



The influence of work safety information disclosure on performance of listed companies in high-risk industries: Evidence from Shenzhen stock Exchange

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ARTICLE INFO

Keywords:

High-risk industry
work safety information disclosure
Enterprise performance
“U-shaped” regulation

ABSTRACT

The disclosure of work safety information of listed companies in high-risk industries is an important aspect of their social responsibility, and it is also an inevitable requirement to meet the right of stakeholders to know, which has a far-reaching impact on the development of enterprises. In order to clarify the impact mechanism of work safety information disclosure on enterprise performance of listed companies in high-risk industries, 222 listed companies in high-risk industries were taken as the research object, and the multiple regression analysis method was used to analyze the relationship between the level of work safety information disclosure of enterprises and their financial performance, safety performance and social reputation. The results show that the work safety information disclosure of listed companies in high-risk industries has a positive impact on corporate financial performance, safety performance and social reputation; unabsorbed slack resources have a positive U-shaped regulatory effect on work safety information disclosure and enterprise social reputation; The shareholding ratio of institutional investors has an inverted U-shaped regulatory effect on the positive relationship between work safety information disclosure and enterprise social reputation. This study has enriched the theoretical and practical exploration of research on work safety information disclosure. It can help improve the level of work safety information disclosure and safety management in enterprises, while guiding the sustainable development of occupational health and safety within these organizations.

1. Introduction

In recent years, China has paid more and more attention to work safety, and the situation in work safety has continued to improve steadily, with the total number of work safety accidents and the number of fatalities in work safety accidents both declining year-on-year. High-risk industries have always been a focus of work safety regulation in China, due to the concentration of safety risks and the severity of accidents. While the Chinese government continues to strengthen work safety regulation, it has also implemented a series of effective measures to strengthen work safety in high-risk industry enterprises, such as the promulgation of the Law on Work Safety, which is suitable for all production and business enterprises in China, and the formulation of a system for the payment of work safety expenses for enterprises in high-risk industries and a safety liability insurance system in high-risk industries. As listed companies, high-risk industry companies have the responsibility and obligation to pay more attention to work safety work, disclose their work safety to

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society in a timely and effective manner, which is not only a manifestation of corporate social responsibility for work safety, but also satisfies the information disclosure needs of various stakeholders, such as investors and the public, playing a significant role in the economic profits and sustainable development of enterprises. However, some high-risk industry listed companies have not realized the importance of work safety information disclosure and there are cases of symbolic disclosure. Such as only disclosing favorable information, using vague language or not disclosing to hide bad work safety conditions. Therefore, further research is needed to examine the effects and role of work safety information disclosure in high-risk industry economic and non-economic performance.

Research on the work safety information disclosure of listed companies in high-risk industries mainly focuses on two aspects: firstly, the research on the quality of occupational health and safety information disclosure of listed companies. Existing studies have analyzed and evaluated occupational health and safety information in social responsibility reports [1–5] and proposed new methods to evaluate the quality of occupational health and safety information disclosure [1,5]. Results have shown that the occupational health and safety conditions of the whole society are poor, especially in developing countries [6,7], where the casualties caused by occupational health and safety problems are much higher than those in developed countries [6,8]. High-risk industries have higher accident severity, and the quality and quantity of occupational health and safety information disclosure are correspondingly higher [9], such as mining, oil and gas industries [8,10,11]. Moreover, companies with large scale [10,12] and occupational health and safety certification [3,12,13] have higher occupational health and safety information quality. Stakeholders disclose occupational health and safety information to avoid potential penalties that can result from accidents, which could lead to financial losses [1]. Secondly, research on the relationship between social responsibility information disclosure and corporate performance of listed companies. Some scholars believe that enterprises' active participation in social responsibility activities and disclosure of social responsibility information can improve corporate performance [14], reduce debt costs [13] financial costs [15,16], alleviate corporate financing constraints [17,18], and improve investment efficiency [19–23] and corporate reputation [18,24–26]. On the contrary, some scholars believe that non-financial information disclosure, such as social responsibility, can cover up bad behaviors such as earnings management of enterprises to a certain extent [27] and aggravate the degree of earnings management of enterprises, leading to high short-term operating costs, which in turn can have a negative impact on business performance [28]. In contrast to general social responsibility information disclosure by listed companies, the significant impact of accidents in high-risk industries can result in high sensitivity of work safety information and strong spillover effects, affecting the decision-making of stakeholders. Moreover, allegations, lawsuits, and work-related injuries, deaths, or illnesses related to occupational health and safety may damage the company's reputation, lose customers, and attract adverse financial consequences such as fines and compensation [29,30]. Therefore, the influence mechanism of work safety information disclosure of listed companies in high-risk industries on enterprise performance requires further in-depth study. This study aims to clarify the economic and social benefits brought by the disclosure of work safety information, providing intrinsic motivation for enterprises to actively disclose such information and ultimately improve the level of work safety information disclosure.

Therefore, this paper aims to focus on high-risk industry listed companies in China as research subjects to explore the effect of work safety disclosure on the production and operation as well as work safety of high-risk industry listed companies. Multiple regression analysis method is employed to analyze the influence of work safety information disclosure on the performance of high-risk industry listed companies, and thus achieve a systematic understanding of the economic and non-economic effects of work safety information disclosure of high-risk industry listed companies, and to provide an internal driving force for companies to actively disclose work safety information, thereby promoting the quality of such disclosure. This can help managers to strengthen the investigation of work safety risks and hazards, standardize the operation of employees in terms of work safety, and improve the work safety management levels of enterprises.

2. Theoretical analysis and research hypothesis

2.1. Theoretical analysis

Enterprise performance represents the outcomes of an enterprise's production and operation, and its economic value and strategic importance to stakeholders and the public can reflect its development prospects and worth. In a broad sense, it encompasses not only the financial returns of the company's activities such as production, investment, and operation, but also non-financial resources such as sustainable development capacity, stakeholder recognition, and social reputation resulting from fulfilling social responsibilities. Social reputation, as an intangible asset of a company, represents the value judgment of the company's attributes such as product or service quality, financial performance, social impact, emotional appeal, etc. It is considered a performance measurement criterion relevant to customers [31]. Therefore, in this paper, we divided enterprise performance into financial performance, safety performance, and social reputation based on the production and operation profits and work safety efficiency and social responsibility performance of listed companies in high-risk industries. this paper aims to study how the level of work safety information disclosure affects these three aspects of enterprise performance.

