The Research on Corporate Environmental Performance Oriented Cross-Organization Environmental Cooperation------Based On the Research of China's Yangtze River Delta Region

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Abstract

The enterprises should obtain the environmental protection knowledge and ability by the cooperation with multiple stakeholders to solve many complex environmental problems. This thesis puts forward and verifies measurement model of the effect of the environmental cooperation between the enterprises and suppliers, customers, environmental NGO, government, universities, research institutes and other stakeholders to the corporate environmental performance through the questionnaire survey of manufacturing enterprises in Yangtze River delta. The results show that in this area, the cooperation between the enterprises and suppliers, customers, universities, research institutions are beneficial to improve the environmental performance of enterprises, but the cooperation with the government have no significant effect, and there are nearly no cooperation with environmental NGO.

Keywords: enterprise; cross-organization; stakeholder; environmental cooperation; environmental performance.

1. Introduction

China has disclosed the first “Environmental Performance Evaluation Report of Listed Company” in 2011, and in these 161 listed company and the seven heavy pollution industry of thermal power, steel, chemical industry, papermaking, textile, food and beverage and building materials and so on, only 10 enterprises of them included in the red list, 40 enterprises failed to include the black list. From a whole, “the level of environmental performance of listed enterprises in China is still very low. And there is no listed enterprises in this evaluation achieve long-term environmental sustainability.”(Economic Information Daily, 2011-6-24). Why the level of environmental performance of China’s enterprises is generally low, and how to effectively improve the environmental performance of enterprises? Once the world's largest CEO survey showed that most CEOs think that the sustainable development questions are too broad and complex. The company should work with multiple stakeholders to solve the problems in sustainable development and achieve sustainable development goals.

2. Theoretical basis

How can the enterprises gain sustainable competitive advantage and which is more important to enterprise's internal resources and external resources? Management scholars have been controversial answer to this question. In recent years, large amounts of literature try to integrate the enterprise's internal and external resources into the same analysis framework.

Wernerfelt[1] in 1984 put forward the Resource Based View (RBV for short) and pointed out that enterprises with specific resources and capabilities are the source of enterprises' lasting competitive advantages, and performance is a key result of resource output. Because the managers of enterprises are often difficult to effective control and use all the heterogeneity resources which form the enterprise competitive advantages, heterogeneous resources not only can get from internal resources, which created and accumulated through endogenous growth, but also depend on the source of enterprises' advantages [2].

Hart[3] in 1995 for the first time applied the framework of resource-based view to the field of environmentally sustainable development field, and put forward the enterprise's natural resource base view. He divided the environmental behavior which impact sustainable competitive advantages into three types: Prevent pollution of the environment, product management and sustainable development. In the enterprise's strategic management, the strategy not only depends on the cooperation of the various functional group in the organization, but also the external critical stakeholders such as environmental protection organization, community, media and government, take them into the design and development of related products. Because on one hand, many advanced environmental management practices, such as environmental design, life cycle analysis and reverse logistics need to integrate different stakeholders in the supply chain [4]. On the other hand, the complexity of environmental issues and these environmental problems is not relevant to most enterprise's core business activity, for most enterprises, to obtain these environmental management knowledge and ability from the enterprise internal activities may cost too high, need more time-consuming and inefficient, and the knowledge and ability can be obtained from outside the organization through cooperating with external actors [5]. At present the research of its impact on corporate environmental performance from the perspective of environmental cooperation of our country is not enough. This study puts five types of major stakeholders (including suppliers, customers, environmental NGO, government, universities and research institutions) into the research, and analyzes on the influence of the enterprise and the environment cooperation to the environmental performance, so as to provide a reference for the enterprise to choose the environment cooperation object.

3. Research hypothesis

3.1Supplier and customer

Because manufacturers face the strict scrutiny from different interest groups (including the end consumers, clients, suppliers, financial institutions), environmental management is very important for manufacturers [6]. Manufacturers can invite suppliers (or clients) directly involved in, and plan environmental management with them and find environmental solutions to reduce pollution or other environmental impacts. In recent years, the literature about environmental cooperation between suppliers and customers is more. Such as Hall[7]viewed that the relations between the buyer and supplier play an important role in promoting the environment innovation. Zhu and Sarkis[8]thought that green supply chain collaboration to the enterprise's environmental performance and economic performance had a positive effect. In fact, products will affect the natural environment in many stages of the supply chain from raw material mining to waste management. Therefore, the hypothesis 1 is that cooperation with suppliers and customers is positively correlation to the enterprise's environmental performance.

