Introductory analysis of sustainable production in Southeast Asia and Japan: Corporate disclosure, green purchasing, and macro situation

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Discussion Paper Series

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Abstract

As an introductory analysis, this paper examines how to shift to the sustainable production in Southeast Asia (especially in Thailand). The current situation of environment and supply chain management in Southeast Asia is measly understood. This paper aims to understand the current situation and future issues with discussion of related policy issues in Southeast Asia. Research design of this study is divided into two parts; micro and macro viewpoints. From the micro viewpoint, we examine corporate disclosure and green purchasing/procurement by adopting neo-institutional theory and stakeholder theory. Regarding corporate disclosure, we use CDP data, whereas, regarding green purchasing/procurement, we use Toyokeizai corporate social responsibility data (focusing on Japanese firms). On the other hand, from the macro viewpoint, we examine the current situation following Porter hypothesis and the framework of green product development of Southeast Asian countries. Based on some macro statistics such as OECD statistics and World Bank data, we review the current situation and what should be discussed from these frameworks as remaining issues.

Preface

        Against the backdrop of 17 Sustainable Development Goals (SDGs) adopted by UN member states in 2015, this paper focuses on goal 12: sustainable consumption and production (SCP). SCP is a consumption and production pattern that increases net welfare (from economic activity) by reducing degrees of resource use and environmental burden, and improving quality of life. Specifically, SCP considers the following things: improvement of recourse and energy use efficiency, sustainable infrastructure, enhancement of access to basic service, afforestation, increase in appropriate jobs, improvement of quality of live, and so on. Realization of these issues will help to achieve the overall SDGs and related issues such as decrease in economic, environmental, and social costs, and poverty. To achieve goal 12, structured approach and cooperation will be needed through supply chain (from production to final consumption). For example, approaches for consumers includes consumer dialogue (e.g. environmental education), communication (e.g. international standard and environmental labeling), and so on.

        As an introductory analysis, focusing on the production side, this paper examines how to shift to the sustainable production in Southeast Asia (SA) (especially in Thailand). The current situation of environment and supply chain management in SA is less understood, which is a motivation of this study. This paper aims to understand the current situation and future issues with discussion of related policy issues in SA.

        Specifically, research design of this study is divided into two parts; micro and macro viewpoints. From the micro viewpoint, we examine corporate disclosure and green purchasing/procurement by adopting neo-institutional theory and stakeholder theory. Corporate disclosure and green purchasing/procurement are related to goal 12.6 and 12.7, respectively. While regarding corporate disclosure, we examine carbon and water disclosure, using CDP data, green purchasing/procurement, we analyze Japanese firms in 2015, using Toyokeizai corporate social responsibility (CSR) data. On the other hand, from the macro viewpoint, we examine current situation following Porter hypothesis and a framework of green product development of SA

countries. Based on some macro statistics such as OECD statistics and World Bank data, we review the current situation and what should be discussed from these frameworks as remaining issues.

This paper is structured into five chapters. From the micro viewpoint, Chapters 1 and 2 examine current situation of corporate carbon and water disclosure, respectively, in the world. Chapter 3 analyzes current situation of green purchasing/procurement in Japan in 2015. On the other hand, from the macro viewpoint, Chapters 4 and 5 analyze the current situation of SCP, comparing SA countries with Japan. Chapter 4 tests Porter hypothesis whereas Chapter 5 adopts the framework of green product development, focusing on Thailand and Japan.

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Chapter 1. Carbon Disclosure in response to institutional pressure in Japan and Southeast Asia

Naima Khatun, Michiyuki Yagi, and Katsuhiko Kokubu

Abstract

This study investigates the relationship between carbon disclosure level and institutional pressure to examine whether companies' participation in Emission Trading Scheme positively influences carbon disclosure level. Additionally, this study examines the relationship between climate change risk and carbon disclosure level. Using a sample of 66 companies of Southeast Asia and 1118 companies of Japan from CDP 2009 to 2015, we find that, both in Japanese and Southeast Asian companies, there is no relationship between companies' carbon disclosure level and participation in the Emission Trading Scheme. We also find that carbon disclosure level is not influenced by regulatory and physical risk; however, other climate change risk affects carbon disclosure level to some extent both in Japan and Southeast Asia. By adding new findings on the perspective of neo-institutional framework to the literature, we find the disclosure level of companies in Japan and in Southeast Asia is not affected by Emission Trading Scheme participation as well as by institutional pressure.

Key words: corporate disclosure; climate change; neo-institutional theory

JEL classification: M14, M41 Q56

1. Introduction

This is a well-proved statement that carbon emission is one of the major threats to the quality of sustainable consumption and production (SCP). Moreover, from a widely and commonly accepted definition of SCP, it can be derived that "the production and use of services and related products, which respond to basic needs and bring a better quality of life while minimizing the use of natural resources and toxic materials as well as the emissions of waste and pollutants over the life cycle of the service or product so as not to jeopardize the needs of future generations" (UNEP, 2015). In addition, sustainable development goal (SDG) 12.6 stimulates companies, particularly large and multi-national companies, to adopt sustainable practices and to incorporate sustainability information into their disclosure (UNEP, 2015).

In spite of these, there is no mandatory carbon disclosure regulation in most of the countries around the world. But some companies disclose carbon emission and reduction information voluntarily. Previous studies such as Rankin et al. (2011) stated that completeness of carbon disclosure is scarce and corporations infrequently disclose quantitative greenhouse gas (GHG) emissions. Similarly, Smith et al. (2008) added that climate change disclosure is still in an unsophisticated stage of development but increasing number of companies is responding voluntary to climate disclosure.

Previous studies confined to test companies' propensity to voluntarily environmental disclosures, the motivation of this study is to analyze how corporations concentrate on carbon disclosure and to what extent companies react to intuitional pressure concerning climate change disclosure.

The purpose of this study is to test the level of carbon disclosure and companies' response to some institutional pressures following neo-institutional framework. This is because neo-institutional theory places importance on societal institutions. Our study aims to examine the association between companies' carbon disclosure level and participation in Emission Trading Scheme (ETS). Moreover, the expansion of climate change regulation and disclosure is being shaped

by the prompt and exclusive growth of the role of institutional pressure as stated by neo-institutional theory.

Consequently, we focus on the carbon disclosure level between Southeast Asian (as developing and most emerging economy's countries) and Japan. With this purpose, we scrutinize the level and scoring of carbon disclosure in Southeast Asia and Japan using CDP dataset from 2009-2015. Additionally, the relationship between carbon disclosure level and companies' participation in ETS, and climate change risk level has been analyzed in our study.

In short, the level of carbon disclosure in Japanese companies is increasing consistently and the disclosure scores have started to increase in Southeast Asian companies since 2013 which remained positive till 2015. On the other hand, both in Japanese and Southeast Asian companies, there seem no relationship between companies' disclosure level and participation in ETS. Therefore, companies don't respond to institutional pressure. Regarding climate change risk, both in Japan and Southeast Asia, carbon disclosure level is not affected by regulatory or physical risk but other climate change risks influence carbon disclosure level to some extent.

There are five sections of this study. Section 2 reviews background of neo-institutional framework and studies of carbon disclosure. Section 3 explains research methodology. While section 4 shows the results and section 5 concludes with limitation and direction for future research.

2. Backgrounds

2.1 Neo-institutional framework

This study follows neo-institutional framework to examine the determinants of carbon disclosure. Recently, Ntim and Soobaroyen (2013) examined the relationship between corporate social responsibility (CSR) activities and corporate governance (CG) empirically. The authors analyzed large listed corporations from 2002 to 2009 in South Africa, following neo-institutional framework. Their results indicated that corporations with high government ownership, larger boards and diverse boards practice more CSR activities than corporations with high block ownership and

institutional ownership. Authors likewise provided new signal that suggests better-governed corporations are more prompted to pursue a more socially responsible program than their poorly-governed counterparts. Accordingly, authors also found positive relationship between internal CG quality and CSR practices and independent directors and CSR practices. Their findings finally concluded that a combination of CSR and CG practices has a strong positive effect on CFP as their study proved that CG positively controls the CSR-CFP connection.

Another study by Ntim and Soobaroyen (2013) stated that, the neo-institutional framework is a perspective which implies that the players in the market not only compete for capitals or efficiency but also seek for ultimate legitimacy and social acceptance. The authors also addressed 3 types of institutional pressure: coercive/regulative, normative, and cognitive/mimetic. Coercive/regulative factors comprise political pressures and the power of the government, normative factors arise from strong influence of the professions, and mimetic force is a result from reacting to uncertainty where in uncertainty is also an influential force that motivates organizations to become more similar to one another.

2.2 CDP and related studies of carbon disclosure

Some studies recently analyzed carbon disclosure, using CDP dataset (e.g. Luo et al., 2012; Matisoff, 2013). CDP is a UK registered independent not-for-profit organization. It has the largest collection globally of self-reported climate change, water and forest-risk data on behalf of investors since 2002. Its goal is to collect and distribute high quality information that motivates investors, corporations and governments to take action to prevent dangerous climate change and protect natural resources. The CDP secretariat works with the Global Reporting Initiative (GRI) to ensure this request and the GRI indicators are closely aligned and complementary.

