation and behavioral orientation of stakeholders toward the corporate. The corporate will have to enhance its green technology innovation capabilities (Su and Fan 2021). The participation of media and other environmental pressure groups in the supervision of enterprise environmental behavior can promote enterprises to respond to environmental problems actively. This suggests that media attention is an element which cannot be neglected while researching environmental issues.

However, the importance of micro-level factors of enterprises cannot be ignored. Based on stakeholder theory in the long term, enterprises are required to consider the requirements of their stakeholders in their development process and achieve consistency with them in the direction of orders through information intermediation. The Corporate social responsibility disclosure mechanisms can enhance corporate reputation in the long run (Khosroshahi et al. 2021). The corporate environmental information disclosure determines whether a company can adequately meet the environmental needs of its stakeholders, thereby promoting the company's capacity for innovation in green technology (Dhaliwal et al. 2011). In addition, according to the Upper Echelons Theory, the politically connected characteristics of the senior management team affect the strategic decision-making behavior, permeating every part of the corporate decision-making process (Hambrick and Mason 1984; Liu, Hu, and Cheng 2021).

Given this, this study focuses on China's heavily polluting listed companies to empirically answer whether there will show a "know-weakness" attitude and continuously improve their green technology innovation or reduce their green innovation intensity under media attention, starting from the "double-edged sword" nature of media attention., to fall into the situation of "shortage"; At the same time, it is considered that heavy polluters gain insight into stakeholders' environmental demands through media attention and respond to such environmental demands with environmental information disclosure, thus influencing enterprises' green technological innovation. We can then use environmental information disclosure as a mediating variable. In addition, the political relevance of senior management teams of heavily polluting enterprises has the characteristics of unique political attributes, which may promote or inhibit the impact of media attention and environmental disclosure on enterprise green technology innovation.

This article's research contribution and significance are as follows: First, we explore the mechanism of media attention to green technological innovation of heavy polluters. Current studies on the influence of the media on corporations have primarily focused on corporate governance and social responsibility performance. Second, we propose and verify the mediating role of corporate environmental information disclosure between media attention and green technology innovation. We further confirmed that when heavily polluting companies gain insight into the environmental demands of stakeholders through media attention, they will use media attention environmental information disclosure to respond to this environmental demand. Finally, political connections of executives are introduced as a moderating variable to provide an in-depth analysis of the effect of political connections on the association between media attention and green technological innovation in heavily polluters and to provide suggestions for improving media monitoring and environmental governance.

The rest of the paper is organized as follows. Part 2 provides the analysis and presents the theoretical analysis and research hypothesis. Part 3 provides the research design. Part 4 presents the empirical analysis. Part 5 provides the study discussions. Part 6 provides conclusions and implications. The article's ending also contains the research gaps and an outlook for further research.

2. Theoretical Analysis and Research Hypothesis

2.1. Green Technology Innovation

Corporate green technology innovation refers to technology or product innovation in energy saving, environmental protection, and resource recycling (Song, Wang, and Sun 2018). Stakeholder Theory argues modern companies ought to consider stakeholders' willingness other than shareholders to obtain more support and resources to continuously improve their business. As environmental problems become more and more prominent, heavy polluters are receiving more attention from stakeholders as the primary source of pollution. These stakeholders are constantly pushing companies to achieve sustainable green technological innovation and growth through policies, formal or informal talks, shareholder power, etc. (Khosroshahi et al. 2021). The above literature affirms the necessity of green technology innovation in enterprises, especially in heavy polluters, and provides a basis for our study of the effect of external media attention in heavy polluters from the stakeholder's perspective.

Due to the dual role of "knowledge spillover" and "technology spillover," green technology innovation is considered an effective vehicle for ecological modernization because it can enhance the profitability of companies while improving the ecological environment (Cai and Li 2018). Through green technology innovation, many enterprises further reduce the pollution problem in production and promote the optimization and upgrading of products. In terms of eco-modernization theory, green technology innovation is the way forward for many heavy polluters, prompting them to undertake green innovation activities spontaneously to reap additional green innovation benefits. However, it is inescapable that green innovation is intrinsically flawed, with enterprises' willingness to self-innovate decreasing.