3.2 Government

As a manager of public affairs and provider of public products, government has the inescapable responsibility to improve environmental performance. According to Neely et al.[10] definition, an environmental performance of corporate refers to the enterprise's efficiency and the effect of a series of environmental control behavior, while the local government environmental performance can be viewed as adding an enterprise environmental performance, and both have the same relationship. Government and enterprises through joint development of new environmental standards and rules, and government as a key external stakeholders involved in product design, development, management until the end of the process, which will help to improve the environmental performance and increase the company's environmental reputation[9]. Therefore, the hypothesis 2 is that cooperation between enterprises and government has a positive impact on the improvement of environmental performance.

3.3 Environmental NGO

Environmental NGO provides organized participation pattern for the public to participation in environmental protection.

Environmental NGO always has environmental protection experts, ecologists, animal and plant scientists and other experts, who have special knowledge in environmental protection and environmental protection and they have obvious information advantages. Obviously, in terms of environmental governance, environmental NGO and companies are two complementary resources organizations. Cooperate with environmental NGO, first provide new knowledge for company to rethink the relationship between business activities and stakeholders ,help the company integration its environment responsibility and market target, especially, NGO can help enterprise to develop friendly environment plans, and reduced cost, and achieved differences of advantage, and cultivating innovative consciousness of environmental protection, and improve operation efficiency, and produced new of technology and new of green products [8]. Second, NGO cooperation, also can help companies gain higher credibility, to a certain extent prevents from such fields as media, environmental groups, and government and other third-party attacks; last collaboration with environmental NGO can also help promote a green image, promoting sales [9].

Hypothesis 3: cooperation between enterprises and environmental NGO has a positive impact on the improvement of environmental performance.

3.4 Universities and research institutions

In recent years, the literature specifically for cooperation between companies and universities and research institutions is less, but the few documents also show that when enterprises develop environmental protection project and the green innovation, through cooperation with universities and research institutions can provide enterprises with technical expertise about environment [11]. In practice, there are also many environmental cooperation between enterprises and universities and research institutions, Such as Ford and no obstacle to cooperation for sustainable development at the University of Michigan research and reconstruction plans, the study of bio fuels between Boeing and Yale university and the development of new biofuel production technology with Kang Philip company and ISU, etc.

Hypothesis 4: Cooperation with universities and research institutions has a positive impact on the improvement of environmental performance.

4. The Empirical Analysis

4.1 Design variables

4.1.1 Independent variable

The independent variable of the study is enterprises with different types of organizations at a given time: the numbers of establishing environmental cooperation with suppliers, customers, environmental NGO, government, universities and research institutions. The value range is an integer greater than or equal to zero.

4.1.2Dependent variable

The dependent variable of the study is the company's environmental performance. In order to reflect the relationship of environmental performance and environmental cooperation, and on the basis of related literature, this thesis selected 10 indicators to measure enterprise's environmental performance with different types of environmental cooperation objectives (as shown in table 1). These indicators represent the effort which the enterprises may change environmental performance by cooperation with other organizations. The sum of the ten indicators is as the Comprehensive Measurements of the level of corporate environmental performance, namely, the value of dependent variable. According to the implementation and effect of the enterprises' environmental performance, this study adopts the Likert, and there are five levels for each evaluation index, that is: 1=very bad, 2=bad, 3=ordinary, 4=good, 5=very good.

4.1.3 Control variable

From the compliance theory, the larger enterprises are more inclined to improve the environmental management performance due to higher social attention, and larger companies also have more economic strength to cooperate with external organizations. Therefore, we use enterprise scale as a control variable in this study, measure it by the number of employees, as continuous variable, and the scope is integer greater than 0. Due to the high degree of environmental pollution, the industries heavily regulated by China are more inclined to cooperate with external organizations to seek more related resources which can improve environmental management performance, so we choose seven dummy variables on behalf of the industry attributes as control variable of this study. So the design variables are as Table 1.

4.2 Samples and data sources

This paper chooses Yangtze River delta region as demonstration area. Yangtze River delta region is one of the most economically developed areas in our country and is also one of the areas with serious pollution. In recent years, the region has made a series of policy of governance environment pollution with inter-regional cooperation. We select manufacturing companies in the region as the research object, with a view to further study in the context of regional environmental cooperation across organizations on environmental cooperation's influence on enterprise's environmental performance.

This study gave out 500 questionnaires, and the distributed object is the director of environmental protection of enterprises. In the header of each questionnaire, we briefly introduced each environmental cooperation, the meaning of environmental performance indicators and the relations of them to ensure that respondents can accurately answer the questions. One was to distribute 300 questionnaires in the several major economic development zone of Shanghai, Zhejiang and Jiangsu province, and withdrew 192 questionnaires. Another was to send 200 questionnaires to the enterprises through the mail way and withdrew 68 questionnaires. There are 17 invalid questionnaires because of incompleteness and 243 valid questionnaires, and the effective rate of the questionnaire is 48.6%.

