Environment, Development and Sustainability
https://doi.org/10.1007/s10668-025-06551-3

Public attention and ESG performance of solid waste disposal companies: empirical evidence from China

Yana Shuai[1,3] · Jingjing Li[1,3] · Jianling Jiao[1,2,3] · Zhengguang Chen[1,2]

Received: 16 October 2024 / Accepted: 26 June 2025

Abstract
The rapid growth of social media has transformed decentralized publics into a powerful social network force, playing a critical role in driving corporate environmental, social, and governance (ESG) responsibility. This study employs econometric models to examine the impact of public attention on the ESG performance of solid waste disposal companies, with a particular focus on the tripartite interaction among the public, government, and enterprises, as well as the moderating effects of public social network characteristics. The research reveals that public attention enhances corporate ESG performance through two primary pathways: guiding governmental policy focus and stimulating green technology innovation in solid waste disposal companies, thereby establishing a virtuous interaction mechanism among stakeholders. Regarding public social network attributes, information dissemination efficiency positively moderates these effects, whereas user influence exhibits a negative moderating effect. Sub-sector analysis further indicates that public attention to community waste management and corporate environmental responsibility is particularly effective in improving ESG performance and governance in solid waste disposal companies. This study offers new insights into ESG theory and practice from the perspectives of multi-agent collaborative governance and social network dynamics.

Keywords Public attention · Corporate ESG performance · Government attention allocation · Corporate green technology innovation · Public social networks

1 Introduction

With the implementation of China's waste sorting policies and the development of "waste-free cities," public attention to solid waste disposal has been steadily increasing (Gu et al., 2024). In the digital era, internet platforms have empowered the public to actively engage in discussions on solid waste management through social media platforms such as Weibo and Douyin (Sui & Zhang, 2024). These discussions span a wide range of topics, including household waste sorting, industrial waste disposal, waste-to-energy incineration, and the development of the circular economy. Public participation extends beyond online discourse

Extended author information available on the last page of the article

Published online: 13 August 2025

to active oversight. For instance, in 2015, residents in Shanghai reported a solid waste disposal center on Weibo for illegally discharging waste at night, sparking widespread public concern and drawing regulatory attention (Weibo, 2015). This incident underscores the critical role of public oversight in ensuring the standardized operation of solid waste disposal companies.

The growing public attention has had a profound impact on the solid waste disposal industry. On the one hand, the immediacy of information dissemination and the amplification effect of social media make it difficult for companies to conceal environmental violations, forcing them to pay more attention to compliant operations (Abdelzaher, 2023; Ye et al., 2024). On the other hand, growing public expectations for environmental governance are driving solid waste disposal companies to integrate sustainable development principles into their strategic decision-making. Against this backdrop, environmental, social, and governance (ESG) performance, as an important tool for measuring a company's sustainable development capability (Abdelzaher & Awad, 2022), is receiving increasing attention from the capital market and stakeholders. As an essential part of the environmental protection industry, the ESG performance of solid waste disposal companies not only influences their long-term development but also has direct implications for urban environmental quality, public health, and overall societal well-being (Abbas et al., 2024; Aziz et al., 2024). Therefore, investigating the relationship between public attention and the ESG performance of solid waste disposal companies is of significant academic and practical importance.

The significant impact of public attention on corporate behavior has been confirmed, but existing research mainly focuses on corporate environmental performance (Du et al., 2023) and green innovation (Li et al., 2024), with the relatively insufficient exploration of other dimensions of sustainable development, as shown in Table 1. In terms of corporate environmental performance, Zhou and Ding (2023) found that public attention effectively promotes improvements in corporate environmental behavior through two channels: consumers and investors. Xu et al. (2024a, b, c) indicated that public environmental attention plays a positive role in improving corporate carbon performance by promoting green technology innovation and optimizing regional energy consumption structures. Regarding corporate innovation, Xu et al. (2024a, b, c) conducted an empirical study showing that an increase in public attention significantly promotes the implementation of corporate green innovation activities.

Table 1 Research on the relationship between public attention and corporate behavior

Independent Variable	Dependent Variable	Focus Topic	Reference
Public attention	Corporate environmental behavior	Environmental Pollution	(Zhou & Ding, 2023)
	Carbon performance	Environment	(Du et al., 2023)
	Green innovation	Environmental Pollution, Smog	(Li et al., 2024; Mao & Lin, 2024)
	Market entry	Smog	(Du et al., 2023)
	Green investment	Smog	(Gu et al., 2021)
	Corporate ESG performance	Environmental Pollution, Climate Change	(Chen et al., 2024; Ren & Ren, 2024)

A few researchers have attempted to explore the impact of public attention on corporate ESG performance. Ren and Ren (2024) examined the positive impact of public environmental attention on corporate ESG performance. Chen et al. (2024) revealed the intrinsic logic of how public attention influences ESG performance through corporate risk transmission mechanisms from a public-enterprise dual-stakeholder perspective. However, these studies either focus on a single stakeholder or only consider bidirectional interactions, failing to establish a systematic analytical framework for understanding the relationship between public attention and corporate ESG performance from a multi-stakeholder collaborative perspective. Additionally, regarding the content dimension of public attention, as shown in Table 1, existing research has mainly concentrated on macro-environmental issues such as environmental pollution (Abdelzaher et al., 2023b; Mao & Lin, 2024) and climate change (Chen et al., 2024), while significantly less attention has been given to specific areas of environmental governance, such as solid waste disposal.

The rapid development of social media has transformed the public from isolated individuals into a tightly interconnected social network through online interactions, comments, and shares (Abdelzaher et al., 2023a; Dong et al., 2024). This network structure greatly amplifies the voice of individual public members, giving them unprecedented collective power. In the internet age, the characteristics of public social networks have been extensively studied. For example, Dong et al. (2024) identified eight types of users based on Weibo data and analyzed their dissemination characteristics. Zheng et al. (2020) found that the social network of public environmental behavior gradually evolved from a small-world network into a scale-free network, and this structural change lowered the threshold for information exchange, promoting the effective diffusion of environmental protection information. Although existing research has widely focused on the impact of social networks on information dissemination and public behavior, the important social environmental factor has been less considered in exploring the relationship between public attention and corporate ESG performance.

Based on the aforementioned research gaps, this paper proposes three research objectives: first, to explore the impact mechanism of public attention on the ESG performance of solid waste disposal companies from a multi-stakeholder perspective that includes the public, government, and enterprises; second, to introduce social network characteristics and explore how the network environment in which the public operates influences the aforementioned relationship; and third, to identify the different themes of public attention and reveal the differentiated impact of each theme on corporate ESG performance.

To achieve the above objectives, this study constructs an econometric model to examine the transmission mechanism through which public attention affects the ESG performance of solid waste disposal companies via government attention allocation and corporate green technology innovation. Additionally, based on Weibo comment data, the study builds a public social network and investigates the role of network characteristics from two dimensions: user influence and information dissemination efficiency. Finally, the study uses the Latent Dirichlet Allocation (LDA) topic model to mine themes from Sina Weibo posts related to solid waste disposal, identify the multiple themes of public attention, and further examine the differentiated impact of these themes on the ESG performance of solid waste disposal companies.

2 Theoretical analysis and research hypotheses

Public attention to solid waste disposal primarily stems from the direct perception and exposure to environmental pollution (Liu et al., 2018). Improper waste management not only contaminates air, water, and soil but also directly affects nearby residents' quality of life and health (Zhang et al., 2024a). This firsthand experience drives the public to pay more attention to environmental and social issues during economic development, raising higher demands for corporate sustainable development. Corporate ESG performance is precisely an important indicator for measuring a company's performance in environmental protection, social responsibility, and corporate governance. Several theoretical frameworks support the notion that public attention positively influences the ESG performance of solid waste disposal companies.

Firstly, stakeholder theory emphasizes that a company's long-term success depends not only on the interests of shareholders but also on the needs and expectations of other stakeholders, such as consumers, communities, and governments (Shah & Rezai, 2023; Shou et al., 2023). As a key external stakeholder, the public significantly influences corporate decisions through public pressure, environmental complaints, and social participation. Existing research has confirmed a marked increase in public attention to environmental issues, such as waste reduction, on platforms like social media (Shah & Rezai, 2023). In addition, Zhou and Ding (2023) conducted a detailed analysis of the impact of the keyword "environmental pollution" in Baidu's search engine on corporate participation in environmental protection activities, finding that public concern over environmental pollution significantly increased corporate involvement in environmental protection. Furthermore, in an effort to enhance public perception and communicate positive information, companies often actively refine their ESG strategies, disclosing more comprehensive and effective ESG data to maintain and shape a good social reputation. Gao and Zhang (2025) highlighted that companies must carefully consider public reactions and the direction of public opinion when formulating strategies to safeguard their reputation and image.

