The Relationship between Investor Behavior and Companies' Response Strategies in the Climate Change Prevention Activities Research Program

Ryota Oki
Department of Administration Engineering, Faculty of Science & Technology
Keio University, Yokohama, Japan
Tel: (+81)45-563-1141, Email: oki-ryota@keio.jp

Akira Tsuboi
Department of Administration Engineering, Faculty of Science & Technology
Keio University, Yokohama, Japan
Tel: (+81)45-563-1141, Email: tsuboi@ae.keio.ac.jp

Masako Takahashi
Department of Administration Engineering, Faculty of Science & Technology
Keio University, Yokohama, Japan
Tel: (+81)45-563-1141, Email: masako@ae.keio.ac.jp

Abstract. Among the Corporate Social Responsible activities, environmental activities have been attracting attention in recent years. In particular, GHG (Green House Gases) emission is related to global climate change. Therefore, the global investors have focused on corporate climate change prevention activities firstly. There are several private programs that disclose corporate environmental activities. How useful is it for companies and their stakeholders to disclose additional environmental information through an external research program? Is it possible to ascertain the kinds of strategies used by companies through the additional information obtained from the research program? In 2002, the CDP (formerly the Carbon Disclosure Project), an NPO established by global institutional investors interested in reducing GHG emissions, started the survey activities for the companies to reduce emissions. It is clear that the CDP reflects the standpoint of the investors. Therefore, the information obtained through the CDP is suitable for analyzing the relationship between investors and companies. This study investigates the CDP Japan 500 that surveyed the 500 largest companies listed on the same securities market, the Tokyo Stock Exchange. Using statistical analyses, it reveals the relationship between investor behavior and companies response strategies in the CDP Japan500, including the additional information and the selected language.

Keywords: investor behavior, climate change prevention, disclosure program, corporate disclosure strategy

1. INTRODUCTION

1.1 Previous Research and Controversial Issues

Since the end of the 20th century, environmental concerns have significantly shifted from local pollution problems to global environmental issues. In the last 20years, global environmental issues have become more serious. On December 12th 2015, at the 21st Conference of the Parties of the United Nations Framework Convention on Climate Change (UNFCCC), the Paris Agreement was adopted by a consensus of 195 countries recognizing climate change as an urgent issue on a global scale.

Under these circumstances, corporate environmental activity is not a countermeasure; it is now recognized to be on the stage of strategy for the company. Companies have been disclosing their environmental information to prove their accountability. With globalization of the markets, companies are required to disclose globally. In particular, climate change prevention activities are considered to be common to all companies. Therefore, in order to get a competitive advantage in the field (such as in the securities market), regardless of the business category, it is specifically important to construct a climate change prevention strategy in corporate environmental management.

Table 1: Major private research programs on environmental management in Japan

Name	Environmental Management Survey	CSR Survey	CDP Japan500
Entity	Nihon Keizai Shimbun	Toyo Keizai Inc.	CDP
Objective stakeholders	Business people, Investors	Financial institutions, Investors	Investors
Start	1998CY	2005CY	2002CY
Research contents	General environmental issues by industry	General CSR issues	Climate change management, risks and opportunities, and emissions
Response method	Electronic system	By mail	Website input system
Disclosure contents	Relative comprehensive evaluation values and ranking of 5(4) question categories by industry	Individual responses, by CSR issue, 5-value scale	Companies surveyed, individual responses, evaluation criteria, method and results
Disclosure media	Report, pay database	Report, pay database	Website
Subjects	Listed companies including emerging markets and leading unlisted companies	All listed and major unlisted companies	Market capitalization top 500 companies

In order to prove corporate accountability for climate change prevention activities and to be sufficiently evaluated, the external disclosure of the activities must be strategical.

In general, companies have several ways of disclosing information on environmental management; disclosure based on the system (such as securities reports and Form 20-F), disclosure based on guidelines (such as annual reports and CSR reports), and disclosure on websites. In addition, information to public research programs related to corporate activities. In recent years, private research programs have also appeared, and the importance of corporate disclosure strategy to these has increased. Generally, most public research projects disclose only the results of some statistical processing, and not individual information. However, many private research programs disclose their survey results for a fee or free of charge, making it possible to compare companies. The major corporate research programs on environmental management including climate change prevention activities that have been carried out extensively and continuously in Japan are "Environmental Management Survey" (Nihon Keizai Shimbun) "CSR Survey "(Toyo Keizai Inc.) and" CDP Japan 500 "(CDP: formerly Carbon Disclosure Project) (Table 1).

