

Research on the Status Quo of Carbon Information Disclosure in Chinese Enterprises

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Abstract—By taking all companies listed in Chinese A share market as research sample, this paper deeply explores current situation and characteristics of Chinese listed company carbon information disclosure from two perspectives, quantity and quality of carbon information disclosure. The results show that industry attributes and industry category have a significant impact on enterprises carbon information disclosure behavior, there is large differences in the level of carbon information disclosure between different industries, and the total carbon information disclosure level is not stable. Meanwhile, most of carbon information disclosure contents focus on low carbon technology and low carbon product plans, there is little carbon information related to carbon trading and carbon audit. And carbon information disclosure of enterprises is different for different stakeholders, quantity of information disclosure for government is the most abundant, followed by banker.

Keywords-carbon information disclosure; disclosure quantity; disclosure quality; the status quo

I. INTRODUCTION

Recently, climate change and energy crisis have been conceived as the main factor threatening global environment and sustainable development of humanbeings[1]. Almost all industries such as utilities, insurance, tourism, real estate, transportation, construction, retail and agriculture will be influenced by climate change-potentially-huge negative economic consequences[2]. In order to reduce the loss of value, many companies began to take carbon reduction strategies and disclose carbon information to meet the need of information from stakeholders and build good environment reputation. Hence, number of enterprises participated in CDP project and conducted voluntary disclosure increases rapidly, in 2010, 82% of global top 500 enterprises takes part in CDP project, while the total number of enterprises involved in CDP project grows from 235 in 2003 to 3050 in 2010[3]. In terms of reality in Chinese, enterprises display low willingness to engage in CDP project and disclose carbon information. CDP project launched an investigation on the top 100 enterprises listed in China in 2011, among which only 11 enterprises filled out the questionnaire, 35 provided information related, while 54 did no response or refuse to participate[4]. This phenomenon indicates that the enthusiasm of carbon information disclosure is not high. In this context, what is the status of carbon information disclosure for Chinese enterprises?

II. LITERATURE REVIEW

About the status of enterprise carbon information disclosure, scholars are most concerned about the process and mechanisms, and what is the quality and how to meet the information need of stakeholders for CDP project. Kolk, Levy and Pinkse (2008)[5] found that information provided by CDP project, enterprise coping strategy with climate change, financial performance and information about GHG emission reduction, can well assist the stakeholders in making investment decision. Nonetheless, Hesse (2006) [6] and Kierman (2008)[7] discovered that carbon information disclosed by CDP can hardly meet information requirement demanded when making investment decision, for as far as enterprise and industry are concerned those information are incomplete and discontinuous. Aldersgate (2007)[8] pointed out that lack of a precise and unified disclosure framework is the root cause of currently low-level and non-comparable carbon report. However, the unified framework of carbon information disclosure requires government to introduce legislation and calls for commercial practice. Villiers and Staden (2010) [9] further investigated individual information needs of stakeholders for companies in South Asia and expanded that individual stakeholders most want to disclose environmental information in the following areas: environmental risks and impacts, environmental policy, measurable environmental goals, behavior to support the objectives, spending (costs) environmental disclosure, environmental accounting reports.

The following is about the content of corporate carbon information disclosure research. Bebbington and Larrinaga-Gonzalez (2008) [10] suggested that carbon reporting should not be merely restricted to financial accounting of carbon emissions; it should incorporate accounting and reporting for the risk and uncertainty associated with climate change. The authors highlight the problematic nature of climate change and indicate that corporations need to extend current reporting systems in order to consider the inherent risk associated with climate change as well as the uncertainty it could cause to business activity. Santos, Beuren and Rausch (2011)[11], after analyzing the disclosing degree of carbon information disclosed in management report of 14 enterprises' with clean development mechanism project, revealed most part of management report concerned about ways of forming carbon credit and investment cost, rather than information with respect to carbon auditing and carbon tax during carbon trading process. Kamat et al. (2012) [11] concentrated their study of carbon information disclosure

behavior on enterprises listed on India exchange, and results showed that disclosed information about carbon emission reduction and other financial ones can hardly be distinguished, meanwhile, differences in understanding and disclosure ways of carbon emission reduction leading to the diversity and incomparable of information disclosed.

III. SAMPLE SELECTION AND DATA COLLECTION

A. Sample Selection

This research selects all companies listed in Chinese A share market as research sample. For the sake of data consistency, given the period of data selection, between 1st Jan.2012 and 31st Dec.2012, the enterprises listed after 2012 are removed. Industries are classified according to “guidance on industry for public enterprises” issued in Apr.2001 by CSRC; and data source for other variables are obtained from Juling financial database.