Secondly, the public pressure theory points out that companies face not only the pressure from mandatory regulations, such as laws and policies set by the government but also non-coercive pressures, including moral constraints imposed by the public (Cho & Patten, 2007). Public environmental demands can generate significant public opinion pressure and guide investment toward companies with better ESG performance through the capital market's "money voting" mechanism (Wang & Zhao, 2018). Research has shown that public environmental attention, as an external governance pressure and feedback mechanism, can effectively improve corporate social responsibility and ESG performance (Tao et al., 2024). Gu et al. (2021) found that an increase in public environmental concern significantly increased the likelihood of CEO changes in heavily polluting companies, with these companies tending to increase green investments to improve their environmental performance in order to alleviate this pressure.

Based on the above, this study proposes research hypothesis 1:

H1: Public attention can enhance the ESG performance of solid waste disposal companies.

Public attention influences the ESG performance of solid waste disposal companies through two pathways: government attention allocation and corporate green technology innovation. On the one hand, the public can express their concerns about solid waste disposal through traditional channels such as petitions, phone complaints, and protests, as well as through social media platforms like Baidu Tieba and Weibo (Guo et al., 2023). This sustained public attention sends a strong "pressure" signal to local governments, prompting them to shift from the single-minded pursuit of economic growth to an "attention reconstruction" that incorporates public welfare and environmental considerations. Mao and Lin (2024) pointed out that the governance effect of public demands can be better achieved with the help of local governments. Furthermore, according to attention-based theory, when the government allocates limited time and resources to the solid waste disposal sector, it implies increased regulatory oversight and resource allocation to the industry. Empirical studies have confirmed that government subsidies and environmental regulation significantly enhance corporate ESG performance (Na et al., 2024; Zhang et al., 2024a, b, c).

On the other hand, green innovation is an effective way for companies to protect the environment while maintaining economic achievements (Na et al., 2024). Existing research indicates that companies respond to public environmental concerns by engaging in green innovation activities (Geng et al., 2023). Moreover, an increase in a company's green innovation level can help reduce pollution emissions during the waste management process and improve the recycling rate of waste resources. Alam et al. (2019), based on panel data of G6 countries' companies from 2004 to 2016, found that corporate R&D investments could enhance carbon efficiency and energy efficiency, thereby improving environmental performance. Additionally, the pursuit of green innovation technologies not only demonstrates a company's commitment to sustainable development but also strengthens its public image and sense of social responsibility (Endl et al., 2021; Huang & Li, 2017).

Based on the above, this study proposes hypotheses 2 and 3:

H2: Public attention can enhance the ESG performance of solid waste disposal companies by attracting government attention.

H3: Public attention can enhance the ESG performance of solid waste disposal companies by strengthening green technological innovation.

In the digital age, the impact of public attention on corporate behavior extends beyond traditional media and offline channels, operating through digital platforms such as social media and online forums. This shift enables unprecedented speed and reach in the dissemination of information. Social network theory suggests that individuals do not exist in isolation but are part of a network environment characterized by mutual influence and interaction (Chen & Gao, 2021). In such a closely connected network environment, the efficiency of information dissemination and the influence of network users become crucial factors in the formation and diffusion of public opinion. Among these, high-influence opinion leaders (such as public figures, industry experts, or authoritative organizations) can significantly amplify the effects of public attention. Through their statements and information dissemination, they encourage more users to participate in discussions and focus on the topic (Bergström & Jervelycke Belfrage, 2018; Liu et al., 2015). Furthermore, the efficient dissemination mechanisms within the network environment enable information to rapidly reach a broad target audience (Wu et al., 2023), thereby quickly concentrating public attention and pressure on specific issues.

These factors not only enhance the breadth and depth of public attention but also place higher demands on companies' ability to perceive and respond to external pressures.

Based on the above, this study proposes hypotheses 4 and 5:

H4: User influence positively moderates the direct effect of public attention on the ESG performance of solid waste disposal companies.

H5: Information dissemination efficiency positively moderates the direct effect of public attention on the ESG performance of solid waste disposal companies.

Figure 1 presents the proposed model of this study.

3 Data and method

3.1 Sample selection

This study examines the period from 2013 to 2021, focusing on solid waste disposal companies in China. Through preliminary screening of the solid waste disposal sector using Tonghuashun securities trading software, 110 companies were initially identified. After excluding samples with missing values, as well as ST and ST* samples, a final sample of 71 companies was included in the study.

3.2 Variable definition

Dependent variable: Corporate ESG performance. Existing research typically uses measurement indicators for corporate ESG performance derived from rating agencies such as MSCI, Bloomberg, Huazheng, Refinitiv, Zhongzheng, and Wind (Lei et al., 2023; Rossi & Candio, 2023). However, these data suffer from opacity in indicator selection and weight allocation, and they do not fully account for the specific characteristics of the solid waste disposal

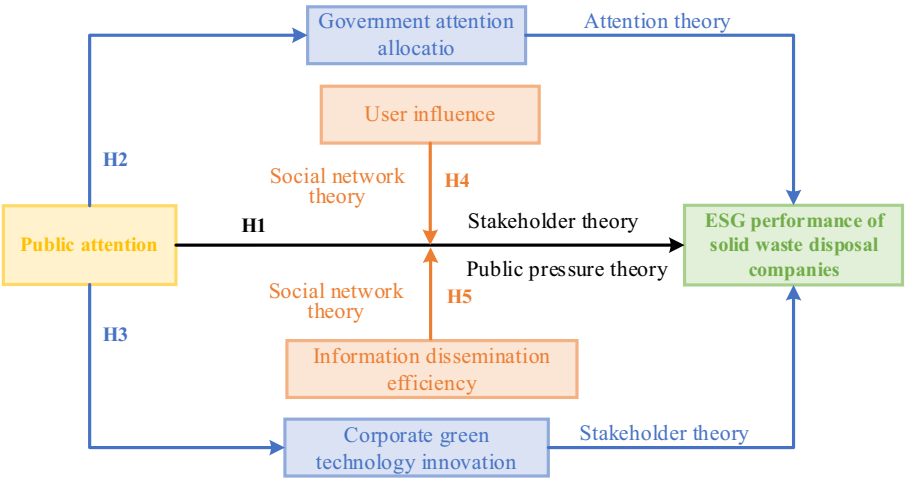

Fig. 1 Hypothetical model

industry. Therefore, this study constructs a customized ESG evaluation index system for the solid waste disposal industry, as shown in Fig. 2. The selection of this index system mainly refers to the key ESG issues for the industry proposed by the Sustainability Accounting Standards Board (SASB, 2023), as well as existing literature on corporate ESG evaluation systems (Chen et al., 2023; Tsang et al., 2023). The detailed measurement methods for these indicators and the weight calculation process have been fully described in our previous research (Jiao et al., 2024).

Independent variable: Public attention. Given that Weibo has become an important platform for the public to express opinions, the number of posts can reflect the level of public attention to a specific topic (Wang et al., 2022a, b). Therefore, this study uses the natural logarithm of the number of posts related to "solid waste disposal" posted by ordinary users on Weibo at the annual and provincial levels to measure public attention. Specifically, the study collects posts from users in different provinces from 2013 to 2021 using the keywords "solid waste treatment," "solid waste disposal," "garbage treatment," and "garbage disposal." After data cleaning, approximately 160,000 valid posts were obtained. These four keywords were chosen for two key reasons: first, they comprehensively cover public discussions on topics related to solid waste disposal; second, these keywords are commonly used in the daily language of Weibo users, making the sample more representative.

Mediating variable: Government attention allocation. To explore the government's regulatory mechanism, this study constructs a government attention allocation indicator to