Recently, Luo et al. (2012) and Matisoff (2013) used CDP dataset to investigate the level of carbon disclosure and convergence in carbon reporting empirically. Luo et al. (2012) examine 291 companies published in CDP 2009 and shown that larger firms prefer to disclose carbon information voluntarily even in the absence of required accounting and reporting standards because they are

aware of social responsibility. On the other hand, Matisoff (2013) conducted content analysis on CDP responses from 2003 to 2010 focusing on the convergence in carbon reporting and trends relating to carbon disclosure based on transparency over time across a wide range of emissions-related activities. Their results presented a mixed perspective regarding the transparency of firms relating to carbon management and accounting. As a result, firms have been increasingly likely to employ a standardized accounting methodology and report numerical data in response to Scope 1, 2, and 3 emissions queries. These suggest that firms are paying closer attention to carbon management and reporting.

Other studies investigate internal and external institutional pressures in carbon disclosure such as participating in ETS. Such as, Rankin et al. (2011) investigated 187 firms of ASX300 index in 2007, of which 80 companies (42.8 per cent) report GHG emissions and their analysis stated that better corporate governance is positively related with the extent of GHG disclosure. They also hypothesized the relationship between the firms participating in the ETS and the level of GHG disclosure but did not find any association. In addition, Luo et al (2012) found that the firms participating in the ETS disclose more about their carbon emission examining 291 firms reported by CDP 2009.

Hence previous studies show both positive and no association between ETS participation and carbon disclosure level in firms reported by CDP. Our study examines carbon disclosure level in response to external pressure of Southeast Asian and Japanese firms from CDP 2009-2015, which add new findings to the literature.

3. Research Methodology

The purpose of this study is to examine the degree of carbon disclosure across countries focusing on CDP carbon disclosure scores, and its trend both in Japan and Southeast Asian companies. We next investigate how institutional pressure affects carbon disclosure, focusing on participating in the ETS and awareness degree of climate change risks.

This study follows neo-institutional framework of Ntim and Soobaroyen (2013). In this framework, Ntim and Soobaroyen (2013) mentioned that, the neo-institutional framework is a viewpoint which suggests that the businesses focus on ultimate social acceptance along with striving for resources or efficiency. There are three types of institutional pressures: coercive/regulative, normative, and cognitive/mimetic. Among them, mimetic pressures arise from imitating another organization's configuration because of the belief that the structure of the latter organization is beneficial. Our study is conducted to examine the Southeast Asian companies' and Japanese companies' response to mimetic pressure.

This study conducts four types of analyses. First, we focus on the number of companies of Southeast Asia and Japan in CDP questionnaire 2009-2015. Second, the average disclosure scores of each country in Southeast Asia, and Japan have been shown. Third, number and percentage of participation in ETS along with disclosure scores have been displayed. Finally, we concentrate on the comparison between Japanese companies and Southeast Asian companies regarding climate change risks (regulatory, physical and other risk) and their average disclosure scores.

Regarding the dataset, we use CDP disclosure score for comparing the degree of corporate disclosure. The sample of our study consists all of the companies of Southeast Asian countries and Japan that could be retrieved from the index of climate change score and response of CDP from 2009 to 2015. We found 25 companies of Thailand, 20 companies of Singapore, 7 companies of Malaysia, 3 companies of Indonesia, 10 companies of Philippines, 1 company of Vietnam, and 1118 companies of Japan disclosing their carbon information as reported by CDP. Thus, in total, 66 companies of Southeast Asia and 1118 companies of Japan are the sample size of this research.

Regarding the ETS analysis, we use question number Q13.1 in 2013, 2014, and 2015, Q14.1 in 2012 and 2011, and Q21.1 in 2010 from CDP questionnaire. It is noted that in 2009 and 2010, there is no information regarding ETS participation in Southeast Asian and Japanese companies.

Regarding risk analysis, the risk identification has been divided into three categories: regulatory, physical and other. These data have been retrieved from CDP database in response to the

question of climate change Q5.1 in 2015, 2014, 2013 and 2011. In case of 2010 and 2009 the 'CC' question numbers are Q3.1, Q4.1, and Q5.1 (2009) and Q1.1, Q2.1, and Q3.1 (2010) respectively. It is noted that only publicly available information has been incorporated in this study.

4. Results

Table 1 represents the number of Southeast Asian and Japanese companies disclosing their information publicly in CDP from 2009 to 2015. It shows that in South East Asia, the observation numbers were fluctuating but tend to be increasing over years (from 5 in 2009 to 23 in 2015). On the other hand, in Japan, the observation numbers were consistently increasing (from 127 in 2010 to 178 in 2015) although the maximum was in 2009 (215).

Table 2 represents the observations, average scores and standard deviation of all the countries of Southeast Asia (individually and entirely), and Japan from the year 2009 to 2015. In Southeast Asia, the average scores were decreasing from 2009 to 2012 by 59.0, 56.0, and 43.5 respectively. The average scores were then increasing rapidly from 2013 to 2015 (53.9, 66.4 and 73.3 respectively). In addition, the standard deviations were increasing in Southeast Asian companies (from 9.9 in 2009 to 28.0 in 2015) except one falling in 2014 (23.0).However, in Japanese companies, it is noticed that the average scores increased every year consistently from 53.9 in 2009 to 91.1 in 2015. In contrast, the standard deviation in Japan also increased from 2009 to 2012 but fluctuations remained from 2013 to 2015.

Table 3 shows the comparison between Japanese companies and Southeast Asian companies in participation of ETS along with average disclosure score. In Southeast Asia, from 2011 to 2013, all companies had no participation in ETS, and the average scores were moderately flat in 2011 and 2013 (approximately 62) except for 2012 (46.6). In 2014 and 2015, only 11.76% and 17.64% firms participated in ETS, respectively. Noticeable differences were that there was a large difference between participation and no participation in ETS. The average scores in case of ETS

participation in 2014 and 2015 (88.5 and 73, respectively) are larger than in no ETS participation (63.46 and 68, respectively.

On the other hand, in Japan, there seems little difference in case of average scores between participating and non-participating firms in ETS. However, the numbers of firms in participation and non-participation in ETS vary apparent. For example, the number of ETS participation was 60 in 2010 and 65 in 2015, whereas the number of non-participation was 66 in 2010 and 112 in 2015.

Table 4 represents the comparison between Japanese and Southeast Asian companies in climate change risk and their average disclosure scores. The risks driven by changes in regulations, physical climate parameters, and other climate-related developments have different number of companies and score in different years. In Southeast Asia, 2 (33.33%) companies in 2009, 2 (33.33%) companies in 2011, 7 (63.63%) companies in 2012, 15 (88.23%) companies in 2013, 11 (64.70%) companies in 2014 and 17 (73.91%) companies in 2015 identified that they have regulatory risk which may affect their business operation. If we look at the average disclosure scores of the companies facing regulatory risks, the average disclosure scores were 69, 70, 51.14, 60.18, 69.9 and 49 in 2009, 2011, 2012, 2013, 2014 and 2015, respectively. Inversely, average disclosure scores for the companies not facing regulatory risk were 44.5 in 2009, 57.66 in 2011, 50 in 2012, 69.5 in 2013, 63.6 in 2014 and 56 in 2015. Therefore, there are mixed results. It seems no relation between regulatory risk and disclosure level in Southeast Asian companies.

Nevertheless, 4 (66.67%) in 2009, 4 (66.67%) in 2011, 10 (90.90%) in 2012, 17 (100%) in 2013, 13 (76.47%) in 2014, and 19 (82.60%) in 2015 companies identified their physical risk. Correspondingly, the average disclosure scores for the companies identifying physical risk were 59.25, 58, 51, 61.61, 67 and 49 in 2009, 2011, 2012, 2013, 2014, and in 2105 which were fluctuated rather than consistency like the number of companies. Conversely, average disclosure scores for the companies not facing physical risk are 39.5 in 2009, 40.5 in 2010, 0 in 2012 and 2013, 71.66 in 2014 and 59 in 2015. Companies that were facing physical risk disclose more from 2009 to 2013 but less in 2014 and 2015 than the companies not facing physical risk. Hence, it seems also mixed result which represents no relation between physical risk and disclosure level in Southeast Asia.

Regarding other climate change risk, the numbers of companies which that identified the risk are 4 (66.67%) in 2009, 4 (66.67%) in 2011, 7 (63.63%) in 2012, 13 (76.47%) in 2013, 11 (64.70%) in 2014 and 17 (73.91%) in 2015. Disclosure scores were 59.25 in 2009, 58 in 2011, 51.28 in 2012, 59.09 in 2013, 64 in 2014, and 52 in 2015. On the other hand, average disclosure scores for the companies that were not facing other climate change risks are 39.5 in 2009, 40.5 in 2011, 49.67 in 2012, 51.33 in 2013, 76.6 in 2014 and 47 in 2015. This indicated that except in 2014, companies having other climate change risk disclose more. In Japan, regarding regulatory risk, the numbers of companies which identified the risk were 116 (92.8%) in 2009, 105 (83.33%) in 2010, 137 (98.56%) in 2011, 140 (97.90%) in 2012, 149 (98.67%) in 2013, 161 (98.17%) in 2014, and 169 (95.48%) in 2015. Disclosure scores of the companies facing regulatory risk were 8.34 in 2009, 47.23 in 2010, 64.37 in 2011, 61 in 2012, 76.87 in 2013, 83.21 in 2014, and 92.42 in 2015. Inversely, average disclosure scores for the companies not facing regulatory risk were 12.55 in 2009, 54.95 in 2010, 58 in 2011, 61.33 in 2012, 82 in 2013, 70 in 2014, and 56 in 2015. There seem diversified results as in some years companies having regulatory risk disclose more and in some years companies not having regulatory risk disclose less. Thus, there seems no relation between regulatory risk and disclosure level in Japanese companies.

