

# **Environmental Accounting Disclosures of Manufacturing and Mining Listed Companies in Shandong Province, China**

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## **Environmental Accounting Disclosures of Manufacturing and Mining Listed Companies in Shandong Province, China**

### **Abstract:**

The study examines factors that affect the environment accounting disclosure levels for a sample of manufacturing and mining listed company in the Shandong province China.

The empirical results show that larger companies are more likely to disclose higher levels of environmental accounting disclosures. Companies operating in industries that produce heavy pollution are also more likely to disclose higher levels of environment accounting information.

Contrary to expectations companies that are more profitable are less likely to have higher disclosures levels. These results suggest that economic performance is of major importance compared to environmental matters.

**Keywords:** Environment Accounting Information; content analysis, institutional theory

## **1.0 Introduction**

China has experienced unprecedented economic growth over a number of years which has improved living standards for the population of 1.3 billion people (The World Bank, 2016). The record economic growth has resulted in rapid industrialisation and urbanisation with detrimental effects on the environment and public health. Pollution issues include industrial air pollution, water pollution, emissions of carbon dioxide, deforestation, soil contamination and disposal of waste. China is the world's largest emitter of greenhouse gasses. Economic activity has increased the consumption of coal resulting in smog and severe pollution of cities such as Beijing, the capital city, issuing pollution red alerts in 2015 (Albert & Xu, 2016).

Environmental issues have become increasingly a social problem. Public scrutiny of companies to operate in environmentally responsible ways and to be more transparent and report on environmental performance is growing. There is growing interest in environmental and social issues from socially responsible stakeholders such as shareholders, employees, customers, suppliers and governments internationally (Qiu, Shaukat, & Tharyan, 2016). However, there is also evidence suggesting that Chinese companies view environmental reporting matters as philanthropy, public relations or crisis management and that there is significant differences of knowledge and performance at a regional level (CSR Asia, 2014).

There are a number of environmental and social responsibility studies internationally. The variation in the economic, political, social and cultural environments of the countries in which these studies have taken place suggests that there will be variation across nations in terms of company and stakeholder responses to corporate social responsibility matters. This study adds to the corporate

environmental reporting context in China and increases our knowledge and understanding of China's commitment and progress about environmental reporting (Yang, Craig & Farley, 2015).

The number of studies on environmental reporting of Chinese companies is growing and maturing. Prior studies of environmental disclosures in China have covered a range of research approaches including case studies, surveys, interviews and content analysis of environmental disclosures (Yang, Craig and Farley, 2015). Analysis of environmental disclosures have included samples of listed companies (Zeng, Xu, Yin, & Tam, 2012, Li, Luo, Wang, & Wu 2013), mining companies (Dong, Burritt, & Qian 2014), state controlled enterprises (Guan, Noronha & Tayles, 2013) or companies rated in corporate responsibility indices (Li & Zhang 2010, Lu & Abeysekera 2014). China is a diverse country with different rates of development of its regions. Because of such variation, this study examines environmental disclosures of at a regional level of one of the largest provinces in the country.

This study examines the factors affecting the level of environmental disclosures of a sample of listed Chinese manufacturing and mining companies, in the Shandong province in China in 2009-10. The Shandong province is in the northern eastern part of China with a population of around 100 million people and is the second most populous region in China (Boxer, n.d.). It is a region where environmental knowledge and performance is perceived to be lower compared with provinces in eastern and southern China (CSR Asia, 2014).

## **2.0 Background and Theory Development**

This section describes the development of environmental reporting in China and the theoretical framework applied in the study.

## 2.1 Background to Environmental Reporting in China

China's economic reforms have been led and controlled by the Communist Party of China. However, the central government is aware of the environmental problem faced by the country and has created policies and targets to reduce environmental damage. In 1998 the State Environmental Protection Administration (SEPA) was set up by the State Council to develop policies to reduce damage to the environment. Success has been mixed with failures in implementing and meeting policy targets and enforcing laws (Chow, 2007).

In 2007, the Ministry of Environmental Protection (the successor to the SEPA) issued the *Measures on Environmental Information Disclosure*. The Ministry required governing bodies to disclose environmental information relating to their areas of responsibility. The prescribed environmental disclosures include: environmental statistics, complaints about the environment and follow-up by the governing body, lists of enterprises that are serious polluters and that have caused serious pollution accidents (EU-China Environmental Governance Programme, 2013). The *Measures on Environmental Information Disclosure* also encourages business enterprises to voluntarily disclose a list of environmental information.