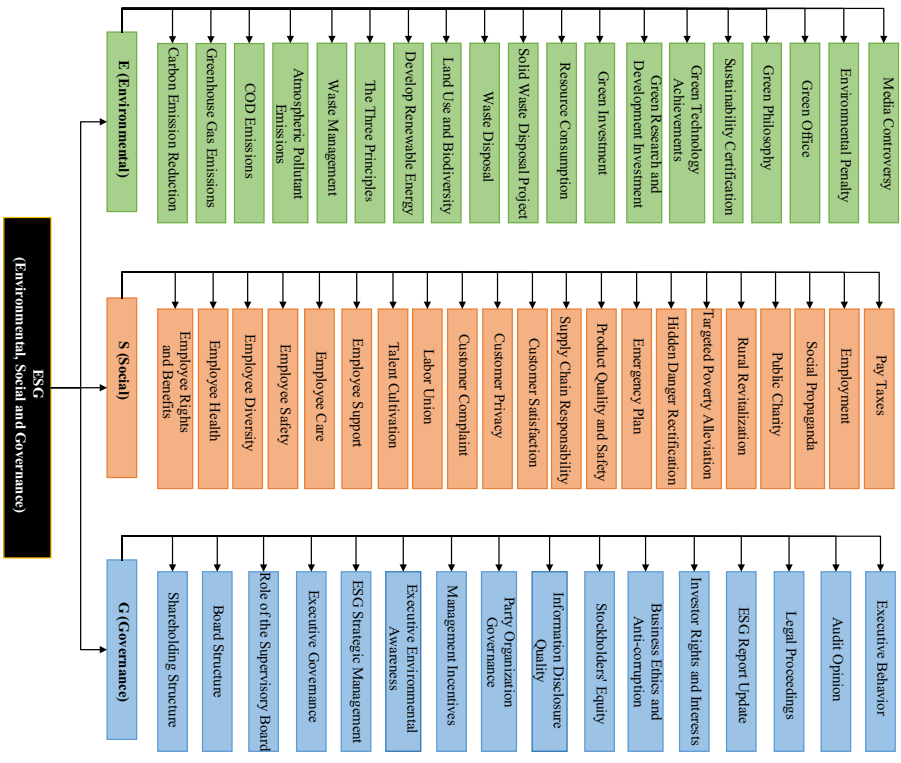

Fig. 2 ESG evaluation index system for Chinese solid waste disposal companies

reflect the annual changes in the government's focus on issues related to solid waste disposal. Specifically, following the methodology of Tao et al. (2024), the study uses the solid waste keywords provided by Gu (2023) to create a word segmentation dictionary closely related to solid waste disposal[1]. This dictionary is used for text analysis of the "Government Work Report." As an official document with legal authority, the "Government Work Report" summarizes the government's work in political, public welfare, environmental, economic, and other areas over the past year, as well as outlining priorities for the upcoming year. It serves as a key signal of the government's resource allocation and areas of focus, conveying to society the issues it will prioritize and where resources will be invested. Therefore, constructing the government attention allocation indicator through text analysis of the "Government Work Report" is reasonable. This study measures government attention allocation by calculating the proportion of solid waste disposal-related keywords' frequency relative to the total word count in the "Government Work Report." The final word frequency proportion is scaled by a factor of 1000 to facilitate coefficient display.

Mediating variable: Corporate green technological innovation. To further explore the internal innovation mechanisms of companies, this study uses the number of green patent applications filed by a company as an indicator to measure the level of corporate green technological innovation. The natural logarithm of the number of green patent applications, with 1 added to the value, is included in the model to reduce the skewness of the data and stabilize the error term. The data is sourced from the China Research Data Service Platform.

Moderating variables: User influence and information diffusion efficiency. Based on the comment relationships and user IP attributes of Weibo posts from 2013 to 2021, this study constructs nine directed public attention networks with provinces as nodes. User IP attributes, representing provinces, are treated as nodes, while user comment relationships are viewed as "arcs" directed from the user who posted the Weibo content to the users who participated in the comments. User influence is measured by the node's betweenness centrality, while information diffusion efficiency is determined by the average shortest path length of the network. The specific calculation methods are given in formulas (1) and (2).

$$g(v) = \sum_{s \neq v \neq t} \frac{\sigma_{st}(v)}{\sigma_{st}} \tag{1}$$

$$L = \frac{1}{n(n-1)} \sum\nolimits_{s \neq t} d_{s,t} \tag{2}$$

Where $g(v)$ represents the betweenness centrality value of node v. $\sigma_{st}(v)$ denotes the number of shortest paths passing through node v from node s to node t, and σ_{st} represents the total number of shortest paths from node s to node t. L denotes the network's average shortest path length, n is the total number of nodes in the network, and $d_{s,t}$ represents the length of the shortest path between nodes s and t.

[1] Keywords: solid waste, solid waste treatment, solid waste management, treatment technology, hazardous waste, industrial waste, household waste, kitchen waste, medical waste, comprehensive utilization, industrial solid waste, urban solid waste, solid waste treatment, solid waste management, waste treatment, waste classification, harmlessness, reduction, resource utilization, incineration, recycling, landfill, integrated treatment technology, emission standards, waste disposal laws, environmental protection regulations, circular economy, green development, sustainable utilization, recycling, waste classification.

Control variables. Corporate ESG performance is influenced by various factors. To reduce empirical bias, the following control variables are selected: equity balance (balance), duality (dual), investment returns (invest), intangible assets (intan), tangible assets (tan), cash flow (cash), board governance (boardratio), asset turnover (asset), and audit quality (big4). The data is sourced from the Wind Database.

The specific definitions of these variables are provided in Table 2.

3.3 Model construction

With reference to Bao et al. (2024), in order to verify the relationship between public attention and the ESG performance of solid waste disposal companies (Hypothesis 1), the model is constructed as follows:

$$ESG_{it} = \beta_0 + \beta_1 public_{it} + \beta_2 Con_{it} + \eta_I + \gamma_t + \varepsilon_{it} \tag{3}$$

Con_{it} Represents a set of control variables, and η_I, γ_t represent industry fixed effects and time fixed effects, while ε_{it} represents the random disturbance term.

Table 2 Variable description

Variable type	Variable name	Variable symbol	Variable description
Dependent variable	Corporate ESG performance	ESG	ESG scores obtained from the ESG evaluation indicator system
Independent variable	Public attention	public	The natural logarithm of the number of Weibo posts obtained with the keywords "solid waste disposal," "solid waste disposal," "garbage treatment," and "garbage disposal"
Mediating variable	Government attention allocation	gov_attention	The proportion of solid waste disposal-related word frequency to the total word frequency in the "Government Work Report"
	Corporate green technology innovation	gTI	The natural logarithm of the number of green patent applications plus one
Moderating variable	User influence	between	Betweenness centrality of nodes in social networks
	Information dissemination efficiency	path	The average path length of social networks
Control variable	Equity balance	balance	The shareholding ratio of the second-largest shareholder to the shareholding ratio of the largest shareholder
	CEO duality	dual	Whether the chairman and the general manager are the same person
	Investment returns	invest	Return on investment (ROI)
	Intangible assets	intan	Intangible assets/Total assets
	Tangible assets	tan	Tangible assets/Total assets
	Cash flow	cash	Net cash flow from operating activities/Total assets
	Board governance	boardratio	Independent directors/Number of directors
	Asset turnover	asset	Operating income/Total assets
	Company audit	big4	Whether the company is audited by the Big Four (PricewaterhouseCoopers, Deloitte, KPMG, Ernst & Young)

Referring to the method of Tan and Zhu (2022), in order to verify the mediating role of governmental attention allocation and firms' green technology innovation (hypotheses 2 and 3), the model is constructed as follows:

$$gov\_attention_{it} = \beta_0 + \beta_1 public_{it} + \beta_2 Con_{it} + \eta_I + \gamma_t + \varepsilon_{it} \quad (4)$$

$$ESG_{it} = \beta_0 + \beta_1 public_{it} + \beta_2 gov\_attention_{it} + \beta_3 Con_{it} + \eta_I + \gamma_t + \varepsilon_{it} \quad (5)$$

$$gTI_{it} = \beta_0 + \beta_1 public_{it} + \beta_2 Con_{it} + \eta_I + \gamma_t + \varepsilon_{it} \quad (6)$$

$$ESG_{it} = \beta_0 + \beta_1 public_{it} + \beta_2 gTI_{it} + \beta_3 Con_{it} + \eta_I + \gamma_t + \varepsilon_{it} \quad (7)$$

Referring to the method of Abdullah et al. (2024), in order to validate the moderating effects of user influence and information diffusion efficiency in the public social network on the process through which public attention affects the ESG performance of solid waste disposal companies (Hypotheses 4 and 5), the model is constructed as follows:

$$ESG_{it} = \beta_0 + \beta_1 public_{it} + \beta_2 between_{it} + \beta_3 public_{it} \times between_{it} + \beta_4 Con_{it} + \eta_I + \gamma_t + \varepsilon_{it} \quad (8)$$

$$ESG_{it} = \beta_0 + \beta_1 public_{it} + \beta_2 path_{it} + \beta_3 public_{it} \times path_{it} + \beta_4 Con_{it} + \eta_I + \gamma_t + \varepsilon_{it} \quad (9)$$

4 Empirical results

4.1 Descriptive statistics

Table 3 presents the descriptive statistics of the main variables. The mean ESG performance of companies is 4.39, with a standard deviation of 1.76, ranging from 1.75 to 8.75, indicating significant variation in the ESG performance of solid waste disposal companies in China. The mean public attention is 6.22, with a range from 2.3 to 9.9, suggesting substantial variation in public attention to solid waste disposal across different regions and years.

This study uses the variance inflation factor (VIF) to test for multicollinearity issues. As shown in Table 4, the mean VIF is 2.1, indicating that the model does not have severe multicollinearity issues.

