



## EMPIRICAL STUDY ON THE IMPACT OF ENVIRONMENTAL INFORMATION DISCLOSURE IN PHARMACEUTICAL INDUSTRY ON THE PROFITABILITY OF ENTERPRISES

Cao Ruiyi, Zhao Lei

*School of Management, Wuhan University of Technology, Wuhan, P. R. China, 430070*

\*Corresponding Author Email: 970347494@qq.com

*This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.*

---

### ARTICLE DETAILS

---

### ABSTRACT

---

#### ARTICLE HISTORY:

Received 27<sup>th</sup> December 2017

Accepted 29<sup>th</sup> December 2017

Available online 29<sup>th</sup> December 2017

#### KEYWORDS:

Pharmaceutical industry, environmental information disclosure, enterprise profitability

The pharmaceutical industry is recognized as an industry with "high pollution and high energy consumption". In recent years, with the further promotion of national environmental protection policies, the responsibility of disclosure environmental information of pharmaceutical companies has also become the focus of attention. This paper narrates the correlation and action mechanism between the quality of environmental information disclosure in the pharmaceutical industry and the profitability of enterprises, and selects 19 representative enterprises in the pharmaceutical industry from 2012 to 2015 as research objects to make an empirical analysis. The analysis found that the disclosure level of environmental information in the pharmaceutical industry is highly positively correlated with the profitability of enterprises, that is, the higher the level of environmental information disclosure, the stronger the profitability of enterprises. In the increasingly serious environmental pollution situation, pharmaceutical companies should take the

---

### 1. INTRODUCTION

As the largest producer of bulk pharmaceutical chemicals in the world, China, in particular, ranks the first in capacity and output of fermented pharmaceutical products. The current situation of pharmaceutical and environmental protection is more serious, for there has a large quantity of "three wastes" (wastes, waste water and waste gas), complex pollutants and low circulating utilization ration and tough difficulties in pollution treatment.

Faced with increasingly serious environmental problems, China has implemented a series of environmental protection policies in response to the pollution in the pharmaceutical industry. For example, in July 2010, the Ministry of Environmental Protection of People's Republic of China released and fully enforced the Discharging Standard for Water Pollutants in Pharmaceutical Industry. In 2013, the Ministry of Environmental Protection of P.R.C would thoroughly investigate and deal with the environmental pollution in the pharmaceutical industry, as the third most important task in environmental protection activities. In April 2015, the manufacturing of bulk drug was listed as one of the ten key remediation sectors. In 2016, the Environmental Protection Tax Law was introduced to change the environmental protection fee into an environmental protection tax and a high-pollution industry like raw drug would be taxed greatly. With increasingly stringent environmental protection policies, the environmental management costs of pharmaceutical companies have been greatly increased, and their profitability has been severely frustrated. There are also some pharmaceutical companies that have been forced to limit or halt their entire production due to their non-compliance with environmental standards. Thus, some of the enterprises that exceed the standard can hardly even survive. Meanwhile, due to the implementation of environmental protection policies and as one of the major heavily polluting industries, the environmental information disclosure in the pharmaceutical industry has

also become the focus of attention.

Theoretically, according to the theory of "green competitive advantage", many scholars believe that the fulfillment of corporate environmental responsibility is a source of competitive advantage and a good reputation of environmental responsibility can enhance the commercial value of the enterprise [1, 2]. According to the research results, there is a significant negative correlation between the disclosure level of environmental information of listed companies and the cost of equity capital, and good disclosure of environmental information reduces the investors' risk expectations, thus reducing the rate of return need for investment [3]. According to the existing research results, we can ask the following questions: What is the effect of environmental information disclosure strategy on enterprise, and whether there is a correlation between them? In response to above problems, this paper selects 19 representative enterprises in the pharmaceutical industry from 2012 to 2015 as the research objects, and makes an empirical analysis of the correlation between the quality of environmental information disclosure on pharmaceutical enterprise and the profitability of pharmaceutical companies.

