

The drivers of corporate environment inputs: Based on neo-institution theory evidence from Chinese listed biological and other companies

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Abstract: From corporate internal governance structure and external institutional environment, this study uses a legitimacy perspective of institutional theory to analyze the main influence factors on corporate environmental protection inputs and propose some hypotheses. With the establishment of empirical models, it analyzes the data of 2004-2009 listed biological and other companies in China to test the hypotheses. The findings are concluded that in internal institutional environment, the nature of the controlling shareholder, the proportion of the first shareholder in the ownership structure, the combination of chairman and general manager in board efficiency and the intensity of environmental laws and regulations of the industry in external institutional environment have an significant impact on the behaviors of corporate environmental protection inputs.

Keywords: Legitimacy, environmental protection, institutional environment.

INTRODUCTION

With increasing environmental risks the pharmaceutical companies face up to, the mandatory rules become stricter and the public disclosure of environmental information is more frequent. As a result, more and more biological and other companies are willing to shoulder the environmental responsibility and increase environmental protection inputs (Ramus 2000). However, what factors drive biological and other companies to take environmental responsibility, increase environmental protection inputs and implement environmental management behavior? This study attempts to use a legitimacy perspective of institutional theory to analyze the main driving factors on corporate environmental protection inputs in pharmaceutical industries and propose some hypotheses. From corporate internal governance structure and external institutional environment, this study establishes two empirical models and analyzes the data of 2004-2009 listed biological and other companies in China to test the hypotheses.

LITERATURE REVIEW

Foreign literature review

Foreign research for this issue is mainly carried out at two levels, they are internal factors and external institutional environment. At the level of internal enterprise, some studies have shown that specific features of enterprises will have driven effect of enterprise environmental management behavior. These factors mainly include the enterprise structure and learning ability. Some scholars pointed out that manager quality will affect the enterprise

environment behavior, such as the leading values and attitude to the environment of managers (Sharma 2000).

At the level of enterprise's external environment, most of the research is mainly focused on the impact that rules and market factors have on enterprise environmental protection investment. Starting from the rule factors, some scholars think that the increasing laws and regulations, as well as the future more and more strict mandatory rules is the chiefly motive of encouraging enterprise to bear environmental responsibility initiatively.

Park & Luo (2001) pointed out that in some developing countries enterprise behavior under the mandatory pressure is mostly driven from the pressure of government and some more organization that has the administrative regulatory power. Speeding indicated that most existing laws and regulations have already been very strict; enterprises will take huge environmental cost if they do not abide by the rules. In addition, there are some scholars that use Game theory to analyze the motivation of enterprises and rules maker during the process of reaching the environmental responsibility goals. Besides the rule factor, some scholars also point out that the "green preference" of market factors such as consumers, investors and other stakeholders also have impact on enterprise environmental behavior. High-income consumers are more willing to buy products of more environment-friendly enterprises, which can encourage enterprises to actively reduce pollution, increase investment in environmental protection initiatively (Marcus and Nichols 1999). B2B (Business to Business) enterprises adopt more comprehensive environmental management practices and invest more funds for

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environmental protection compared to B2C (Business to Consumer).

Domestic literature review

Domestic research about enterprise environmental protection investment mainly starts from the theory of property rights, discussing the driving force problem of enterprises' environmental protection investment. A perfect property right system can promote enterprises to carry out environmental protection investment, and allow the enterprises to get enough economic benefits. Through the questionnaire research, he think that management guidance, learning ability and other factors have significant promoting effect on the enterprises environmental protection investment. Enterprise environmental inputs can be used as a kind of "core competence" to help enterprises to obtain competitive advantage, and thus drive enterprise's environmental protection investment.

Through the above review, we found that researches on this problem start earlier in foreign countries, and results are relatively rich, but the domestic study of this problem is still in its infancy, and there is no empirical study of large sample size, which is in view of the listed company. This paper intends to use the legitimacy perspective of intuitional theory, from the enterprise internal and external system environment, to analyze the driving factors of enterprise environmental investment, to construct a driving force model of environmental investment, and using the data of listed biological and other companies from 2004 to 2009 to empirically test the model.