Regarding physical risk, the numbers of companies which identified physical risk were 108 (86.4%) in 2009, 89 (70.63%) in 2010, 116 (83.45%) in 2011, 123 (86.01%) in 2012, 136 (90.06%) in 2013, 150 (85.36%) in 2014, and 159 (89.83%) in 2015. Correspondingly, average disclosure scores of the companies having physical risks were 8.78, 42.80, 64.42, 61.17, 77.55, 82.77, and 93.96 from 2009 to 2015, respectively. These scores also show the same result as in regulatory risk where the disclosure level were increasing with the increase of companies facing physical risk except in 2012 where the score falls to 61.42 from 64.42 in 2011. If the attention is focused on the disclosure scores of the companies not having physical risk, it were 6.65 in 2009, 43.92 in 2010, 63.65 in 2011, 60 in 2012, 71.53 in 2013, 89.12 in 2014 and 69.43 in 2015. Therefore, no consistent outcome is noticeable in case of physical risk too, and there seems no relation between physical risk and disclosure level in Japanese companies.

Regarding other climate change risk, the numbers of companies which identified other risk were 109 (87.2%) in 2009, 85 (67.46%) in 2010, 99 (71.22%) in 2011, 117 (81.81%) in 2012, 135 (89.40%) in 2013, 140 (85.36%) in 2014, and 149 (84.18%) in 2015. Accordingly, average disclosure scores related to other climate change risks were 8.09, 46.90, 64.37, 60.83, 77.04, 83.51, and 93.96 in 2009, 2010, 2011, 2012, 2013, 2014, and 2015, respectively. This trend is similar to other two types of risk as the numbers of companies facing other climate change risks were increasing except in 2010 and disclosure level was also increasing except in 2012. On the other hand, the disclosure scores of the companies not facing other climate change risk were 7.06 in 2009, 42.61 in 2010, 64.07 in 2011, 61.81 in 2012, 76.06 in 2013, 78.61 in 2014 and 74.81 in 2015. It is observed that except in 2012, in all other years' companies having other climate change risk disclose more than the companies not facing other climate change although in some years the differences were negligible. There appears some relation between disclosure level and other climate change risk in Japanese companies.

In summary, it can be commented that the level of carbon disclosure scores is increasing every year in Japanese companies and fluctuating in Southeast Asian companies. On the other hand, regarding the companies' participation in ETS and climate change risks, it found that companies do not respond much in case of institutional pressure. Regarding climate change risk and average disclosure scores, it is summarized that both in Japanese and Southeast Asian companies, there seems no influence of regulatory and physical risk on companies' carbon disclosure level but other climate change risks affect the level of carbon disclosure to some extent and that is proved both in Japanese and in Southeast Asian companies.

5. Conclusions

The purpose of this study is to find out to what extent corporations concentrate on carbon disclosure and to check companies' response to some institutional pressures. This study also aims to find the relationship between carbon disclosure level and some climate change risk determinants.

This study conducts 4 analyses: 1) the number of companies in Japan and Southeast Asia which disclose their information in response to CDP questionnaire; 2) average disclosure scores and standard deviation of the Japanese and Southeast Asian companies; 3) comparison between Japanese and Southeast Asian companies in case of participation in ETS along with average disclosure scores; and 4) comparison between Japanese and Southeast Asian companies regarding climate change risk and their average disclosure scores.

The findings of this study are as follows. First, carbon disclosure level was increasing every year in Japanese companies but it is noticed that from 2012 the disclosure scores were increasing very rapidly. On the other hand, in Southeast Asian companies, the average disclosure scores were fluctuated from 2009 to 2012 and increasing promptly from 2013 to 2015. Second, companies both in Japan and Southeast Asia didn't respond to institutional pressure as there seems no significant relationship between companies participate in ETS corresponding to their average disclosure scores. Third, regarding climate change risk, there seems no effect of regulatory and physical risk on the disclosure level of Japanese and Southeast Asian companies but in case of other climate change risk it is noticed that there is little relationship between companies' carbon disclosure level and other climate change risk.

This study contributes to neo-institutional theory by adding new findings considering comparative analysis of companies in Southeast Asia and Japan participating in ETS which reveals that companies in Southeast Asia and Japan do not respond to institutional pressure. Particularly mimetic pressure has been examined in this study. Our study contributes to Nitm et al. (2013) study assessing the relationship between external pressure (participation in ETS) and carbon disclosure level and finds no relationship between external pressure and carbon disclosure level.

Additionally, this study has some implications to investors, regulators, and policy makers in various ways. Investors can have some ideas from this study that Japanese and Southeast Asian companies do not response to mimetic pressure which may help them to take better investment decision. Regulators and policy makers will get some idea about the relationship of companies' carbon disclosure level and external institutional pressure which they can utilize in case of imposing

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new rules and regulations. Because, policy makers can check that companies in Japan and Southeast Asia do not response to external institutional pressure and based on this finding they can enforce new standard whether participation in ETS should be imposed as mandatory or voluntary rules.

Remaining issues are as follows. Our study contributes to neo-institutional framework by examining only mimetic pressure while other two parts of institutional pressure such as coercive pressure and normative pressure are not examined in this study. Future research may focus on the other features of neo-institutional framework such as coercive pressure (engagement with policy makers) or normative pressure (funding research organizations, engagement with trade association). Also, relationship between some other variables of scope 3 carbon emission such as business travel, employee commuting, processing of sold products and carbon disclosure level could also be examined in future research.

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Table1. Number of Southeast Asian and Japanese companies disclosing their information publicly in CDP from 2009 to 2015

Year	Indonesia		Thailand		Singapore		Malaysia		Vietnam		Philippines		Total	Japan	
	Ind.	Com.	Ind.	Com.	Ind.	Com.	Ind.	Com.	Ind.	Com.	Ind.	Com.		Ind.	Com
2009	–	–	1	2	2	2	1	1	–	–	–	–	5	21	215
2010	–	–	–	–	–	–	–	–	–	–	1	1	1	21	127
2011	1	1	2	2	1	1	1	1	–	–	2	2	7	42	139
2012	–	–	3	3	3	3	2	2	–	–	3	3	11	23	144
2013	–	–	2	3	–	–	–	–	–	–	–	–	3	22	151
2014	1	1	7	7	5	6	–	–	–	–	2	2	16	22	164
2015	1	1	6	8	6	8	2	3	1	1	2	2	23	31	178
Total	–	19	–	47	–	46	–	25	–	2	–	21	66	–	1118

Note: 'Ind' and 'Com' stand for industry and company, respectively.

Table 2. Carbon disclosure scores and standard deviation

Country	2009			2010			2011			2012			2013			2014			2015		
	obs	avg	s.d.	obs	avg	s.d.	obs	avg	s.d.	obs	avg	s.d.	obs	avg	s.d.	obs	avg	s.d.	obs	avg	s.d.
Indonesia	1	41.0	–	0	–	–	1	63.0	–	1	11.0	–	1	32.0	–	2	43.5	2.1	1	45.0	–
Malaysia	1	54.0	–	0	–	–	2	59.0	31.1	3	55.3	3.8	4	68.0	14.1	1	59.0	–	3	54.3	36.9
Philippines	2	56.5	2.1	0	–	–	1	28.0	–	3	30.7	19.9	2	34.5	29.0	2	60.5	9.2	2	53.5	23.3
Singapore	2	64.0	1.4	0	–	–	4	53.0	14.8	4	43.0	26.5	6	52.0	25.7	7	65.9	28.6	8	80.5	31.2
Thailand	5	62.6	11.3	0	–	–	2	69.5	0.7	2	62.5	0.7	5	57.0	34.8	5	80.2	18.1	8	81.8	19.7
Vietnam	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–	0	–	–
SA	11	59.0	9.9	0	–	–	10	56.0	17.9	13	43.5	21.6	18	53.9	26.2	17	66.4	23.0	22	73.3	28.0
Japan	59	53.9	15.9	102	60.5	16.0	203	61.6	19.0	218	66.1	19.4	209	73.6	17.9	214	78.3	20.2	173	91.1	14.4

Note: 'Obs' denotes the number of observations, whereas 'avg' and 's.d.' denote average and standard deviations of carbon disclosure scores, respectively.

Table 3. Comparison between Japanese and Southeast Asian companies in case of participation in ETS along with average disclosure scores

Year		South-East Asian Companies		Japanese Companies	
		Yes (ETS)	No	Yes (ETS)	No
2009	Average score	–	–	–	–
	obs	–	–	–	–
2010	Average score	–	–	47.43	49.62
	obs	–	–	60	66
2011	Average score	–	62.6	63.72	64.84
	obs	–	6	63	76
2012	Average score	–	46.63	67.44	69.73
	obs	–	11	58	85
2013	Average score	–	61.61	78.01	75.22
	obs	–	17	67	84
2014	Average score	88.5	63.46	79.50	79.38
	obs	2	15	69	95
2015	Average score	73	68	96.51	87.82
	obs	3	14	65	112

Table 4. Comparison between Japanese and Southeast Asian companies regarding climate change risk and their average disclosure scores.