2.2. Impact of Media Attention on Corporate Green Technology Innovation

Media attention, as a social information intermediary, will expose and amplify the harm of this pollution behavior to stakeholders, thus causing the loss of corporate culture and business value, while heavy polluters will regulate their green management behavior and increase their green technology innovation to avoid corporate losses. In the above discussion, for the stakeholder theory, the primary pursuit of green technological innovation by heavily polluting firms is not to lose their reputation; for the ecological modernization theory, firms want to obtain permanent economic and ecological performance. Thus, it can be argued that, in terms of its governance role, media attention plays a typical catalytic role in heavy polluters.

On the one hand, media attention can inform heavy polluting enterprises of stakeholders' demands and lay an excellent governance foundation for ecological modernization concept, which will continuously enhance enterprises' attention to green technology innovation through the governance foundation; On the other hand, enterprises will be caught by the media attention itself. In related literature studies, companies with less negative news have a lower probability of stock crashes (Kim, Li, and Li 2014). The media can hugely impact investor confidence by disclosing negative news of listed companies. The rapid development of mobile communication networks reduces the cost of information dissemination, and news is quickly disseminated between investors and non-investors. Even when listed companies issue public clarifications, it is difficult to fully compensate for the loss of profits resulting from such negative media attention.

The impact of media attention in heavy polluters can be described in two ways based on stakeholder theory and corporate ecological modernization theory. For the positive governance effect, the first can be attributed to the long-standing reputation view of stakeholders. An important reason for companies to engage in stakeholder management is to maintain their social reputation and thus gain a competitive advantage (Stucki 2019). To stabilize their sustainable competitive edge, heavy polluters will strive to meet the sustainable development needs of their stakeholders, while responsible heavy polluters will gradually focus on achieving long-cycle green technology innovation activities (Solikhah 2020). Based on this, the following hypothesizes are proposed:

H1a: Positive media attention significantly impacts green technology innovation in heavy polluters.

H1b: Negative media attention significantly impacts green technology innovation in heavy polluters.

2.3. Impact of Corporate Environmental Information Disclosure on Corporate Green Technology Innovation

The relatively low image of heavy polluters means that it needs to respond to the ecological demands of its stakeholders through environmental disclosure, thus demonstrating the green stance of a heavy polluter and preserving its reputational value (Zhang et al. 2019). Based on stakeholder theory, it is required for companies to respond to the environmental demands of their stakeholders through eco-disclosure to demonstrate their active social responsibility and the measures they have taken (Elijido-Ten 2004). Stakeholders' increased awareness of the quality of environmental information disclosure makes it easier for companies to engage in green technology innovation, and this facilitates the rise in market share of green products or processes, thus generating new momentum for corporate green technology innovation (Dhaliwal et al. 2011). The above literature discussion found that environmental information disclosure's impact is realized from external pressure and social reputation. Based on the external pressure theory, the public scrutiny of enterprises could be a greater incentive to strengthen their green technology innovation. While facing the institutional pressure exerted by the public, they are encouraged to make more proactive environmental management decisions through green technology innovation, which will result in higher market ratings. Companies must disclose their green innovation behaviors and release positive signals about their green development to enhance stakeholders' understanding of their core truths and future strategies.

H2: The quality of corporate environmental information disclosure has a significant positive effect on the green technology innovation of heavy polluters.

2.4. Mediating Role of the Environmental Information Disclosure

During the impact of negative media opinion on green technology innovation, corporates usually respond to the environmental demands of stakeholders through environmental information disclosure. Similarly, media attention influences corporate environmental information disclosure (Cho and Patten 2007). Voluntary corporate disclosure regarding environmental information can help alleviate asymmetries. It is undeniable that media coverage can influence stakeholders' investment decisions (Groza, Pronschinske, and Walker 2011). On the one hand, environmental information disclosure may promote corporate green technology innovation through compliance costs (external pressure) and reputation effects (internal incentives)(Xiang et al. 2020; Yin and Wang 2018).

