Research on Environmental Information Disclosure of Polluting Industry Enterprises from the Perspective of Impression Management

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Abstract: Environmental information disclosure is the main way for enterprises to convey their performance of environmental responsibility, and also an important tool for the government to carry out environmental protection work. Based on stakeholder theory, impression management theory and information asymmetry theory, this research regression analyzed the impact of corporate performance on environmental information disclosure for 112 listed companies in heavy polluting industries. The results show that the quality of environmental information disclosure of high-performing enterprises is higher than that of low-performing enterprises. The self-interested impression management greenwashing behavior adopted by enterprises in heavy polluting industries reduces the quality of environmental information disclosure. This study breaks through the previous single research from the perspective of financial information manipulation, analyzes the impression management behavior of enterprises on text information reflecting circular thinking, and enriches literature on environmental information disclosure.

1. Introduction
The rapid development of the economy has created remarkable achievements for China, as well as a series of environmental problems. Environmental information disclosure is becoming more and more crucial in environmental protection work as a carrier for enterprises to convey their environmental responsibility fulfillment to the outside world and for the public to understand the environmental performance of enterprises. Under the influence of government advocacy and stakeholder supervision pressure, more and more enterprises begin to disclose environmental information independently in environmental reports, social responsibility reports or sustainable development reports, and listed companies have become the main body of environmental information disclosure in China. However, while the quantity keeps growing, the quality of environmental information disclosure is not optimistic[1]. Different from annual reports which mainly focus on financial information, corporate environmental information disclosure mainly consists of text information. In Chinese culture, where circular thinking is emphasized, text information that is hard to be regulated and legally constrained usually has greater discretion than financial information, which provides greater activity space for corporate executives to guide market behavior through text information manipulation[2]. On this basis,
information asymmetry in the capital market also provides an "opportunity" for listed companies to use information disclosure to conduct impression management. In terms of the content and depth of disclosure, enterprises tend to adopt a selective disclosure strategy. They disclose more favorable environmental matters, less or even no negative environmental matters, report good news instead of bad news, and whiten the actual environmental performance and environmental performance of enterprises. As a result, the environmental report cannot play its due role and further deepens the information asymmetry between enterprises and stakeholders. As investors with information disadvantages, they can only obtain the environmental information disclosed by enterprises after "processing", and have no way to know the real environmental performance of enterprises. Therefore, the issue we focuses on is whether corporate performance has a significant impact on corporate environmental information disclosure. If so, is it positive or negative?

2. Materials and Methods

2.1. Theoretical analysis and research hypothesis
Corporate performance is the most concerned indicator by stakeholders and investors are also most sensitive to performance information. Through literature review, it is found that some scholars have studied the impact of corporate performance on financial information disclosure and believe that managers will conduct impression management on financial reports out of performance motivation. Changes in the form of financial reports make textual information gradually surpass all types of accounting statements and become the main part of financial reports, providing space for managers to carry out impression management. Most studies have proven that management will perform earnings management on the company’s financial data. Some studies have also found that management will use self-interested performance attribution and other means to perform impression management on performance information in financial reports[3][4]. Environmental information and other social responsibility information, as relatively independent non-financial information, may also become the object of impression management[5].

Based on the stakeholder theory, most studies have shown that the financial performance and social responsibility performance of enterprises are closely related, and influence and promote each other[6]. Environmental disclosure responsibility is an important issue of corporate social responsibility, which has attracted more attention than other social issues. With the continuous improvement of the disclosure system, the impact of corporate financial performance on environmental information disclosure has become one of the important topics for researchers[1]. Most scholars believe that there is a positive correlation between corporate financial performance and corporate environmental responsibility disclosure (Kuzey and Uyar, 2017; Sun et al., 2019) [3][4], while some scholars failed to find the correlation between the two (Mahadeo et al., 2011; Dyduch and Krasodomska, 2017) [7][8]. The reason for the different conclusions may be that most studies did not consider the psychological factors of the management. According to behavioral economics, the psychology of the management will change under different financial conditions. Under the "irrational man" hypothesis of behavioral economics, investors not only have economic preferences, but also show strong social preferences. Enterprises showing a good sense of social responsibility are easier to be recognized by the society even if their financial performance is poor. According to the impression management theory, when the company's performance is poor, the management tends to "exaggerate" the company's environmental performance in the social responsibility report or environmental report in order to offset the negative impact of the poor performance, and to emphasize the company's environmental protection vision, investment in environmental protection and social welfare with a large text description. This kind of organizational impression management behavior of manipulating language information, on the one hand, conveys the good future performance prospect and "green" corporate image to the information audience, and on the other hand, attributes the poor performance to the cost of fulfilling the environmental responsibility. A series of acquisition and protective impression management strategies are used by poor performance enterprises under performance motivation to make the "unfavorable"
information drown in the "favorable" information, which reduces the quality of environmental information disclosure to a great extent. Enterprises with better performance will pursue green benefits on the basis of achieving economic goals. Under the sustainable development strategy, in order to maximize the environmental performance of enterprises, resource providers often hope that the management authorities can invest part of their resources into environmental protection while pursuing economic benefits. When disclosing environmental information, high-performing enterprises often choose more detailed quantitative disclosure, and the content mainly focuses on economic quantitative data, so as to ensure that investors can provide accurate, reliable and high-quality environmental information and establish a "pro-environmental" image of enterprises.