Year		Southeast Asian companies						Japanese companies					
		Regulatory		Physical		Others		Regulatory		Physical		Others	
		Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
2009	Average score	69	44.5	59.25	39.5	59.25	39.5	8.34	12.55	8.78	6.65	8.09	7.06
	obs	2	4	4	2	4	2	116	9	108	17	109	16
2010	Average score	–	–	–	–	–	–	47.23	54.95	42.80	43.92	46.90	42.61
	obs	–	–	–	–	–	–	105	21	89	37	85	41
2011	Average score	70	57.66	58	40.5	58	40.5	64.37	58	64.42	63.65	64.37	64.07
	obs	2	4	4	2	4	2	137	2	116	23	99	40
2012	Average score	51.14	50	51	–	51.28	49.67	61	61.33	61.17	60	60.83	61.81
	obs	7	4	10	1	7	4	140	3	123	20	117	26
2013	Average score	60.18	69.5	61.61	–	59.09	51.33	76.87	82	77.55	71.53	77.04	76.06
	obs	15	2	17	–	13	4	149	2	136	15	135	16
2014	Average score	69.9	63.6	67.07	71.66	64	76.6	83.21	70	82.77	89.12	83.51	78.61
	obs	11	6	13	4	11	6	161	3	150	14	140	24
2015	Average score	49	56	49	59	52	47	92.42	56	93.29	69.43	93.96	74.81
	obs	17	6	19	4	17	6	169	8	159	18	149	28

Chapter 2. Water Performance Disclosure and Stakeholders: Trend and Relevance

Yaokun Liu, Michiyuki Yagi, and Katsuhiko Kokubu

Abstract

Goal 12 of Sustainable Development Goals and its target 12.6, how firms and what can be the matters for firms to adopt sustainable practice and to integrate sustainability information to their reporting cycle is interested to be investigated. This study expands former study of carbon disclosure, by focusing on water performance disclosure and examining whether their results can transferrable to water-related issues. This study analyzes 1) the awareness on water disclosure about companies, 2) the trends of water disclosure, and 3) the relevance of non-financial stakeholders and water disclosure. Using data of CDP's water projects from 2010 to 2015, this study confirms that regarding water disclosure, the trend of water withdrawals and discharges is decreasing, whereas water recycle and consumption tend to increase. The awareness of firms about water disclosure, such as requiring their key to do water disclosure increases year by year but still low in general. This study finds that all stakeholders are associated with water disclosure, and that regulator, local communities and employees act as important factors. Furthermore, stakeholder customers in developed countries and water utilities/suppliers in developing countries are also important for water disclosure.

Key words: corporate disclosure, water, stakeholder theory

JEL classification: M14, M41 Q56

1. Introduction

"On 1 January 2016, the 17 Sustainable Development Goals (SDGs) of the 2030 Agenda for Sustainable Development officially came into force" United Nations (2015a, 2015b). Over the next fifteen years, with these new goals that universally apply to all, countries will mobilize efforts to end all forms of poverty, fight inequalities, and tackle climate change. SDGs with 169 targets are broader in scope and go further than the Millennium Development Goals (MDGs) (the goals which were set in 2000, and successfully ended in 2015), by addressing the root causes of poverty, and the universal need for development that works for all people (United Nations Development Programme, 2015). The goals cover the three dimensions of sustainable development: economic growth, social inclusion, and environmental protection.

Regarding SDGs, this study examines sustainable consumption and production (SCP) of Goal 12 (ensure sustainable consumption and production patterns) in both developed and developing countries. Specifically, this study focuses on Target 12.6: encourage companies, especially large and trans-national companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle. The motivation of this study is what can be the matters for companies to adopt sustainable practices and to integrate sustainability information into their reporting cycle. Focusing on firms' environmental disclosure, environmental performance seems a practicable way. A number of previous literatures were focused on environmental (carbon) disclosure, whereas water disclosure appears to have lack of research in recent years and is valuable to be investigated. This study investigates the trends of environmental (water) performance disclosure from 2010 to 2015 and the relevance of non-financial stakeholders based on the former environmental (carbon) disclosure study; Guenther et al. (2016).

In short, this study finds that the number of companies who would like to take part in water disclosure tends to increase year by year. Although in specific categories of water disclosure it is not increasing all the time, the awareness of water disclosure of firms keeps rising over the years. Furthermore, no matter it is in developed or developing countries, non-financial stakeholder such as regulator, employee, and local communities act as important factor to water performance disclosure.

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While in developing countries, water utilities/suppliers seem also very significant in developed countries.

This paper is constructed in five sections. The next section contains a literature review of Gunther et al. (2016) and the introduction of CDP data. Section 3 explains our research methodology and provides some information and descriptive statistics about our sample. Section 4 discusses our results and section 5 draws conclusions.

2. Background

2.1 Stakeholder theory and corporate disclosure

In the environmental accounting field, the relationship between carbon performance and carbon disclosure is an important issue. This study follows the research framework of Guenther et al. (2016). Guenther et al. (2016) examined carbon disclosure from the viewpoint of stakeholder theory. Results of their study are about carbon performance disclosure and only transferable to climate-change issues. This study aims to expand their study to the wider field of environmental (water) performance or sustainability in general. Specifically, this study focuses on the awareness about water performance disclosure of companies, and the relationship between stakeholders and water performance disclosure, to see whether the conclusions of Gunther et al (2016) can transferable beyond climate-change issues and effect on water issues.

Stakeholder theory, as a very flexible socio-political concept, emerged with different interpretations distinguishing between managerial, legal, and ethical approaches. Building on the managerial view: business can be understood as a set of relationships among groups that have a stake in the activities that make up the business. Prior literature before Guenther et al. (2016) examined the relationship between environmental disclosure and environmental performance, often focusing on only financial market-oriented control variables and financial stakeholders. Instead, Guenther et al. (2016) analyzed the relevance of different non-financial stakeholder groups with environmental disclosure.

Applying Tobit regressions, Guenther et al. (2016) analyzed the relationship between carbon disclosure and the relevance of stakeholder groups: government, general public, media, employees, and customers, by building on a worldwide sample from the three major CDP reports from 2008 to 2011, resulting in a total sample of 3,631 observations. The five stakeholders' pressure can potentially affect corporate disclosure in the following reasons. Governments may be evaluators of corporate disclosure, seeking input on prospective legislation. General public may be interested in the carbon performance of businesses and can pressure the government to change environmental regulations. Further, as a consequence of increased public awareness about climate change, media may influence the degree of corporate disclosure through increasing audience attention. Again, employees may have also started to pay attention to a firm's disclosed carbon performance. Finally, many customers' conscience regarding climate change may have obliged companies to adopt pertinent policies and to report their carbon performance.

Guenther et al. (2016) found that 1) All stakeholders' (government, general public, media, employees, and customers) pressures affect carbon disclosure; 2) Only one stakeholder group (government) acts as a moderator for the relationship between carbon performance and carbon disclosure; and 3) corporate carbon performance acts as a moderator effect between stakeholder relevance and carbon disclosure.

2.2 CDP

CDP is a global not-for-profit organization, founded in 2000 and headquartered in London. It pioneers and provides the world's only global natural capital disclosure system of over 4,500 companies, representing over 50% of the market capitalization of the world's largest 30 stock exchanges, and 110 cities from 80 countries' report, share and take action on vital environmental information. CDP operates its global disclosure system on behalf of 767 institutional investors representing over a third of the world's invested capital. The insight it brings enables investors, companies, cities and governments to understand and act on the business case for reducing impacts

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on the environment and natural resources. CDP works to transform the way the world does business to prevent dangerous climate change and protect natural resources.

CDP's water program works to catalyze action to improve water security globally. A 40% global shortfall in supply is expected by 2030. Businesses as usual water management will put at risk $63 trillion or 1.5 times today's global economy. This water program motivates companies to disclose and reduce their environmental impacts, and accelerate the use of this data in multiple ways. It has been six years since CDP water project came into force in 2010. From CDP water project's data, information about different categories of water disclosure from a large amount of companies can be gathered. Thus, focusing on typical questions from each year's questionnaires and analyzing them can investigate the trends of change of water disclosure over years.

3. Methodology

While Guenther et al. (2016) examined about carbon performance disclosure and stakeholder issues; this study examines the degree of water performance disclosure and stakeholder's relevance for water issues in business activity. This study aims to expand Guenther et al. (2016) study findings to the wider field of environmental performance or sustainability in general. Considering Target 12.6 of SDGs, this study divides the sample into developed and developing countries, in order to find differences depending on economic conditions. This study investigates the trends of water performance disclosure over years from 2010 to 2015 by CDP water questionnaire. This study focuses on three issues: 1) the differences between developed and developing countries, by particular questions from CDP water project's questionnaires; 2) the awareness of companies about water performance disclosure related requirement of suppliers; 3) the relationship between stakeholders and water performance disclosure, distinguished by developed and developing countries, in order to compare the results with Guenther (2016).

Regarding the first analysis, there are 4 categories of water performance disclosure in CDP water projects (Table 1). These are water withdrawals, water discharge, water recycled, and water

consumption. Table 2 shows key questions for calculating water performance disclosure in this study. In questionnaires from 2010 to 2013, there are dichotomous disclosures (yes or no) of three out of four categories, where as there is no disclosure data about water consumption. While in 2014, all four categories are included in questionnaire, answers for which are numeric, in 2015 answers are also numeric but there are only three categories involved, except water recycled.

Regarding the second analysis (requirement of key supplier), this study uses questionnaires from CDP water questionnaire: W6.4 (2010), W3.3 (2011), W3 (2012), W3.3 (2013), W2.5 (2014), and W1.3 (2015). The questions from 2010 to 2015 is "do you require your key suppliers to report on their water use, risks and management?" and its answers are Yes/ No/ no answer.