Table 3 Descriptive statistics of major variables

Variable	*N*	Mean	SD	Min	Max
ESG	639	4.390	1.760	1.750	8.750
public	639	6.220	1.270	2.300	9.900
balance	639	0.330	0.270	0.004	1
dual	639	0.240	0.430	0	1
invest	589	1.820	19.19	−9.360	384.5
intan	639	0.0900	0.120	0	0.660
tan	639	0.870	0.140	0.320	1
cash	639	0.0100	0.410	−10.22	0.330
boardratio	639	0.380	0.0600	0.270	0.600
asset	639	0.530	0.510	0.0100	3.920
big4	639	0.0600	0.230	0	1

Table 4 VIF test results

Variable	public	balance	dual	invest	intan	tan
VIF	1.05	1.07	1.07	1.11	6.24	6.14
Variable	cash	boardratio	asset	big4	mean	-
VIF	1.08	1.06	1.11	1.09	2.1	-

Table 5 Benchmark regression results

Variable	(1)	(2)	(3)	(4)
	ESG	E	S	G
public	0.287***	0.190*	0.213*	0.577***
	(2.94)	(1.94)	(1.68)	(5.78)
balance	0.896***	0.392	1.305***	0.863***
	(3.21)	(1.39)	(3.85)	(2.86)
dual	0.316**	0.157	0.373**	0.447***
	(2.22)	(1.03)	(2.18)	(2.64)
invest	−0.001	−0.003	−0.001	0.001
	(−0.68)	(−0.81)	(−0.60)	(0.61)
intan	6.040***	4.484***	6.495***	7.512***
	(4.84)	(3.16)	(4.17)	(5.45)
tan	3.789***	2.257**	4.324***	5.066***
	(4.30)	(2.06)	(4.03)	(4.85)
cash	2.840***	3.995***	2.643**	1.477
	(3.30)	(4.34)	(2.46)	(1.53)
boardratio	2.919***	2.545**	2.795**	3.725***
	(2.77)	(2.09)	(2.29)	(2.86)
asset	0.359**	0.239	0.399**	0.466**
	(2.26)	(1.16)	(2.22)	(2.56)
big4	1.769***	1.247***	1.981***	2.145***
	(6.50)	(4.48)	(5.07)	(8.86)
_cons	−4.935***	−3.078**	−5.491***	−6.669***
	(−3.98)	(−2.09)	(−3.69)	(−4.83)
Year	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes
N	589	589	589	589
adj. R^2	0.424	0.527	0.333	0.270

Note: ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively, with t-values in brackets

4.2 Benchmark regression

Table 5 presents the results of the benchmark regression. Column (1) shows that public attention has a significant positive impact on corporate ESG performance (β=0.287, p<0.01), supporting Hypothesis 1, which suggests that public attention can effectively improve the ESG performance of solid waste disposal companies. This result aligns with the core idea of public pressure theory, which posits that companies will actively respond to public attention and pressure by improving their ESG performance to maintain corporate image and social legitimacy (Tao et al., 2024). This finding is also supported by relevant literature. For example, Ren and Ren (2024) highlighted that public concern over environmental issues can significantly enhance corporate ESG performance, indicating that the public, as an external

supervisory force, can promote improvements in a company's environmental, social, and governance practices. However, Chen et al. (2024) presented a different viewpoint, arguing that public attention to climate issues can reduce corporate ESG performance. This is because such attention may increase the market risks faced by companies, thereby negatively affecting their financial performance and earnings.

The analysis results in columns (2) to (4) show that public attention has a significant impact on each dimension of corporate ESG performance. Specifically, in the corporate governance dimension, public attention exhibits a stronger positive effect, with a coefficient of 0.577, which is significant at the 1% level. This finding indicates that the positive impact of public attention on corporate ESG performance is consistent across different dimensions. Cain and McKeon (2016) also suggested that behavioral consistency is widely present in corporate strategies. Companies, while focusing on environmental performance, also integrate social responsibility and enhancing corporate image into their strategic planning.

4.3 Robustness test

This study conducts robustness tests using two approaches: alternative variables and omitted variables. For alternative variables, the study adopts the Huazheng ESG score and constructs an ESG dictionary to calculate word frequency (Mansouri & Momtaz, 2022), which serves as a substitute for the self-built ESG evaluation index system. Additionally, the keywords "garbage treatment," "garbage disposal," "solid waste treatment," and "solid waste disposal" are used as Baidu Index keywords for web scraping to construct a new public attention indicator. The results, presented in Table 6, Columns (1) to (3), show that public attention (public) continues to exhibit a positive significance at the 1% level. This suggests that the core conclusion of this study withstands rigorous robustness tests.

In terms of omitted variables, this study adopts methods such as adding control variables, different fixed effects, and a placebo test to mitigate the potential impact of omitted variable bias. In Column (4) of Table 6, three regional control variables—industrial structure (ind), representing the ratio of the output value of the tertiary industry to the secondary industry; regional economic development level (GDP), represented by the natural logarithm of GDP; and population size (people), represented by the natural logarithm of the region's resident population—are added. Additionally, the degree of industry competition (HHI), measured by the Herfindahl-Hirschman Index, is included as an industry-level factor. In column (5) of Table 6, interaction fixed effects for industry and year are introduced. The results show that the positive impact of public attention on corporate ESG performance remains significant at both the 10% and 1% levels.

Moreover, this study follows the approach of Cornaggia and Li (2019) by using a placebo test. Specifically, the "public" variable from all "firm-year" data in the sample was extracted and randomly assigned, and the baseline model was re-estimated. If a placebo effect exists, the "public" coefficient after random treatment should remain significantly positive. The results, shown in column (6) of Table 6, indicate that the "public" coefficient is negative and not significant, showing a significant difference from the baseline regression results, thus suggesting no placebo effect. To further confirm the robustness of this conclusion, the process was repeated 500 times, and the number of times the "public" coefficient was significantly positive in the 500 regressions was recorded. The results show that in only 2 out of 500 instances, the "public" coefficient was positive with a p-value less than 0.01, and in

Table 6 Robustness test

Variable	(1)	(2)	(3)	(4)	(5)	(6)
	ESG	ESG	ESG	ESG	ESG	ESG
public	0.334***	0.018***	0.386***	0.221*	0.346***	−0.017
	(4.23)	(3.66)	(4.07)	(1.93)	(2.94)	(−0.08)
ind				0.000***		
				(3.46)		
pop				−0.323		
				(−1.54)		
GDP				0.546**		
				(2.46)		
HHI				−0.041		
				(−0.09)		
_cons	−4.253***	−0.399***	−7.122***	−7.718***	−4.101***	−3.109***
	(−3.64)	(−6.03)	(−4.81)	(−4.46)	(−2.92)	(−2.83)
Con	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	No	Yes
Industry	Yes	Yes	Yes	Yes	No	Yes
Year-Industry	No	No	No	No	Yes	No
N	589	589	589	589	589	589
adj. R^2	0.229	0.323	0.431	0.441	0.320	0.414

Note: ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively, with t-values in brackets

10 instances, the "public" coefficient was positive with a p-value less than 0.05. These are low-probability events, further validating the robustness of the conclusions.

4.4 Endogeneity test

To address potential endogeneity issues in the model, this study follows the approach of Tao et al. (2024) and Du et al. (2019) by introducing the number of internet broadband access ports (internet) and per capita telecom service volume (telecom) as instrumental variables for public attention. These variables represent the level of regional communication infrastructure and network coverage, which are key factors influencing the public's use of social media platforms like Sina Weibo to discuss relevant issues and express concerns. Moreover, broadband ports are more closely related to network hardware facilities, and telecom service volume reflects consumption capacity. These two variables are macro-level indicators that are unlikely to directly affect the ESG performance of firms, thus meeting the relevance and exogeneity requirements for the selection of instrumental variables.

Table 7 presents the results of the instrumental variable two-stage regression. Column (1) reports the first-stage regression results, where the coefficients for the number of internet broadband access ports and per capita telecom service volume are positive and significant at the 1% level, indicating that the higher the communication infrastructure and network coverage in a region, the greater the public attention. Additionally, the F-statistic from the Wald test is 214.502, significantly larger than the 10% critical value, passing the weak instrument test. Finally, column (2) reports the second-stage regression results, where, after controlling for potential endogeneity, the positive effect of public attention on corporate ESG perfor-

Table 7 Endogeneity test

Variable	(1)	(2)
	public	ESG
public		0.420***
		(0.134)
internet	0.473***	
	(11.67)	
telecom	1.169***	
	(17.5)	
_cons	−6.763***	−5.780***
	(−8.88)	(1.456)
Con	Yes	Yes
Year	Yes	Yes
Industry	Yes	Yes
N	589	589
adj. R^2	0.8652	0.458
Wald	214.502	

Note: ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively, with t-values in brackets

Table 8 Mediating effect test

Variable	(1)	(2)	(3)	(4)
	gov_attention	ESG	gTI	ESG
public	0.128***	0.260***	0.201***	0.211**
	(2.94)	(2.65)	(2.65)	(2.27)
gov_attention		0.209**		
		(2.08)		
gTI				0.377***
				(6.86)
_cons	1.401**	−5.228***	−2.499**	−3.993***
	(2.05)	(−4.22)	(−2.21)	(−3.15)
Con	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes
N	589	589	589	589
adj. R^2	0.217	0.428	0.399	0.477

Note: ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively, with t-values in brackets

mance remains significant at the 1% level, consistent with the previous baseline regression results, further validating the reliability of the study's main conclusions.