Therefore, corporate environmental information disclosure is affected by corporate performance. Under the influence of performance factors, enterprises with poor performance are more inclined to conduct impression management on social responsibility reports disclosed at the same time node as financial reports, which leads to lower quality of environmental information disclosure. Based on the above analysis, this paper proposes the following hypotheses:

H1: Compared with enterprises with poor performance, enterprises with good performance have higher quality of environmental information disclosure.

2.2. Research design

2.2.1. Sample selection and data sources

According to the guidelines on green securities issued by the State Environmental Protection Administration in 2008, 13 industries have been classified as heavily polluting: metallurgy, chemicals, petrochemicals, coal, thermal power, building materials, paper making, brewing, pharmaceuticals, fermentation, textiles, leather tanning and mining. According to the Industry Classification Results of Listed Companies in the 3rd Quarter of 2019, a total of 911 listed companies belong to heavy polluting industries. Among the 19 secondary categories, 524 listed companies in the three representative industries were selected, which accounted for the top three enterprises in chemical raw materials and chemical products manufacturing industry (25.14%), pharmaceutical manufacturing industry (23.38%) and non-metallic mineral products industry (9%). After excluding ST companies and listed companies that did not issue social responsibility reports in 2018, 112 companies were obtained. Therefore, these 112 enterprises in heavy polluting industries were taken as the research samples. Environmental information disclosure data is collected and obtained manually by consulting annual reports, social responsibility reports, environmental reports and sustainable development reports; Environmental performance data are collected manually through corporate annual reports and social responsibility reports, the websites of environmental protection departments (bureaus) of various regions, corporate websites, and stock exchange websites of Shanghai and Shenzhen stock exchanges. The social responsibility report and the basic information of the enterprise are collected manually from the websites of Juchao Information Network, Shanghai Stock Exchange, Shenzhen Stock Exchange and the enterprise website. Company size, asset-liability ratio from the CSMAR database.

2.2.2. Definition of variables

2.2.2.1 Explained variables

The explained variable in this paper is environmental information disclosure quality (EID). At present, there is a lack of unified standards and norms for the measurement of environmental information disclosure. Some scholars use external databases or data from authoritative institutions (such as Runling Global Rating Agency), but the content scoring method is the most common method to measure the quality of environmental information disclosure. Therefore, this paper uses content scoring method to measure the quality of environmental information disclosure by referring to the practice of scholars at home and abroad. The advantage of content scoring is the ability to synthesize all kinds of information into a single, comparable number, and the depth and breadth of a complete project classification. The
content scoring method was also adopted in this paper. The Level of Environmental Information Disclosure EID was obtained by referring to the voluntary Environmental Disclosure rating table of Clarkson (2008) [9]. See Table 3-1 for specific items and scores. This paper collects the annual report and social responsibility report of sample enterprises, reads and analyzes the information related to the enterprise environment, scores according to the scoring rules, and takes the score value as the proxy variable of environmental information disclosure quality (EID).