Signal theory refers to the process in which organizations communicate signals to stakeholders in order to reduce information asymmetry while conveying organizational intentions, behaviors, and performance to the market and stakeholders [32,33]. It is also a bridge connecting various stakeholders. According to signal theory, the disclosure behavior of work safety information by listed companies in high-risk industries can be regarded as the transmission of signals regarding the internal work safety status of the enterprise to stakeholders. This behavior and its effects, such as the disclosure of safety rules and regulations, accident information, work safety investment, safety responsibility information, and other related content, can help maintain the organization's legitimacy, improve the image of the enterprise in the minds of its various stakeholders, gain recognition from the general public and fund support

from investors, and consequently significantly affect the financial performance and social reputation of the enterprise. Moreover, disclosing work safety information in high-risk industries can inspire enterprises to carry out work safety activities, detect potential risks, and ultimately influence the safety performance of the enterprise.

Unabsorbed slack resources have a certain signal effect and can convey information on internal resource redundancy in enterprises to the outside world, which affects stakeholders' recognition and decision-making regarding the work safety status of the company, thereby significantly impacting corporate performance. The proportion of shares held by institutional investors in listed companies can convey information about the company's strong development capabilities and sound governance to society, but it can also signal risks such as controlling work safety decisions by major shareholders, leading to uncertainty in its impact on corporate performance. Therefore, this study is based on signal transmission theory to explore the impact mechanism of work safety information disclosure on corporate performance in high-risk industries and considers the regulating effect of unabsorbed slack resources and institutional investors' shareholding ratio.

2.2. Work safety information disclosure level and financial performance of listed companies in high-risk industries

The financial performance of listed companies is crucial for their survival and growth, and a determining factor for the steady advancement of national economies and high-quality societal development. Although corporate disclosure of social responsibility information has a significant impact on production, management, and development, a consensus has not been reached. On the one hand, the main goal of the company is to make profits to improve shareholder value [34], so it is more difficult to perform more social responsibility behaviors that benefits all stakeholders. Moreover, disclosure of social responsibility information will consume certain resources and increase additional costs of information disclosure, which will have a negative impact on the company's profitability [35] and is not conducive to improving the short-term profits of the company [36]. However, on the other hand, corporate social responsibility information disclosure behavior can improve the positive image of enterprises, obtain resources support from the government, human capital support from employees, capital injection from investors and public recognition [37–39], and increase the long-term value of enterprises [36].

As an important component of social responsibility, the disclosure of work safety information by listed companies in high-risk industries can have a profound impact on investor decision-making, public perception, and the sustainable development of enterprises. Work safety information disclosure can effectively mitigate the information asymmetry between enterprises and society, minimize principal-agent costs, enhance stock liquidity, and ultimately enhance the company's value. In summary, this paper puts forward the following hypothesis.

Hypothesis 1. The disclosure level of work safety information of listed companies in high-risk industries is positively correlated with their financial performance.

2.3. Work safety information disclosure level and safety performance of listed companies in high-risk industries

Safety performance refers to the behaviors taken at work to ensure personal health and safety as well as the safety of the working environment [40], which predicts workplace injuries [41,42] and reflects the work safety effect of the enterprise. Higher safety performance results in fewer occupational injuries [4]. Previous studies have shown that employees' safety attitudes, organizational participation, implementation of work safety, and occupational health policies positively impact the safety performance of the company [43]. Certification in occupational health and safety can also enhance the safety performance of the company [44].

Listed companies in high-risk industries have a social responsibility to disclose work safety information, which is governed by the "Law on Work Safety", the "Administrative Measures for Information Disclosure of Listed Companies", and other relevant laws and regulations. Such disclosure serves to facilitate stakeholders' understanding of the work safety risks faced by enterprises, prompting regular maintenance of safety facilities and equipment, increased investment in work safety, strengthened safety education and training, and improved work safety management. Furthermore, the disclosure of work safety information can enhance enterprise managers' comprehension of the internal work safety environment, reducing the asymmetry between their safety perceptions and the information available. This, in turn, assists managers in identifying and addressing work safety risks and hidden dangers, regulating employees' adherence to safety protocols, elevating the level of work safety management, and enhancing enterprise safety performance. Therefore, this paper puts forward the following hypothesis.

Hypothesis 2. The disclosure level of work safety information of listed companies in high-risk industries has a positive impact on enterprise safety performance.

2.4. Work safety information disclosure level and social reputation of listed companies in high-risk industries

Social reputation refers to a comprehensive and positive evaluation of an enterprise's production and operation activities by external stakeholders. It is a crucial intangible asset for companies and a key element of their soft power to gain advantages in highly competitive markets. Any complaint concerning occupational health and safety may damage the company's reputation [29]. Therefore, the company will react and try to avoid unsafe working conditions and accidents [45]. Most high-risk industries, such as mining, construction, chemical industry, petroleum, natural gas, etc., actively disclose occupational health and safety information [10, 11], and incorporate occupational health and safety issues into corporate social responsibility strategies.

Corporate social responsibility (CSR) information has a "reputation insurance effect". The higher the quality of CSR information

disclosure, the higher the corporate reputation [46]. The disclosure of work safety information and other related social responsibility information by listed companies in high-risk industries can influence external perceptions of the enterprise's internal work safety situation, enhance stakeholders' impression of the company, and positively impact the establishment and long-term maintenance of the company's short-term social reputation. Therefore, this paper puts forward the following hypothesis.

Hypothesis 3. The disclosure level of work safety information of listed companies in high-risk industries has a positive impact on corporate social reputation.

2.5. Influence of unabsorbed slack resources

Slack resources are resources possessed by an enterprise beyond its minimum requirements for survival, which can be freely used [47,48]. They possess value, rarity, and are difficult to replicate, providing sustainable competitive advantages [48]. Slack resources play a vital role in internal decision-making and strategic adjustment. Furthermore, they help enterprises fulfill social responsibilities [49], which improves the quality of social responsibility information disclosure [50]. Slack resources mitigate the impact of environmental risks, which lowers costs and resources constraints faced by enterprises in fulfilling social responsibilities and prioritizing work safety, thus improving competitiveness. According to the liquidity characteristics of slack resources, these resources can be divided into absorbed slack resources and unabsorbed slack resources [51]. Absorbed slack resources lack liquidity and are highly specific, making them difficult to convert. They are typically allocated to specific enterprise projects. Unabsorbed slack resources, such as surplus cash and cash equivalents, are highly efficient and can be used freely in various areas, facilitating effective pursuit of strategic objectives [51]. This paper investigates the moderating effect of unabsorbed slack resources on the relationship between work safety information disclosure and firm performance.

Unabsorbed slack resources can serve as a buffer and reduce the impact of external environmental changes on enterprises, providing necessary resources support. In situations of scarce resources, enterprises prioritize their business activities and focus solely on short-term financial performance. They may use limited resources to expand production scale and create economic value, while ignoring work safety and neglecting social responsibility obligations. This could lead to opportunistic behaviors such as overworking, reducing safety inputs, and cutting corners. In contrast, when sufficient internal unabsorbed slack resources are available, enterprises are more likely to participate in social responsibility activities, which can improve their financial performance [49]. Additionally, these enterprises can increase their utilization rate of slack resources, invest in work safety measures, proactively disclose safety information, and send a positive message to the public that they are operating legally, compliant with regulations, and meet safety standards. This can significantly improve the safety performance and social reputation of enterprises.