In 2008, the People's Republic of China State-owned Assets Supervision and Administration Commission of the State Council (SASAC), published corporate social responsibility guidelines for state owned enterprises (SOEs). *Guidelines to State-owned Enterprises Directly under the Central Government on Fulfilling Corporate Social Responsibilities*. ((SASAC, n.d.). The guideline explains that the SOE's are responsible for fulfilling corporate social responsibilities in terms of social progress and environmental protection. These responsibilities include strengthening resource conservation,

supporting environment protection, and ensuring the health and safety and legal rights of employees. In 2009 SASAC required all SOEs to publish CSR reports within three years. In 2012 all state owned enterprises had to publish a CSR report annually (Zhu, Liu & Lai, 2016).

The Chinese government is putting more emphasis on environment matters and in 2014 the amended Environmental Protection Law came into effect on January 1, 2015. The legislation increases accountability of firms that violate environmental regulations. Firms that generate environmental offences face larger fines and potential reputational damage from authorities publishing details of the violations. To reduce corruption, the amended law increases accountability on government officials to apply the law appropriately imposing heavy penalties for improper behaviour (Falk, 2014). However, there are concerns that implementing and enforcing the law by local environmental protection bureaus may be difficult for the central government to control (Zhang and Cao, 2015).

There are special environment requirements for listed companies. From 2003 the Ministry of Environmental Protection requires any company applying for listing to provide information to show that all environmental protection requirements are met. The information is to be audited and the result to be disclosed to the public. Similar requirements are set by the China Securities Regulatory Commission (EU-China Environmental Governance Programme, 2013).

The two main stock exchanges in China have issued guidelines on reporting environmental information. In 2005 the Shenzhen Stock Exchange issued *Shenzhen Stock Exchange Social Responsibility Instructions to Listed Companies*. The stock exchange encourages social responsibility reports to be published (Shenzhen Stock Exchange, 2006). Then, in 2008, the Shanghai Stock Exchange issued *Guideline on Environmental Information Disclosure by Listed Companies* also encouraging listed

companies to disclose social responsibility reports.(Shanghai Stock Exchange, 2009). In December 2008 the Shanghai Stock Exchange required listed companies with shares listed offshore to prepare the reports.

## **2.2 Theory and Literature Review**

This study employs an institutional theory perspective in examining environmental disclosures in Chinese corporates. Yang et al. (2015) argue that such an approach is appropriate to consider the macro influence of the Chinese government at an economic and political level and, at a micro level, the influence of international companies and international consumers on Chinese organization.

Institutional theory views organisations as operating in a social framework of rules, norms, values and routines of what constitutes appropriate behaviour. Scott (1995) argues that in order to survive organisations must conform to current beliefs and norms in the environment.

De Maggio and Powell (1983) argue that there is homogeneity of organisational form and practices driven by institutional isomorphism. During this process, pressure is put on organisations to resemble other firms that deal with the same set of environmental conditions. In the environmental reporting context this would be how a company's environmental reporting processes change and adapt over time (Deegan and Samkin, 2009).

Three forms of isomorphic pressures are identified by De Maggio and Powell (1983). These are coercive, mimetic and normative pressures. Coercive pressures are created by organizations on which the companies are dependent. For example, government mandating of environmental reporting practices puts pressure on a company to adopt environmental reporting.

Mimetic isomorphism is where organisations model themselves on other organisations because of uncertainty. In the context of environmental reporting, if a company is uncertain about what to report they may model their environmental reporting practices on other companies, to ensure acceptance. .

Normative isomorphism results from group norms i.e., pressure from occupational groups and professions. In relation to environmental reporting, normative isomorphic pressures may arise from industry associations that advocate environmental reporting or managerial groups that have a collective opinion on the desirability of environmental reporting (CSR Asia, 2014).

In this context the following section identifies the research hypotheses.

### **3.0 Research Hypotheses**

The paper tests the following hypotheses for the influence of firm characteristics on voluntary environmental disclosures.