1.2 Objectives

Consideration of the results and challenges of previous research, the objective of this study is to reveal whether companies disclose additional information that shows the relevance of investors' behavior through private research programs. On the other hand, Ogino, et.al., revealed that among private research programs of Japan, answers to the CDP Japan500 affect the shareholding ratio of institutional investors (Ogino, et.al., 2014 and Ogino, et.al., 2015). The survey of CDP spreads globally not only in Japan, and it has the universal questions and evaluation system. The following study deals with the CDP Japan500 as a representative of the private research program. CDP, as shown in Table 1, has carried out a survey on climate change prevention activities of companies in cooperation with the global investors. It expects that companies disclose clearly the information which is necessary for investors, specifically institutional investors (Ogino, et.al., 2014). Therefore, other disclosures can be compared with the CDP response information. The results obtained measure the usefulness of the information for the institutional investors and the stakeholders, who have similar information requests to the institutional investors.

2. RESEARCH APPROACH

This study has two steps.

The first step; this step is creating indices that represent the information difference between the corporate compulsory or voluntary disclosure and the disclosure through the research program of climate change prevention activities by using a text

mining approach.

The second step; this step makes models to express the investors' behavior and the response strategy of companies to the research program of climate change prevention activities using multiple regression analyses. According to the previous research, the dependent variable is the shareholding ratio of institutional investors, and the independent variables are indices representing climate change prevention activities, including those selected at the first step.

2.1 Indices Representing Climate Change Prevention Activities: the First Step

2.1.1 Information Framework

The research program of climate change prevention activities is the CDP Japan500 in this study. On the other hand, the corporate compulsory or voluntary disclosures are the securities reports including Form 20-F, the annual reports, and the CSR reports including the environmental reports. Anyone can obtain them at no charge and retrospectively. Other information disclosed on the corporate website is excluded from the analysis because of the fact that the company can change and delete the contents at any time.

Table 2. CDP questionnaire

Sections	Categories
Climate Change Management	Governance
	Strategy
	Targets & Initiatives
	Communication
Risks & 0pportunities	Climate Change Risks
	Climate Change Opportunities
Emissions	Emissions Methodology
	Emissions Data
	Scope1 Emissions Breakdown
	Scope2 Emissions Breakdown
	Energy
	Emissions Performance
	Emissions Trading
	Scope 3 Emissions

The corporate compulsory or voluntary disclosures are rich in variety. Therefore, the information disclosed by answering the CDP survey is selected as a criterion. The guidance to answer the questionnaire which is disclosed by the CDP is used to evaluate the difference between the disclosed information by the CDP and others.

The CDP survey is constructed of three sections; "climate change management", "risks and opportunities", and "emissions" (Table 2). Concerning numerical values strategically, companies will not disclose in private research programs more than has already been disclosed through other reports or medias. Therefore, the emissions section and the targets and initiatives category in the climate change management section, which are the numerical value data, are excluded from the following disclosure comparison analysis. The "risks and opportunities" section explains the individual contents of each company that can be analyzed to compare the disclosures in the first step. However, it is difficult to reveal the relevance of investor behavior statistically in the second step. Then the risks and opportunities section is also excluded in the analyses. In addition, the communication category in the climate change management section is excluded, because it is not relevant information to the substantial climate change prevention activities. Therefore, the question item to be analyzed in this study are the governance and the strategy of the climate change management" section. The CDP explained the details and the contents requested of each questionnaire in its survey guidance (Table 3). This table shows the information framework on corporate climate change management requested by institutional investors. According to the requirement on Table 3, climate change management information disclosed through the CDP is compared with the corporate compulsory or voluntary disclosures. As all subjects are text type information, after the text mining process is applied to them, quantitative comparison indices are calculated. However, concerning the investor behavior, texts or words, which are not included in the information framework, are not analyzed.