Specifically, unabsorbed slack resources offer strong liquidity and high allocation efficiency, providing relatively stable cash flows to support enterprises' production activities. When faced with financial difficulties, limited access to financing, or technological constraints, enterprises can adjust their operations, boost financial flexibility, and mitigate the impact of adverse environments by drawing upon these resources. Moreover, unabsorbed slack resources enable enterprises to invest in work safety activities, including regular maintenance and inspection of safety equipment, training and education programs, and hiring certified safety officers or engaging safety consultants. These investments help reduce potential work safety risks, improve safety performance, and enhance social reputation. Therefore, we put forward the following hypothesis.

Hypothesis 4. Unabsorbed slack resources positively regulate the relationship between work safety information disclosure and corporate financial performance;

Hypothesis 5. Unabsorbed slack resources positively regulate the relationship between work safety information disclosure and enterprise safety performance;

Hypothesis 6. Unabsorbed slack resources positively regulate the relationship between work safety information disclosure and corporate social reputation.

2.6. Influence of institutional investors

Institutional investors are legal entities that invest large amounts of money in securities, including investment companies, insurance companies and social security funds. These investors have information advantages and can influence corporate decisions. Compared to ordinary investors, institutional investors possess technology and information advantages, are more familiar with national economic policies, and various laws and regulations. Moreover, they are better-equipped to interpret corporate disclosure information and make prompt adjustments according to relevant policies, enabling them to make rational investment decisions and maximize their interests. It is widely recognized that institutional investors serve as effective regulators that improve corporate performance [52].

However, institutional investors' shareholding increases the complexity of the capital market environment and intensifies the information asymmetry between shareholders and companies. Without rigorous control systems in place, institutional investors may prioritize short-term interests over the long-term development of the company. This may lead them to conspire with the management to prevent the enterprise from fulfilling its social responsibility of regular safety disclosures, resulting in non-compliance with safety regulations. These actions may cause serious economic losses, casualties, and adversely impact the financial, safety, and social reputation of the enterprise. Based on the above analysis, we introduce the moderating variable of institutional investors on the basis of hypotheses 1, 2, and 3, and propose the following hypotheses.

Hypothesis 7. The shareholding ratio of institutional investors weakens the relationship between work safety information disclosure and corporate financial performance.

Hypothesis 8. The shareholding ratio of institutional investors weakens the relationship between work safety information disclosure and corporate safety performance.

Hypothesis 9. The shareholding ratio of institutional investors weakens the relationship between work safety information disclosure and corporate social reputation.

To sum up, the theoretical model diagram shown in Fig. 1.

3. Method

3.1. Sample selection and data sources

Based on the research questions and the content presented in this paper, listed companies in high-risk industries that disclose the amount of work safety expenses in Shenzhen Stock Exchange are selected as samples, and a total of 222 eligible listed companies are obtained by excluding missing financial data, ST and *ST companies. It involves 18 mining industries, 20 construction industries, 20 transportation industries, 25 metal and non-metal processing industries, 52 machinery manufacturing industries and 87 chemical industries. By manually collecting, sorting out and analyzing the 2020–2021 annual reports of sample companies, work safety information disclosure and safety performance data of enterprises in high-risk industries were obtained; Additionally, financial data, including the return on total assets, asset-liability ratio, ESG score, and institutional investors’ shareholding ratio, were derived from the Wind database and processed using Excel. The empirical research part is mainly completed by SPSS22.0 software. Considering that the disclosure of work safety information may have inverse causality problems with its financial performance, safety performance and social reputation, this paper takes into account previous studies and introduces a one-year delay in handling the dependent variables of financial performance, safety performance, and social reputation [53,54]. The analysis utilizes 2021 data as the dependent variables, while the independent variables and control variables are based on 2020 data, aiming to partially mitigate concerns related to endogeneity.

3.2. Variable measurement

(1) Explained variables

This paper aims to investigate the impact of disclosing safety information in high-risk industries on the financial, safety, and social reputation of corporations. Additionally, we aim to study the potential regulatory effects of unabsorbed slack resources and institutional investors’ shareholding ratio on this impact. To measure corporate financial performance, we use return on total assets (ROA) as a proxy variable with reference to Tang et al. [55]. Higher ROA values indicate better financial conditions, production efficiency, and

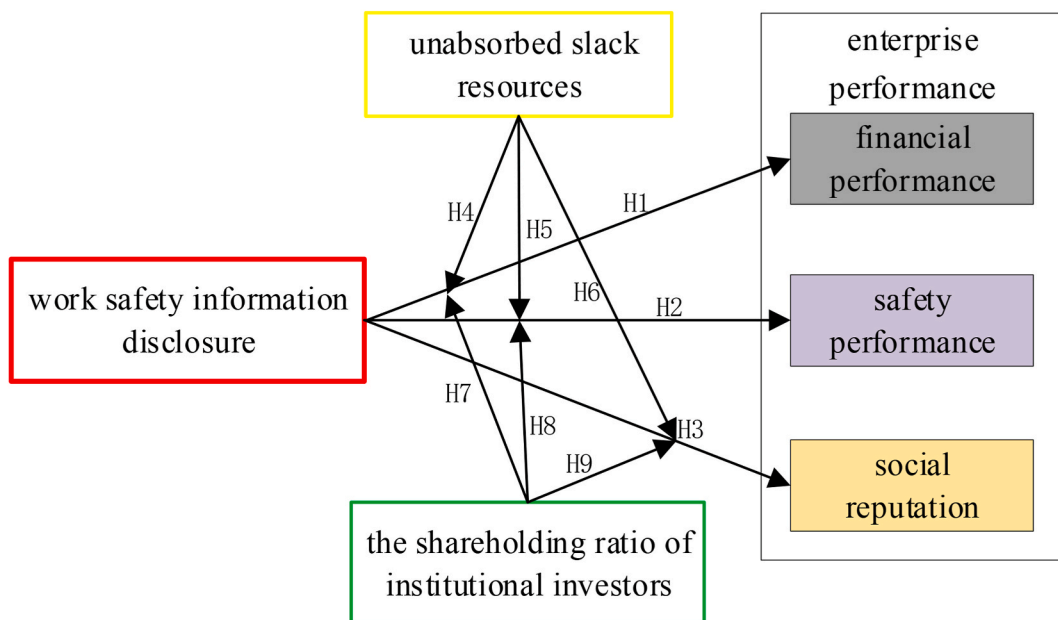


Fig. 1. Theoretical model.

overall enterprise performance.