4.3 Results and analysis

This study used SPSS software to analyze 243 valid questionnaires. The general situation of the samples are the following: according to the enterprise scale, the enterprises of less than 300 employees accounted for 31.0%, the enterprises between 300-2000 people accounted for 30.8%, the enterprises of more than 2000 employees accounted for 38.2%; according to industry type, petrochemical industry accounted for 23.2%, textile industry accounted for 21. 8%, paper making and paper products accounted for 19.7%, biological pharmaceutical industry accounted for 14. 5%, furniture manufacturing accounted for 11.3%, food processing industry accounted for 5.3%, others include electricity, heat production and supply industry, electrical machinery and equipment manufacturing industry, nonmetal mineral products etc. accounted for 4.2%.

4.3.1 Current situation of enterprise environmental performance and environmental cooperation

The statistical result of questionnaire survey shows that the frequency of enterprises environmental cooperation with and suppliers and customers is higher, which respectively accounted for 40.2% and 32.5% of the total number of cooperation, and in cumulative total is 72.7%, and the frequency of environmental cooperation with universities and research institutions and government respectively accounted for 17.3% and 10%.

Because in the Yangtze river delta region currently, only few environmental NGO such as "Friends of Nature" of Jiangsu more actively join in environmental protection, and the participation field is relatively narrow, the influence is very limited, and the environmental groups is not attracted the attention of business managers, and they almost have no environmental cooperation action with enterprise, ,therefore, the later research will delete and environment NGO cooperation with the environment variable..From the results of descriptive statistical analysis on the relevant indicators of measuring corporate environmental performance, we can see that the green mean of the environmental performance indicators in these 243 companies is almost greater than 4, Standard deviation between 0.683-0.831 , indicating that the existing environmental cooperation between enterprises has an important influence on enterprises' environmental performance.

4.3.2 Correlation analysis

Because the variable of this study belongs to the orderly classification variable, we adopt the correlation analysis of Kendall in the research of whether there is correlation between different types of organization environmental cooperation and environmental performance just shown as Table 2. Analysis results show that the environmental cooperation with suppliers and customers has very strong correlation with corporate environmental performance, the cooperation with universities and research institutions has strong correlation with corporate environmental performance, and the cooperation with government has weak correlation with corporate environmental performance.

The size of the company has positive and significant effect for across the organization environmental cooperation. By comparing various industries, the environmental cooperation of petroleum and chemical industry, papermaking and paper products and biological industry has strong correlation with corporate environmental performance.

4.3.3 Regression analysis

The variance inflation factor (Logistic) was tested by the correlation test between the variables and the variance inflation factor (VIF) showed that there was no multiple linear among the variables (tolerance minimum value was 0.29). In this paper, the cumulative Logistic regression model is used to analysis the results. The results are shown in Table 3.

Regression results show that the environmental cooperation with suppliers, customers and the universities and research institutions has a significant positive impact on enterprise environmental performance, while cooperation with government has no significant impact on enterprise's environmental performance. About the control variables, the results show that the size of the company has positive and significant effect for the environmental cooperation performance consequences. By comparing with other industries, petrochemical industry has the most influence.

5 Research Conclusions and Suggestion

5.1 Research conclusion

(1) The environmental cooperation with suppliers, customers and the universities and research institutions has significant impact on enterprise environmental performance. This shows the interaction between enterprises and supply chain members and the cooperation between enterprises and universities and research institutions through the project research “point-to-point” form can help enterprises to reduce pollution and other environmental impacts.

(2) The environmental cooperation with government has weak correlation with corporate environmental performance and regression results did not support the hypothesis of positive impact. The reason is that although the government has a certain influence on the enterprises’ environment management behavior in formulating environmental regulation of the industry and the process of law enforcement, there lack in-depth cooperation between them. After meeting the requirements of laws and regulations, the enterprises have no active environmental improvements; therefore, the effect was not significant in the regression results.

(3) Although environmental NGO has done a lot of work on promoting environmental protection knowledge, the environmental cooperation with enterprises remains to be conducted.

The above conclusions show that enterprises with some external environmental cooperation is indeed played a significant role in improving corporate environmental performance, but cooperation partners are limited. This article suggested that enterprises should actively try to carry out more extensive cooperation with the government, environmental NGO and other enterprises, and use resources characteristics of different organizations to help themselves to improve and realize the sustainable development strategy.