The main contribution of this paper lies in following three points. Firstly, Relationship between enterprise environmental information disclosure, an independent variable, and the level of corporate profitability, dependent variables, are studied. Thus filling the study in sectors related to corporate environmental information disclosure and corporate profitability. Secondly, because most researches in China focus on the comprehensive research of heavy pollution industries at present, there are few researches on the subdivided industries. This article takes the pharmaceutical industry as the research object and complements the vacancy of the research on the subdivided industries. Thirdly, in view of the serious frustration of the profitability of the pharmaceutical industry at present, this paper puts forward some related suggestions on environmental information disclosure, in order to provide some references for the development of pharmaceutical

enterprises.

## 2. THEORETICAL ANALYSIS AND RESEARCH HYPOTHESES

On the one hand, the disclosure of corporate environmental information has shaped the need of enterprises to positively fulfill their environmental responsibilities. On the other hand, it reflects that the importance attached greatly to stakeholders by enterprise. According to the analysis by Xu Guanghua and others, from the viewpoint of stakeholders, the disclosure of environmental information is conducive to solving the problem of information asymmetry between enterprises and stakeholders, reducing the uncertainty risk of the future environment of enterprises, so that investors are more willing to invest in companies that disclose environmental information under the same conditions, so as to enable them to obtain premium income in the capital market [4]. From an enterprise perspective, enterprises can disclose high-quality environmental accounting information to stakeholders in a timely manner by taking on environmental responsibilities and actively participating in environmental protection, which helps reduce investors' risk expectations and the necessary return on capital. For heavy pollution industries, the disclosure of environmental information is even more important because there is greater environmental risk in heavy pollution industries. Compared with other industries, the enterprises with heavy pollution have higher degree of correlation between operational risks and environmental information. By improving the disclosure level of corporate environmental information, it can enhance the stakeholders' confidence in the enterprise and reduce its operating risk. Based on the above analysis, this paper proposes that:

There is a positive correlation between the level of corporate environmental information disclosure and corporate profitability.

## 3. RESEARCH DESIGN

### 3.1 Data sources and sample selection

**Table 1:** Name of sampling company and stock code

Name of company	Stock code	Name of company	Stock code
E-fan pharmacy	002019	Shanghai Pharm	601607
HAISCO	002653	Yunnan Baiyao	000538
LIVZON	000513	Kangmei Pharm	600518
SHANGDA Wit	000915	Taiji Group	600129
SALUBRIS	002294	Guangji Pharm.	000952
Northeast Pharm	000597	Shenqi Pharm.	600613
Jincheng Pharm	300233	SL Pharm	002038
Jinling Pharm	000919	Shuangcheng Pharma	002693
Fuan Pharm	300194	Qianhong Pharm	002550
Huahai Pharm	600521	Samples in total	19

This article selects the pharmaceutical industry, one of the industries polluted most seriously, as a sample. There are 19 pharmaceutical companies are selected finally as the samples, deducting part of companies with major changes in recent three years listed in motherboards in Shenzhen and Shanghai, and small and medium enterprise board. We collected datum during 2012-2015, in consideration that the higher frequency of China's environmental protection policy issuance in 2012-2015, larger the implementation strength and the data is more representative, for the purpose of observing the changes in corporate environmental information disclosure over time.

### 3.2 Variable selection and measurement standards

#### 3.2.1 Explained variables

The explained variable in this article is a comprehensive evaluation indicator of corporate profitability.

There are many indicators to measure the profitability of enterprises. This article selects five indicators, including net profit margin on equity, net profit margin of sales, earnings per share, net assets per share, total net assets, to represent the corporate profitability. By adopting the principal component analysis, the principal component was extracted, and the composite score was calculated. Then the comprehensive score shall be as comprehensive evaluation index used for measuring the corporate profitability.