Referring to the practice of Fan [56], safety performance is evaluated using the content analysis method. Based on the 2021 annual reports of listed companies in high-risk industries, specific projects were scored and used to determine the work safety effect of these enterprises. The safety performance metric consists of various factors such as safety accidents, emergency plans, safety policies and regulations, safety protection equipment and facilities, safety inspection, safety education and training, safety management, future work safety strategies, and safety-related penalties and rewards. Examples of specific scoring standards can be found in Table 1. For example, if there is no security incident in the whole year, one point is scored, and if there is a security incident, one point is deducted. 1 point for the existence of emergency plans for safety accidents or safety drills; Have safety policy and regulation management system, etc., get 1 point; Have the necessary safety protection equipment and facilities, etc., get 1 point; Conduct safety hazard investigation, safety equipment inspection activities, etc., get 1 point; Organized safety education and training, got 1 point; Set up a safety management department, score 1; Integrate work safety into development strategy or business plan, etc., score 1; 1 point for not being punished by the relevant departments for work safety issues throughout the year, and 1 point is deducted for safety penalties; Received the government security special fund award, was awarded honorary title, etc., scored 1 point.

Social reputation of listed companies in high-risk industries was measured using ESG scores from the Wind database.

(2) Explanatory variables

With reference to the study by Li and Yang [57], we have divided the measurement of work safety information disclosure into 11 categories, with corresponding points awarded for each category disclosed. Specifically, these categories include: work safety risks and hidden hazards, national work safety policies and regulations, enterprise work safety standards, description of safety accidents, work safety measures and protection, work safety fee standards, amounts and directions of usage, safety qualifications of enterprises and employees, next year's work safety plan and objectives, employee safety education and training, and safety rewards and punishments. Each disclosed item by the sample company is assigned one point, and the total number of disclosed items represents the overall score of their work safety information disclosure.

(3) Regulating variable

This study, referencing previous research [50,58], utilized the current ratio as a metric to gauge slack resources of enterprises that are not being utilized. The current ratio is calculated as a comparison between current assets and current liabilities, and it indicates the solvency of an enterprise. Specifically, an enterprise with a higher current ratio possesses more current resources at its disposal.

The shareholding ratio of institutional investors, on the other hand, was measured by the percentage of shares owned by institutional investors in relation to the total outstanding shares at the end of the year, as derived from the Wind database.

(4) Control variables

In this study, we examined the impact of various factors, including the return on total assets (ROA), enterprise size (Size), asset-liability ratio (LEV), Enterprise growth ability (Growth), and capital operation capacity (COC) on enterprise performance. Our regression model controlled for these factors. A detailed explanation of each variable can be found in Table 2.

4. Results and discussion

4.1. Descriptive statistical analysis

Table 3 presents descriptive statistical results of the variables used in the model, including mean, median, minimum, maximum, and standard deviation values. The mean value of ROA, measuring financial performance, is 0.059, with a maximum of 0.284 and a

Table 1
Safety performance indicators.

indicator	Scoring example
Safety accident situation	1 point is awarded if there is no safety incident in the whole year, and 1 point is deducted if there is a safety incident
contingency plan	1 point for the existence of emergency plans for safety accidents or safety drills
Safety policy and regulation management system	Have safety policy and regulation management system, etc., get 1 point
Secure equipment and facilities	Have the necessary safety equipment and facilities, etc., get 1 point
safety inspection	Get 1 point for potential safety hazards screening, safety equipment inspection activities, etc
Safety education and training	1 point for organizing safety education and training
Safety management department	1 for setting up a safety management department
future work safety strategies	1 point for incorporating work safety into development strategy or business plan
Safety penalty	1 point is awarded for not being penalized by relevant departments for work safety issues throughout the year, and one point is deducted for safety penalties
Work safety reward	Receive the government security special fund award, awarded honorary title, etc., get 1 point

Table 2
Variable definitions.

Variable type	variable	Variable name	Calculation method
Explained variable	ROA ₂	financial performance	i+1 year net profit/total assets
	SPER ₂	safety performance	i+1 year safety performance score
	ESG ₂	Social reputation	i+1 year ESG score
Explanatory variable	SDI	work safety information disclosure level	i year production safety information disclosure score
	Rate	unabsorbed slack resources	Current assets/current liabilities
regulated variable	INST	Proportion of shares held by institutional investors	Total institutional holdings/A-shares outstanding
	ROA ₁	Rate of return on total assets	Net profit/total assets
control variable	Size	Company size	The natural log of total assets
	LEV	Asset-liability ratio	Total liabilities/total assets
	Growth	Enterprise growth ability	Current operating revenue/previous operating revenue -1
	COC	Capital operation capacity	Working capital/total assets

minimum of -0.266 . The low standard deviation of 0.076 suggests little variation in financial performance among listed companies in high-risk industries, resulting in a relatively balanced financial performance. The mean value of safety performance scored 4.50, and the standard deviation is 2.275. Scores of safety performance ranging between 1 and 10 were reported, where the median score is 5. However, there was a considerable difference in the scores of safety performance among the sample companies, revealing a poor work safety effect. The social reputation ESG score indicated a mean value of 6.120, with a median of 6.085, a maximum of 8.46, and a minimum of 4.21, having a standard deviation of 0.653. The scores mainly distribute between (4.21 and 8.46), and the median is lower than the average. The results demonstrate that listed companies in high-risk industries mostly receive low social reputation scores. The work safety information disclosure level's mean value is 5.39, and the standard deviation is 2.337. This indicates that the level of work safety information disclosure of listed companies in high-risk industries differ significantly, mainly within the range of 1–10. The average and standard deviation of the flow ratio of unabsorbed slack resources are 1.832 and 1.539, mainly distributed between 0.107 and 12.324. The median of the flow ratio of unabsorbed slack resources is 1.333, lower than the average. Most companies report slack resources below the overall average, and there is a large variation among the sample companies. Finally, the institutional investors' shareholding ratio's mean value and standard deviation are 0.412 and 0.221, respectively, mainly distributed between 0 and 0.906.

4.2. Correlation analysis

Table 4 presents the Pearson correlation coefficients between the main variables. The disclosure level of work safety information in listed companies operating in high-risk industries is positively correlated with their corporate financial performance, safety performance, and ESG score for social reputation. This relationship is significant at the 1% level, suggesting that companies operating in high-risk industries with high scores for work safety information disclosure should prioritize their investments in work safety. Such efforts should include enhanced internal safety measures, active risk management, and regular safety education and training for employees. By doing so, companies can improve their safety performance and social reputation, which can lead to higher stock prices and better financial performance. These findings are consistent with the hypotheses put forward in this paper, and provide initial support for the views presented in hypotheses 1, 2 and 3.

Slack resources that are not utilized have a negative correlation with social reputation, but positively correlate with financial and safety performance. However, this correlation is not significant. Institutional investors' shareholding ratio has a positive correlation with corporate financial performance and social reputation, but negatively correlates with safety performance, which could be attributed to the self-centered behavior of these investors. They prioritize corporate profitability, financial performance, and social reputation, but tend to overlook corporate social responsibility. They even collude with managers or interfere with work safety behaviors, urging the company to invest more resources in production and expand its scale to increase profits. As a result, the financial performance and social reputation of the company improve, however, the safety performance decreases as institutional shareholding increases.