5.2 The limitations of this study and future research direction

This thesis still exists some shortcomings and limitations. Firstly, because the measurement of corporate environmental performance has no off-the-shelf database, the measurement of each variable in this study is mainly based on foreign related empirical scale and precious research and does this research mainly in the way of subjective evaluation of respondents. Although the study took a variety of ways to increase the measuring reliability and validity, the subjective evaluation method may affect the dependability and accuracy of data and research results. Secondly, these studies takes the cooperation numbers with different types of organizations in a given period of time as independent variable, but in fact, just rely on the cooperation numbers cannot fully and accurately obtain the relevant information of cooperation. The follow-up study can use the input of time or cost as the research variables. Thirdly, this study only analyzed the impact of across the organization environmental cooperation on the corporate environmental performance, but not covered the causes of environmental cooperation and how to cooperate, etc. and follow-up study can choose typical cases in this study.

References

Wernerfelt B.A. (1984). Resource-Based View of the Firm, Strategic Management Journal,5(2),171-180

Dyer, J.H., Singh, H. (1998). The relational view: cooperative strategy and sources of inter-organizational competitive advantage, Academy of Management Review 23, 660-679.

Hart, S.L. (1995). A natural-resource-based view of the firm,The Academy of Management Review, 88(20), 986-1014.

Vachon, S., Klassen, R.D. (2008). Environmental management and manufacturing performance: the role of collaboration in the supply chain, International Journal of Production Economics 111, 299-315.

Rondinelli, D.A., London, T. (2003). How corporations and environmental groups cooperate: assessing cross-sector alliances and collaborations, Academy of Management Executive, 17, 61-76.

Henriques, I., Sadorsky, P.(1999). The relationship between environmental commitment and managerial perceptions of stakeholder importance, Academy of Management Journal, 42(1), 87-99.

Hall, J. (2000). Environmental supply chain dynamics, Journal of Cleaner Production ,8, 455-471.

Zhu, Q., Sarkis, J. (2004). Relationships between operational practices and performance among early adopters of green supply chain management practices in Chinese manufacturing enterprises, Journal of Operations Management, 22 (3),265-289.

Roy, R., Whelan, R.C. (1992). Successful recycling through value-chain collaboration, Long Range Planning, 25, 62-71.

Neely, A., Gregory, M., Platts, K. (1995).Performance measurement system design: a literature review and research agenda, International Journal of Operations and Production Management, 15 (4),80-116.

Seuring, S. (2004). Integrated chain management and supply chain management comparative analysis and illustrative cases, Journal of Cleaner Production, 66(12),1059-1071.

Table 1: Design variables

Variable type	Variable name	Measurement
Independent variable	Suppliers	The number of cooperation
	Customers	The number of cooperation
	ENGO	The number of cooperation
	Government	The number of cooperation
	Universities and research institutions	The number of cooperation
Dependent variable	EMP	Environment policy formulation Environmental objectives and results The construction of the environmental management organization system The improvements for suppliers in the development of environmentally friendly products and packaging Set up environmental protection image for enterprise The reduction and recycling of the waste or by-product Environmental protection technology and product innovation Product cycle reduce the enthusiasm of environment load Implement environment risk management motivation Enterprise's environmental planning and environmental vision
Control variables	Enterprise scale	Number of employees （Emp.）
	Industry attributes	0 or 1

Table 2: Variable correlation test

Variable	EMP.	Sup.	Cus.	Gov.	Uni.
EMP.	1				
Sup.	0.387**	1			
Cus.	0.310***	0.131*	1		
Gov.	0.106*	0.213**	0.079	1	
Uni.	0.407***	0.058	0.064	0.098*	1
Emp.	0.192**	0.343***	0.278***	0.182*	0.202**
Petroleum and chemicals	0.256***	0.221**	0. 208**	0.203*	0.033
Textile	0.075	0. 206**	0. 304***	0.035	0.023
Paper	0.212**	0. 203**	0.087*	0. 203*	0.014
Biological pharmaceuticals	0.223**	0.102*	0.083	0.023	0.115**
Furniture manufacturing	0.084	0.217***	0.341***	0.054	0.067
Food	0.014	0.271***	0.392***	0.045	0.064
Others	0.074	0.223***	0.380***	0.122*	0.035

Note : * p<0.10, ** p<0.05, *** p<0.01

Table 3: Regression analysis results

Variable	coefficient	P Value
Sup.	0.103***	0.009
Cus.	0.205***	0.032
Gov.	0.027	0.253
Uni.	0.312***	0.008
Emp.	0.237**	0.066
Petroleum and chemicals	0.388***	0.003
Textile	0.066	0.164
Paper	0.086	0.125
Biological pharmaceuticals	0.094	0.138
Furniture	0.008	0.651
Food	0.056	0.236
Others	0.069	0.211
Chi-Square	55.65***	0.000
Likelihood	500.61	
Negelkerke R^2	0.336	

Note: * p<0.10, ** p<0.05, *** p<0.01

Appendix: Notes

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