Meanwhile, environmental responsibility forms an integrated component of social responsibility, and detailed environmental information disclosure can reflect the social responsibility undertaken by enterprises. Companies that actively disclose environmental information can help convey positive signs of business stability to investors and create a favorable corporate image. In addition, environmental information disclosure serves as an influential factor for corporate credit, which helps reduce informational asymmetry between banks and heavily polluting enterprises to obtain financing and alleviate debt and financing costs (Ni and Kong 2016).

H3: The corporate environmental information disclosure quality has a significant positive mediating effect between media attention and corporate green technology innovation.

2.5. Moderating Role of Political Connections

Political connection exerts a disincentive influence on firms' green innovation activities. First, it has a "sheltering effect" on the public opinion and environmental disclosure of politically connected corporate executives (Shleifer and Vishny 1994). Second, due to the need for promotion assessment of officials and corporate green strategy to generate new contradictions (Piotroski and Zhang 2014). Companies actively engaged in green technology innovation should concentrate on conservation and social responsibility rather than seeking political connections for executives. This rent-seeking behavior causes companies to expend more effort and investment to hire government officials, pay high salaries, etc., to whitewash environmental disclosures, avoid environmental fines, and "cover-up" negative public opinion through a strong government background (Iatridis 2013). These politically connected executives lack experience in environmental governance and professional corporate governance knowledge. The above literature shows that political connections hinder technological innovation activities. The curse effect of political resources exists in technological innovation activities, which reduces the efficiency of firms' technology innovation. Firms rely more on government resources and government intervention through political connections, leading to a lack of R&D autonomy. Therefore, the level of the political connections of executives in heavily polluting corporates may inhibit the effect of media opinion and environmental disclosure in influencing corporates' green technology innovation.

H4a: The political connection of corporate executives plays an inhibitory and moderating role in media attention to influence green technology innovation through environmental information disclosure.

However, some scholars have reached the opposite conclusion. Corporates with a certain level of political connection respond quickly to public environmental demands, incorporating the positive driving role of political relations (Yang and Zhang 2015). Corporate green technology innovation activities need to be supported by more lavish subsidies for R&D investment (Deng, You, and Wang 2019). Companies with more political connections could achieve more substantial investment and financing capabilities to breakthrough financial bottlenecks, thus providing more incredible support for corporate green technology innovation activities, as investors are more likely to make judgments about the future corporate value and financial performance based on the analysis of information about political connections (Wu et al. 2012). High levels of political connection can make it easier for firms to access external capital and more government subsidies (Li et al. 2021). In addition, this political connection can mitigate the institutional and management risks of the business (Liu and Zhang 2021). These pieces of the literature suggest that political connections enhance the environmental resilience of firms. The public opinion effect of media attention and the political sensitivity of executives are usually effective in promoting CSR disclosure and green decision-making behavior. Therefore, the hypothesis is proposed:

H4b: The political connections of corporate executives act as a positive moderator in the media's focus on the impact of green technology innovation through environmental information disclosure.

The theoretical framework of this study is shown in Figure 1.

3. Research Design

3.1. Variable Selection

In this paper, the data of 16 types of A-shares listed companies in the heavy pollution industry in China from 2007 to 2019 are selected as a sample. Where the explained variable is the corporate's green technology innovation, the natural logarithm of the sum of the green invention and green utility model patents will be used to measure the green technology innovation of corporates (Liao 2020). The media attention is calculated by manual collation, which mainly includes two types of tendency index