2.1.2 Text Mining Process in the CDP Responses

The corporate description answering in the information framework of CDP is different for each company. Therefore, the company original words of comparison are extracted by the following text mining process, firstly. Then they are compared with the words in other corporate disclosure media. This process is performed for each company.

① Extraction of basic words: According to Table 3, the basic words that can identify the topic of the question content are extracted from the CDP answer text of the company: e.g. "CSR Promotion Committee" for "Highest level of direct responsibility for climate change".

② Extraction of analysis words: The co-occurrence words with the basic words are extracted as analysis words of each company from the CDP answer text: e.g. "the Executive Committee" as an analysis word for "belongs under the highest authority" with "CSR Promotion Committee" as the basic word for "the highest authority".

③ Appearance comparison of the analysis words: Total of the analysis words that appeared in the corresponding context of securities reports, CSR reports and other reports of the company.

④ Calculation of disclosure comparison indices: Details are explained in the next subsection.

Table 3. Climate change prevention activities questionnaires

The most significant question	Details	Contents requested
Highest level of direct responsibility for climate change	Title and/or committee name of the person responsible	The relevant job title or committee name / the positioning in the company
Incentives provided for the management of climate change issues	Details	Incentive type / subjects / evaluation index of them
Risk management procedures with regard to climate change risks and opportunities	Details on management procedures	The frequency of monitoring/ the reporting results / the region considered / the future risk being considered
	Application-level of specified process	
	Priority determination method	
Climate change integrated into business strategy	Strategic planning process and details of strategy	Affecting process on the business strategy/ the climate change issue that affects the strategy/ the most important element among short term business strategies affected by climate change/ the most important element among long-term business strategies affected by climate change / strategic advantage over competitors/ the most important business decision made by the strategy considering climate change

Table 4. Disclosure comparison indices

Reference base		Formulae	Meaning
$T^k o$	Total responses	$\sum_{j}^{n_i} x_{ij}^k$	The total number of elements of disclosure vector represents the disclosure about the CDP request information.
$T^k d$	Total responses weighted by the allocated disclosure score	$\sum_{j}^{n_i} \delta_{ij} x_{ij}^k$	The total elements of disclosure vector weighted by the allocated points of the disclosure score emphasizes the satisfaction level of the information disclosure requirements of institutional investors.
$T^k s$	Total responses weighted by the degree of significance	$\sum_{j}^{n_i} z_{ij}^k . x_{ij}^k$	The total elements of disclosure vector weighted by the degree of significance conforms to the CDP questions requirements and ensures accuracy.
$T^k sd$	Total responses weighted by the degree of significance and allocated disclosure score	$\sum_{j}^{n_i} z_{ij}^k . \delta_{ij} x_{ij}^k$	The total elements of disclosure vector weighted by the allocated points of the disclosure score and the degree of significance emphasizes the satisfaction level of the information disclosure requirements of institutional investors and ensures the accuracy.

2.1.3 Disclosure Comparison Indices

The CDP shows the evaluation method in its survey guidance and evaluates corporate answers by "Disclosure score" and "Performance score". Companies can answer the survey referring the evaluation method. Concerning the disclosure score, the following variables and indices are determined.

$X_i^k = (x_{ij}^k)$: disclosure vector

$x_{ij}^k = 1$(disclosure)or 0 (non $-$ disclosure)

k: disclosure type, 0: CDP, 1: other report

i: questions,

j: disclosure element $j = 1, \ldots, n_i$

n_i : number of elements in the i-th question

δ_{ij}: allocated points of the disclosure score for the j-th element in the i-th question

$Z_{ij}^k = (z_{ijl}^k)$: significant disclosure vector

$z_{ijl}^k = 1$(disclosure)or 0 (non $-$ disclosure)

l: disclosure required element $l = 1, \ldots, m_i$

m_i : number of required characteristic elements in the i-th question

The more requirement characteristic elements the word has, the more significant it is.

The ratio of the compulsory or voluntary disclosures index T^1 to the CDP disclosure index T^0 defines R (=T^1 / T^0). As R is small, the additional information through the CDP is larger than the information on other sources.