4.5 Mediation effect test

(1) Government attention mechanism
This paper examines the government regulation mechanism through distribution tests to explore how public attention influences the ESG performance of solid waste disposal companies, as shown in columns (1) and (2) of Table 8. The first-stage regression results indicate that public attention significantly promotes the government's attention allocation to the solid waste disposal sector (the estimated coefficient for the public is 0.128, significant at the 1% level). This suggests that public opinion pressure may

prompt the government to take more proactive actions. The second-stage regression results show that the government's attention allocation to the solid waste disposal sector is significantly positively correlated with the ESG performance of solid waste disposal companies (the estimated coefficient for gov_attention is 0.209, significant at the 5% level). This indicates that greater government focus on solid waste disposal issues leads to more positive impacts on the ESG performance of the companies involved. Overall, these findings validate the mediating mechanism through which public attention improves government attention allocation in the solid waste disposal sector, thereby driving improvements in the ESG performance of related companies. In other words, Hypothesis 2 of this study is supported.

The mediating role of government attention allocation has also been validated in related fields. For example, Zhang et al. (2024b) demonstrated that public participation in environmental issues fosters increased government attention to environmental protection, which, in turn, effectively facilitates pollution control. Similarly, Mao and Lin (2024) suggested that the channel through which public oversight promotes corporate green innovation lies in urging local governments to strengthen environmental regulation. The effectiveness of public demands often requires support and proactive actions from local governments to be fully realized, highlighting the critical role of the government in promoting corporate sustainable development.

(2) Corporate innovation mechanism

The regression results for the internal green innovation mechanism of firms are shown in columns (3) and (4) of Table 8. The first-stage regression results indicate that public attention plays a significant role in promoting internal green technological innovation within firms (the estimated coefficient for the public is 0.201, significant at the 1% level). This phenomenon may stem from firms' proactive adoption of technological advancements to achieve green transformation in response to public expectations and regulatory pressures. The second-stage regression results show a significant positive correlation between the firm's green technological innovation and its ESG performance (the estimated coefficient for gTI is 0.377, significant at the 1% level). As noted by Xu et al. (2024a, b, c), firms can effectively improve their environmental governance and social responsibility by enhancing their technological innovation capabilities. Overall, the results support Hypothesis 3 of this study, indicating that public attention can enhance the ESG performance of solid waste disposal companies by strengthening green technological innovation.

Existing studies have widely confirmed the significant impact of public environmental attention on corporate decision-making and behavior (Wang et al., 2022a, b). Zhao and Li (2025) found that public environmental awareness is a key driver for promoting green transformation in energy-intensive industries, and the empirical results of this study in the solid waste disposal sector further extend this conclusion. In the field of green innovation, existing research indicates that it is an inevitable means for firms to achieve both economic and environmental win-win outcomes (Liu et al., 2024). Jiang et al. (2024) found that green technological innovation can improve a company's financial performance; Santra (2017) confirmed that it effectively curbs emissions growth and enhances energy efficiency; and Liu et al. (2024) further revealed the positive impact of green technological innovation on a company's social image. This study's findings on the promotion of corporate ESG perfor-

mance through green technological innovation align with the above research, collectively highlighting the crucial role of green technological innovation in driving corporate sustainable development.

4.6 Moderating effect test of public social network

Network structure and topological characteristics can reflect public awareness and supervision intensity, which can influence corporate ESG practices. Table 9 presents the regression results with information dissemination efficiency and user influence in the public social network as moderating variables. It can be observed that the interaction coefficient between information dissemination efficiency (i.e., average path length) and public attention is significantly negative at the 10% level (public*path estimated coefficient = −0.601). This indicates that when the network's average path is shorter, information transmission speed and efficiency increase, and the positive impact of public attention on improving the ESG performance of solid waste disposal companies becomes more significant, thus supporting Hypothesis 5. Additionally, user influence, represented by the network's betweenness centrality index, moderates the relationship between public attention and corporate ESG performance with a negative effect (public*between estimated coefficient = −0.009, significant at the 1% level). This indicates that, in provinces with higher user influence, the effect of increased public attention on corporate ESG performance is less pronounced. Conversely, in regions with lower user influence, the effect of increased public attention is more significant in advancing the ESG practices of local companies, which does not support Hypothesis 4.

Social media, as an important platform connecting independent individuals in the public, has created extensive social networks (Chen et al., 2024; Ren & Ren, 2024). While existing studies have confirmed the positive impact of public attention on corporate ESG performance, they have paid less attention to the structural characteristics of public social networks. This study innovatively introduces social network analysis methods into the empirical research

Table 9 Moderating effect test

Variable	(1)	(2)
	ESG	ESG
public	1.145**	0.404***
	(2.29)	(3.21)
path	0.317	
	(0.12)	
public*path	−0.601*	
	(−1.84)	
between		0.049*
		(1.68)
public*between		−0.009*
		(−1.95)
_cons	−5.235	−5.585***
	(−1.32)	(−4.28)
Con	Yes	Yes
Year	Yes	Yes
Industry	Yes	Yes
N	589	589
adj. R^2	0.427	0.427

Note: ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively, with t-values in brackets

on the relationship between public attention and corporate ESG performance, revealing that the efficiency of information dissemination in networks has a significant positive moderating effect on this relationship. This expands the academic understanding of the mechanisms through which public attention influences corporate performance. Additionally, the existing literature generally emphasizes the crucial role of opinion leaders in the information dissemination process, suggesting that they can attract followers and generate significant social influence (Ye et al., 2021). This study finds a negative moderating effect of user influence after incorporating users' positions in the network into the empirical analysis. This result may be attributed to two factors: first, enterprises tend to focus resources on managing public relations crises rather than substantively improving ESG performance; second, the echo chamber effect leads to a tendency toward homogenization in high-influence nodes (Dai & Han, 2023), weakening the diversity and sustainability of public pressure, thereby making it difficult to drive systematic improvements in corporate ESG performance.

4.7 The differential impact of public attention topics on corporate ESG performance

Although this study has successfully constructed indicators reflecting public attention through social media data such as Sina Weibo posts and Baidu search indices, these indicators mainly focus on showing the overall public attention to solid waste disposal and are insufficient to reveal the specific preferences of the public regarding different waste management topics. Therefore, in order to explore in more depth how the ESG performance of solid waste disposal companies responds to public attention on different topics, this study applies the LDA topic model to conduct a detailed analysis of the textual content in Sina Weibo posts. This method helps us gain a more comprehensive understanding of the public attention on various solid waste disposal topics, providing important insights for solid waste disposal companies to develop ESG strategies that better align with public expectations.

(1) Identification of solid waste disposal topics of public attention
LDA is a widely used topic modeling algorithm. It uses statistical methods to cluster text corpora, enabling the automatic discovery of thematic information and word distribution patterns in the text (Jin et al., 2023). Compared to manual coding, the LDA model can more comprehensively and consistently identify semantic patterns in multi-topic texts. Therefore, this study uses the LDA model to mine the themes from the collected Sina Weibo text corpus, in order to more objectively and systematically identify the different topics of public concern regarding solid waste disposal.
Table 10 presents a list of popular words for each topic. By comprehensively considering perplexity, consistency scores, and existing literature (Wu et al., 2022), this study divides public attention on solid waste disposal into four main themes: Topic 1 focuses on community waste management and environmental maintenance; Topic 2 concerns urban development and ecological environmental governance; Topic 3 emphasizes public health prevention and environmental risks; and Topic 4 centers on corporate environmental responsibility and waste treatment technologies. These sub-themes not only reveal the diversity of public concerns but also provide targeted strategic directions for solid waste disposal companies to better respond to societal expectations and enhance their ESG performance.

Table 10 Top words by topic

Topic	Focus of attention	Popular words
Topic 1	Community waste management and environmental maintenance	garbage, garbage sorting, garbage disposal, work, residents, community, community, disposal, sorting, activities, living, environment, civil, street, site, cleaning, urban, propaganda, found, urban management, dump, trash, management, China, recycling.
Topic 2	Urban construction and ecological environmental management	work, construction, living, waste classification, project, city, promote, development, rural, ecological, waste disposal, living waste, governance, management, enhancement, classification, environment, implementation, focus on, amending, facilities, waste, environmental protection, promote, disposal.
Topic 3	Public health prevention and control and environmental risks	prevention and control, Japan, officer, work, Japanese, masks, wastewater, disinfection, doing good, disposal, isolation, medical, health, marine, measures, management, detection, implementation, discharge, protection, place, waste, ensure, emergency, Fukushima.
Topic 4	Corporate environmental responsibility and waste treatment technologies	environmental protection, enterprise, disposal, waste treatment, facility, company, pollution, equipment, garbage, ecology, solid waste, unit, production, technology, environment, limited company, construction waste, hazardous waste, utilization, management, China, recycling, kitchen waste, domestic waste, transportation.