#### **State Ownership**

Regulatory pressure is a coercive factor in influencing environmental disclosures in China. As described in the Section 2.1 the central government is a key driver of environmental strategies and policies. Compliance with legislation and regulations is considered to be a key driver of Chinese companies to adopt corporate social responsibility practices (CSR Centre, 2014).

State owned enterprises (SOEs) in China play a large role in China's economy and with the market reforms in the 1990's, are permitted to list shares. SOEs are very much influenced by the Chinese Central Government represented by the SASAC. In 2012, SASAC required SOEs to publish corporate responsibility reports annually.

Greater government influence on state controlled companies leads to greater pressure on managers to meet expectations of government in the areas of environmental management and reporting. Managers have incentives to communicate environmental information to avoid reputational damage and demotion if policy guidelines are not adhered to (Li, Luo, Wang & Wu, 2013). Li & Zhang (2010) find a positive relationship between state controlling shareholdings of listed companies and the preparation of corporate responsibility disclosures. This leads to the following hypothesis.

H1: Shandong listed companies with a majority of state ownership are more likely to disclose a higher level of environmental accounting information.

### **Industry Differences**

The Shandong province has important energy resources with extensive coal and oil fields; with associated industries that are considered to be heavy polluters. The petroleum industry is an important industry with Shandong having one of China's largest oil producing areas. Heavy industries include the production of aluminum (Shandong Company) and oil refining and production of synthetic rubber and fertiliser (Sinopec Qilu).

There is a strong manufacturing focus in the region with Qingdao the major manufacturing centre. Textile, locative, chemical, machine tool, household electrical appliance, petrochemical and pharmaceutical factories are located in Qingdao. Large companies that originated from Qingdao include Haier Corporation a multinational company producing domestic appliances and Tsingtao Brewery Group, China's largest brewery. In other provincial cities machinery, chemicals, fertilisers, electronics, paper, pharmaceuticals, and textiles are produced (Baxter, n.d.).

Companies operating in industries with higher pollution propensity are more likely to increase environmental reporting because of central government requirements on saving energy and reducing carbon emissions. Managers of such companies have incentives to increase environmental disclosures to communicate changes in company performance as well as to manage stakeholder perceptions about the company's performance on environmental matters (Clarkson, Richardson & Vasvari, 2008).

H2: Shandong listed companies in heavy polluting industries are more likely to disclose a higher level of environmental accounting information.

### **Regional Differences**

In the Shandong province there are designated Economic and Technological Zones. Special economic zones were established by the Central government as part of China's reformation to attract foreign investment. There are three national zones in the Shandong province: Qingdao, Yantai and Weihai (Doing Business in Shandong, n.d.).

The central government has also selected export zones where the focus is on the manufacture of goods for export in particular industries. Export zones are designated for the cities of Jinan, Weihai, Weifang, and Yantai (Doing Business in Shandong, n.d.).

It is likely that companies operating in centrally chosen economic development zones will have greater knowledge and awareness of environmental matters as coercive and mimetic responses to attract foreign investment. In addition, companies operating in export zones may be influenced by overseas customers' requirements relating to environmental practices. Companies may demonstrate mimetic isomorphism adopting environmental practices and disclosures that align with international standards. The hypothesis is therefore:

H3: Shandong listed companies located in central government designated economic and export zones are more likely to disclose a higher level of environmental accounting information.

### **Multinational Companies**

Chinese companies operating in a number of international markets are also likely be influenced by overseas customers' requirements relating to environmental practices.

H4: Shandong listed companies in that are multinational are more likely to disclose a higher level of environmental accounting information.

### **Profitability**

Profitable firms can be expected to provide greater voluntary disclosure of environmental activities and higher quality disclosures because they have more resources to implement and report on environmental practices and outcomes. In samples of companies included in selected corporate social responsibility index rankings, Li and Zhang (2010) Lu and Abeysekera (2014) find a positive association between firm profitability and social and environmental disclosures. Similar results are reported by Li, et al. (2013) for a sample of 1,574 Chinese listed companies selected in 2008 which identified a positive association between firm profitability and companies disclosing corporate social responsibility information. In addition, more profitable companies produce higher quality of the disclosures. However, the association is weaker if the controlling shareholder is the Central government.

H5: Shandong listed companies that are more profitable are more likely to disclose a higher level of environmental accounting information.