2.1.4 Response Languages

The CDP surveys the same questionnaire to several groups of companies shown in Table 5. Companies can select a language to represent their answers to the questionnaire. All

answers are disclosed regardless of the language. If the companies are in the Global 500 group and they want their survey to be graded, they must answer in English. If the companies are in the Japan 500 group, they can answer in English or Japanese and they will still their survey results graded. Companies included in the CDP Japan 500 are divided into two groups; being included in the Global 500 (G500 hereafter) and not included in the Global 500 (NG500 hereafter). The strategic selection of the representation language by the company denotes the corporate stakeholders whom the company recognizes as important.

Table 5. CDP climate change reports 2013 by country.

Country reports in alphabet order		
Asia ex-Japan	DACH 350	Italy 100
Australia and New Zealand	France	Japan 500
Benelux 150	FTSE 350	Korea 250
Brazil 100	Global 500	Nordic 260
Canada 200	Iberia 125	S&P 500
Central and Eastern Europe	India 200	South Africa 100
China	Ireland	Turkey 100

2.1.5 Hypotheses on Additional Information

Whether the companies disclose the additional information through the CDP should be confirmed, firstly. The following null hypotheses are tested statistically.

H_{01}: The companies do not disclose any additional information through the CDP.

H_{02}: The additional information has no relation to the representation language.

H_{03}: The additional information has no relation to the corporate groups (companies included in the Global500 and companies not included).

The distribution of T^0 (the index of information disclosed through the CDP) and the distribution of T^1 (the index of information disclosed through other corporate reports) are compared to test H_{01}. The distribution of the ratio R (= T^1 / T^0) is also used as a supplementary test of their hypothesis.

The bivariate distribution $\mathbf{T}= (T^0, T^1)$ of the companies representing in English ($\mathbf{T}_E$) and the distribution of the companies representing in Japanese ($\mathbf{T}_J$) are compared to test H_{02} using the Mahalanobis' distance (MHN-D). The distribution of the ratio R (= T^1 / T^0) is also used as a supplementary test of the hypothesis.

The bivariate distribution $\mathbf{T}= (T^0, T^1)$ of the G500 companies ($\mathbf{T}_G$) and the distribution of the NG500 companies ($\mathbf{T}_{NG}$) are compared to test H03 using MHN-D. The distribution of the ratio R (= T^1 / T^0) is also used as a supplementary test of the hypothesis.

2.2 Relationship between Investor Behavior and Companies' Strategies: the Second Step

2.2.1 Variables for Multiple Regression Analysis

Multiple regression analysis (MRA) is applied to the shareholding ratios of institutional investors as the dependent variables indicating investor behavior and the disclosure comparison indices and response languages are the independent variables indicating the companies' response strategies in the climate change prevention activities research program (Table 6).

To eliminate spurious correlation, this study makes the default model constructed from control variables: size, profitability, financial position, stock price and industry.

2.2.2 Hypotheses on Investor Behavior

The strategies which each company can determine are the representation language and the additional contents of information disclosure through the CDP. Therefore, to reveal the relationship between investor behavior and companies response strategies in the CDP Japan500, the following null hypotheses are tested statistically.

H_{04}: The Institutional investors' shareholding ratio has no relation to the representation language.

H_{05}: The Institutional investors' shareholding ratio has no relation to the additional information.

With the institutional investors' shareholding ratio as the dependent variable, the default models are constructed using the control variables and the CDP evaluations as independent variables. The significances of the analysis models including the CDP response strategies are compared with them.

2.3 Sample Companies

The samples are the companies having responded to the CDP Japan500 in 2014. The CDP Japan 500 includes top 500 listed companies, however the responded companies are 160. They are classified into four groups by the representation language and in the Global500 or not (Table 7).

Table 7. The CDP Japan500 response companies

Japan 500	Response languages	
	English	Japanese
G500 (in Global500)	22	1
NG500(not in Global500)	100	46

Note: Five companies selected both languages.