**TABLE 1** Detailed rules of EID scoring project

| 1 Governance structure and management system (5) |
|-----------------------------------------------|
| 1) Set up pollution control departments and/or environmental management posts (0-1) |
| 2) Environmental and/or social affairs committees with the participation of directors (0-1) |
| 3) Establish environmental terms for customers and/or suppliers (0-1) |
| 4) Implement environmental management system at plant and/or company level (0-1) |
| 5) Management compensation is linked to environmental performance (0-1) |

| 2 reliability (6) |
|-------------------|
| 6) Provide a separate CSR report or similar report (0-1) |
| 7) The disclosure of information on the environmental performance report is independently verified (0-1) |
| 8) Periodic verification or audit of environmental performance and/or systems (0-1) |
| 9) Independent agency certification for environmental projects (0-1) |
| 10) External rewards for environmental performance (0-1) |
| 11) Participate in specific industry associations or voluntary environmental improvement activities (0-1) |

| 3 Environmental performance indicator (60) |
|-------------------------------------------|
| 12) Environmental performance indicators in energy use and/or energy efficiency (0-6) |
| 13) Environmental performance indicators for water use and/or water use efficiency (0-6) |
| 14) Environmental performance indicators in terms of greenhouse gas emissions (0-6) |
| 15) Environmental performance indicators for other gas emissions (0-6) |
| 16) Environmental performance indicators for the discharge of highly toxic substances (soil, water, air) (0-6) |
| 17) Other environmental performance indicators for the discharge or leakage of toxic and hazardous substances (0-6) |
| 18) Indicators for waste generation and management (recycling, reduction, disposal and clean-up) (0-6) |
| 19) Performance indicators in land and resource use, biodiversity and conservation (0-6) |
| 20) Indicators of the environmental impact of products and services (0-6) |
| 21) Compliance situations (including overreach, reportable incidents, etc.) (0-6) |

| 4 Environmental spending (3) |
|-----------------------------|
| 22) The amount saved for the company by spontaneous environmental protection (0-1) |
| 23) Spending on technology, research and development and invention to improve environmental performance (0-1) |
| 24) Penalties for environmental matters (0-1) |

| 5 Vision and strategic statement (6) |
|-----------------------------------|
| 25) Public statements to shareholders and/or stakeholders about environmental performance (0-1) |
| 26) A statement of the company's environmental policies, values, principles and codes of conduct (0-1) |
| 27) Presentation of a formal management system for environmental risk and performance (0-1) |
| 28) Statement on the regular environmental performance inspection and evaluation of the enterprise (0-1) |
| 29) Statement of measurable objectives in relation to future environmental performance (0-1) |
| 30) A statement of an invention and/or new technology in a given environment (0-1) |

| 6 Environmental status quo (4) |
|------------------------------|
| 31) A statement of whether the company complies with certain environmental standards (0-1) |
| 32) Overview of industry characteristics on environmental impact (0-1) |
| 33) An overview of how business operations, products and services affect the environment (0-1) |
| 34) An overview of the company's environmental performance compared to industry peers (0-1) |
2.2.2.2 Explanatory variables

Previous research found that reference on existing results on the impact of factors on enterprise environmental information disclosure of impression management literature, this paper builds (select) two virtual variable to measure corporate performance (perform), the income from the perspective of net profit to measure business performance good or bad, if the sample was compared with last year's net profit declined, the income is zero, Otherwise I take 1; EPS is a measure of corporate performance from the perspective of earnings per share. If the basic earnings per share of the sample company in the current year is lower than the basic earnings per share of the previous year, EPS is 0; otherwise, it is 1.

2.2.2.3 Control variables

Based on the research of Shen Hongtao (2014) and Zhu Wei et al. (2019) on environmental information disclosure, this paper selects company size, asset-liability ratio, return on assets and ownership structure as the control variables. See Table 3-2 for the definition of specific research variables.

| Variable types | variable name | Variable symbol | Variable definitions |
|----------------|---------------|-----------------|---------------------|
| Explained variable | environmental information disclosure | EID | The quality score of environmental information disclosure after standardization treatment |
| Explanatory variables | Net profit | income | Net profit increase is 1, otherwise is 0 |
| | Earnings per share | EPS | Earnings per share increase is 1, otherwise is 0 |
| | company size | size | The natural log of total assets |
| | Asset-liability ratio | lev | Total liabilities/total assets |
| | Return on assets | roa | The average of net profit/total assets |
| | Equity structure | top1 | The shareholding ratio of the largest shareholder |

2.2.3 Model design

Model (1) is constructed in this paper to test the research hypothesis H1 proposed above. Among them, EID is the quality of enterprise environmental information disclosure, and the per-form of enterprise performance is respectively replaced by Income and EPS for testing, so there are two regression results.