#### 3.2.2 Explanatory variable

The explanatory variable in this article is environmental disclosure index. The current literature can be found that there is no integrated and standardized standard in China to measure the level of environmental information disclosure in enterprises. Based on the evaluation methods proposed by Bi Qian and others, and combining with the characteristics of the pharmaceutical industry, this system of scoring environmental information disclosure level is proposed in this article (see Table 2 for specific measures standard) [5]. In the process of grading, we mainly evaluate the degree and manner of each item involved by making reference to the annual report released by the enterprise and the contents related to the social responsibility report. After getting the total score of each company, we will take the ratio of the total score obtained from the enterprise in the maximum score as the enterprise environmental information disclosure index. The specific formula is as follows:

$$\text{EDI} = \frac{\text{The sum of scores on each items disclosed by the i company}}{\text{The optimal sum of scores on disclosed items}} \times 100$$

**Table 2:** The system of grading enterprise's environmental information level

No	Environmental information disclosed items	Grading standard
1	Whether disclose environmental information or publish related independent report	Without description: 0; disclosure in annual reports: 1; issue the independent report: 2
2	Concept of environmental protection, policy and target	Without description: 0; simple description: 1; detailed description: 2
3	The occurrence of major environmental problems	Without description: 0; simple description: 1; detailed description: 2
4	Environmental costs such as total water consumption, total coal consumption, GDP energy consumption of RMB 10,000	Without description: 0; qualitative description: 1; Combination of qualitative and quantitative description : 2
5	Environmental liabilities such as waste water and emissions of waste gas	Without description: 0; qualitative description: 1; Combination of qualitative and quantitative description : 2
6	Investment related to environmental protection	Without description: 0; qualitative description: 1; Combination of qualitative and quantitative description : 2
7	Environmental protection performance such as "three wastes" emission reductions	Without description: 0; qualitative description: 1; Combination of qualitative and quantitative description : 2
8	Enterprise's education on environmental protection and training	Without description: 0; simple description: 1; detailed description: 2
9	Disclosure of environmental audit	Without description: 0; simple description: 1; detailed description: 2
10	Government regulation and agency certification	Without description: 0; simple description: 1; detailed description: 2

### 3.2.3 Control variables

There are many factors affect the cost of the equity of the enterprise equity. This paper selects the asset scale and solvency as control variables, drawing on the research of relevant scholars both at home and abroad, and taking into account that other factors may have impacts on the profitability of the enterprise.

**Table 3:** Variable types and their measuring standard

Variable types	Variable name	Variable symbols	Measuring standard
Explained variable	Enterprise profit capability	EP	The enterprise's profitability comprehensive score is obtained by the principal component analysis for measurement
Explanatory variable	Disclosure Index of environmental information	EDI	The overall index is obtained from the environmental information disclosure level scored by sub-items and weighted for measurement.
Control variable	Enterprise scale	SIZE	The natural logarithm of the total assets of the business is used for measurement.
	Solvency	DPA	Measured by the ratio of current assets (current assets/current liabilities)

### 3.3 Model building

To verify the hypothesis of this paper that there is a positive correlation between enterprise profitability and its environmental information disclosure, a regression model is established:

$$EP = \beta_0 + \beta_1 EDI + \beta_2 SIZE + \beta_3 DPA$$

## 4. EMPIRICAL TEST AND RESULT ANALYSIS

### 4.1 Profitability principal component analysis

The principal component analysis method is used to extract the eigenvalues of the five profitability indicators mentioned above. The selection criterion of eigenvalues is that the cumulative variance contribution rate reaches more than 90%. The following example illustrates the analysis process in 2014. The result is obtained through analyzing the following table by SPSS software.

**Table 4:** Total variance of the original variables for factor explanation

No.	Initial eigenvalues			Extraction sums of squared loadings			Rotational sums of squared loadings		
	Total	Varian ce percent	Accu mulati on %	Total	Varia nce perce nt	Accu mulat ion %	Total	Varia nce perce nt	Accu mulat ion %
1	3.600	71.994	71.994	3.600	71.994	71.994	2.940	58.795	58.795
2	1.092	21.831	93.824	1.092	21.831	93.824	1.751	35.030	93.824

3	.162	3.248	97.072						
4	.114	2.271	99.343						
5	.033	.657	100.000						

Extraction method: main component analysis

It can be seen from Table 1, the cumulative contribution rate of the first two components reach 93.824% > 90%, in line with the requirements of extracting principal components, so we choose the principal component 1 and principal component 2 as the principal component factor of the principal component factor representing the company's experience ability.