Table 6. Variables

Indices	Variables	Source
Investor activities	Institutional investors' shareholding ratio (Ig) Japanese institutional investors' shareholding ratio (Ij)	Nikkei NEEDS database
CDP response strategies	Total responses Total responses weighted by the allocated points of disclosure score Total responses weighted by the degree of significance Total responses weighted by the degree of significance and the allocated points of disclosure score	Corporate reports and CDP
	Response language	
CDP evaluations	Global500 or not Disclosure score, Performance score	CDP Japan 500
Control variables	Market capitalization, Overseas sales ratio, Financial leverage or Capital adequacy ratio, Tobin's Q, Stock returns averages, Stock returns 3-year average, ROA 3-year average Stock price fluctuations (3 years), Small shareholders' equity Accounting standards (only Japanese standard or not) Industry dummies (manufacturing or not)	Nikkei NEEDS database

Table 8. Disclosure comparison between through the CDP(T^0) and other sources(T^1) by indices

		To				Td				Ts				Tsd			
		Mean	S.D.	t	U	Mean	S.D.	t	U	Mean	S.D.	t	U	Mean	S.D.	t	U
Governance	T^0	6.76	1.16	***	***	4.66	0.52	***	***	3.95	1.05	***	***	2.99	0.74	***	***
	T^1	2.55	1.98			1.91	1.44			1.68	1.35			1.41	1.14		
	R	0.39	0.31			0.42	0.32			0.41	0.31			0.45	0.33		
Risk management procedures	T^0	10.39	2.78	***	***	3.21	0.52	***	***	7.11	1.85	***	***	1.84	0.35	***	***
	T^1	1.35	1.51			0.29	0.37			0.93	1.00			0.20	0.24		
	R	0.12	0.12			0.09	0.10			0.13	0.12			0.10	0.11		
Strategy	T^0	9.92	1.86	***	***	2.25	0.40	***	***	8.08	1.81	***	***	1.87	0.40	***	***
	T^1	0.84	1.11			0.19	0.24			0.62	0.92			0.13	0.20		
	R	0.08	0.10			0.08	0.10			0.08	0.11			0.07	0.10		
Total	T^0	27.06	4.48	***	***	10.11	1.00	***	***	19.14	3.66	***	***	7.04	1.11	***	***
	T^1	4.73	3.56			2.37	1.74			3.23	2.51			1.74	1.35		
	R	0.17	0.12			0.23	0.17			0.17	0.12			0.24	0.17		

Note: Significant levels of the differences between CDP and others are 1%(***), 5%(**), 10%(*).

Table 9. Additional information and response languages

		To		Td		Ts		Tsd	
		Mean(SD)	Distance	Mean(SD)	Distance	Mean(SD)	Distance	Mean(SD)	Distance
Governance	T_E	6.65, 2.47	0.100	4.62, 1.89	0.066	4.11, 1.73	0.290	3.17, 1.48	0.705
	T_J	7.00, 2.73		4.75, 1.97		3.58, 1.58		2.61, 1.26	
	R_E	.393(.336)		.424(.337)		.409(.326)		.444(.335)	
	R_J	.380(.243)		.410(.284)		.428(.281)		.456(.318)	
Risk management procedures	T_E	10.88, 1.18	0.719	3.30, 0.27	0.529	7.46, 0.83	0.791	1.91, 0.19	0.589
	T_J	9.27, 1.73		2.98, 0.33		6.31, 1.16		1.68, 0.22	
	R_E	.101(.125)	***	.076(.111)	**	.104(.124)	***	.092(.127)	**
	R_J	.178(.098)		.107(.061)		.180(.091)		.129(.068)	
Strategy	T_E	9.85, 0.56	0.699	2.24, 0.13	0.656	8.43, 0.47	0.749	1.94, 0.10	0.569
	T_J	10.07, 1.47		2.28, 0.32		7.30, 0.97		1.71, 0.19	
	R_E	.054(.102)	***	.055(.099)	***	.057(.109)	***	.053(.106)	***
	R_J	.146(.082)		.139(.081)		.129(.086)		.112(.085)	
Total	T_E	27.38, 4.21	0.372	10.16, 2.27	0.066	20.00, 3.03	0.840	7.35, 1.76	0.993*
	T_J	26.33, 5.93		10.01, 2.59		17.19, 3.70		6.34, 1.67	
	R_E	.155(.130)	*	.226(.177)		.152(.132)	*	.234(.185)	
	R_J	.218(.089)		.254(.143)		.211(.091)		.256(.139)	

Note: Every significant level of the difference between Rs is the result of the nonparametric test.