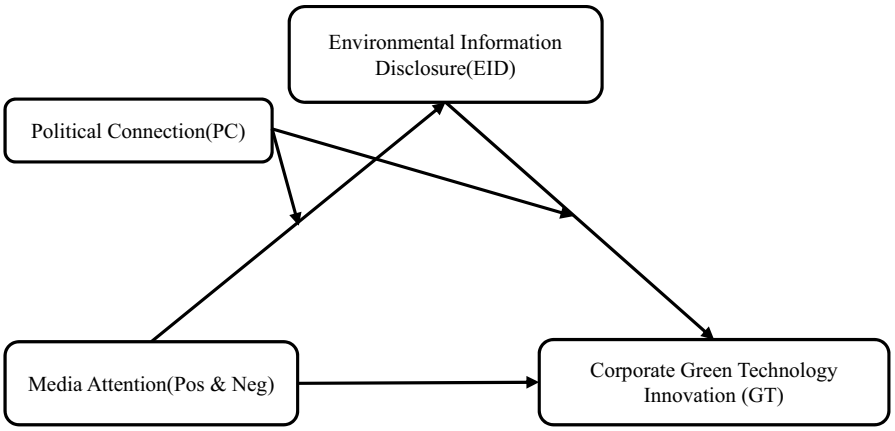

Figure 1. Theoretical framework.

data, negative and positive. This paper uses the mandatory disclosure dimension to classify environmental information disclosure into 9 and 4 non-mandatory indicators. The scoring criteria are: 2 points for quantitative and qualitative description of environmental information disclosure, 1 point for qualitative description, and 0 points for no disclosure, and scores are summed to calculate the environmental information disclosure index.

Referring to existing related studies, this paper uses corporate assets, equity concentration, executive compensation, corporate internal control, and corporate growth capability as control variables. Considering that sales revenue is easily influenced by contingent factors such as market demand, and sales revenue of the same enterprise varies significantly from year to year, total assets are chosen as the main indicator of enterprise size (Ma and Parish 2006). Equity concentration can have a significant impact on corporate decision making and corporate performance, so there is a need to control for internal equity variability across firms, so the concentration of equity is measured by the sum of the shareholdings of the top shareholders of listed companies as a percentage of total equity (Gedajlovic and Shapiro 1998). Executive compensation incentives have interest convergence effects incorporate R&D innovation practices, which help executives develop R&D innovation strategies, strengthen their efforts throughout the R&D innovation process, and enhance the coordination and cooperation of the executive team while reducing laziness and free-riding behavior, so the natural logarithm of total executive compensation is used to control its interference effects (Ikram, Li, and Minor 2019). A company's growth reflects whether the company can achieve economies of scale. Differences in growth rates of companies of different size classes will lead to important effects on business decisions, so the growth rate of the company's revenue is used to control such effects (Heirman and Clarysse 2004). Corporate internal control is an important aspect of internal corporate governance, which enhances the standardization and efficiency of corporate enterprise management by regulating internal power and coordinating internal stakeholder relationships. The internal administration of different companies varies greatly, so there is a need to control its interference (Damania, Fredriksson, and Mani 2004). Moreover, this paper's EID quality measurement items and variable definition (Table S1 and S2) can be found in the supplementary document.

3.2. Model Construction

The fixed-effects model controls fixed effects by subtracting the mean of the dimension of control from each model variable. The model obtained is the transformed data with each variable as the mean of the dimension of control removed (Croissant and Millo 2008). First, this paper uses fixed effects regression to construct model (1) to examine the effects of positive and negative media attention on green technology innovation capability.

$$GT = \beta_0 + \beta_1 Pos + \beta_2 Neg + \beta_3 Top10 + \beta_4 Pay + \beta_5 Size + \beta_6 IC + \beta_7 Year + \beta_8 Code + \beta_9 Industry + \varepsilon_1 \quad (1)$$

Model (2) is constructed to test H2 to examine the impact of the quality of corporates' environmental information disclosure on their green technology innovation.

$$GT = \theta_0 + \theta_1 \mathrm{EID} + \theta_2 Top10 + \theta_3 Pay + \theta_4 Size + \theta_5 IC + \theta_6 Year + \beta_7 Code + \beta_8 Industry + \varepsilon_3 \quad (2)$$