(2) The differential impact of public attention on the ESG performance of solid waste disposal companies across different topics

Building on previous research on the relationship between public attention and the ESG performance of solid waste disposal companies, this study further explores which public concerns are more likely to drive improvements in the ESG performance of these companies. By using the LDA topic model to identify different public attention themes, the following econometric model is constructed to reveal the differential impacts:

$$ESG_{it} = \beta_0 + \beta_1 Topic_{nit} + \beta_2 Con_{it} + \eta_I + \gamma_t + \varepsilon_{it} \tag{10}$$

$Topic_{nit}$ represents the public attention to topic n in company i's province p during period t, measured by the natural logarithm of the number of Weibo posts related to the topic.

Table 11 presents the regression results between public attention on different topics and the ESG performance of solid waste disposal companies. In columns (1) to (3), posts related to the "community waste management and environmental maintenance" topic are closely linked with the ESG performance, environmental performance, and social performance

Table 11 The regression results of public attention topics

Variable	(1)	(2)	(3)	(4)
	ESG	E	S	G
Topic1	0.609***	0.435**	0.792***	0.515**
	(2.78)	(2.02)	(2.67)	(2.17)
Topic2	−0.088	−0.043	−0.050	−0.231
	(−0.45)	(−0.21)	(−0.20)	(−1.12)
Topic3	−0.039	−0.004	−0.080	−0.011
	(−0.40)	(−0.04)	(−0.67)	(−0.10)
Topic4	−0.071	−0.067	−0.288	0.346*
	(−0.40)	(−0.42)	(−1.13)	(1.84)
_cons	−5.320***	−3.447**	−6.203***	−6.441***
	(−4.28)	(−2.37)	(−4.08)	(−4.61)
Con	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes
N	589	589	589	589
adj. R^2	0.432	0.529	0.343	0.277

Note: ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively, with t-values in brackets

of solid waste disposal companies. Specifically, when public attention to the "community waste management and environmental maintenance" topic increases by 1%, the ESG performance of solid waste disposal companies increases by 0.609%, environmental performance increases by 0.435%, and social performance increases by 0.792%. The coefficients are positive at the 1%, 5%, and 1% significance levels. The results in column (4) show that posts related to the "community waste management and environmental maintenance" and "corporate environmental responsibility and waste treatment technologies" topics are closely related to the governance performance of solid waste disposal companies. Specifically, when public attention to the "community waste management and environmental maintenance" and "corporate environmental responsibility and waste treatment technologies" topics increases by 1%, the governance performance of solid waste disposal companies increases by 0.515% and 0.346%, respectively, with these coefficients being positive at the 5% and 10% significance levels.

The topic analysis based on social media data indicates that public attention to different topics has a differentiated impact on the ESG performance of solid waste disposal companies, with the "community waste management and environmental maintenance" topic showing the most significant and comprehensive influence. This finding extends existing research in two dimensions: first, although Sui and Zhang (2024) identified that public attention to waste sorting on social media platforms mainly focuses on community health management, urban environmental construction, and environmental protection movements, it did not reveal the connection between these topics of concern and changes in corporate behavior. In addition, compared to studies by Ren and Ren (2024) and Chen et al. (2024) on macro-environmental issues such as environmental pollution and climate change, this research, by focusing on specific topics within the solid waste disposal sector, not only confirms the substantial impact of public attention on corporate behavior but also uncovers the significant heterogeneity of this impact due to differences in the topics of concern.

5 Conclusion and implications

5.1 Conclusion

The rapid development of social media has reshaped the way the public engages in environmental governance, allowing dispersed individuals to connect closely through complex social networks, creating an unprecedented collective influence, which in turn becomes a significant force in driving companies to fulfill their ESG responsibilities. Using Chinese solid waste disposal companies as a case study, this research employs econometric methods from a multi-stakeholder perspective (public-government-enterprise) to explore the mechanisms through which public attention affects the ESG performance of solid waste disposal companies. Additionally, based on Weibo comment data, the study constructs a public social network to examine the role of network structure in this process.

The finding that public attention significantly enhances the ESG performance of solid waste disposal companies is supported by several robustness and endogeneity tests, reinforcing the notion that public participation has become a critical driver in encouraging firms to fulfill their environmental and social responsibilities. Moreover, public concern operates through two key channels: government attention allocation and firms' drive for innovation. This mechanism highlights the interaction of multiple actors in corporate ESG governance, with public attention guiding the effective allocation of government resources and prompting companies to proactively engage in green technological innovation. Additionally, the efficiency of information dissemination within public social networks plays a positive moderating role, while user influence exerts a negative moderating effect, reflecting the complex impact of social networks on the effectiveness of public oversight. Finally, public attention directed at community waste management and corporate environmental responsibility proves to be most effective in enhancing corporate ESG and governance performance. This suggests that focusing public attention on these areas can more effectively promote the sustainable development of solid waste disposal companies.

5.2 Theoretical contributions

The theoretical contributions of this study are primarily reflected in three aspects: First, this study expands the theoretical perspective on the relationship between public attention and corporate ESG performance. Unlike previous studies that focused on a single or binary stakeholder perspective, this research constructs a multi-stakeholder analytical framework of "public attention-government attention allocation/corporate green technology innovation-corporate ESG performance," revealing how public attention influences the ESG performance of solid waste disposal companies through attracting government attention and enhancing corporate green technology innovation. This provides a more systematic and comprehensive theoretical explanation for understanding the pathways to improving corporate ESG performance. Second, this study incorporates the characteristics of public social networks into the empirical analysis of the relationship between public attention and corporate ESG performance. By constructing a public social network focused on solid waste disposal, this research explores the moderating effects of user influence and information dissemination efficiency on corporate ESG performance, shedding light on the network effects of public attention and enriching the theoretical mechanisms of how public attention influ-

ences corporate behavior. Finally, this study refined the content dimensions of public concern themes. Unlike previous studies that treated public concern as a singular concept, this paper employed the LDA topic clustering method to identify specific thematic categories of public concern. The study further examines the differential impacts of distinct thematic concerns on corporate ESG performance, offering a more nuanced and in-depth theoretical interpretation of public concern.

5.3 Managerial implications

The results of this study provide important managerial implications for solid waste disposal companies. Managers should fully recognize the positive role of public oversight and actively embrace, rather than avoid, public attention, viewing it as a key driver for enhancing ESG performance. Specifically, companies should establish transparent information disclosure mechanisms, offer open tours of their environmental facilities, and regularly publish environmental responsibility reports to foster positive interactions with the public. From a long-term development perspective, companies should translate public attention into innovation momentum by increasing investment in green technology research and development and building environmental innovation capabilities. Furthermore, enterprises can proactively engage in communication and coordination with government agencies. By leveraging the resource allocation advantages generated by public attention, they can establish a virtuous interaction mechanism combining government support, corporate innovation, and public supervision, thereby achieving sustainable corporate development.

5.4 Limitations and future research

This study has certain limitations. It focuses solely on Chinese companies, and their ESG performance may be influenced by China's unique regulatory environment and policy orientation. Future research could further conduct cross-national comparisons to explore the mechanisms and differences in how public attention affects corporate ESG performance in different cultural, institutional, and economic contexts. This would contribute to a more comprehensive understanding of the impact of public attention and provide more valuable insights for policy-making and corporate practices on a global scale.

Acknowledgements This research was supported by the National Natural Science Foundation of China (72374062, 72204074), the Fundamental Research Funds for the Central Universities (JZ2024HGTB0240).

Author contributions Yana Shuai: Conceptualization, Design, Methodology, Writing-Original Draft, Revision. Jingjing Li: Revision, Language Editing, Resources. Jianling Jiao: Conceptualization, Design, Methodology, Formal analysis, Resources, Funding acquisition, Revision. Zhengguang Chen: Revision, Language Editing, Resources.