**Table 5:** Component score coefficient matrix

	Parts	
	1	2
Net assets income rate (%)	.283	.041
Total property net profit rate (%)	.350	-.078
Profit margin on sales (%)	.422	-.257
Net asset value per share (Yuan)	-.250	.717
Earnings per share (Yuan)	.056	.401

Extraction method: principal component analysis.

Rotation method: Kaiser standardized maximum variance method.

From the principal component score matrix in Table 2, we can get the expression of principal component 1 and principal component 2 as:

$$f_1 = 0.283x_1 + 0.350x_2 + 0.422x_3 - 0.250x_4 + 0.056x_5$$

$$f_2 = 0.041x_1 - 0.078x_2 - 0.257x_3 + 0.717x_4 + 0.401x_5$$

Comprehensive score of enterprise comprehensive profitability :

$$EP = \frac{71.994f_1 + 21.831f_2}{93.824}$$

Similarly, the comprehensive score of enterprise comprehensive profitability in other years can be obtained.

### 4.2 Correlation analysis of profitability and environmental disclosure level

Table 6 shows the results of the correlation analysis among the major variables in each year. It can be seen that the correlation coefficient between the explanatory variables and the explanatory variables is greater than 0.5 from 2012 to 2015, it shows that there has a strong positive correlation between the enterprises profitability (EP) and enterprise's environmental information disclosure (EDI), indicating that company with higher level of environmental information disclosure, its profitability is also stronger in the pharmaceutical industry.

**Table 6:** Correlation analysis among major variables from 2012 to 2016

Correlation analysis among major variables in 2012					Correlation analysis among major variables in 2013				
	EP	EDI	SI ZE	D P A		EP	EDI	SI ZE	DPA
EP	1				EP	1			
EDI	0.609	1			EDI	0.6343	1		
SIZE	-0.173	0.0494	1		SIZE	-0.1066	0.1026	1	
DPA	0.37564	0.0417	0.322	1	DPA	0.37546	0.0664	-0.4014	1
Correlation analysis among major variables in 2014					Correlation analysis among major variables in 2015				
	EP	EDI	SI ZE	D P A		EP	EDI	SI ZE	DPA
EP	1				EP	1			
EDI	0.56283	1			EDI	0.52392	1		
SIZE	-0.0337	0.03954	1		SIZE	-0.0523	0.32323	1	
DPA	0.37928	0.00263	0.4258	1	DPA	0.40191	0.1737	-0.1085	1

#### 4.3 Regression analysis

It can be seen from Table 6 that the correlation coefficient between explanatory variables and control variables does not exceed 0.5, and their correlations are not strong enough to meet the preconditions of multiple linear regression. Multivariate linear regression results are as follows.

**Table 7:** Multiple linear regression analysis

Year	Model	Regression coefficient	Standard error	t	Significance
2012	Constant	-14.046	32.010	-0.439	0.667
	EDI	31.294	9.010	3.473	0.003
	SIZE	0.360	1.428	0.252	0.804
	DPA	0.377	0.171	2.211	0.043
2013	Constant	-44.221	49.840	-0.887	0.389
	EDI	36.646	12.353	2.967	0.010
	SIZE	1.364	2.202	0.619	0.545
	DPA	0.681	0.326	2.087	0.054
2014	Constant	-31.454	27.452	-1.146	0.270
	EDI	30.919	7.507	4.118	0.001
	SIZE	1.041	1.192	0.873	0.396
	DPA	0.527	0.196	2.689	0.017
20	Constant	19.530	23.05	0.847	0.410

15			4		
	EDI	15.447	6.115	2.526	0.023
	SIZE	-0.928	1.065	-0.871	0.397
	DPA	0.445	0.218	2.041	0.059

Table 7 shows the relationship between enterprise profitability (EP) and the level of environmental information disclosure. It can be seen from the data in the table that it has a positive greatly relation between enterprise profitability and the level of environmental information disclosure at the level of 5%. Besides, the correlation coefficient between corporate profitability and corporate solvency is also high. General speaking, the fitting degree of the model is higher. This shows the higher the level of enterprise environmental information disclosure, the stronger the profitability of enterprises. Thus, improving the level of enterprise environmental information disclosure has a positive effect on enhancing the profitability of enterprises.