The drivers of corporate environment inputs

The impact of organizational legitimacy on corporate behavior

The legality of forcing organizations is the power that forces companies to adopt the legitimate organizational structure and behavior. Organizational legitimacy affects corporate behaviors mainly in two levels: Strong sense and weak sense. Strong sense means that organizations have no rights to choose their behaviors but shaped by the institution (Zhang, Rui, and Li 2013). For example, organizations must comply with the laws and regulations formulated by the government. If not, they will be punished, and even cannot survive. The strong sense of legality will affect corporate behaviors. So the organization had to take more legitimate actions recognized by the external environment. The legitimacy of the weak sense means that the institution affects the organizations or individuals by influencing resources or incentives. From the perspective of a weak sense, organizational legitimacy is an intangible resource, which is an important resource that can help organization get other resources. These important resources will determine the core competitiveness of enterprises. Specific to the

company's environmental investment behavior, on the one hand, with the continued improvement of environmental laws and regulations, strong sense of legitimacy asks organization to take more legitimate actions recognized by the external environment. So companies have to increase environmental investment to meet the requirement of environmental policies and regulations. On the other hand, a weak sense of legality stimulate companies to shoulder environmental responsibility, control pollutions, implement clean production by the approving of corporate environmental inputs by investors, creditors, consumers and other stakeholders. So as to obtain incentives from stakeholders to help companies get more important core competitiveness. Through the analysis above we can find that both strong sense and weak sense of legitimacy actuate corporate environmental inputs by institutional environment pressure. What specific factors affect the company's environmental investment behavior? This paper tends to explore from internal and external institutional environment (Xu, Zhou, Hu, and Xu 2013).

The impact of internal institutional environment on the behaviors of corporate environmental protection inputs

Through the organizational structure required by the institutional environment, the organization expressed it acts in a reasonable way, which is recognized by the society. So the internal governance environmental of the organization can feel the legitimacy pressure. Proper internal governance structure of companies can reflect the legitimacy requirement of external institutional environment to the organization and conduct the adaptability of the organization to the external institutional environment (Shadi 2012). Therefore, even if facing with the same external institutional environment, different companies have different responses because of different internal governance structure. The degree of the reaction to the legitimacy of companies is called 'the sensitivity of legitimacy' (Sara and Abdollahi 2012). Nowadays, China attaches more and more importance to environmental protection. Different companies with different internal governance factors (size, technology, ownership structure and financial status, etc.) will have different sensitivity to the legitimacy, which will affect corporate environmental behaviors. Some companies will invest a lot of money for environmental behavior, such as sewage treatment, waste gas purification; increase corporate environmental products research efforts, etc. Others not only don't care environmental protection, but also abuse environmental resources and damage environment. Based on the discussion above, we developed five hypotheses as follows:

The impact of owner structure on environmental protection inputs

Compared with private companies, state-owned companies undertake more social responsibilities. When it

comes to social responsibility, government and the public have high expectation on state-owned companies. Thus in the same institutional environment state-owned companies are more likely to invest more money with stronger 'sensitivity of legitimacy'. As a result, this paper puts forward the following hypothesis:

Hypothesis 1: state-owned listed biological and other companies have more investment in environmental protection.

From a legitimacy perspective, if the ownership structure is too centralized, the balance of corporate governance structure will be destroyed and the legitimacy pressure on corporate behavior can't be guaranteed. So the sensitivity of legitimacy of the company will be reduced. As a result, this paper puts forward the following hypothesis:

Hypothesis 2: the listed biological and other companies' ownership concentration is negatively related to the inputs in environmental protection.

The separation of ultimate control and ownership will lead to the failure of internal governance structure. It will reduce corporate 'sensitivity of legitimacy'. The company is not willing to spend more money to environmental protection and management. Therefore, this paper proposes the following hypothesis:

Hypothesis 3: the separation of the ultimate controller's control rights and cash flow rights of the listed biological and other companies and environmental protection inputs are negative correlation.

The impact of board independence on the environmental protection inputs

The efficiency of the board directly determines the efficiency of company operation and management. The more efficient the board directors, the stronger the corporate environmental pressure 'sensitivity of legitimacy' is. As a result, the company is more likely to invest in environmental protection. Therefore, this paper proposes the following hypothesis:

Hypothesis 4: the proportion of independent directors of listed biological and other companies has a positive impact on corporate environmental protection inputs.