Table 10. Additional information and corporate groups

		To Mean(SD)	To Distance	Td Mean(SD)	Td Distance	Ts Mean(SD)	Ts Distance	Tsd Mean(SD)	Tsd Distance
Governance	T_G	7.00, 3.62	0.581***	4.75, 2.71	0.613***	4.41, 2.46	0.681***	3.46, 2.10	0.881***
	T_{NG}	6.67, 2.17		4.63, 1.63		3.78, 1.40		2.83, 1.16	
	R_G	.538(.319)	*	.577(.324)	**	.532(.323)	*	.575(.336)	*
	R_{NG}	.335(.290)		.363(.301)		.372(.298)		.401(.315)	
Risk management procedures	T_G	12.15, 1.62	0.767**	3.54, 0.39	0.764**	8.00, 1.10	0.438**	2.01, 0.27	0.487***
	T_{NG}	9.75, 1.25		3.09, 0.25		6.79, 0.87		1.78, 0.17	
	R_G	.130(.129)		.107(.147)		.133(.119)		.128(.161)	
	R_{NG}	.123(.120)		.078(.076)		.125(.121)		.094(.090)	
Strategy	T_G	10.23, 1.31	0.349	2.31, 0.28	0.307**	8.46, 1.12	0.622*	1.96, 0.24	0.643**
	T_{NG}	9.81, 0.67		2.23, 0.15		7.94, 0.44		1.84, 0.09	
	R_G	.126(.134)		.119(.130)		.134(.144)	*	.126(.143)	*
	R_{NG}	.066(.089)		.067(.086)		.058(.084)		.051(.077)	
Total	T_G	29.38, 6.54	0.802	10.60, 3.38	0.950	20.87, 4.68	0.845*	7.76, 2.61	1.101*
	T_{NG}	26.22, 4.08		9.94, 2.01		18.51, 2.71		6.78, 1.42	
	R_G	.229(.130)	*	.325(.181)	**	.228(.146)		.333(.205)	
	R_{NG}	.154(.113)		.202(.151)		.149(.108)		.207(.146)	

Table 11. Investor behavior and response languages

Dependent variables	Ig			Ij		
Model	Default	Language	Global500	Default	Language	Global500
Adj-R^2	.117	.112	.122	.222	.219	.217
Intercept	1.314***	1.314***	1.307***	1.599***	1.598***	1.599***
English		.003			-.006	
G500			.029			-.001
Capital adequacy ratio	.002*	.002*	.002*	.001	.001	.001
ROA 3-year average	.007*	.007*	.007*	-.005*	-.005*	-.005*
Stock price fluctuations	.109***	.108***	.115***	.005	.007	.005
Accounting standard	.032*	.031*	.018	-.070***	-.068***	-.070***
Industry dummies	-.019	-.019	-.016	.019	.020	.019
Performance score	.023	.023	.023	-.019	-.018	-.019

Table 12. Investor behavior and additional information: Coefficients of additional information indices of 72 MRA models

Dependent variables		Ig T^0	Ig T^1	Ig R	Ij T^0	Ij T^1	Ij R
Governance	To			-.096			
	Td		-.025	-.089			
	Ts	-.028	-.019				
	Tsd	-.065**	-.028		-.081		
Risk management procedures	To				-.019	-.027**	-.267*
	Td					-.106**	-.363*
	Ts	-.018			-.016	-.048**	-.290*
	Tsd	-.103				-.188**	-.344**
Strategy	To	-.016					
	Td	-.076					
	Ts	-.018	-.040		-.013		
	Tsd	-.074	-.151				
Total	To		.		-.004	-.006	
	Td	-.028	-.019	-.165	-.019		
	Ts	-.011*	-.012		-.008	-.010	
	Tsd	-.053**	-.023				

Note: The numerical value is shown if the adjusted-R^2 of the corresponding additional information model is greater than that of the default model (Ig: .231, Ij: .124).