### **Size**

Larger companies face, because of their potential impact on the environment, more scrutiny by external parties such as government agencies, environmental groups and the media. Thus they have incentives to disclose environmental information to meet the stakeholder needs.

H6: Shandong listed companies that are larger are more likely to disclose a higher level of environmental accounting information.

## **4.0 Research Method**

### **4.1 Sample selection and data collection**

The population is the manufacturing and mining companies located in the Shandong province and listed on the Shanghai and Shenzhen stock exchanges during the period 2009-2010. Excluded from the population are companies in financial difficulty and companies with missing data. This final sample contains 63 listed companies.

Table 2 classifies the sample by the nature of manufacturing using the industry published by China Securities Regulatory Commission (n.d.). There are a range of manufacturing companies spanning food and beverage to pharmaceutical companies. There is a concentration of 12 companies (19.1%) producing chemical materials and fibre, and seven companies (11.1%) manufacturing transport equipment. Table 2 also shows those industries identified by the State Environmental Protection Administration (2003) as heavy polluters. The environmentally sensitive industries are food and drink, textile, clothing, paper and printing, metal and non-metal mining. Of the sample of 63 companies, 29 (46.1 %) operate in heavy polluted industries.

[Insert Table 1]

Company financial and ownership data is collected from the China Stock Market and Accounting Research database (CSMASR) provided by the GuoTainAn information service (GTA, n. d.). Data on environmental disclosures and governance was manually collected from the company annual reports for 2009 and 2010.

#### **4.2 Environmental Accounting Information Disclosure index (EAID)**

An environmental accounting information disclosure index is used to measure the level of environmental accounting information for both qualitative and quantitative disclosures. Environmental accounting information disclosures can include financial and non-financial environmental performance information such as the implementation of environmental laws and regulations, environmental quality and pollution.

Disclosure indexes are a valid research tool to examine the quantity and quality of information disclosed in corporate annual reports and are used often in empirical accounting research (Botosan 1997). Although various quality and quantity measures are used to assess environmental disclosures there is a high level of correlation between them (Hooks and Van Staden, 2011).

A limitation of disclosure indices is that inferences are restricted to the extent that the index is valid. Matters of validity centre on what disclosures to include in an index and how to define and assess disclosure quality (Botosan 2004, Leuz and Wysocki 2008). For this index, these limitations are mitigated in the following ways: Firstly, disclosures are limited to environmental disclosures in the annual and/or environment reports. Secondly, subjectivity in coding is reduced by not applying a weighting to items disclosed.

Each disclosure item was allocated a score of 0, 1 or 2. A score of 0 was given if there was no disclosure. A score of 1 was given if there was only a quantitative or qualitative disclosure. A company scored a total of 2 if both quantitative and qualitative information was given for a disclosure item. The scores were not weighted. An individual score for a company was calculated as the sum achieved as a proportion of the total score that can be achieved. Table 2 lists the environmental accounting information included in the index.

[Insert Table 2]

### 4.3 Regression Model

The following regression model is used to test the relationship between environmental disclosures scores and the dependent variables.

$$EDI = b_0 + b_1GOV + b_2IND + b_3REGDEV + b_4MULTI + b_5PROFIT + b_6SIZE + b_8LEV + \eta$$

The dependent variable is the environmental disclosure score (EDI) for each company for 2008 and 2009. There are seven independent variables. GOV is the variable for state ownership and is the percentage of shares owned by each Shandong listed company. IND are those companies operating in an industries identified as heavy polluters. A binary variable of 1 is used to identify a heavy polluting company and 0 otherwise. REGDEV are companies operating in zones identified by the central government for special economic and export development. Those companies operating in a designated zone are coded 1 and those that are not zero. Companies that are multinationals (MULTI) are coded in the same way. Profit is the variable measuring profitability which is measured as the return on assets. Size is the logarithm of total assets and leverage (LEV) is total liabilities as a percentage of total assets.

### 4.3 Results

#### Descriptive Statistics

A summary of the disclosure scores are shown in Table 3. Results for the individual companies are available on request. The mean score for 2008 was 0.256 and 2009 0.326; an increase of 27.3%. The difference in the means scores is significantly different at the 1% level for both parametric and non-parametric tests. There is not a huge variation in scores as shown by the standard deviation and the similarity of the mean and median scores. However, the mean score is low compared to the maximum score achieved by a company of 0.62.