Data availability The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Conflict of interest The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

Abbas, R., Abdelzaher, M., Shehata, N., & Tantawy, M. (2024). Production, characterization and performance of green geopolymer modified with industrial by-products. *Scientific Reports*, *14*(1), 5104. https://doi.org/10.1038/s41598-024-55494-8

Abdelzaher, M. (2023). Sustainable development goals for industry, innovation, and infrastructure: Demolition waste incorporated with nanoplastic waste enhanced the physicomechanical properties of white cement paste composites. *Applied Nanoscience*, *13*(8), 5521–5536. https://doi.org/10.1007/s13204-023-02766-w

Abdelzaher, M., & Awad, M. M. (2022). Sustainable development goals for the circular economy and the water-food nexus: Full implementation of new drip irrigation technologies in upper Egypt. *Sustainability*, *14*(21), 13883. https://doi.org/10.3390/su142113883

Abdelzaher, M., Farahat, E. M., Abdel-Ghafar, H. M., Balboul, B. A., & Awad, M. M. (2023a). Environmental policy to develop a conceptual design for the water–energy–food nexus: A case study in Wadi-Dara on the red sea coast, Egypt. *Water*, *15*(4), 780. https://doi.org/10.3390/w15040780

Abdelzaher, M., Hamouda, A. S., & El-Kattan, I. M. (2023b). A comprehensive study on the fire resistance properties of ultra-fine ceramic waste-filled high alkaline white cement paste composites for progressing towards sustainability. *Scientific Reports*, *13*(1), 22097. https://doi.org/10.1038/s41598-023-49229-4

Abdullah, Zhu, N., & Hashmi, M. A. (2024). Exploring the influence of green innovation, ESG performance, and corporate reputation on stock market performance: A mediated moderation perspective. *Environment Development and Sustainability*, 1–37. https://doi.org/10.1007/s10668-024-05840-7

Alam, M. S., Atif, M., Chien-Chi, C., & Soytaş, U. (2019). Does corporate R&D investment affect firm environmental performance? Evidence from G-6 countries. *Energy Economics*, *78*, 401–411. https://doi.org/10.1016/j.eneco.2018.11.031

Aziz, Z. S., Jazza, S. H., Dageem, H. N., Banoon, S. R., Balboul, B. A., & Abdelzaher, M. A. (2024). Bacterial biodegradation of oil-contaminated soil for pollutant abatement contributing to achieve sustainable development goals: A comprehensive review. *Results in Engineering*, *22*, 102083. https://doi.org/10.1016/j.rineng.2024.102083

Bao, X., Sadiq, M., Tye, W., & Zhang, J. (2024). The impact of environmental, social, and governance (ESG) rating disparities on corporate risk: The mediating role of financing constraints. *Journal of Environmental Management*, *371*, 123113. https://doi.org/10.1016/j.jenvman.2024.123113

Bergström, A., & Jervelycke Belfrage, M. (2018). News in social media: Incidental consumption and the role of opinion leaders. *Digital Journalism*, *6*(5), 583–598. https://doi.org/10.1080/21670811.2018.1423625

Cain, M. D., & McKeon, S. B. (2016). CEO personal risk-taking and corporate policies. *Journal of Financial and Quantitative Analysis*, *51*(1), 139–164. https://doi.org/10.1017/S0022109016000041

Chen, L., & Gao, M. (2021). Novel information interaction rule for municipal household waste classification behavior based on an evolving scale-free network. *Resources Conservation and Recycling*, *168*, 105445. https://doi.org/10.1016/j.resconrec.2021.105445

Chen, S., Han, X., Zhang, Z., & Zhao, X. (2023). ESG investment in china: Doing well by doing good. *Pacific-Basin Finance Journal*, *77*, 101907. https://doi.org/10.1016/j.pacfin.2022.101907

Chen, S., Mao, Z., Li, Y., & Kang, J. (2024). The effect of china's public climate concern on ESG disclosure. *Finance Research Letters*, *62*, 105132. https://doi.org/10.1016/j.frl.2024.105132

Cho, C. H., & Patten, D. M. (2007). The role of environmental disclosures as tools of legitimacy: A research note. *Accounting Organizations and Society*, *32*(7–8), 639–647. https://doi.org/10.1016/j.aos.2006.09.009

Cornaggia, J., & Li, J. Y. (2019). The value of access to finance: Evidence from m&as. *Journal of Financial Economics*, *131*(1), 232–250. https://doi.org/10.1016/j.jfineco.2018.09.003

Dai, J., & Han, M. (2023). The evolution of network public opinion considering information cocoons. *Information Studies: Theory & Application*, *46*(06), 111–117. https://doi.org/10.16353/j.cnki.1000-7490.2023.06.016

Dong, X., Ye, L., & Lian, Y. (2024). Who has dominated information spreading on social media during the early stage of COVID-19 pandemic in china?? A Temporal network analysis. *International Journal of Disaster Risk Reduction*, *107*, 104493. https://doi.org/10.1016/j.ijdrr.2024.104493

Du, Y., Li, Z., Du, J., Li, N., & Yan, B. (2019). Public environmental appeal and innovation of heavy-polluting enterprises. *Journal of Cleaner Production*, *222*, 1009–1022. https://doi.org/10.1016/j.jclepro.2019.03.035

Du, W., Li, M., Fan, Y., & Liang, S. (2023). Can public environmental concern inhibit the market entry of polluting firms: Micro evidence from China. *Ecological Indicators*, *154*, 110528. https://doi.org/10.1016/j.ecolind.2023.110528

Endl, A., Tost, M., Hitch, M., Moser, P., & Feiel, S. (2021). Europe's mining innovation trends and their contribution to the sustainable development goals: Blind spots and strong points. *Resources Policy*, *74*, 101440. https://doi.org/10.1016/j.resourpol.2019.101440

Gao, X., & Zhang, G. (2025). Media coverage and corporate green innovation: Empirical study from an economic perspective. *Finance Research Letters*, *74*, 106740. https://doi.org/10.1016/j.frl.2025.106740

Geng, Y., Chen, J., Liu, T., & Tao, D. (2023). Public environmental attention, media coverage, and corporate green innovation: Evidence from heavily polluting industries in China. *Environmental Science and Pollution Research*, *30*(37), 86911–86926. https://doi.org/10.1007/s11356-023-28369-0

Gu, X. (2023). Research progress of solid waste in China——Based on document visualization analysis from 2012 to 2022. *China Resources Comprehensive Utilization*, *41*(03), 122–124. https://doi.org/10.3969/j.issn.1008-9500.2023.03.030

Gu, Y., Ho, K. C., Yan, C., & Gozgor, G. (2021). Public environmental concern, CEO turnover, and green investment: Evidence from a quasi-natural experiment in China. *Energy Economics*, *100*, 105379. https://doi.org/10.1016/j.eneco.2021.105379

Gu, X., Chen, F., Hou, J., Dong, Y., Wang, Y., & Li, J. (2024). Public attention and psychological trends towards waste reduction: A large-scale data analysis based on social media. *Journal of Cleaner Production*, *467*, 142873. https://doi.org/10.1016/j.jclepro.2024.142873

Guo, M., Lin, Y., Shyu, R. J., & Huang, J. (2023). Characterizing environmental pollution with civil complaints and social media data: A case of the greater Taipei area. *Journal of Environmental Management*, *348*, 119310. https://doi.org/10.1016/j.jenvman.2023.119310

Huang, J. W., & Li, Y. H. (2017). Green innovation and performance: The view of organizational capability and social reciprocity. *Journal of Business Ethics*, *145*, 309–324. https://doi.org/10.1007/s10551-015-2903-y

Jiang, J., Seng, J., Huo, W., & Shi, J. (2024). Mitigating managerial short-sightedness in green technology innovation and corporate financial performance: The role of National team shareholding. *International Review of Financial Analysis*, *96*, 103622. https://doi.org/10.1016/j.irfa.2024.103622

Jiao, J., Shuai, Y., & Li, J. (2024). Identifying ESG types of Chinese solid waste disposal companies based on machine learning methods. *Journal of Environmental Management*, *360*, 121235. https://doi.org/10.1016/j.jenvman.2024.121235

Jin, S., Stokes, G., & Hamilton, C. (2023). Empirical evidence of urban climate adaptation alignment with sustainable development: Application of LDA. *Cities*, *136*, 104254. https://doi.org/10.1016/j.cities.2023.104254

Lei, N., Miao, Q., & Yao, X. (2023). Does the implementation of green credit policy improve the ESG performance of enterprises? Evidence from a quasi-natural experiment in China. *Economic Modelling*, *127*, 106478. https://doi.org/10.1016/j.econmod.2023.106478

Li, Y., Yaacob, M. H., & Xie, T. (2024). Effects of china's low carbon pilot City policy on corporate green innovation: Considering the mediating role of public environmental concern. *Finance Research Letters*, *65*, 105641. https://doi.org/10.1016/j.frl.2024.105641

Liu, S., Jiang, C., Lin, Z., Ding, Y., Duan, R., & Xu, Z. (2015). Identifying effective influencers based on trust for electronic word-of-mouth marketing: A domain-aware approach. *Information Sciences*, *306*, 34–52. https://doi.org/10.1016/j.ins.2015.01.034

Liu, Y., Sun, C., Xia, B., Cui, C., & Coffey, V. (2018). Impact of community engagement on public acceptance towards waste-to-energy incineration projects: Empirical evidence from China. *Waste Management*, *76*, 431–442. https://doi.org/10.1016/j.wasman.2018.02.028