Table 3
Descriptive statistical results.

variable	sample number	Minimum value	Maximum value	median	Average value	Standard deviation
ROA2	222	-0.266	0.284	0.057	0.059	0.076
SPER2	222	1	10	5	4.50	2.275
ESG2	222	4.210	8.460	6.085	6.120	0.653
SDI	222	1	10	5.5	5.39	2.337
Rate	222	0.107	12.324	1.333	1.832	1.539
INST	222	0	0.906	0.424	0.412	0.221
ROA1	222	-50.426	50.404	4.231	4.758	0.221
Size	222	20.067	26.210	22.623	22.743	1.229
LEV	222	0.059	0.915	0.477	0.467	0.186
Growth	222	-0.618	1.714	0.040	0.056	0.268
COC	222	-0.570	0.635	0.134	0.142	0.208

Table 4
Correlation coefficient matrix of variables.

variable	ROA2	SPRE2	ESG2	SDI	Rate	INST	ROA1	Size	LEV	Growth	COC
ROA2	1										
SPRE ₂	0.122*	1									
ESG ₂	0.211***	0.193***	1								
SDI	0.182***	0.611***	0.288***	1							
Rate	0.071	0.093	-0.139**	0.087	1						
INST	0.188***	-0.191***	0.187***	-0.064	0.006	1					
ROA ₁	0.355***	0.129*	0.200***	0.044	0.214***	0.126*	1				
Size	0.142**	-0.155**	0.389***	-0.061	-0.396***	0.399***	0.094	1			
LEV	-0.169**	-0.156**	0.069	-0.175***	-0.680***	0.014	-0.293***	0.473***	1		
Growth	0.217***	0.048	0.194***	0.010	-0.035	-0.009	0.368***	0.060	0.002	1	
COC	-0.063	-0.049	-0.130*	-0.022	0.715***	-0.068	0.185***	-0.480***	-0.628***	0.039	1

Note: *, ** and *** respectively indicate the significance level of 10%, 5% and 1%.

It is evident from the correlation coefficient matrix that the correlation coefficients between variables are all below 0.7, suggesting that there is no significant multicollinearity among the preliminary verification variables. Upon conducting further tests on variable variance inflation factor (VIF), we discovered that the VIF values of all models' variables are mainly centered around 1, and the VIF values of all models' variables are less than 3, which is lower than the critical value of 10. Therefore, it can be assumed that there is no multicollinearity among regression variables.

4.3. Regression analysis

4.3.1. Work safety information disclosure level and financial performance

Table 5 displays the results of the regression analysis examining the relationship between work safety information disclosure and financial performance. To enhance the explanatory power of the regression coefficient of the regression equation, this study conducted centralization of independent and regulating variables before testing the adjustment effect of unabsorbed slack resources and institutional shareholding ratio, and then carried out cross-multiplying operation. Model 1 acts as the base model as it only includes control variables. Previous research has shown that financial indicators such as pre-financial position, profitability, and asset-liability ratio significantly influence a firm's financial performance. Model 2 assesses the impact of work safety information disclosure on corporate finance. The regression coefficient of work safety information disclosure level is 0.004, and the p-value is 0.046, which suggests that the level of work safety information disclosure positively impacts corporate financial performance at a 95% confidence level. In other words, the disclosure of work safety information affects the stock price of listed companies and their overall performance. A higher level of disclosure leads to higher financial performance. Thus, hypothesis 1 is verified.

Based on the results shown in model 3 and 4, the regression coefficient of unabsorbed slack resources is observed to be 0.004, indicating that it has no significant impact on corporate financial performance. Furthermore, the interaction coefficient between the disclosure level of work safety information and unabsorbed slack resources is -0.002 , unabsorbed slack resources it has p-value of $0.296 > 0.1$, indicating that the regulating effect on the relationship between work safety information disclosure and financial performance is not significant, which does not support hypothesis 4. These findings show that enterprises rely on unabsorbed slack resources to a certain extent, which is not favorable for improving financial performance through technological innovation. In addition, unabsorbed slack resources are not effective in supporting enterprise production, operation, and expansion in the short term. Therefore, unabsorbed slack resources have no significant influence on regulating the relationship between work safety information disclosure and corporate financial performance.

The results of model 5 indicate that institutional shareholding has a positive effect on the financial performance of enterprises. A large proportion of institutional shareholding can attract other minority shareholders to increase investment, which effectively alleviates financing constraints and improves financial performance. Meanwhile, the results of model 6 indicate that institutional shareholding negatively affects the relationship between work safety information disclosure and financial performance. The coefficient of the interaction term is -0.016 , and the p value is 0.084, verifying hypothesis 7. According to the strategic alliance hypothesis, institutional investors may work with managers to make private deals in order to maximize their own profits. This can lead to a disregard for corporate social responsibility and a weakening of the positive effects of safety information disclosure on financial performance.

Table 5
Regression results of work safety information disclosure on financial performance.

variable	Financial performance					
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Constant term	-0.085 (0.407)	-0.119 (0.246)	-0.128 (0.214)	-0.135 (0.193)	-0.055 (0.610)	-0.030 (0.779)
ROA ₁	0.002*** (0.001)	0.002*** (0.001)	0.002*** (0.001)	0.002*** (0.001)	0.002*** (0.001)	0.002*** (0.001)
Size	0.009* (0.053)	0.009** (0.047)	0.009** (0.049)	0.009** (0.046)	0.005 (0.292)	0.004 (0.401)
LEV	-0.130*** (0.000)	-0.114*** (0.001)	-0.102*** (0.008)	-0.097** (0.012)	-0.104*** (0.004)	-0.102*** (0.005)
Growth	0.036* (0.053)	0.035* (0.058)	0.037** (0.048)	0.039** (0.040)	0.037** (0.045)	0.033* (0.073)
COC	-0.089*** (0.003)	-0.079*** (0.009)	-0.094*** (0.007)	-0.098*** (0.005)	-0.081*** (0.007)	-0.085*** (0.005)
SDI Rate		0.004** (0.046)	0.004* (0.052)	0.004* (0.071)	0.004** (0.033)	0.004* (0.054)
INST			0.004 (0.373)	0.007 (0.207)		
SDI*Rate				-0.002 (0.296)	0.042* (0.073)	0.044* (0.060)
SDI*INST						-0.016* (0.084)
R ²	0.205	0.220	0.223	0.227	0.232	0.242
adjR ²	0.187	0.198	0.198	0.198	0.207	0.214
ΔR ²	0.205	0.015	0.003	0.004	0.012	0.011
F	11.169***	10.109***	8.770***	7.815***	9.218***	8.517***

Note: The numbers in brackets are P-values, and *, ** and *** respectively indicate the significance level of 10%, 5% and 1%.