From the legal point of view, the combination of chairman and general manager will not only influence the efficiency of the board, but also influence corporate 'sensitivity of legitimacy' when facing environmental pressure. Thus corporate environmental behaviors will be affected. From this, this paper puts forward the following hypothesis:

Hypothesis 5: the combination of chairman and general manager is negatively related to the corporate environmental protection inputs.

The impact of external institutional environment on the behaviors of corporate environmental protection inputs

The impact of external institutional environment on corporate environmental protection inputs is mainly embodied in following aspects.

The government control pressure

In general, the higher government control pressure the industry is under, the more the company will invest in the environment. <The guide of environmental information disclosure of listed biological and other companies> published by Chinese ministry of environmental protection in 2010 explicitly requests that heavy-polluting listed biological and other companies must disclose the information of pollutant emission condition, environmental law observation, environmental management and so on regularly. Thus, this paper puts forward the following hypothesis:

Hypothesis 6: the more government intervention the industry is under, the more the company will invest in the environment.

Social environment pressure

The impact of social environment on the behaviors of corporate environmental protection inputs acts primarily through the moral legitimacy pressure exerted by consumers, investors and other stakeholders. The higher consumers demand for environmental protection, the higher recognition pressure companies are under. In order to obtain the consumers' identity, companies are forced to increase investment in environmental protection. Investors will impose pressure of the legitimacy on companies through the financial markets. Investors believe that listed biological and other companies with good green performance participating in environmental protection actively can effectively take into account the current investment income as well as long-term capital appreciation and their potential industry earnings have also been confirmed in reality. Therefore, we propose the following hypothesis:

Hypothesis 7: the higher legitimacy requirements of the social environment, the more the company will invest in environmental protection.

EMPIRICAL TEST

Model test

Samples and data selection

This paper selects annual reports and social responsibility reports from all A-share companies listed on Shanghai and Shenzhen exchanges from 2004 to 2009 as samples. All environmental inputs intensity data are collected from annual reports and social responsibility reports. In order to ensure the accuracy of the data, the data of every year are collected separately by two people at the same time. After the collection of the data, an independent third person will check the data, which is in conformity.

Excluding the financial and insurance industries, ST companies and other research companies with incomplete data, finally we got 1118 sample observations, accounting for 21.6% of the total. This shows that in all listed biological and other companies in 2004-2009, only 21.6% of listed biological and other companies have environmental protection inputs.

Testing model

According to hypothesis 1-7, we build two models to test the hypotheses: Model 1:

$$\text{Logit}(DUM) = \beta_0 + \beta_1 \times SOE + \beta_2 \times FIRST + \beta_3 \times CV + \beta_4 \times DUAL + \beta_5 \times INDRATIO + \beta_6 \times MN + \beta_7 \times LAWNUM + \beta_8 \times \sum_{i=1}^3 \text{Control} + \alpha_i \times \sum_{i=1}^5 \text{Year} + \delta \times \sum_{i=1}^{12} \text{Industry} + \varepsilon$$

Model 2 :

$$EIS = \beta_0 + \beta_1 \times SOE + \beta_2 \times FIRST + \beta_3 \times CV + \beta_4 \times DUAL + \beta_5 \times INDRATIO + \beta_6 \times MN + \beta_7 \times LAWNUM + \beta_8 \times \sum_{i=1}^3 \text{Control} + \alpha_i \times \sum_{i=1}^5 \text{Year} + \delta \times \sum_{i=1}^{12} \text{Industry} + \varepsilon$$

In the model B₁-B₈ represent the coefficient of the explanatory variables.

Environmental input intensity (EIS) = all environmental investment that enterprise uses for environmental improvement in current period / enterprise's current operating cost.

Instructions of this index

Because that our country has not yet established environmental accounting framework, and have not formed unified specification on environmental assets, liabilities, costs and revenues, etc. measurements of the above accounts in existing literature are all based on the existing financial accounting standards to measure and evaluate by themselves. According to the find during the author's manual collecting process, because of the absence of, in accounting standards, specific requirements on measure of environmental protection costs capitalization in enterprise environmental protection investment, most listed biological and other companies' information disclosure of enterprise environmental investment expensing is all standardized and uniform regardless of the amount or disclosure range, however corresponds to the capitalized portion of environmental investment, capitalization standards are different. In view of this, we use the ratio of enterprise environmental protection investment of the year and the operating expenses all year as a proxy variable of environmental protection investment, while ignoring its capitalization parts. In this paper, the evaluation of the environmental investment is developed with reference to the assessment indicators in current international standard for environmental management through the ISO14000. The standard was formally promulgated on September 1,

1996, and has also been a pilot and comprehensively promoted in China. At present, a considerable number of enterprises, which have been through the ISO14001 have already measure and disclosure the environmental costs in accordance with the standards of this system, specific measurement issues are in the following table 1.