[Insert Table 3]

Between 2009 and 2010, the disclosures scores for 45 companies increased, while the scores for 12 companies decreased and for six companies the scores remained unchanged. In 2009, three companies did not provide any environmental disclosures but this number dropped to only one company in 2010. These results indicate that almost all companies were making environmental disclosures and there was a major improvement in the content of the environmental disclosure as exhibited by the increase in the mean EDI scores during the two year period,

Table 4 shows the descriptive statistics for the independent variables. For the sample of companies the average shareholding of the central government was 19.45% with the highest shareholding of 84.9%. Just under half of the companies (49%) are in heavy polluting industries and 81% in designated economic development zones. One fifth of the companies were multinational companies. The return on assets of the companies averaged 6.0% with the most profitable company earning a return of 27%. As expected the companies are very large with average liabilities of around 50% of total assets.

[Table 4]

The Pearson Correlations are reported in Table 5. IND (heavy polluting industry), Size and LEV (leverage) are significantly positively correlated with environmental disclosures while PROFIT is significantly negatively correlated. As expected there is a significant correlation between SIZE and government ownership.

[Table 5]

### **Regression results**

The results of the regression are shown in Table 6. The model is highly significant and the adjusted  $R^2$  is 39%. Consistent with Table 5 there is a positive relation between environmental disclosures and companies in heavy polluting industries (IND) and firm SIZE confirming H2 and H6. The model shows no significant association between environmental disclosures and government ownership, regional development zones, and multinational companies.

Institutional theory predicts that the coercive influence of the government through controlling shareholdings of listed companies will have a positive impact on environmental disclosures. However, no association is reported. A possible explanation for the lack of association may be due to a lack of enforcement of the government regulations putting insufficient pressure on managers to comply with rules. Another explanation is that there may be that the government controlled entities have competing priorities put on them by the central government which are difficult to capture in a study of this nature.

Economics development zones are not a significant influence on environmental accounting information disclosure levels

Chinese multinational companies have little influence on the environmental information disclosure scores. A possible explanation is that their environmental reporting practices may be different in China compared with operations overseas.

Contrary to expectations, there is a negative association between the profitability of listed companies that and the environmental accounting information disclosure levels. This suggests that managers are prioritising economic performance over environmental matters.

## **5.0 Conclusion**

The number of studies on corporate environmental reporting in China is increasing with an array of perspectives and approaches. This study takes a regional approach in examining environmental disclosures of a sample of listed companies operating in the Shandong in order to gain deeper insights of environmental reporting in China. However, a tradeoff of the regional focus is that it limits the generalizability of the results.

A content analysis of environmental disclosures in annual and environment reports is carried out for 2009 to 2010. Six factors considered to influence environmental reporting are examined.

The study shows that the overall level of environmental accounting information disclosures is at a relatively low level but there is a significant improvement in disclosure levels between 2009-2010. Future studies could consider examining the trend in disclosure levels over time.

Shandong listed companies operating in heavy polluting industries and that are large are likely to disclose higher levels of environmental accounting information. State ownership, multinational

companies and companies operating in government supported economic zones have no significant influence on environmental accounting information disclosure levels.

A perplexing result is that government controlled companies have no impact on the level of environmental despite the Chinese central government legislating to improve environmental practices and reporting. It is suggested that the complexities of the Chinese political processes on government controlled companies is difficult to measure.

Corporate profitability is negatively related to the environmental accounting information disclosure level indicating that companies have a strong focus on economic performance as opposed to a wider corporate responsibly perspective.