3. RESULTS AND DISCUSSIONS

3.1 Companies' Response Strategies in the Climate Change Prevention Activities Research Program

The disclosure scores in the CDP Japan500 distributed disproportionately in 2014. Through the CDP, the low scoring companies did not disclose useful descriptive information requested by the CDP. Neither, did they disclose this information on their corporate reports/websites. The analyzed companies are limited to companies that disclose information.

The test results of the first three hypotheses are shown in Table 8,9,10. Table 8 indicates that the companies disclose some kinds of additional information through the CDP. Table 9 shows that the additional information has related to the response language. Except for the results on the governance, the companies selecting English disclose more useful information through the CDP than the companies selecting Japanese. However, the MHN-Ds of the response languages are basically insignificant except for the total responses calculated by Tsd. It`s clear that selecting the response language has no effect on the institutional investors ' shareholdings ratios. Table10 denotes that the differences in the additional information between the G500 companies and the NG500 companies, specifically on the total responses Td. The G500 companies disclose more useful information through the CDP than the NG500 companies. In other words, the NG500 companies' disclosure on their reports/websites are more substantial and useful than those of the G500 companies for investors. The MHN-Ds of G500 are long and significant, therefore, the corporate climate change management is likely to affect the institutional investors' shareholdings ratios.

3.2 Relation between Investor Behavior and Companies' Response Strategies

The testing results of the last two hypotheses are shown in Table 11 and 12. Table 12 shows the principal results. Table 11 shows that the institutional investors prefer the G500 companies than the NG500 companies. However, it is possible to indicate that investors are aware of the response language. This means that the useful strategic disclosure for the NG500 companies is not responding in English but the contents. Table 12 shows that the additional information has some relations to the investor behavior. The institutional investors are not necessarily looking at the CDP answer content about climate change management. It means that the scoring system of the CDP is important for them to invest. On the other hand, the Japanese institutional investors are considered to be interested in the differences of the information content about risk management procedures between the CDP and other sources of the CDP. The additional information about risk management procedures will be valuable for them to invest.

4. CONCLUDING REMARKS

Through the CDP, the research program, companies disclose the additional descriptive information on their climate change prevention activities that is requested to disclose by institutional investors. This is the most important result obtained in this study. Especially, the information on the risk management and the strategy is not fully disclosed. In other words, the institutional investors require more disclosure in this area. This result means that disclosure on the CDP contains plenty additional information. In addition to that, Japanese institutional investors invest more on companies whose answer to the CDP has additional information.

The G500 companies disclose more useful information through the CDP, and the institutional investors prefer the G500 companies than the NG500 companies. This suggest disclosure through the CDP is evaluated by the institutional investors. And previous research indicates that the company should answer CDP and aim at the CDP high score for being invested by the institutional investors.

The institutional investors, however, are not necessarily looking at the CDP answer content. Therefore it is considered that the scoring system of the CDP is important for them to invest. In the case of the Japanese institutional investors, their investment behaviors are related to the corporate disclosure behavior on risk management procedure. Therefore, it is important for companies how to disclose their climate change management.

REFERENCES

CDP (2014) *CDP Japan 500 Climate Change Report. (n.d.).* Retrieved October 15, 2014, from https://www.cdp.net/en-US/Pages/HomePage.aspx

Corporate reports are obtained from each corporate website

Nihon Keizai Shimbun (2015) *Environmental Management Survey*

Nikkei Digital Media (2015) *,Nikkei Economic Electronic Databank System, Nikkei Media Marketing, Inc.,*

NTT DATA Mathematical Systems Inc., *Text Mining Studio* Ver. 5.2

Ogino, K., Tsuboi, A., Uryu, T., Murakami, T., Shibata, M., Takahashi, M. (2014) Relevance of GHG emission reduction activities and investors behavior: Information disclosure to major private surveys, *Proceeding of the 10th Conference of Information System Society of Japan,* A22, 6 pages*, http://www.issj.net/conf/issj2014-papers/*

Ogino, K., Tsuboi, A., Takahashi, M. (2015) Corporate Activity to Prevent Climate Change and Shareholder Structure: How Does CDP Connect Companies with Investors?, *PERTANIKA Journal of Social Sciences & Humanities,* Vol. 23, No. S, pp. 97-108,

Toyo Keizai Inc. (2015) *CSR Survey*