B. Data Collection Methods

Carbon management and information disclosure is in its infancy in China, there are little enterprise participated CDP project and disclosed carbon information, therefore, in order to get research data, this paper expanded the research sample, which not only confining the enterprise participated CDP project and disclosed carbon information, but also including all a-share listed companies. In this research, research data comes from carbon disclosure the listed companies disclosed through the media and the company's web site, so, it is a large amount of data. In order to solve data collection problem, this study firstly uses web crawler technology and designs topic-focused web crawler to collect carbon information for enterprise disclosed to establish the research database (which is showed in fig.1):

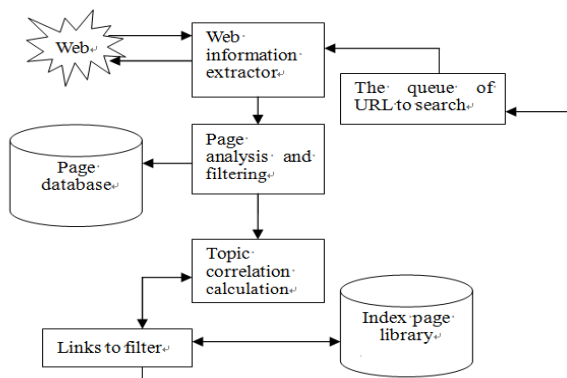


Figure 1. The structure of topic-focused web crawler

IV. ANALYSIS OF SURVEY RESULTS

A. Analysis On The Overall Situation Of Carbon Information Disclosure For Chinese Listed Companies

Fig.2 shows the total number of articles disclosed about carbon information by sample enterprises from 2010 to 2012. From fig. 2 we can see that the total number of articles disclosed by Chinese A-share listed companies experiences a downward trend, which is decreased from 97,471 in 2010 to 45,192 in 2012. What is more, the total number of words for carbon information disclosed by

Chinese A-share listed companies also shows a downward trend between the three years from Fig.3. The above results illustrate that the enthusiasm of carbon information disclosure is in the fall for Chinese A-share listed companies.

This conclusion indicates that enterprises become more cautious and rational to treat the problem of carbon information disclosure. Chinese government has proposed specific reduction targets in 2009 and set off a wave of low-carbon development, which makes lots of companies to advertise themselves as low-carbon enterprises to seize market opportunities and access to good social effects through disclosing carbon information. So, enterprises disclosed lots of carbon information, but the information maybe is not much relevant to reducing emissions themes.

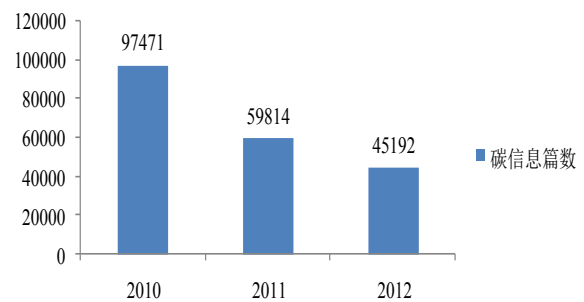


Figure 2. Analysis on the total quantity of carbon information disclosure for companies during 2010-2012

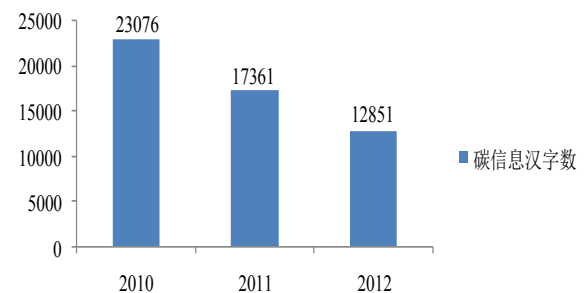


Figure 3. Analysis on the total words of carbon information disclosure for companies during 2010-2012

B. Analysis On The Quantity Of Carbon Information Disclosure For Chinese Listed Companies

Note from table 1 that among the 2314 qualified samples, 1380 disclosed carbon information, accounting for 59.64%, and the total number of articles is 40885, which shows that many companies chose other ways such as media and website other than annual report to disclose carbon information.