Regarding the third analysis, this study uses W2.4a (2014) and W2.7 (2015) questions. The question is "which of the following stakeholders are always factored into your organization's water risk assessments?" Stakeholders are divided into customers, employees, investors, local communities, NGOs, other, other water users at local level (LL), regulators (LL), statutory special interest group (LL), suppliers, water utilities/suppliers (LL), and river basin management authorities (only in 2015). Its answers are divided relevant (included, included for suppliers/FA, not yet included) three types, not evaluated, and not relevant (explanation provided, included) two types. We focus on 'relevant, included' options to see the degree of relevance of each stakeholder.

Regarding developed and developing countries, sample firms are separated according to the List of Developing Economics published in International Monetary Fund (IMF) in 2015. The developed countries are Australia, Belgium, Canada, Finland, France, Germany, Hong Kong, Ireland, Israel, Italy, Japan, Luxembourg, Netherland, Norway, Portugal, Singapore, South Korea, Spain, Sweden, Switzerland, Taiwan, United Kingdom, and USA. The developing countries are Bermuda, Brazil, Chile, Colombia, Hungary, India, Indonesia, Mexico, Russia, South Africa, Thailand, and Turkey.

4. Result

4.1 Water performance disclosure

Table 3 shows the answers that are separated into four categories of water disclosure, which are water withdrawal, water discharge, water recycle, and water consumption. The percentage of firms with answer 'yes' is calculated. The higher percentage means the higher degree of water disclosure companies did. Total observation of companies tends to increase from 2010 to 2015. It implies that the awareness of water disclosure of companies keeps rising over the time. In general, the percentage of water withdrawals and discharges appear decreasing over time, whereas water recycle and consumption tend to increase.

Comparing each of the four items, the percentages of withdrawal are larger than the percentages of discharge, whereas discharge is larger than recycle in general. It indicates that companies from 2010 to 2013 paid more attention to the water disclosure in the order of withdrawals, discharge, and recycle. In 2014 and 2015, the trends of water withdrawal, water discharges, water recycle were similar each other as that from 2010 to 2013. However, the water consumption tends to be reported more than water discharge in 2014 and 2015. In addition, regarding developed and developing countries, comparing the percentage of total companies, companies from developing countries (97%, 86%, 58%, and 44%) seem more willing to disclosure their water performance than companies from developed countries (95%, 82%, 46%, and 35%).

4.2 Requirements of key suppliers

Table 4 shows the percentage of requirements of key suppliers for their water disclosure. The higher percentage means more companies require their key suppliers to disclose about water operations. From 2010 to 2015, the percentage of disclosure requirement of supplier increased from 25% to 36% in developed countries. On the other hand, the percentage of developing countries tends to be fluctuated, but relatively small (below 25% except for 2015). In total, it shows that more companies from developed countries (32%) are willing to do the requirement than the companies from developing countries (23%).

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4.3 Stakeholders

Table 5 and 6 shows stakeholder questions in 2014 and 2015 respectively. The upper side of the tables' shows developed countries and the lower side indicates developing countries. Regulators at the local level (65%), local communities (58%), employees (58%), customers (52%), and water utilities/suppliers (51%) were ranked by larger percentage in the developed countries in 2014. In the developing countries the highest degrees of relevance were also regulators at the local level (79%), employees (71%), local communities (69%), investors (69%), and water utilities/suppliers (57%). On the other hand, in 2015, the highest degrees of relevance in developed countries were employees (72%), regulators at the local level (70%), local communities (69%), investors (61%), and customers (59%). In developing countries the highest degrees of relevance were also regulators at the local level (73%), employees (71%), local communities (68%), investors (68%), and water utilities/suppliers (60%).

This ranking of percentage shows that in the developing countries in 2014 and 2015, the relevance of stakeholders and water disclosure were similar, where highest rates were regulator at the local level, employee, local communities, investors, and water utilities/suppliers. Whereas in developed countries, ranking changed slightly from 2014 to 2015 but the following four stakeholders, regulator at the local level, employee, local communities, and customers, tend to be in top five in both years. This indicates that non-financial stakeholder (regulator, employee, and local communities) acts as an important role to water issues. Note that these stakeholders do not necessarily affect water disclosure, but have close relationship with corporate activity with water issues. In developing countries, water utilities/suppliers seem also significant.

5. Conclusions

The purpose of this study is to investigate the trends of water performance disclosure over years from 2010 to 2015, and to expand former literature Gunther et al. (2016) to the wider field of environmental (water) performance or sustainability in general, to see whether the conclusions of

Gunther et al. (2016) is transferable beyond climate-change issues and effect on water projects. Considering Target 12.6 of SDGs, this study focuses on three points: 1) the differences of water disclosure between developed and developing countries, 2) the awareness of firms about water disclosure related requirements to their suppliers, and 3) the relationship between stakeholders and water performance disclosure, distinguished by developed and developing countries.

The results have the following tendencies. Regarding the first analysis, in general, the highest degrees of water disclosure were found in the order of water withdrawals, discharge, consumption, and recycle. In addition, we find that companies in developing countries seem to be more willing to disclosure their water performance than companies in developed countries. Regarding the second analysis, the results show that firms' water disclosure-related requirement of their supplier increased year by year in developed countries (from 25% to 36%), whereas in developing countries that seems fluctuating but relatively small (below 25% except for 2015). Regarding the third analysis, the results reveal that in recent years, the relevance of stakeholder and water disclosure in the developing countries has a similar tendency. That is, highest rates are regulator at the local level, employee, local communities, investors, and water utilities/suppliers.

Guenther et al. (2016) found that stakeholder groups (e.g. government GHG politics, the general public, the media, employees, and customers) are regarded as relevant stakeholders to whom the firms disclose their climate change related efforts. They found that firms headquartered in countries with stronger GHG politics (government), and more potential for the general public to influence the regulatory process disclose more carbon-related information. In this study of water issues, regulator at the local level, local communities also act as important factors to water performance disclosure. It means that the result of Guenther et al. (2016) about carbon disclosure also can be transferable to water-related issues.

Furthermore, Guenther et al. (2016) shown that employees and customers as stakeholders were positively associated with the carbon disclosure of firms. In this study, employees and customer act as important roles to firms in developed countries, whereas in developing countries only employees affect water performance disclosure in a higher degree. In addition, water

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utilities/suppliers (instead of customers in developing countries) play a significant role in affecting water disclosure.

Also, Guenther et al. (2016) revealed that government acts as a moderator for the relationship between carbon performance and carbon disclosure. In this study, local regulators and local communities are appeared as major relevance with water performance disclosure. However, this study does not examine whether they act as a moderator or not.

From this study, we consider some policy implications. Regarding SDGs 12.6, in order to achieve integrating sustainability information in firms' reporting cycle, water performance disclosure should not be ignored. Although the awareness of firms arises, water disclosure of recycle and consumption is still under-expectation. In addition, companies from developing counties should be encouraged to require their suppliers about water disclosure-related efforts. Because it cannot be a high-quality water performance disclosure without knowing the water performance disclosure of their raw material, which is provided by the suppliers. Policy maker (e.g. government) should do such encouragement to aware the importance of water related disclosure requirements in the developing countries.

Furthermore, non-financial stakeholders are always being important factors for firms' water performance disclosure. In order to encourage water disclosure of firms' performance in both developed and developing countries, the pressures of non-financial stakeholders are needed. Specifically, government should encourages stakeholders such as regulator at the local level, employee, local communities, and water utilities/suppliers in developing countries to give assessment towards firms, while encourage regulator at the local level, employee, local communities, and consumer in developed countries. These kinds of encouragement will do a great help to completing SDGs' target 12.6.

This study does not analyze the situation of water performance disclosure in certain companies. Thus, further study can be conducted to examine the relevance of stakeholders of certain companies.

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Table 1 CDP Water Questionnaires for analysis

Year	2010	2011	2012	2013	2014	2015
Withdrawals	W13	W7.1	W7.1	W7.1	W5.1	W1.2a
Discharges	W15	W8.1	W8.1	W8.1	W5.1	W1.2b
Recycle	W14	W7.2	W7.2	W7.2	W5.1	–
Consumption	–	–	–	–	W5.1	W1.2c

Table 2. Questions for Table 3

Year	Key questions
2010-2013	Are you able to provide data, whether measured or estimated, on water withdrawals/ discharge/ recycle/ consumption within your operations? Answers: Yes/ No/ No answer.
2014	*Please report the total withdrawal, discharge, and consumption and recycled water volumes across your operations for the reporting period.* Answers: *Numeric numbers*. (In order to keep consistent with the analysis of former years, in data analyzing part the author decide to consider numeric numbers disclosed by company as the answer 'yes')
2015	· Water withdrawals: *for the reporting year, please provide total water withdrawal data by source, across your operations* · Water discharges: *for the reporting year, please provide total water discharge data by destination, across your operations* · Water consumption: *for the reporting year, please provide total water consumption data, across your operations* · Answers: *Many different answer options for each question.* (In order to keep consistent with the analysis of former years, this study focused on Total disclosure, and considered the answers disclosed in total column as the answer 'yes'.