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**Table 1 Industry Distribution**

<b>Industry</b>	<b>n</b>	<b>% Total</b>	<b>% Heavy Polluters</b>
Beverage	2	3.2	
Chemical fibre	2	3.2	3.2
Chemical materials and products	10	15.9	15.9
Electrical machinery & equipment	5	7.9	
Electronic components	2	3.2	
Extractive	2	3.2	
Food	1	1.6	
General machinery	5	7.9	
Metals smelting and rolling	4	6.3	6.3
Non-metallic mineral products	6	9.5	
Paper and paper products	3	4.8	4.8
Pharmaceutical	5	7.9	7.9
Plastic	1	1.6	
Printing	1	1.6	1.6
Rubber	1	1.6	1.6
Special equipment	3	4.8	
Textile	3	4.8	4.8
Transportation equipment	7	11.1	
<b>Total</b>	<b>63</b>	<b>100.0</b>	<b>46.1</b>

**Table 2 Environment Accounting Information Disclosure Index**

Environmental accounting information	Disclosure items	Scoring
Implementation of environmental regulations	Achievement and the reason why regulations were not implemented	no description 0 point qualitative description 1 point both qualitative and quantitative 2 points
Environmental quality	Cases of discharging pollutions	
	Standard achieved for major environmental quality indicators	
	Pollution accidents	
Environmental governance and pollutants use	Pollution control and governance	
	Personnel of environmental governance and detection	
	Pollutants recycling	
	Other pollution control measures	
Financial information related to environment	Environmental protection grants and subsidies	
	"Three wastes" income and tax reduction	
	sewage charges and fines	
	Forestation fees	
	Environmental protection investment	
	Depreciation and amortization cost of environmental protection facilities	
	Reduce pollution and improve the environment of research and development spending	
	Other environmental spending	
	Or have an environmental liabilities	

**Table 3 Environmental Disclosure Index: Summary Scores**

	<b>2009</b>	<b>2010</b>	<b>Overall</b>
Mean	0.26	0.36	0.29
Median	0.23	0.31	0.27
Minimum	0	0	0
Maximum	0.62	0.62	0.62
Standard Deviation	0.16	0.205	0.18
p-values			
t-test		<sup>1</sup> 0.00**	
Wilcoxon signed rank test		<sup>2</sup> 0.00**	

**Table 4 Descriptive Statistics (n=126)**

	<b>Variable</b>	<b>Mean</b>	<b>Max</b>	<b>Min</b>	<b>Median</b>	<b>Standard Deviation</b>
Government ownership	GOV	19.45	84.90	0	5.37	23.09
Heavy pollution industry	IND	0.49	1.00	0	0	0.50
Regional development	REGDEV	0.81	1.00	0	1.00	0.39
Multinational corporation	MULTI	0.21	1.00	0	0	0.41
Profitability	PROFIT	0.06	0.27	-0.15	0.05	0.06
Total assets ('000)	SIZE	5,344,800	32,793,207	636,137	2,526,193	6,213,897
Leverage	LEV	0.49	0.85	0.07	0.52	0.19

**Table 5 - Pearson correlations (n=126)**

	EDI	GOV	IND	REGDEV	MULTI	PROFIT	SIZE
EDI	1.000						
GOV	0.159	1.00					
IND	0.393**	-0.033	1.000				
REGDEV	0.061	0.079	-0.089	1.000			
MULTI	-0.103	-0.187*	-1.880*	-0.052	1.000		
PROFIT	-0.214*	0.112	-0.202*	0.029	0.171	1.000	
SIZE	0.511**	0.345**	0.084	0.080	0.084	0.132*	1.000
LEV	0.268**	0.169	0.083	-0.078	-0.203*	0.178*	0.330**

\* and \*\* highlight significance at the 0.05 and 0.01 levels where the level of significance is two-tailed  
EDI environmental disclosure index, GOV is the percentage of shares owned by the government, IND  
1 if the industry is a heavy polluter and 0 otherwise, REGDEV1 if economic development zone, 0  
otherwise, MULTI – multinational corporation 1, otherwise 0  
PROFIT return on assets, SIZE total assets of the company, LEV total liabilities as a percentage  
total assets

**Table 6 – Regression**

	<b>Variable</b>	<b>Model 1</b>
Constant		-1.711 (0.000)
Government ownership	GOV	0.0001 (0.824)
Heavy pollution industry	IND	0.102 (0.000)**
Regional development	REGDEV	0.027 (0.398)
Multinational corporation	MULTI	-0.012 (0.716)
Profitability	PROFIT	-0.704 (0.003)**
Total assets ('000)	SIZE	0.090 (0.000)**
n		126
F-value		12.587 (0.000)
Adjusted R <sup>2</sup> %		39.40%

**Dependent variable is Environmental disclosure index**

\* and \*\* highlight significance at the 0.05 and 0.01 levels where the level of significance is two-tailed