Secondly, models (3), (4), (5), and (6) are constructed to test whether the environmental information disclosure acts as a mediating role when the independent variables are negative media attention (Neg) and positive media attention (Pos), respectively, and to test H4.

$$EID = \beta_{10} + \beta_{11} Neg + \beta_{12} Top10 + \beta_{13} Pay + \beta_{14} Size + \beta_{15} IC + \beta_{16} Year + \beta_{17} Code + \varepsilon_4 \quad (3)$$

$$GT = \beta_{20} + \beta_{21} Neg + \beta_{22} EID + \beta_{23} Top10 + \beta_{24} Pay + \beta_{25} Size + \beta_{26} IC + \beta_{27} Year + \beta_{28} Code + \varepsilon_5 \quad (4)$$

$$EID = \beta_{30} + \beta_{31} Pos + \beta_{32} Top10 + \beta_{33} Pay + \beta_{34} Size + \beta_{35} IC + \beta_{36} Year + \beta_{37} Code + \varepsilon_6 \quad (5)$$

$$GT = \beta_{40} + \beta_{41} Pos + \beta_{42} EID + \beta_{43} Top10 + \beta_{44} Pay + \beta_{45} Size + \beta_{46} IC + \beta_{47} Year + \beta_{48} Code + \varepsilon_7 \quad (6)$$

Finally, in model (7) and (10), two interaction terms, Neg*PC and Pos*PC, are introduced to test the conditional indirect role of the political connections of heavy polluting firms in the influence process of positive and negative media attention on the mediating variable environmental information disclosure quality (EID). In models (8) and (11), in addition to the above interaction terms, the interaction term EID*PC is introduced to examine the role of political connections in moderating the mediating variable environmental information disclosure (EID). In models (9) and (12), the magnitude of the conditional indirect effect can be calculated by the impact effect of the coefficients above interaction terms. Models (7), (8), and (9) are constructed to mainly verify that political connection acts as a positive or inhibitory role in the mediating model when negative media attention is an independent variable. Models (10), (11), (12) are constructed to verify that it plays a positive or inhibitory role in the mediating model when positive media attention is the independent variable and to test H5a and H5b.

$$EID = \partial_{10} + \partial_{11} Neg + \partial_{12} PC + \partial_{13} Neg \times PC + \varepsilon_8 \quad (7)$$

$$GT = b_{10} + b_{11} EID + b_{12} Neg + b_{13} PC + b_{14} Neg \times PC + b_{15} EID \times PC + \varepsilon_9 \quad (8)$$

$$Indirect\ effect_{Neg} = (b_{11} + b_{15} PC) \times (\partial_{11} + \partial_{13} PC) + \varepsilon_{10} \quad (9)$$

$$EID = \partial_{20} + \partial_{21} Pos + \partial_{22} PC + \partial_{23} Pos \times PC + \varepsilon_8 \quad (10)$$

$$GT = b_{20} + b_{21} EID + b_{22} Pos + b_{23} PC + b_{24} Pos \times PC + b_{25} EID \times PC + \varepsilon_9 \quad (11)$$

$$Indirect\ effect_{Pos} = (b_{21} + b_{25}PC) \times (\partial_{21} + \partial_{23}PC) + \varepsilon_{10} \quad (12)$$

4. Empirical Analysis

4.1. Impact of Positive and Negative Media Attention on Corporate Green Technology Innovation

Model (1) (2) in Table 1 show the empirical regression results of heavy polluters' positive and negative media attention. Firstly, in the model (1) and (2), both positive media attention (Pos) and negative media attention (Neg) are significant at the 5% level with positive coefficients. It indicates that negative media attention is more substantial than positive media attention. For heavy polluting corporates, positive media attention can motivate corporates to enhance green technology innovation to maintain the current positive image value. Meanwhile, negative media attention can stimulate corporates to gain insight into the public's environmental demands while avoiding losses for corporate reputation and paying costs for potential corporate cultural values, thus enhancing their green technology innovation ability. H1a and H1b are verified.