4.3.2. Work safety information disclosure level and safety performance

This study employed hierarchical regression analysis to examine the influence of the level of work safety information disclosure in listed companies operating in high-risk industries on safety performance. Additionally, it aimed to investigate the regulating effect of unabsorbed slack resources and institutional investors. Model 1 and 2 in Table 6 were conducted to assess the impact of work safety information disclosure on enterprise safety performance. The results showed that the regression coefficient of work safety information disclosure level was 0.569, and the p-value was 0.000, indicating that the level of work safety information disclosure significantly and positively impacted enterprise safety performance. Higher quality of work safety information disclosure implies that the enterprise values work safety, has a good internal safety culture, a well-established safety supervision system, comprehensive safety risk investigation, and adequately qualified staff with safety education and training. Overall, improving the level of work safety in listed companies operating in high-risk industries could effectively enhance safety performance. Hence, hypothesis 2 was supported.

Model 3 and 4 examined the regulatory effect of unabsorbed slack resources. Within model 3, the coefficient of unabsorbed slack resources was 0.15 with a p-value of 0.22, indicating that such resources have no significant impact on safety performance. In contrast, model 4 found a statistically significant positive relationship between the cross-product term of slack resources and the disclosure level of work safety information, with a coefficient of 0.125 and a p-value of 0.008 at the 1% level. This suggests that unabsorbed slack resources enhance the positive impact of disclosure on safety performance. Specifically, enterprises with more unabsorbed slack resources have sufficient funds and ability to increase work safety investment, actively check and eliminate work safety risks, and carry out safety education and training activities, resulting in improved safety performance. Hence, hypothesis 5 is supported.

In model 5 and model 6, the research tests the moderating role of institutional investors. Model 5 indicates that the institutional shareholding ratio has a negative impact on corporate safety performance. In model 6, the cross-multiplication coefficient between the institutional shareholding ratio and the level of work safety information disclosure is -0.638, with a p-value of 0.007. This indicates a negative correlation between the two variables, which suggests that institutional investors may collude with managers due to egoism. They may interfere with the allocation of resources towards work safety activities and affect the quality of work safety information disclosure, leading to non-compliance in work safety, and reduced safety performance of enterprises. As such, the hypothesis 8 is verified.

4.3.3. Work safety information disclosure level and social reputation

From model 1 and 2 in Table 7, it can be observed that the disclosure level of work safety information by listed companies in high-risk industries has a significant positive impact on the reputation of these enterprises. The regression coefficient for this relationship is 0.085 and the corresponding p-value is 0.000. Therefore, it can be surmised that high levels of disclosure of work safety information by listed companies in high-risk industries contribute to enhancing their social reputation. Hence, hypothesis 3 is supported by the results of the study.

By analyzing the regression outcomes of model 3 and 5, it can be inferred that the introduction of first-order regulation terms of

Table 6
The multiple regression results of workplace safety information disclosure level on safety performance.

variable	safety performance					
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Constant term	15.279*** (0.000)	10.406*** (0.000)	10.075*** (0.000)	10.472*** (0.000)	8.377*** (0.003)	9.364*** (0.001)
ROA1	0.039* (0.069)	0.041** (0.018)	0.040** (0.021)	0.046*** (0.008)	0.043** (0.014)	0.043** (0.012)
Size	-0.410*** (0.006)	-0.385*** (0.001)	-0.387*** (0.001)	-0.394*** (0.001)	-0.264** (0.042)	-0.307** (0.018)
LEV	-2.504** (0.025)	-0.292 (0.749)	0.154 (0.875)	-0.139 (0.887)	-0.606 (0.509)	-0.498 (0.581)
Growth	0.191 (0.749)	0.063 (0.896)	0.122 (0.799)	0.020 (0.966)	0.005 (0.991)	-0.147 (0.755)
COC	-3.391*** (0.000)	-1.948** (0.012)	-2.491*** (0.005)	-2.191** (0.014)	-1.884** (0.014)	-2.048*** (0.007)
SDI		0.569*** (0.000)	0.565*** (0.000)	0.582*** (0.000)	0.560*** (0.000)	0.544*** (0.000)
Rate			0.150 (0.220)	-0.010 (0.941)		
INST					-1.317** (0.028)	-1.239** (0.036)
SDI*Rate				0.125*** (0.008)		
SDI*INST						-0.638*** (0.007)
R ²	0.100	0.421	0.425	0.444	0.434	0.453
adjR ²	0.080	0.405	0.406	0.423	0.415	0.432
ΔR ²	0.100	0.320	0.004	0.019	0.013	0.019
F	4.821***	26.043***	22.59***	21.248***	23.425***	22.037***

Note: The numbers in brackets are P-values, and *, ** and *** respectively indicate the significance level of 10%, 5% and 1%.

Table 7
The multiple regression results of workplace safety information disclosure level on enterprise reputation.

variable	Social reputation					
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Constant term	1.228 (0.164)	0.498 (0.555)	0.680 (0.423)	0.655 (0.437)	0.796 (0.379)	0.916 (0.311)
ROA1	0.006 (0.281)	0.007 (0.232)	0.008 (0.168)	0.007 (0.191)	0.007 (0.239)	0.007 (0.214)
Size	0.222*** (0.000)	0.226*** (0.000)	0.226*** (0.000)	0.233*** (0.000)	0.210*** (0.000)	0.205*** (0.000)
LEV	-0.433 (0.150)	-0.101 (0.727)	-0.321 (0.307)	-0.499 (0.123)	-0.061 (0.836)	-0.031 (0.915)
Growth	0.345** (0.033)	0.326** (0.034)	0.290* (0.060)	0.286* (0.061)	0.312** (0.044)	0.320** (0.038)
COC	-0.084 (0.743)	0.132 (0.590)	0.394 (0.167)	0.601** (0.045)	0.107 (0.665)	0.161 (0.515)
SDI		0.085*** (0.000)	0.088*** (0.000)	0.096*** (0.000)	0.084*** (0.000)	0.082*** (0.000)
Rate			-0.080* (0.065)	-0.149*** (0.006)		
INST					0.125 (0.515)	0.089 (0.642)
SDI*Rate			0.013 (0.390)	-0.037 (0.188)		
SDI*Rate ²				0.008** (0.037)		
SDI*INST					-0.077 (0.313)	0.379 (0.160)
SDI*INST ²						-0.591* (0.078)
R ²	0.201	0.288	0.299	0.314	0.292	0.303
adjR ²	0.182	0.268	0.273	0.284	0.266	0.273
ΔR ²	0.201	0.087	0.011	0.014	0.005	0.010
F	10.840***	14.487***	11.369***	10.758***	11.007***	10.230***

Note: The numbers in brackets are P-values, and *, ** and *** respectively indicate the significance level of 10%, 5% and 1%.

work safety information disclosure level, unabsorbed slack resources, and institutional investors' shareholding respectively does not have any significant linear moderating effect on the positive relationship between work safety information disclosure and social reputation in high-risk industries. The coefficient for the first-order regulation term of unabsorbed slack resources and explanatory variable is 0.013, with a corresponding p-value of 0.390, while the first-order regulation term coefficient for institutional investors' shareholding is -0.077, having a p-value of 0.313. Thus, it can be concluded that hypothesis 6 and 9 have not been validated by the study.