Table 3 Water performance disclosures in developed and developing countries

Group/Year	obs	Withdrawals	Discharges	Recycle	Consumption
Developed countries					
2010	133	92% (122)	91% (121)	42% (56)	–
2011	201	96% (193)	81% (163)	56% (113)	–
2012	245	98% (240)	82% (200)	58% (141)	–
2013	277	97% (269)	77% (214)	59% (164)	–
2014	278	95% (265)	76% (212)	69% (192)	78% (217)
2015	328	93% (306)	88% (290)	–	91% (298)
Total	1462	95% (1395)	82% (1200)	59% (666)	85% (515)
Developing countries					
2010	12	100% (12)	92% (11)	67% (8)	–
2011	29	100% (29)	79% (23)	72% (21)	–
2012	31	100% (31)	81% (25)	81% (25)	–
2013	45	96% (43)	82% (37)	73% (33)	–
2014	47	94% (44)	83% (39)	94% (44)	87% (41)
2015	63	98% (62)	95% (60)	–	94% (59)
Total	227	97% (221)	86% (195)	80% (131)	91% (100)

Notes: The percentage of answer 'Yes' in water performance disclosure. See Table 1 for question numbers in each year.

Table 4. Disclosure requirement for Suppliers (%)

Year	Developed countries		Developing countries	
	obs	%	obs	%
2010	133	25% (33)	12	25% (3)
2011	201	30% (60)	29	17% (5)
2012	242	31% (75)	33	21% (7)
2013	277	33% (91)	45	16% (7)
2014	280	29% (82)	47	32% (15)
2015	351	36% (127)	65	23% (15)
Total	1484	32% (468)	231	23% (52)

Table 5. Degree of association between stakeholders and corporate activity (2014)

Stakeholder	obs	Relevant, included	Relevant, included for suppliers/FA	Relevant, not yet included	Not evaluated	Not relevant, explanation provided	Not relevant, included	(blank)
Developed countries								
Customers	251	52% (130)	7% (18)	10% (25)	14% (36)	9% (23)	2% (4)	6% (15)
Employees	251	58% (145)	12% (30)	6% (15)	14% (34)	3% (8)	1% (2)	7% (17)
Investors	251	50% (126)	10% (24)	10% (24)	19% (48)	3% (8)	1% (3)	7% (18)
Local communities	251	58% (146)	20% (49)	5% (12)	9% (22)	1% (3)	2% (4)	6% (15)
NGOs	251	42% (106)	14% (36)	7% (18)	23% (57)	4% (11)	2% (5)	7% (18)
Other	251	4% (11)	1% (3)	<1% (1)	24% (60)	2% (5)	–	68% (171)
Other water users (LL)	251	38% (95)	20% (50)	9% (22)	22% (55)	3% (8)	2% (4)	7% (17)
Regulators (LL)	251	65% (163)	15% (38)	4% (9)	8% (20)	2% (4)	1% (2)	6% (15)
Statutory special interest groups (LL)	251	25% (63)	15% (38)	8% (20)	33% (84)	5% (12)	4% (9)	10% (25)
Suppliers	251	35% (87)	23% (58)	11% (28)	17% (43)	4% (11)	2% (4)	8% (20)
Water utilities/suppliers (LL)	251	51% (129)	19% (48)	6% (15)	11% (28)	4% (9)	2% (5)	7% (17)
Developing countries								
Customers	42	45% (19)	12% (5)	19% (8)	10% (4)	10% (4)	2% (1)	2% (1)
Employees	42	71% (30)	7% (3)	14% (6)	5% (2)	–	–	2% (1)
Investors	42	69% (29)	–	5% (2)	19% (8)	–	2% (1)	5% (2)
Local communities	42	69% (29)	12% (5)	7% (3)	7% (3)	2% (1)	–	2% (1)
NGOs	42	55% (23)	5% (2)	17% (7)	14% (6)	5% (2)	2% (1)	2% (1)
Other	42	10% (4)	–	–	17% (7)	2% (1)	2% (1)	69% (29)
Other water users (LL)	42	45% (19)	14% (6)	7% (3)	19% (8)	5% (2)	2% (1)	7% (3)
Regulators (LL)	42	79% (33)	10% (4)	–	10% (4)	–	–	2% (1)
Statutory special interest groups (LL)	42	38% (16)	5% (2)	21% (9)	21% (9)	7% (3)	2% (1)	5% (2)
Suppliers	42	33% (14)	14% (6)	21% (9)	14% (6)	10% (4)	2% (1)	5% (2)
Water utilities/suppliers (LL)	42	57% (24)	14% (6)	14% (6)	10% (4)	2% (1)	–	2% (1)

Table 6. Degree of association between stakeholders and corporate activity (2015)

Stakeholder	obs	Relevant, included	Relevant, included for suppliers/FA	Relevant, not yet included	Not evaluated	Not relevant, explanation provided	Not relevant, included	(blank)
Developed countries								
Customers	309	59% (182)	7% (22)	6% (20)	11% (33)	11% (35)	2% (7)	3% (10)
Employees	309	72% (223)	9% (27)	5% (15)	7% (22)	3% (10)	–	4% (12)
Investors	309	61% (189)	6% (19)	6% (19)	16% (49)	5% (15)	2% (5)	4% (13)
Local communities	309	69% (214)	13% (41)	5% (16)	6% (17)	3% (10)	<1% (1)	3% (10)
NGOs	309	49% (150)	13% (41)	7% (21)	19% (60)	6% (20)	2% (5)	4% (12)
Other	309	6% (20)	2% (5)	<1% (1)	28% (88)	5% (14)	<1% (1)	58% (180)
Other water users (LL)	309	50% (154)	17% (51)	6% (19)	17% (54)	6% (17)	1% (2)	4% (12)
Regulators	309	70% (216)	11% (35)	5% (14)	7% (21)	2% (7)	–	5% (16)
River basin management authorities	309	36% (110)	20% (63)	9% (27)	17% (51)	9% (28)	1% (4)	8% (26)
Statutory special interest groups (LL)	309	32% (100)	17% (51)	7% (22)	27% (82)	9% (29)	3% (8)	6% (17)
Suppliers	309	45% (139)	19% (60)	11% (33)	15% (45)	5% (15)	1% (4)	4% (13)
Water utilities/suppliers (LL)	309	55% (170)	19% (58)	6% (20)	9% (29)	5% (15)	1% (3)	4% (13)
Developing countries								
Customers	62	50% (31)	5% (3)	15% (9)	13% (8)	15% (9)	2% (1)	2% (1)
Employees	62	71% (44)	3% (2)	10% (6)	13% (8)	–	2% (1)	2% (1)
Investors	62	68% (42)	–	6% (4)	18% (11)	5% (3)	2% (1)	2% (1)
Local communities	62	68% (42)	11% (7)	8% (5)	8% (5)	3% (2)	–	2% (1)
NGOs	62	56% (35)	2% (1)	16% (10)	16% (10)	3% (2)	3% (2)	3% (2)
Other	62	10% (6)	–	2% (1)	23% (14)	11% (7)	–	55% (34)
Other water users (LL)	62	48% (30)	13% (8)	8% (5)	23% (14)	5% (3)	–	3% (2)
Regulators	62	73% (45)	6% (4)	11% (7)	5% (3)	–	–	5% (3)
River basin management authorities	62	53% (33)	5% (3)	15% (9)	16% (10)	5% (3)	–	6% (4)
Statutory special interest groups (LL)	62	35% (22)	3% (2)	15% (9)	31% (19)	6% (4)	3% (2)	6% (4)
Suppliers	62	35% (22)	13% (8)	19% (12)	23% (14)	3% (2)	3% (2)	3% (2)
Water utilities/suppliers (LL)	62	60% (37)	8% (5)	16% (10)	8% (5)	3% (2)	–	5% (3)

Chapter 3. Corporate governance and green purchasing and procurement in Japan: Empirical insights from a neo-institutional framework

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Abstract

This study aims to empirically examine how corporate governance affects green purchasing/procurement from the viewpoint of a neo-institutional framework. This study uses survey data from Toyokeizai Corporate Social Responsibility database, which consists of 1,007 Japanese firms observations of various industries in 2015. Regarding the board size, this study finds that board size is negatively related to green purchasing, indicating that Japanese company with smaller board size implements more green purchasing. Further, we find that board diversity is positively related to green purchasing; showing that increasing the number of female board members makes company to implement greener purchasing. On the other hand, regarding green procurement, this study finds that it does not affect much both board size and board diversity. These findings indicate that green purchasing is affected by both board size and board diversity in Japanese companies in 34 industries, which suggests that company that has smaller board size and a higher ratio of female board member tend to implement more green purchasing, leading to the achievement of Goal 12 of SCP and SDGs.

1. Introduction

The 2030 Agenda for Sustainable Development includes a set of 17 Sustainable Development Goals (SDGs) which was adopted on 25 September 2015. The SDGs build on the success of the Millennium Development Goals (MDGs) and aim to eradicate all forms of poverty, fight inequalities and tackle climate change by 2030. The purpose of the SDGs is to "call for action by all countries, poor, rich and middle-income to promote prosperity while protecting the planet" (United Nations, 2016). Among 17 Goals of SDGs, this study focuses on the sustainable consumption and production (SCP) of Goal 12. SCP is about "the use of services and related products, which respond to basic needs and bring a better quality of life while minimizing the use of natural resources and toxic materials as well as the emissions of waste and pollutants over the life cycle of the service or product so as not to jeopardize the needs of future generations" (United Nations Environment Programme (UNEP), 2016).