Heavy polluters may receive excessive public media attention for their green technology innovation activities, so the above regression results may face the endogeneity problem of mutual causality. Therefore, this study adopts the following instrumental variable approach to exclude the endogeneity problem. We use the proportion of illiquid shares (NTS) and the annual industry average of positive and negative media coverage (AMT) for the regression analysis. As reported in Table 1, model (5) and (6), the coefficients of NTS and AMT are significant. Both are significantly positive, indicating no invalid instrumental variable problem for the instrumental variables. (7) to (9) are the results of

Table 1. Regression results.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Model	Pos or Neg impacts on GT		EID impacts on GT		Endogeneity Test				
Variables	GT	GT	GT	GT	Pos	Neg	GT_{t+1}	GT_{t+2}	GT_{t+3}
Pos	0.03***	0.05***					0.02**	0.01*	0.02**
	(0.00)	(0.00)					(0.02)	(0.00)	(0.01)
Neg	0.04**	0.07**					0.03***	0.02***	0.02***
	(0.00)	(0.00)					(0.00)	(0.00)	(0.00)
EID			0.17***	0.08***					
			(0.01)	(0.00)					
NTS					0.21**	0.00***			
					(0.11)	(0.00)			
AMT					0.37***	0.001***			
					(0.10)	(0.00)			
Top10	0.44***	0.57***	0.54***	0.65***	5.41***	2.82***	0.56***	0.48***	0.36
	(0.06)	(0.02)	(0.06)	(0.12)	(0.48)	(0.58)	(0.15)	(0.08)	(0.19)
Size	0.06***	0.00***	0.06***	0.02***	0.02*	0.91***	0.03	0.02	0.01
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.06)	(0.00)	(0.00)	(0.00)
Pay	−0.11***	−0.22***	−0.10***	−0.04***	0.00	−0.00**	−0.11***	−0.11***	−0.11***
	(0.01)	(0.05)	(0.01)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
Growth	−1.02***	−1.55**	−0.86**	−0.20**	−1.06**	−0.84*	−1.32**	−1.04*	−1.02
	(0.20)	(0.15)	(0.16)	(0.05)	(0.15)	(0.14)	(0.85)	(0.74)	(0.70)
IC	−0.06***	−0.01*	−0.03***	−0.02**	−0.09	−0.07	−0.18	−0.21	−0.24
	(0.00)	(0.00)	(0.00)	(0.00)	(0.02)	(0.04)	(0.00)	(0.00)	(0.01)
Year	√	√	√	√	√	√	√	√	√
Code	√		√		√	√	√	√	√
Industry		√		√					
_cons	0.07***	0.11***	0.02	0.27**	0.01***	−0.02***	−0.006	−0.004	−0.007
	(0.02)	(0.06)	(0.02)	(0.16)	(0.06)	(0.32)	(0.06)	(0.32)	(0.23)
F	64.88***	54.46***	167.16***	139.22***	43.20***	42.21***	86.18***	19.194***	19.635***
R^2	0.102	0.147	0.112	0.088	0.110	0.109	0.100	0.072	0.035

Standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

the second-stage regression with green technology innovation from period t + 1 to t + 3, respectively, and the coefficient results are consistent with model (1). It indicates mutual causality did not change the above conclusions.

4.2. Impact of Corporate Environmental Information Disclosure on Corporate Green Technology Innovation

Model (3) (4) in Table 1 show the environmental information disclosure regression results of heavily polluting corporates and green technology innovation. Firstly, in model (3) and (4), the environmental information disclosure of heavily polluting corporates is significant at a 1% level. Its coefficient is positive, which indicates that there is a significant positive effect between the corporate environmental information disclosure and corporate green technology innovation, suggesting that the higher quality of corporates' response to the public's environmental demands, the higher the promotion effect on their green technology innovation, H2 is verified.