Results of correlation analysis and regression analysis verify assumption in this article. Thus, there is a positive correlation between enterprise profitability and the level of its environmental information disclosure.

#### 5. RESEARCH RESULTS AND SUGGESTIONS

Through the analysis of 19 listed pharmaceutical companies in the pharmaceutical industry from 2012 to 2015, it has found that there is a positive correlation between enterprise profitability and the level of enterprise environmental information disclosure. If the enterprise has higher level of environmental information disclosure, in turn, its profitability will be stronger. Improvement of enterprises in enhancing the level of disclosure of environmental information gives an impetus to enhance its profitability. From 2012 to 2015, although the disclosure level of environmental information in the pharmaceutical industry generally increased, the overall level remained relatively low. There only are qualitative descriptions included in annual reports or social responsibility reports in most companies, lacking quantitative information. According to the conclusion of this article and the current situation in the pharmaceutical industry, the following three suggestions are made.

The government and relevant departments should improve the policies and legal supervision mechanisms. Although Ministry of Environmental Protection of P.R.C introduced a series of policies on heavy pollution industries this year, these policies have not been implemented completely and effectively and there are still some vacancies in policies and laws on enterprise environmental information disclosure. As a result, some enterprises now selectively disclose environmental information. Thus the government and relevant departments should establish and improve relevant laws and regulations on environmental information disclosure, improve the corresponding punishment mechanism and intensify law enforcement.

The accounting circle should establish and improve the evaluation system of enterprise environmental information disclosure level. At present, China has not established a complete evaluation system of environmental information disclosure level. This is also a difficulty in the research process: the quantification of environmental information disclosure is difficult to be realized and the evaluation process is not objective enough. This is also an important reason why enterprise statements can hardly reflect environmental factors such as environmental assets, environmental liabilities and environmental rights and interests. Only by establishing the unified and objective evaluation criteria, can we promote the greening of the report.

From the perspective of pharmaceutical enterprises, enterprises should improve the disclosure level of environmental information in order to obtain stronger profitability. From the conclusion of this article, the improvement of the disclosure level of enterprise environmental information is consistent with the goal of pursuing the maximization of economic benefits. Therefore, as enterprises with heavy pollution, designated by the Ministry of Environmental Protection of P.R.C, pharmaceutical companies should take an active responsibility for environmental protection, incorporate green environmental protection into the company's strategic guidelines, and actively promote the digitization and

comprehensiveness of corporate environmental information disclosure.

## REFERENCES

- [1] Porter, M.E., Linde, C. V. 1995. Toward A New Conception of The Environment Competitiveness Relationship [J]. *Journal of Economic Perspectives*, 9 (4), 97-118.
- [2] Brammer, S., Pavelin, S. 2004. Building A Good Reputation [J]. *European Management Journal*, 22 (6), 704-713.
- [3] Qian, B., Jue, P., Yongyan, Z. 2012. Environmental Information Disclosure System, Company Governance and Environmental Disclosure [J]. *Accounting Research*, 2 (7), 39-47.
- [4] Guanghua, X., Sijia, W. 2017. Environmental Information Disclosure, Media Concern and Enterprise Value Research [J]. *Environment Accounting*, 5 (10), 35-42.
- [5] Xuan, Z. 2017. Research on Impact Of Enterprise Environmental Information Disclosure On Cost Of Ownership Based On Empirical Evidence Of Listed Companies In Thermal Power Industry [J]. *Southwest University Journal*, 8 (50), 97-102.