Among 11 targets under Goal 12, this study focuses on the target 12.7: promote public procurement practices that are sustainable in accordance with national policies and priorities. "The potential to affect SCP through sustainable public procurement is significant, since an increasing number of countries around the world consider the environmental and social impacts of their public spending and have implemented Sustainable Public Procurement or Green Public Procurement" (UNEP, 2015, p.37). Specifically, this study examines the green purchasing and procurement implemented by Japanese companies as sustainable procurement practices, using dataset from Toyokeizai corporate social responsibility (CSR) in 2015.

The purpose of this study is to investigate the determinants of implementing green purchasing/procurement from the viewpoint of corporate governance (CG). Since the final decision of implementation of green purchasing/procurement might be related to the board members in a company, this study focuses on the relationship between CG such as board size and board diversity. Specifically, this study examines how CG affects green purchasing/procurement from the viewpoint of neo-institutional theory; following Ntim and Soobaroyen (2013) study findings. The authors examine why CG drives CSR practices and how a firm's governance mechanisms drive its CSR

based on the neo-institutional theory. The authors also investigate the relationship between CG and CSR practices, and consequently examines whether CG can positively moderate the association between corporate financial performance (CFP) and CSR.

This study uses corporate data from Toyokeizai CSR database, which consists of 1,007 Japanese firms' observation of different industries in 2015. As proxy for CG, this study uses two CG indicators: total number of board members and a ratio of female board member. As CSR indicators, this study adopts two CSR indicators: the percentages of firms that implement green purchasing and procurement.

In summary, this study finds that board size is negatively related to green purchasing. Further, we find that board diversity is positively related to green purchasing. As of green procurement, this study finds that it is not related to two CG variables, because no correlation is found. These findings indicate that only green purchasing is affected by both board size and board diversity in Japan, suggesting that a company with smaller board size and a higher ratio of female board member tends to implement more green purchasing, leading to the achievement of Goal 12 of SCP and SDGs.

This paper is structured as follows. Section 2 reviews neo-institutional framework in terms of CG and CSR strategy. While section 3 discusses the methodology focusing on scatter plots and surveyed data, section 4 explains the dataset obtained from Toyokeizai CSR database. Section 5 shows the results about the relationship between CG and green purchasing/procurement. Section 6 concludes with a short summary of the results and implications.

2. Background

This study examines how corporate governance affect company's green purchasing/procurement, based on the framework of Ntim and Soobaroyen (2013). The authors examined why and how a company's internal CG might influence its CSR strategies based on the neo-institutional theory. The neo-institutional theory is that it has been successfully employed in

predicting the diffusion and/or imposition of a number of corporate practices at the national level, but has rarely been applied at the organizational level of analysis relating to CG/CSR.

Ntim and Soobaroyen (2013) also examined why and how the association between CSR and CFP might be intensified by CG. Their empirical findings were based on a sample of South African listed corporations from 2002 to 2009 in five main industries: basic materials, consumer goods, consumer services, industrials, and technology/telecoms. In the regression analysis, the authors made 8 hypothesizes and found that there is a significantly positive relationship between 6 relations: internal CG quality and CSR practices, government ownership and CSR practices, board size and CSR practices, independent directors and CSR practices, board diversity and CSR practices, and CG index and CSR-CFP relationship. On the other hand, the authors also found that there is a significantly negative relationship between the two relations: block ownership and CSR practices, and institutional ownership and CSR practices. The authors explained that CSR practices are low in the corporations with high block and institutional ownership, but high in corporations with high government ownership, and larger, diverse and more independent boards. The authors also concluded that a combination of CSR and CG practices has a strong positive effect on CFP, implying that CG positively moderates the CSR-CFP connection.

The reason why this study follows the neo-institutional framework of Ntim and Soobaroyen (2013) is that their methodology and analysis of CG and CSR relationship can be applied to our study about the association between CG and green purchasing/procurement in Japan. Specifically, this study focuses on their hypotheses 5 and 7.

The hypothesis 5 is that there is a positive association between board size and CSR practices. Ntim and Soobaroyen (2013) investigated how board size drives its CSR practice based on the neo-institutional theory. Following them, board size plays an important role for CSR practice because larger boards are associated with greater diversity in terms of stakeholder representation, which can enhance corporate reputation and image. In the results of analysis, the authors found that there is a positive effect of board size on the CSR practices.

The hypothesis 7 is that there is a positive association between board diversity on the

basis of ethnicity and gender, and the CSR practices. Following Ntim and Soobaroyen (2013), board diversity is important for a firm's CSR practices, because boards of diverse gender (and ethnic backgrounds) help to improve efficiency by connecting a firm to its external environment and attracting resources. In the results of their analysis, the authors found that board diversity has a strong positive relationship with CSR practices.

3. Methodology

This study aims to examine how CG is related to green purchasing/procurement, following the framework of Ntim and Soobaroyen (2013). Following Ntim and Soobaroyen (2013), two hypotheses have been tested in this study. One hypothesis is that there is a positive association between board size and the green purchasing/procurement. The other hypothesis is that there is a positive association between board diversity and the green purchasing/procurement. In the former hypothesis, this study examines whether board size such as the total number of board members is related to the green purchasing/procurement. In the latter hypothesis, this study examines whether board diversity such as the ratio of female board member is related to the green purchasing/procurement.

As of the definitions of green purchasing and green procurement, the green purchasing is the selection and buying of equipment, expendable supplies and office supplies that minimize impacts on the natural environment, while green procurement is the selection and buying of environmental friendly materials and manufacturing components which are necessary for manufactured goods. This study carefully examines the relationship between CG and green purchasing/procurement, using firm and industry average scores with Toyokeizai CSR data in 2015.

4. Data

Dataset of this study is obtained from Toyokeizai CSR database in 2015. This database

contains surveyed data of 1,305 companies (1,259 listed companies and 46 unlisted companies). Toyokeizai conducted questionnaire survey by sending questionnaire to all 3,580 listed Japanese companies and unlisted major companies and compiled CSR data. Toyokeizai conducted a CSR evaluation of each company to assess and publish each company's level of CSR engagement and adequacy. Each company is evaluated and assigned one of the five ratings (AAA, AA, A, B, and C) from the viewpoint of 4 main CSR areas such as 'human resources,' 'environment,' 'corporate governance,' and 'social contribution'. Among the CSR areas, there are 64 key questions on the basis of the questionnaire's results of total 33 industries and 1,325 responding companies.

Regarding green purchasing/procurement, this study uses questions 12 and 13 of environment data. Question 12 asks to what extent your company makes green purchasing (1: we make green purchasing based on the guideline of Green Purchasing Network (GPN); 2: we make green purchasing based on our original guideline; 3: we don't make green purchasing; 4: Others). Question 13 asks to what extent your company makes green procurement (1: we make green procurement based on our comprehensive guideline; 2: we make green procurement based on our partial guideline; 3: we don't make green procurement; 4: no business necessity; 5: others). In both question 12 and 13, this study adds up the number of companies which answer 1 and 2, compiling the data of green purchasing/procurement and making the percentage of companies by industry.

Regarding corporate governance variables, this study uses question 6 of CG data. Question 6 asks the situation in the appointment of the board members (1: the number of female board members; 2: the number of male board members; 3: the number of foreign board members; 4: a ratio of female board members). In question 6, this study uses two CG indicators. The first CG indicator is the total number of board members (female and male). The second CG indicator is the ratio of female board members. This study analyzes two hypotheses at the industry average level.

5. Results

Table 1 shows industry average scores for green purchasing/procurement and CG. The

number of observations is 1,007 in 34 different industries (33 TOPIX Sector Indices and unlisted companies). From Table 1, regarding green purchasing, we find that industries with the highest implementing percentage are air transportation (100%), electric power and gas (90.91%) and electric appliances (78.41%), while industries with lowest implementing percentage are securities and commodities futures (16.67%), real estate (20.69%) and services (22.08%). On the other hand, regarding the green procurement, Table 1 shows that industries with highest implementing percentage are electric appliances (80.68%), rubber products (80.00%), transportation equipment (72.73%) and electric power and gas (72.73%), while industries with lowest implementing percentage are mining (0%), securities and commodities futures (0%), other financing businesses (0%) and services (5.19%). Furthermore, the average industry scores for green purchasing and green procurement are 53.92% and 37.34% respectively. This indicates that more Japanese companies tend to implement green purchasing rather than green procurement, because of its CSR strategy or its business necessity.

Regarding board size, Figures 1 and 2 show the scatter plots of industry average toward green purchasing and procurement respectively. Correlation of board size and green purchasing and green procurement are −0.432 and 0.106, respectively (Figures 1 and 2). Figure 1 shows that there is a negative correlation between board size and green purchasing, and this correlation does not support our hypothesis (the hypothesis 5 of Ntim and Soobaroyen (2013)). Further, Figure 2 shows that there is no correlation between board size and green procurement, and hence this finding also does not support our hypothesis (the hypothesis 5 of Ntim and Soobaroyen (2013)). These findings indicate that the board size negatively affects the decision to implement green purchasing and does not affect much the decision to implement green procurement.

There are some outliers in Figure 1 such as air transportation (100%), electric power and gas (90.91%) and real estate (20.69%), while Figure 2 such as electric appliances (80.68%), rubber products (80.00%), electric power and gas (72.73%), and real estate (13.79%). Regarding these outliers, we consider that electric power and gas and real estate industries are not related to the association between board size and green purchasing/procurement, because there is no business

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necessity in these industries.