4.3. Mediating Effect Test of Corporate Environmental Information Disclosure

This paper uses the stepwise test regression method (Fairchild and MacKinnon 2009). From Table S5 (See Supplementary Document Table S5), it can be concluded that β_{11} and β_{21} are 0.056 and 0.048, respectively significant at 1% statistical level, β_{22} is 0.16 and significant at 1% statistical level. From Table S6 (See Supplementary Document Table S6), the results are obtained from the Bootstrap method with 1000 replicated sampling. The 95% confidence intervals are [0.0066, 0.0115], [0.0360, 0.0600], none of which contains 0, indicating a significant mediating effect. So, it can be concluded that the quality of corporate EID plays a significant intermediary effect in the process of negative media attention on corporate GT, H3 is verified.

4.4. Moderating Effect Test of Political Connection

According to the suggestion of Preacher (Preacher, Rucker, and Hayes 2007), the Bootstrap method was adopted to automatically divide the level of political connections into three groups of the low, medium, and high, and the significance of conditional indirect effect was judged according to the difference of executive political level under different levels.

In Table S7 (See Supplementary Document Table S7), the conditional indirect effect of political connection is 0.021, 0.017, and 0.012 at low, medium, and high levels, respectively, when the independent variable is negative media coverage, and none of the confidence intervals contain 0. The indirect effects are significant, and the indirect effects diminish with increasing levels of political connection. When the independent variable is positive media attention, the conditional indirect effect of political connection is 0.021, 0.019, and 0.015 at low, medium, and high levels, respectively, and none of the confidence intervals contain 0. The indirect effect is significant, and the indirect effects diminish with increasing levels of political connection. The above results indicate that the indirect effect of positive and negative media attention on corporate GT through EID quality keeps weakening as the level of political connection increases, which plays an inhibitory moderating effect. H4a is verified.

5. Discussions

The findings of the study show that:

(1) The more positive and negative media attention, the more corporates implement green technology innovation. Some scholars have pointed out that media pressure amplifies the performance loss and corporate governance dimensions of environmental issues, thus driving corporate GT under

attentional pressure (Lyon and Montgomery 2013). As mentioned previously, green technology innovation requires corporates to achieve more excellent R&D investment, subsidy support, and increasing production costs for optimal resource allocation. Many heavy polluters are often unable to ensure the long-term implementation of green investments (Stucki 2019). Moreover, negative media attention has a more substantial influence on GT of heavily polluting corporates than positive media attention. Negative media attention can more reduce the information asymmetry of corporate stakeholders, making them more concerned about the fulfillment of corporate environmental responsibility, which affects the investment decisions of stakeholders and impacts corporate environmental protection strategies. Secondly, negative media attention on heavy polluters will trigger social opinion, which will substantially negatively impact corporate image, management reputation, and product market sales quickly. Therefore, heavy polluting corporates consider that once the immediate public opinion crisis outbreak, they are more likely to increase their green technology innovation investment.

(2) The higher the corporate environmental information disclosure quality, the heavier polluters strengthen their corporate green technology innovation. Corporate EID is voluntary, not mandatory, so companies have more autonomy to disclose (Cho and Patten 2007). Based on the stakeholder theory, it can be seen as a way for companies to respond to the environmental demands of their stakeholders, and it can be seen as an environmental strategy that companies seek. Some scholars point out that heavily polluting companies will focus on environmental disclosure policies to demonstrate their green corporate stance and work to recoup the loss of the image of heavy pollution (Zhong, Li, and Zhao 2021). The more adequate the content of such disclosure, the more it shows the concern of corporates for environmental issues, thus winning the support of more stakeholders, thus improving the corporates' GT investment through higher quality of EID at the level of green strategy, and finally achieving the improvement of corporates' GT capability.