From the view of industry classification for qualified sample, Finance and insurance demonstrates the highest participation extent (82.93%), behind comes Electricity, gas and construction industry. This phenomenon indicates that industrial difference plays an important role in disclosing carbon information and implementing carbon management practice. Most manufacturing companies belong to high pollution and high emission industry and face enormous pressure to reduce emission, then, the

carbon information disclosure becomes necessary and urgent. However, the information disclosure level of manufacturing is in the middle, which is not high. Overall, large differences of disclosure levels exist in different industries.

TABLE I. STATISTICAL DESCRIPTION OF SAMPLE BY INDUSTRY CLASSIFICATION

INC	Samples	Samples disclosed carbon information	Percent
Agriculture, forestry, animal husbandry and fishery	44	29	65.91%
Mining	57	41	71.93%
Manufacture	1390	859	61.80%
Electricity, gas	73	57	78.08%
Construction industry	48	37	77.08%
Transportation, storage	74	49	66.22%
IT	177	74	41.81%
Wholesale and retail trade	126	76	60.32%
Finance, insurance	41	34	82.93%
Real estate	123	53	43.09%
Social service	70	32	45.71%

C. Analysis on the content of carbon information disclosure for Chinese listed companies

In light of the definition of carbon information from Tian, the content of carbon information is divided into three areas in this study: (1) management of climate change. it includes whether a company assume the duties of climate change, if a company build management incentives of climate change; whether a company develop low-carbon technologies or carbon products as the company's long-term development strategy; whether a company establish clear reduction goals, whether there are specific measures and necessary actions for external communication. (2) Risk and opportunity concerned with climate change. The risks posed by climate change include natural risks, regulatory risks, competitive risks and reputational risks; opportunities mean that climate change is the opportunity to develop low-carbon product design low-carbon technologies and obtain greater market share. (3) carbon emissions covers the following aspects: how to choose carbon accounting and audit methods, specific data of carbon emissions, auditing and greenhouse gas emissions trading. According to the above definition, carbon information is divided into nine topics as showed in table 2[12]:

According to the 9 topics, the corresponding keywords for each topic are determined, and the number of keywords is calculated. Then, the topic of each piece of information based on the number of keywords is divided. One article will belong to the topic if its number of keywords is the biggest. In the specific process of keyword splitting, semantic is the main basis rule, for instance, topics 1 management of incentive mechanism with climate change

split into climate change, management mechanism and incentive mechanism, and topic 2 decomposed into low-carbon technologies program and low-carbon product plans.

It is found from table 2 that most of carbon information disclosure contents focus on low carbon technology and low carbon product plans. There are 23,262 articles which are relevant to this topic, accounting for 51.47%. Then, there are also many articles related to management incentive mechanism with climate change. The effectiveness of specific data and specific carbon emissions is the main content of corporate carbon disclosure, there are 6149 articles related to this topic, which included the content about reduction targets enterprises achieved and reduction plan enterprises will complete. In addition, there are little carbon information about risk and opportunity concerned with climate change, verification and audit of carbon emission and emissions trading.

TABLE II. CONTENT ANALYSIS OF CARBON INFORMATION DISCLOSURE FOR CHINESE LISTED COMPANIES IN 2012

Disclosure Theme	Articles	Percent
1. Management of incentive mechanism with climate change	7686	17.01%
2.Low-carbon technology and low-carbon products plan	23262	51.47%
3. Emissions reduction targets and plan	4611	10.20%
4.Cognition from administrators about the risk	4611	10.20%
5.Cognition from administrators about the opportunity	2459	5.44%
6. Carbon accounting methods	205	0.45%
7. Specific data of carbon emissions	6149	13.61%
8.Verification and audit of carbon emissions	307	0.68%
9.Emissions trading	1537	3.40%

To further investigate the differences of carbon information disclosure between different stakeholders, this study statistics the amount of carbon information according to the categories of stakeholders. Based on the results of Clodia and Perrini (2011) [13], this research divided shareholders into stockholder, banker, customers, suppliers, government and community. This study selects one company as an unit to calculate the involved stakeholder categories and the number of each type of stakeholders in articles. According to the number of each type stakeholder, the articles are classified.

As shown in fig.4, companies disclosed lots of carbon information for government, and the total number of articles is 12898, which is far higher than banker, customers, suppliers, government and community. The following one is banker, companies disclosed 9240 articles for them, which means companies also pay much attention to their information needs.