Therefore, corporate environmental input intensity EIS ranges between 0-1. The EIS of sample company during the study are shown in table 2.

As shown in table 2, since 2004, the environmental inputs intensity of China's listed biological and other companies has been steadily improving. However, listed biological and other companies' environmental protection inputs need to be strengthened. In all companies that disclose the specific amount of the investment in environmental protection, environmental protection inputs account for only 0.03% of company's total operating expenses of the minimum. The mean corporate environmental protection expenses only account for 5.3% of total operating expenses. This shows that the environmental protection inputs of companies in China's is not be desired and it need to be strengthened.

According to model 1 and model 2, table 3 gives the definition of each variable:

Empirical test

Firstly, this study tests model 1. The empirical test results are listed in table 4. Secondly, this study tests on model 2. The empirical test results are listed in table 5.

DISCUSSION

From the check of ownership property, hypothesis 1 sets up significantly. Compared with non-state controlled listed biological and other companies, state-controlled listed biological and other companies invested more in environmental protection. Hypothesis 2 and hypothesis 3, the separation of ownership and control and the proportion of the first shareholder both showed no significant influence. Although some literatures indicated that in China there is a higher proportion of pyramid shareholding structure and high ultimate control rights and cash flow rights are separate seriously. As a result, this special structure will lead to the failure of internal governance structure and break the balance of the benefit game. But through the front inspection, we found that the majority of companies conducted environmental management is state-owned companies and the proportion accounted for 61%. The disorders of internal governance structure caused by the pyramid structure mainly occurred in private and family businesses. Therefore, it is probably because the majority of state-owned enterprises, resulting in the separation of ownership and control, the proportion of the largest shareholder have no significant effect.

Table 1: Measure standards of enterprise environment protection investment

Environment protection investment: (In accordance with the international standards of environment protection ISO14001)	<ol style="list-style-type: none"> 1. The pollution control cost: cost of environment device (such as cost of set up, operation and maintenance in noise source control) 2. Pollution control operation and maintenance amount: environmental equipment maintenance payments, environmental equipment maintenance fund 3. Waste disposal costs: including sewage charges, green fees, environmental taxes, environmental liabilities, etc. 4. Costs of improve product or technology: costs of technological innovation in order to reduce energy consumption 5. Environmental management training-related costs, including cost of regular cost of maintaining environmental protection machinery and personnel (such as sewage detection, etc.), environmental management salaries 6. Expenses incurred losses due to pollution, such as environmental damage reparation and sewage charges and management fees paid to the state. 7. Other environmental issues' impact on the financial situation of the enterprise.
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Table 2: The descriptive statistics of listed biological and other companies' EIS

Year	Obs	Mean	Std. Dev.	Min	Max
2004	173	0.039	0.075	0.0003	0.156
2005	215	0.048	0.089	0.0012	0.196
2006	135	0.046	0.071	0.0003	0.208
2007	217	0.049	0.078	0.0003	0.212
2008	179	0.069	0.102	0.0012	0.323
2009	199	0.068	0.083	0.0004	0.305

Table 3: Variable definition

Explained variable	Expected symbol	Variable definition
EIS		Environmental input intensity, measured according to the method described above
DUL		A dummy variable, if company implements environmental management in a year, the value is 1, otherwise 0.
Explained variable		
SOE	+	The nature of the controlling shareholder, SASAC is 1, otherwise 0.
FIRST	-	The proportion of the first shareholder
DUAL	-	If the chairman and the general manager is the same person, the value is 1, otherwise 0.
CV	-	The separation degree of company ownership and control rights.
INDRATIO	+	The proportion of independent directors=the number of independent directors/total number of the board
MN	+	Marketability difference
LAWNUM	+	The number of environmental laws and regulations of the industry
Control variable		
SIZE		Company scale: taking natural logarithm of the total amount of the company's assets.
ROA		The company's profitability
LEV		The company's total liabilities/total assets