(3) The quality of corporate environmental information disclosure has a significant mediating effect between negative media attention and corporate green technology innovation. Previous studies have shown that corporate EID is more often the object of study, and less frequently, the quality of disclosure is used as a mediating variable to investigate the role of mediating effects in negative media attention and corporate green technology innovation capability (Plumlee et al. 2015). However, in this study, under the premise of the above findings, when negative public opinion erupts, corporates tend to respond to stakeholders' environmental demands through voluntary EID to increase green innovation investment and realize the improvement of corporates' green technology innovation capability (Cailou, Fuyu, and Chong 2021; Pan and Fan 2021). The quality of corporate environmental information as this intermediary plays the role of information intermediary and reduces the information asymmetry between corporates and stakeholders. The more adequate and higher quality of corporate EID means that corporates respond to stakeholders' demands and increase green technology innovation investment through media insight claims and disclosure reports in the context of negative public opinion outbreak, which has a significant contribution to the improvement of corporates' technology innovation capability.

(4) Corporate executives' level of political connection plays an inhibitory moderating role in the influence of media attention on green technology innovation through environmental information disclosure. Previous studies show that executives with overlapping functions and interests tend to evade environmental regulation, delay, and cover-up environmental truths, resulting in heavily polluting companies that conduct environmental management also stopping to do and becoming less proactive (Kahn et al. 2021). Especially in 2014, when the Ministry of Environmental Protection decided not to carry out environmental verification of listed companies, in the context of local protectionist interference and rent-seeking interests, the first thing that comes to companies with political connections when responding to negative public opinion is not to respond to stakeholders, but to PR and cover-up public opinion. Inaccurate disclosure or non-disclosure of relevant contents in environmental information disclosure reports and the initiative of government departments to put down standards are also the main reasons for the decline in their disclosure quality. In addition, heavily polluting companies neglect to invest in

environmental governance while investing much effort and hiring government officials at high salaries (Minh and Ngoc 2021). The lack of environmental governance and management skills of politically connected executives is also the main reason for suppressing the moderating effect (Li et al. 2021).

6. Conclusions and Policy Implications

6.1. Conclusions

This study explores the effects of media attention and corporate environmental information disclosure based on stakeholder theory and superstructure theory using data of heavily polluting listed companies from 2007 to 2019. This paper found that: positive and negative media attention can motivate heavily polluting firms to meet stakeholders' environmental requirements and thus improve their green technology innovation capabilities. In addition, this study considers the mediating role of environmental disclosure reports released to the public by heavily polluting firms. The content of environmental disclosure can be seen as a response to stakeholders, and the quality of environmental disclosure has an important contribution to corporate green technology innovation. While media attention motivates heavy polluters to meet stakeholder demands, environmental information disclosure to respond to stakeholders significantly mediates the effect when public opinion erupts. Finally, this study delves into the inhibitory moderating effect of political connections as a moderating variable.

6.2. Policy Implications

First, the online media concern plays an excellent supervisory effect, thus promoting green technology innovation. For the restraint of corporate environmental behavior, government departments should give full play to the media's extra-legal oversight role, drive the mainstream of social opinion, and establish a multi-governance environmental governance system. Therefore, relevant governmental regulatory authorities should focus on regulating online media reports to gradually improve the supervision and governance of the external environment of corporates. Secondly, heavy polluters should focus more on the quality of environmental information disclosure to enhance their corporate environmental reputation, upgrade environmental information disclosure as a corporate environmental strategy, reduce information asymmetry with stakeholders, and promote green technology innovation investment to enhance an excellent corporate environmental image. The government should develop differentiated incentive policies based on the heterogeneity of heavy polluters, adjust environmental regulations and processes, and promote specific policies. Finally, companies with political connections should not just seek political patronage behavior. They should realize that improving their strength, increasing their innovation, and having a spontaneous awareness of environmental protection is the only way to survive to move forward with green development.

6.2.1. Research Gaps and Outlook

This study has some shortcomings, which can be further improved and supplemented in the future. First, it does not further distinguish whether positive media attention and negative media attention are "sensational reports" or "false reports" (Ahern and Sosyura 2015). In the future, if relevant false media reports can be further distinguished and eliminated, the evidence of the impact of media attention on the green technology innovation of heavy polluters will be more direct. Second, only the impact of online media coverage was considered. Although

newspaper and magazine reports have been impacted by online reports and self-media in recent years, they still have some reference value at the beginning of this study.

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