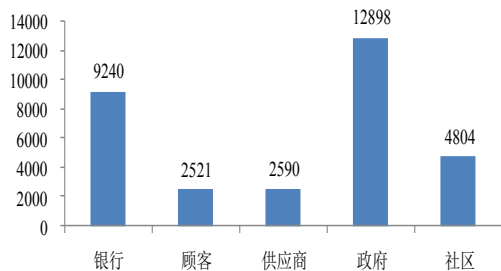


Figure 4. Statistical analysis of carbon information disclosure articles for different stakeholders

In addition, fig.5 further explore differences of carbon information disclosure between different stakeholders. Among the carbon information disclosed by enterprises, the information needs from government is considered firstly, 35.64% of the information is about to meet its needs, and then is banker, community, shareholders, customers and suppliers ,accounting for 25.53%,13.27% , 11.44 % , 7.16% and 6.97% ,respectively.

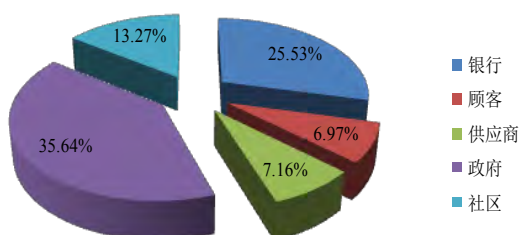


Figure 5. Statistical analysis of carbon information disclosure proportion for different stakeholders

To sum up, among the 2314 qualified samples, 1380 disclosed carbon information, accounting for 59.64%, which means that the proportion carbon information disclosure through non-annual report is relatively high, Such result just confirms the point of Aerts and Cormier(2008)[14], Aerts and Cormier(2009)[15], Cormier, Ledoux and Magnan(2009)[16] that unofficial information disclosure channels such as corporate websites and media increasingly become important ways, including the amount of information is very rich. This phenomenon is mainly based on the following reasons: firstly, The freedom of information disclosure through media and website is relatively large than through annual report, the information is not subject to strict regulation. Secondly, the timeliness of information disclosed through non-annual report is stronger than through annual report. What is more, non-annual report informal channels could express information better than other, such as providing dynamic information (updated), real-time access to data and information, hypertext links, interactive features (questions), video, data download function and so on. They can provide more vivid image information.

V. CONCLUSIONS AND LIMITATIONS

By taking all companies listed in Chinese A share market as research sample, this study carried out

investigation on the status and characteristics of carbon information disclosure for Chinese enterprises, came into the following conclusions:

(1) Among the 2314 qualified samples, 1911 disclosed carbon information, accounting for 82.58%, which means that the proportion carbon information disclosure through non-annual report is relatively high, such results just confirms the point of Aerts and Cormier(2008), Aerts and Cormier(2009), Cormier, Ledoux and Magnan(2009)[17] that unofficial information disclosure channels such as corporate websites and media increasingly become important ways, including the amount of information is very rich. This phenomenon is mainly based on the following reasons: firstly, the freedom of information disclosure through media and website is relatively large than through annual report, the information is not subject to strict regulation. Secondly, the timeliness of information disclosed through non-annual report is stronger than through annual report. Non-annual report informal channels could express information better than other, such as providing dynamic information (updated), real-time access to data and information, hypertext links, interactive features (questions), video, data download function and so on. They can provide more vivid image information.

(2) The total number of articles disclosed by Chinese A-share listed companies experiences a downward trend, which indicates that enterprises become more cautious and rational to treat the problem of carbon information disclosure.

(3) This phenomenon indicates that industrial difference plays an important role in disclosing carbon information and implementing carbon management practice. The research results further confirmed the view of Campbell (2003) [18]; Cho and Patten (2007) [19]; Brammer and Pavelin (2008) [20]; Haddock-Fraser and Fraser (2008) [21], which also shows that those enterprises belong to environmentally sensitive industry will disclose more carbon information than the ones belong to non- environmentally sensitive industry.

(4) About the disclosure content of carbon information, it is mainly related to low-carbon technologies enterprises adopted and low-carbon products plan enterprises will adopt. This study also explores that there is big differences of carbon information disclosure between different stakeholders. Companies disclosed lots of carbon information for government, which is far higher than banker, customers, suppliers, government and community. Among the carbon information disclosed by enterprises, the information needs from government is considered firstly.

There also exist some limitations. Firstly, with respect to sample selection, data source selection only considers 2012 one year, rather than uses time series data. It may contribute to the deviation of conclusion in terms of science and universality. Secondly, the computer program used in data processing was written by researchers themselves. Limited by our knowledge we chose an easy way to deal with the data, the scientific of the method need to be further improved.

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