Table 4: The Logit regression results of factors that influence environmental protection inputs of listed biological and other companies

Disclosure	Coef.	Std. Err.	z	P>z
Soe1	0.1501**	0.0646	2.32	0.020
Cv	0.0984	0.1296	0.76	0.448
First	0.0142*	0.0079	1.78	0.074
Dual	-0.8417***	0.1101	-7.65	0.000
Indratio	-1.0183	0.6789	-1.5	0.134
Lawnum	0.0044**	0.0017	2.57	0.009
Size	0.3916***	0.0335	11.7	0.000
Leverage	0.3402*	0.1993	1.71	0.088
Roal	0.3301*	0.5227	0.63	0.0528
Marketizat~n	-0.0231	0.0168	-1.38	0.169
Cons	-9.8519	0.7654	-12.87	0.000
Year	Yes			
Industry	Yes			
PseudoR2	0.1468			
N	7223			

Note: * p< 0.1, ** p<0.05, *** p<0.01.

Table 5: The regression test result of environmental protection inputs intensity of listed biological and other companies

	Controlling shareholders' nature	Board efficiency	External institutional pressure	All variables
Constant	0.319			0.574
	0.525			0.276
Soe	0.113**			0.123**
	0.009			0.005
Cv	-0.131			-0.136
	0.138			0.129
First	0.008			-0.053
	0.955			0.97
Dual		-0.187**		-0.197**
		0.002		0.003
Indratio		-0.404		-0.294
		0.359		0.534
Market			0.015	0.016
			0.327	0.374
Lawnum			0.026**	0.028**
			0.002	0.023
Size	0.006	0.011	0.017	0.005*
	0.760	0.616	0.404	0.084
Lev	0.037	0.051	0.065	0.032
	0.791	0.705	0.614	0.821
Roa	0.115**	0.095	0.071	0.153**
	0.004	0.004**	0.004**	0.004
Year	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes
Adj R-Square	0.022	0.024	0.029	0.0342
N	1040	1073	1094	1022

From the perspective of board effective test, hypothesis 5 is accepted. The combination of the chairman and general manager is negatively correlated with corporate environmental inputs intensity. This shows that the combination of the chairman and general manager will affect the efficiency of the board and is not conducive to supervision of the board. But the findings do not support hypothesis 4. It may be due to the mandatory requirement of the proportion of independent directors which make the proportion of independent directors cannot entirely represent the efficiency of independent directors.

From the test of external institutional environment, hypothesis 6 is accepted. The more environmental protection pressure listed biological and other companies have, the more they will invest in environmental management. Political environment plays a very important role in the behavior of corporate environmental management. The test result of hypothesis 7 is not significant. But this does not fully explain the social, cultural and customs and other factors will not form the legitimacy of pressure on corporate environmental behavior. Because institutional environment is an important factor of economic life and in social macro environment, consumer habits, traditions, community norms, values, cultural change, regional demographic and the level of economic development of the institutional environment are very macro concept. Due to the complexity of the institutional environment, it is difficult to measure them with a single index.

Control variables constituted by firm characteristics are equally worthy of attention. Whether Separate analysis of the three groups of variables or overall observation of external and internal institutional environment for the company, in the characteristics embodied in the company by company size, profitability and financial risk, only the profitability have a significant impact on the intensity of environmental protection inputs. Since the paper belongs to pioneering research, we select the control variables main reference foreign literature. Currently, there is no literature available for reference in China. Through the test of the study, it is at least showed that profitability has always had a significant effect on corporate environmental input intensity.

CONCLUSION

The main conclusions of this article are as follows: The environmental protection inputs of listed biological and other companies in China are mainly influenced by the external and internal institutional environment. Specifically, the state-owned holding companies invest more in environmental protection than other companies. The proportion of the largest shareholder of listed biological and other companies and their environmental

investment intensity is inversely proportional. The separation of chairman and general manager is helpful to increase corporate environmental protection inputs. In the external institutional environment, the more government control the companies are under, the more investment they will have in environmental protection. The empirical results provide empirical evidence to standardize and guide the environmental behavior of listed biological and other companies.

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