Model 1:

\[ EID = \beta_0 + \beta_{\text{perform}} + \beta_{\text{size}} + \beta_{\text{lev}} + \beta_{\text{roa}} + \beta_{\text{top1}} + \varepsilon \]

3. Results & Discussion

3.1. Descriptive statistical analysis

As shown in Table 4-2, the average score of environmental information disclosure quality (EID) of samples among selected groups is 12.51, and the maximum score is 30, indicating that the overall quality of environmental information disclosure of listed companies is not ideal, and even the highest score does not reach the pass line. The mean values of Income and EPS are 0.68 and 0.56 respectively, both greater than 0.5, indicating that more than half of the sample companies have improved their performance compared with the previous year.
### TABLE 3: Descriptive statistics of principal variables

| variable | Number of observations | average | standard deviation | minimum | maximum |
|----------|------------------------|---------|--------------------|---------|---------|
| EID      | 112                    | 12.51   | 5.849              | 2       | 30      |
| income   | 112                    | 0.68    | 0.469              | 0       | 1       |
| EPS      | 112                    | 0.56    | 0.498              | 0       | 1       |

#### 3.2. Regression analysis

As shown in Table 4-4, Column (1) and Column (2) respectively use Income and EPS as the proxy variables of PERFORM to test the impact of corporate performance on the quality of corporate environmental information disclosure. The estimated coefficients of Income and EPS are both significantly positive, indicating that the EID of the companies with a decline in net profit or earnings per share in the current year is higher than that of the previous year. This result supports hypothesis H1, that is, compared with the companies with poor performance, the environmental information disclosure quality of the companies with good performance is higher.

### TABLE 4: Regression results

| variable | EID (1) | EID (2) |
|----------|---------|---------|
| income   | 0.340***| 0.182*  |
| EPS      | -0.157  | -1.891  |
| lev      | -0.157  | -0.103  |
| size     | -3.427  | -3.131  |
| roa      | -0.102  | -0.024  |
| top1     | 0.112   | 0.148   |

#### 4. Conclusions

Taking listed enterprises in heavy polluting industries as the research object, which is the key object of national environmental protection work, this study focuses on the impact of corporate performance on the quality of environmental information when listed enterprises disclose environmental information. Research findings: (1) Corporate performance will affect corporate environmental information disclosure. The quality of information disclosure of high-performing enterprises is high, while the quality of environmental information disclosed by low-performing enterprises is relatively low. (2) The disclosure manipulation has a negative impact on stakeholders, after a "modified" enterprise management report cannot provide investors and other stakeholders to reflect the reality of the enterprise actual situation information, information asymmetry between enterprises and stakeholders, lead investors to make wrong decisions, even endanger the orderly operation of the capital market. (3) Information manipulation includes not only financial information manipulation, but also non-financial information manipulation. However, the existing norms of information disclosure are mostly for financial information, while the norms of non-financial information are slightly inadequate. In Chinese culture, where circular thinking is emphasized, text information is more obscure and flexible in the way of disclosure, and more flexible in conveying impressions and intuitive feelings. Therefore, non-financial information is more difficult to standardize and legally constrain. Compared with
financial information, management has greater discretion. This provides a larger activity space for executives to guide market behavior through text information manipulation.

Finally, through the above theoretical analysis and empirical test, in order to improve the status quo of environmental information disclosure of listed companies, this paper puts forward the following measures and suggestions:

1. Enterprise level. No matter whether they belong to the 13 heavily polluting industries stipulated by the environmental protection administration or not, listed companies should disclose environmental information according to the facts and regulations. They should not take self-interested attribution as the disclosure guide, but only disclose information that they hope investors to see and that is beneficial to the development of enterprises. We should understand that although impression management of enterprise environmental information can help the management to hide environmental pollution and reduce the risk of being blamed in the short term, it cannot make the company have the ability to create value continuously.

2. National level. We will establish standards for the disclosure of environmental information by listed companies, perform environmental supervision duties, expand the scope of companies that publish environmental information, and require them to release independent environmental information reports. The CSRC has increased penalties for companies that fail to disclose information on time.

3. The social dimension. China has not yet established a sound and unified environmental information disclosure standards and systems, environmental information disclosure is still voluntary disclosure, so social supervision is particularly important. The public should strengthen the awareness of participating in environmental protection, pay attention to the environmental information of enterprises, actively participate in the supervision of enterprises, put sustainable development into practice in life, and jointly build a beautiful China.

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