It's worth noting that the introduction of the second-order regulation term SDI*Rate2 for unabsorbed slack resources in model 4 improves the model's overall explanatory power, with the R² increasing to 0.314. SDI*Rate2 has a significant positive effect ($\beta = 0.008$, $p = 0.037$) and the coefficient of the first-order adjustment term is -0.077. Unabsorbed slack resources have a positive U-shaped regulating effect on the relationship between the level of safety information disclosure and social reputation. Resource constraint theory suggests that when unabsorbed slack resources are scarce, their buffering effect is limited, leaving companies vulnerable to external environmental changes. As a result, companies may focus their limited resources on production and operational activities, which weakens the impact of work safety information disclosure on social reputation in high-risk industries. However, as unabsorbed slack resources increase, companies gain more flexibility in allocating resources, which improves their ability to focus on safety as well as production and expansion. From a principal-agent theory perspective, managers may be reluctant to invest in work safety activities with insignificant short-term benefits because they prioritize their own interests. Uneven distribution of unabsorbed slack resources among companies can lead to internal conflict, which can hurt reputation. Unabsorbed slack resources require a certain threshold amount to positively affect corporate social responsibility expectations and enhance work safety information disclosure's positive effect. Therefore, unabsorbed slack resources have a threshold value that must be crossed to positively adjust the relationship between work safety information disclosure and corporate social reputation of listed companies in high-risk industries.

When the second-order adjustment item of institutional shareholding is added into model 6, the coefficient of determination of the model is significantly higher than that of model 5. The coefficient of SDI*INST2 is -0.591, the p value is 0.078, and the coefficient symbol of SDI*INST is positive, indicating that the institutional shareholding has an "inverted U-shaped" regulating effect on the relationship between work safety information disclosure and corporate social reputation. The shareholding of institutional investors has a certain threshold effect, and the shareholding ratio within the threshold range can enhance the positive impact of the disclosure of work safety information on the social reputation of enterprises. Reasonable investment by institutional investors can increase the likelihood of actively supervising corporate misconduct, participating in corporate governance, mitigating information asymmetry between enterprises and society, and prompting enterprises to fulfill their social responsibilities by actively disclosing information related to work safety. Consequently, it can effectively enhance the social reputation of the business entity. Nevertheless, an excessive

investment by institutional investors in shares is not conducive to ensuring work safety. On the one hand, excessive shareholding by institutional investors with absolute right to speak may, in order to maximize short-term interests, reduce the cost of enterprises' excessive investment in social responsibility, inhibit enterprises' fulfillment of social responsibility obligations, hinder work safety, and thus lead to a series of negative consequences, damaging the social reputation of enterprises. On the other hand, excessive share ownership poses a risk of collusion between institutional investors and managers which could weaken the oversight mechanism of corporate governance.

4.4. Robustness test

In order to enhance the reliability of the research results, we performed the following robustness tests in this paper. we replaced the return on total assets (ROA) with the return on equity (ROE) as the substitute variable of corporate financial performance. The results did not change substantially.

According to Table 8, it can be seen that work safety information disclosure has a positive impact on the financial performance of the company. And the unabsorbed slack resources positively affect the financial performance of enterprises, but the moderating effect of unabsorbed slack resources on the relationship between work safety information disclosure level and financial performance is not significant. The shareholding ratio of institutional investors negatively moderates the effect of work safety information disclosure on the financial performance of the company. These findings are consistent with the above conclusions and therefore have a certain degree of robustness.

4.5. 4.5 summary

Through correlation analysis and regression analysis, the results show that the level of work safety information disclosure of listed companies in high-risk industries is positively correlated with company financial performance, safety performance, and social reputation. Unabsorbed slack resources can significantly enhance the effect of work safety information disclosure on the improvement of safety performance of listed companies in high-risk industries and have a U-shaped moderating effect on the relationship between work safety information disclosure and corporate social reputation. That is to say, the more abundant the unabsorbed slack resources are, the higher the resource allocation efficiency and the stronger the company's flexibility. Companies can invest surplus funds in work safety activities, strengthen work safety funds, materials, personnel, and technical support, improve work safety conditions, and organize work safety education and training, effectively enhancing the impact of work safety information disclosure on safety performance. When the accumulation of unabsorbed slack resources reaches a certain amount, it can enhance the positive impact of work safety information disclosure on corporate social reputation in high-risk industries. The proportional holding of institutional investors negatively regulates the relationship between work safety information disclosure and financial performance, safety performance and has an inverted U-shaped moderating effect on corporate social reputation. Institutional investors with funding and information advantages may conspire with managers to achieve more internal transactions, seek personal interests, damage enterprise financial performance, and affect social reputation for the purpose of maximizing short-term benefits. Excessive holdings of institutional investors may interfere with the company's performance of social responsibilities, hinder the ability of the enterprise to invest resources in work safety activities, and cause the loss of safety performance of the enterprise.

Therefore, this study is beneficial to establish a unified standard for the work safety information disclosure methods and contents of listed companies in high-risk industries, and establish an evaluation and assessment mechanism for work safety information disclosure and a regulatory system for work safety information disclosure, in order to improve the quality of work safety information disclosure and drive companies to actively participate in work safety supervision activities, and help establish a good social safety atmosphere.

Table 8

The multiple regression results of workplace safety information disclosure level on financial performance.

variable	Financial performance					
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Constant term	-0.452* (0.096)	-0.538** (0.050)	-0.547** (0.048)	-0.567** (0.040)	-0.279 (0.328)	-0.201 (0.482)
ROA ₁	0.005*** (0.004)	0.005*** (0.004)	0.005*** (0.004)	0.005*** (0.007)	0.005*** (0.004)	0.005*** (0.004)
Size	0.027** (0.028)	0.028** (0.025)	0.027** (0.025)	0.028** (0.023)	0.012 (0.361)	0.009 (0.511)
LEV	-0.219** (0.018)	-0.180* (0.057)	-0.168* (0.098)	-0.153 (0.134)	-0.140 (0.137)	-0.131 (0.160)
Growth	0.117** (0.020)	0.114** (0.021)	0.116** (0.021)	0.121** (0.016)	0.122** (0.013)	0.109** (0.025)
COC	-0.163** (0.040)	-0.137*** (.0085)	-0.151* (0.100)	-0.167* (0.072)	-0.145* (0.064)	-0.159** (0.043)
SDI		0.010* (0.063)	0.010* (0.066)	0.009* (0.095)	0.011** (0.037)	0.010* (0.065)
Rate			0.004(0.757)	0.012 (0.387)		
INST					0.168*** (0.006)	0.174*** (0.004)
SDI*Rate				-0.006 (0.186)		
SDI*INST						-0.051** (0.036)
R ²	0.166	0.179	0.179	0.186	0.207	0.223
adjR ²	0.146	0.156	0.153	0.156	0.181	0.194
ΔR ²	0.166	0.013	0.000	0.007	0.028	0.016
F	8.585***	7.818***	6.687***	6.092***	7.993***	7.660***

Note: The numbers in brackets are P-values, and *, ** and *** respectively indicate the significance level of 10%, 5% and 1%.