Liu, X., Huang, N., Su, W., & Zhou, H. (2024). Green innovation and corporate ESG performance: Evidence from Chinese listed companies. *International Review of Economics & Finance, 95*, 103461. https://doi.org/10.1016/j.iref.2024.103461

Mansouri, S., & Momtaz, P. P. (2022). Financing sustainable entrepreneurship: ESG measurement, valuation, and performance. *Journal of Business Venturing*, *37*(6), 106258. https://doi.org/10.1016/j.jbusvent.2022.106258

Mao, Y., & Lin, Y. (2024). Do more hands make work easier? Public supervision and corporate green innovation. *International Review of Economics & Finance*, *91*, 1064–1083. https://doi.org/10.1016/j.iref.2024.01.071

Na, C., Ni, Z., Shu, Q., & Zhang, H. (2024). Can government subsidies improve corporate ESG performance? Evidence from listed enterprises in China. *Finance Research Letters*, *64*, 105427. https://doi.org/10.1016/j.frl.2024.105427

Ren, X., & Ren, Y. (2024). Public environmental concern and corporate ESG performance. *Finance Research Letters*, *61*, 104991. https://doi.org/10.1016/j.frl.2024.104991

Rossi, P., & Candio, P. (2023). The independent and moderating role of choice of non-financial reporting format on forecast accuracy and ESG disclosure. *Journal of Environmental Management*, *345*, 118891. https://doi.org/10.1016/j.jenvman.2023.118891

Santra, S. (2017). The effect of technological innovation on production-based energy and CO2 emission productivity: Evidence from BRICS countries. *African Journal of Science Technology Innovation and Development*, *9*(5), 503–512. https://doi.org/10.1080/20421338.2017.1308069

SASB (2023). Waste Management Sustainability Accounting Standard. https://sasb.org/standards/download/

Shah, M. U., & Rezai, R. (2023). Public-sector participation in the circular economy: A stakeholder relationship analysis of economic and social factors of the recycling system. *Journal of Cleaner Production*, *400*, 136700. https://doi.org/10.1016/j.jclepro.2023.136700

Shou, Y., Wu, C., Shao, J., Hu, W., & Lai, K. (2023). Does green technology innovation contribute to logistics companies' market value? The effects of stakeholder engagement and public attention. *Transportation Research Part E: Logistics and Transportation Review*, *176*, 103227. https://doi.org/10.1016/j.tre.2023.103227

Sui, F., & Zhang, H. (2024). How to go green? Exploring public attention and sentiment towards waste sorting behaviors on Weibo platform: A study based on text co-occurrence networks and deep learning. *Heliyon*, *10*(19), 38510. https://doi.org/10.1016/j.heliyon.2024.e38510

Tan, Y., & Zhu, Z. (2022). The effect of ESG rating events on corporate green innovation in china: The mediating role of financial constraints and managers' environmental awareness. *Technology in Society*, *68*, 101906. https://doi.org/10.1016/j.techsoc.2022.101906

Tao, Y., Hou, W., Liu, Z., & Yang, Z. (2024). How can public environmental concerns enhance corporate ESG performance?? Based on a dual perspective of external pressure and internal concerns. *Science of Science and Management of S & T*, *45*(07), 88–109. https://doi.org/10.20201/j.cnki.ssstm.2024.07.009

Tsang, Y. P., Fan, Y., & Feng, Z. (2023). Bridging the gap: Building environmental, social and governance capabilities in small and medium logistics companies. *Journal of Environmental Management*, *338*, 117758. https://doi.org/10.1016/j.jenvman.2023.117758

Wang, Y., & Zhao, J. (2018). Voting with money: The impact of public environmental concern on asset prices in different industries. *Journal of Management World*, *34*(09), 46–57. https://doi.org/10.19744/j.cnki.11-1235/f.2018.09.005

Wang, B., Xu, S., Sun, K., Chang, X., Wang, Z., & Zhao, W. (2022a). Government responsive selectivity and public limited mediation role in air pollution governance: Evidence from large scale text data content mining. *Resources Conservation and Recycling*, *187*, 106553. https://doi.org/10.1016/j.resconrec.2022.106553

Wang, D., Mao, J., Cui, R., Yu, J., & Shi, X. (2022b). Impact of inter-provincial power resource allocation on enterprise production behavior from a multi-scale correlation perspective. *Energy Economics*, *114*, 106323. https://doi.org/10.1016/j.eneco.2022.106323

Weibo. (2015). Shanghai Jiading solid waste plant poisons Jiangsu Taicang. https://weibo.com/2875528504/3902190538196448

Wu, Z., Xie, P., Zhang, J., Zhan, B., & He, Q. (2022). Tracing the trends of general construction and demolition waste research using LDA modeling combined with topic intensity. *Frontiers in Public Health*, *10*, 899705. https://doi.org/10.3389/fpubh.2022.899705

Wu, B., Zhu, P., Yin, H., & Wen, F. (2023). The risk spillover of high carbon enterprises in china: Evidence from the stock market. *Energy Economics*, *126*, 106939. https://doi.org/10.1016/j.eneco.2023.106939

Xu, G., Tang, X., & Liiu, X. (2024a). Has the opening of High-speed rail improved the ESG performance of enterprises?? The mediating effect of green technology innovation. *Soft Science*, *38*(06), 113–119. https://doi.org/10.13956/j.ss.1001-8409.2024.06.15

Xu, J., Ye, F., & Shang, L. (2024b). The impact of public environmental concern on the level of corporate carbon performance. *Chinese Journal of Management*, *21*(6), 865–875. https://doi.org/10.3969/j.issn.1672-884x.2024.06.008

Xu, Y., Yang, L., Hossain, M. E., Haseeb, M., & Ran, Q. (2024c). Unveiling the trajectory of corporate green innovation: The roles of the public attention and government. *Journal of Cleaner Production*, *444*, 141119. https://doi.org/10.1016/j.jclepro.2024.141119

Ye, W., Liu, Z., & Pan, L. (2021). Who are the celebrities? Identifying vital users on Sina Weibo microblogging network. *Knowledge-Based Systems*, *231*, 107438. https://doi.org/10.1016/j.knosys.2021.107438

Ye, X., Hou, R., Wang, S., & Omar, N. A. B. (2024). Social media, relationship marketing and corporate ESG performance. *Finance Research Letters*, *63*, 105288. https://doi.org/10.1016/j.frl.2024.105288

Zhang, M., Wei, J., Li, H., Chen, Y., & Liu, J. (2024a). Comparing and optimizing municipal solid waste (MSW) management focused on air pollution reduction from MSW incineration in China. *Science of the Total Environment*, *907*, 167952. https://doi.org/10.1016/j.scitotenv.2023.167952

Zhang, M., Yang, Y., Du, P., Wang, J., Wei, Y., Qin, J., & Yu, L. (2024b). The effect of public environmental participation on pollution governance in china: The mediating role of local governments' environmental attention. *Environmental Impact Assessment Review*, *104*, 107345. https://doi.org/10.1016/j.eiar.2023.107345

Zhang, H., Lai, J., & Kang, C. (2024c). Green signalling under environmental pressure: Does local government environmental regulatory pressure promote corporate environmental information disclosure? *Economic Analysis and Policy*, *83*, 813–844. https://doi.org/10.1016/j.eap.2024.07.016

Zhao, X., & Li, S. (2025). Artificial intelligence and public environmental concern: Impacts on green innovation transformation in energy-intensive enterprises. *Energy Policy*, *198*, 114469. https://doi.org/10.1016/j.enpol.2024.114469

Zheng, J., Cheng, Y., Ma, G., & Shao, C. (2020). Research on evolution of public environmental protection behavior based on data crawler and dynamic social network. *Systems Engineering-Theory & Practice,40*(01), 219–229. https://doi.org/10.12011/1000-6788-2018-1919-11

Zhou, B., & Ding, H. (2023). How public attention drives corporate environmental protection: Effects and channels. *Technological Forecasting and Social Change*, *191*, 122486. https://doi.org/10.1016/j.techfore.2023.122486

Authors and Affiliations

Yana Shuai[1,3] · Jingjing Li[1,3] · Jianling Jiao[1,2,3] · Zhengguang Chen[1,2]

✉ Jianling Jiao
jianljiao@126.com

Yana Shuai
18255949706@163.com

Jingjing Li
mqddpj@163.com

Zhengguang Chen
hbczgs@163.com

[1] School of Management, Hefei University of Technology, Hefei 230009, China

[2] Philosophy and Social Sciences Laboratory of Data Science and Smart Society Governance, Ministry of Education, Hefei, Anhui, People's Republic of China

[3] Anhui Key Laboratory of Philosophy and Social Sciences of Energy and Environment Smart Management and Green Low Carbon Development, Hefei University of Technology, Hefei 230009, China