5. Conclusion and enlightenment

5.1. Research conclusion

This study used multiple regression analysis to analyze the relationship between work safety information disclosure, financial performance, safety performance, and social reputation among 222 high-risk industry listed companies. The results showed that work safety information disclosure had a positive effect on the financial performance, safety performance, and social reputation of high-risk industry listed companies. Unabsorbed slack resources increased the impact of work safety information disclosure on safety performance and had a positive U-shaped regulating effect on the relationship between work safety information disclosure and social reputation. The proportion of institutional investors' shareholding restrained the positive effect of work safety information disclosure on financial and safety performance and had an inverted U-shaped regulating effect on the positive relationship between work safety information disclosure and social reputation.

5.2. Theoretical contribution and practical significance

The theoretical contribution of this paper is mainly reflected in the following aspects: firstly, this study enriches the theoretical research on work safety information disclosure and clarifies the impact of work safety information disclosure on corporate development. Secondly, existing literature mainly focuses on the impact of work safety information disclosure on economic benefits of enterprises. However, this study not only considers the economic benefits of work safety information disclosure, but also explores its social performance in terms of work safety. By studying the effects of work safety information disclosure from the perspectives of financial performance, safety performance, and social reputation of enterprises, this research provides a more comprehensive understanding of how to effectively improve the quality of work safety information disclosure. Thirdly, this study observes the influence mechanism of work safety information disclosure on corporate performance from the perspectives of resource-based theory and pressure theory. It finds that unabsorbed resources and The shareholding ratio of institutional investors play an important regulating role in the relationship between work safety information disclosure and corporate performance.

This research contributes to improving the quality of work safety information disclosure and the level of safety management in high-risk industries, enhancing the governance system of work safety, and guiding the sustainable development of occupational health and safety in enterprises. The disclosure of work safety information can urge high-risk industry companies to increase investment in work safety, strengthen the construction of work safety standards, and alleviate work safety risks and hazards. This can enhance the company's image among stakeholders, thereby gaining public recognition and investor support. This recognition may improve the company's financial performance and social reputation.

5.3. Management enlightenment

Therefore, this study offers some recommendations. Firstly, the China Securities Regulatory Commission should improve laws and regulations on work safety information disclosure. Ministry of Emergency Management of the People's Republic of China and China Securities Regulatory Commission should establish principles in disclosing work safety information within high-risk industries, establish a supervision system for work safety information disclosure, and create unified protocols on disclosure methods and content. Listed companies in high-risk industries should establish and reinforce the awareness of their employees regarding work safety responsibilities. These companies should also establish rules and regulations on work safety, develop emergency plans for work safety accidents, and closely monitor the allocation and utilization of work safety costs to encourage enterprises to prioritize internal work safety measures. Additionally, all stakeholders should improve supervision awareness of work safety in high-risk industries. They should actively participate in work safety supervision activities and pay attention to the disclosure of work safety information of enterprises.

Secondly, it is recommended to utilize unabsorbed slack resources of enterprises in a reasonable and flexible manner. Unabsorbed slack resources can promptly respond to external environmental shocks, improve financial flexibility, increase investment in work safety funds, eliminate work safety risks, and thereby enhance the core competitiveness and safety performance of enterprises. Listed companies in high-risk industries should pay attention to the accumulation of unabsorbed slack resources such as financial funds, in order to avoid funding interruptions caused by external environmental shocks, major risk hazards, and financing constraints that would prevent accurate and effective resource allocation for resolving company predicaments. At the same time, attention should be paid to the long-term effects of unabsorbed slack resources, as they may not be able to be converted into enterprise competitive advantages in the short term. Only when unabsorbed slack resources within the enterprise have been accumulated to a certain extent and coordinated with the company's research and development, innovation, and production activities, can they effectively resist risks, improve enterprise competitive advantages, and thereby improve enterprise financial performance and social reputation.

Finally, it is crucial to standardize the institutional investment industry and maximize the supervisory role of investment firms in corporate governance. Strict measures should be implemented to prevent opportunistic and unethical trading behaviors that could harm companies. Additionally, investors should actively prioritize long-term value and avoid short-sighted or collusive trading activities that harm company growth. To strengthen the institutional investment system, regulations should be enacted to ensure that investment firms hold stable shares in companies, and can participate in decision-making and corporate governance. This will enable them to effectively supervise companies, prevent earnings management, and improve capital allocation efficiency in the market. Investment firms should also promote responsible investment by prioritizing companies that prioritize work safety and improve their

level of information disclosure. This will enhance the industry's reputation and recognition, ultimately improving companies' safety performance and overall reputation.

5.4. Limitations

This study has some limitations. Firstly, the data collection and analysis of annual reports from listed companies in high-risk industries were conducted manually, and the scoring of disclosed work safety information was subjectively determined to create the work safety information disclosure index and safety performance score. As a result, the assignment of index data in this study may lack authority and standardization. Additionally, the financial data in this paper are all from Wind database, so it may be impossible to fully grasp the authenticity and reliability of the data.

Authorship contribution statement

Xuanyu Zhang: Conceived and designed the analysis; Analyzed and interpreted the data; Contributed analysis tools or data; Wrote the paper.

Suxia Liu: Conceived and designed the analysis; Analyzed and interpreted the data; Wrote the paper.

Qiang Mei: Conceived and designed the analysis.

Jingjing Zhang: Wrote the paper.

Funding statement

This research was supported by the National Natural Science Foundation of China (Grant No. 72074099, 71874072, 72004081), the Social Science Fund of Jiangsu Province (Grant No. 20GLB009).

Data availability

Data will be made available on request.

CRedit authorship contribution statement

Xuanyu Zhang: Visualization, Software, Methodology, Investigation, Formal analysis, Data curation, Conceptualization, Writing - original draft, Writing - review & editing. **Suxia Liu:** Writing - review & editing, Supervision, Resources, Project administration, Methodology, Funding acquisition, Conceptualization. **Qiang Mei:** Supervision, Funding acquisition, Conceptualization. **Jingjing Zhang:** Supervision, Funding acquisition.

Declaration of competing 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.

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