Regarding board diversity, again, Figures 3 and 4 show the scatter plots of industry average toward green purchasing and procurement, respectively. Correlation of board diversity and green purchasing and green procurement are 0.396 and 0.108, respectively, in Figures 3 and 4. Figure 3 shows that there is a positive correlation between board diversity and green purchasing, supporting our hypothesis and the hypothesis 7 of Ntim and Soobaroyen (2013). On the other hand, Figure 4 shows that there is no correlation between board diversity and green procurement, hence not supporting our hypothesis and the hypothesis 7 of Ntim and Soobaroyen (2013). These findings indicate that board diversity such as a ratio of female board member positively affects the firm's decision to implement only green purchasing, not green procurement.

In addition, Figure 3, we find that there are 4 types of typical industries in the relationship between board diversity and green purchasing: air transportation (higher board diversity and more green purchasing); securities and commodities futures (lower board diversity and less green purchasing); electric power and gas (lower board diversity and more green purchasing); and marine transportation (higher board diversity and averagely green purchasing).

In Figure 3, the outliers are air transportation (100.00%) and marine transportation (50.00%), while in Figure 4 are air transportation (50.00%) and marine transportation (50.00%). Regarding these outliers, we consider that transportation industry does not much affect the relationship between board diversity and green purchasing/procurement, because there is no business necessity in these industries. Also, regarding the outliers, Figures 1, 2, 3, and 4 explain that 4 industries such as air and marine transportation, electric power and gas, and real estate are not related to green purchasing/procurement.

6. Conclusions

The purpose of this study is to examine how CG affects the green purchasing/procurement, following the neo-institutional theory framework of Ntim and Soobaroyen (2013), based on the

dataset from Toyokeizai CSR database in 2015. This study finds that there is a negative correlation between board size and green purchasing, and that there is no correlation between board size and green procurement. This suggests that board size is negatively related to only green purchasing, since the companies which have smaller (larger) board size, the more (less) they implement green purchasing. This is probably because it is more difficult to control and manage the larger boards compared to the smaller boards. Also, we find that green procurement is not affected by board size, since the implementation of green procurement is strongly influenced by its industrial needs or characteristics.

Further, this study finds that there is a positive correlation between board diversity and green purchasing, but that there is no correlation between board diversity and green procurement. This suggests that board diversity is positively related to only green purchasing, not green procurement, since the more (less) company has board diversity, the more (less) company implement green purchasing. This is probably because "recruiting the female board members can bring diversity in ideas and opinions to board discussions" (Ntim and Soobaroyen, 2013, p.473). In addition, we find that board diversity is not related to implement green procurement, probably because of its industrial needs or characteristics, again.

This study contributes to the literature on CG-CSR relationship in Japanese companies in various industries. Regarding green purchasing, both board size and board diversity are considered to be important CG variables to achieve Goal 12.7 of SCP and SDGs, because there is a direct relationship between two CG variables and green purchasing. In addition, this study also contributes to the neo-institutional theory by adding new finding for Japanese companies. That is, board decisions to implement green purchasing are related to both board size and board diversity in Japanese companies in various industries.

The limitation of this study is the selection of CG variables. Following the framework of Ntim and Soobaroyen (2013), using other CG variables such as government ownership, block ownership, institutional ownership and independent directors will help us to find new results in the analysis of association between CG and green purchasing/procurement. The second limitation is that,

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we test only hypothesis 5 and 7 of Ntim and Soobaroyen (2013), and results might be different by testing other hypothesis of Ntim and Soobaroyen (2013).

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Table 1. Industry average scores of green purchasing/procurement and CG

| TOPIX Sector Indices	Obs	Implementing green purchasing (1+2)	Implementing green procurement (1+2)	Board size	Board diversity
Fishery, Agriculture & Forestry	2	50.0%	50.0%	16.00	0.0%
Mining	2	50.0%	0.0%	20.50	3.3%
Construction	48	54.2%	41.7%	20.81	1.6%
Foods	40	67.5%	52.5%	16.90	1.0%
Textiles and Apparels	22	50.0%	45.5%	30.82	0.9%
Pulp and Paper	9	66.7%	44.4%	26.89	3.0%
Chemicals	79	51.9%	51.9%	22.16	2.0%
Pharmaceutical	15	60.0%	46.7%	18.27	4.6%
Oil and Coal Products	3	66.7%	33.3%	18.67	0.0%
Rubber Products	10	60.0%	80.0%	39.60	0.0%
Glass and Ceramics Products	12	41.7%	33.3%	25.00	0.3%
Iron and Steel	12	58.3%	33.3%	17.83	2.5%
Nonferrous Metals	11	45.5%	54.5%	27.27	0.2%
Metal Products	20	55.0%	55.0%	21.15	0.7%
Machinery	57	54.4%	50.9%	21.65	4.7%
Electric Appliances	88	78.4%	80.7%	25.23	2.8%
Transportation Equipment	33	69.7%	72.7%	21.24	1.0%
Precision Instruments	16	62.5%	43.8%	21.50	0.8%
Other Products	28	53.6%	53.6%	19.50	2.9%
Electric Power and Gas	11	90.9%	72.7%	14.55	1.7%
Land Transportation	17	64.7%	17.6%	19.06	4.9%
Marine Transportation	2	50.0%	50.0%	18.00	11.3%
Air Transportation	2	100.0%	50.0%	8.50	16.7%
Warehousing and Harbor Transportation	12	41.7%	8.3%	18.92	0.0%
Information & Communication	69	36.2%	10.1%	21.43	1.4%
Wholesale Trade	94	51.1%	14.9%	16.32	2.8%
Retail Trade	90	27.8%	6.7%	22.76	0.8%
Banks	29	44.8%	3.4%	21.55	0.8%
Securities and Commodities Futures	12	16.7%	0.0%	22.50	0.0%
Insurance	8	50.0%	50.0%	40.50	1.4%
Other Financing Business	13	69.2%	0.0%	13.46	1.1%
Real Estate	29	20.7%	13.8%	44.93	2.9%
Services	77	22.1%	5.2%	23.04	2.5%
Unlisted companies	35	51.4%	42.9%	19.46	2.6%
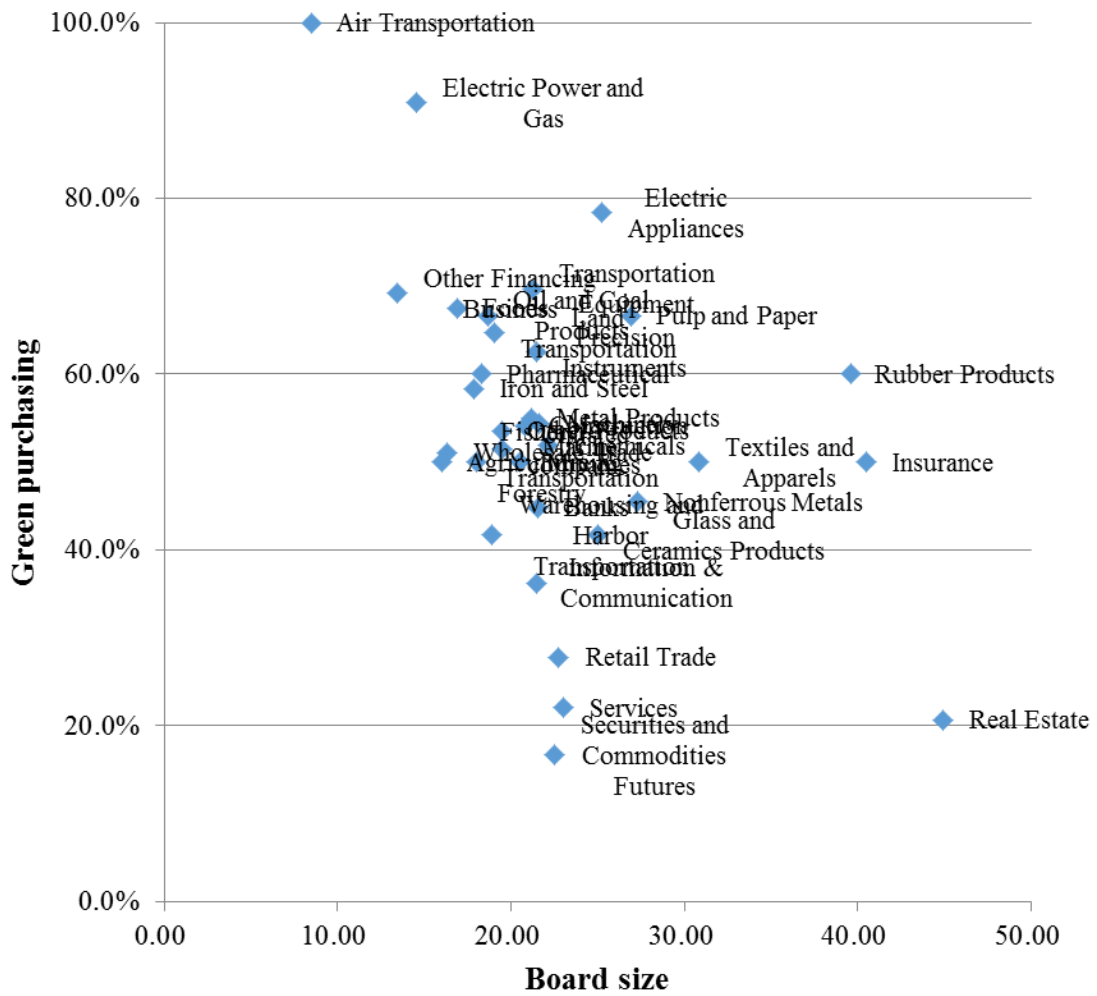
Figure 1. Board size and green purchasing
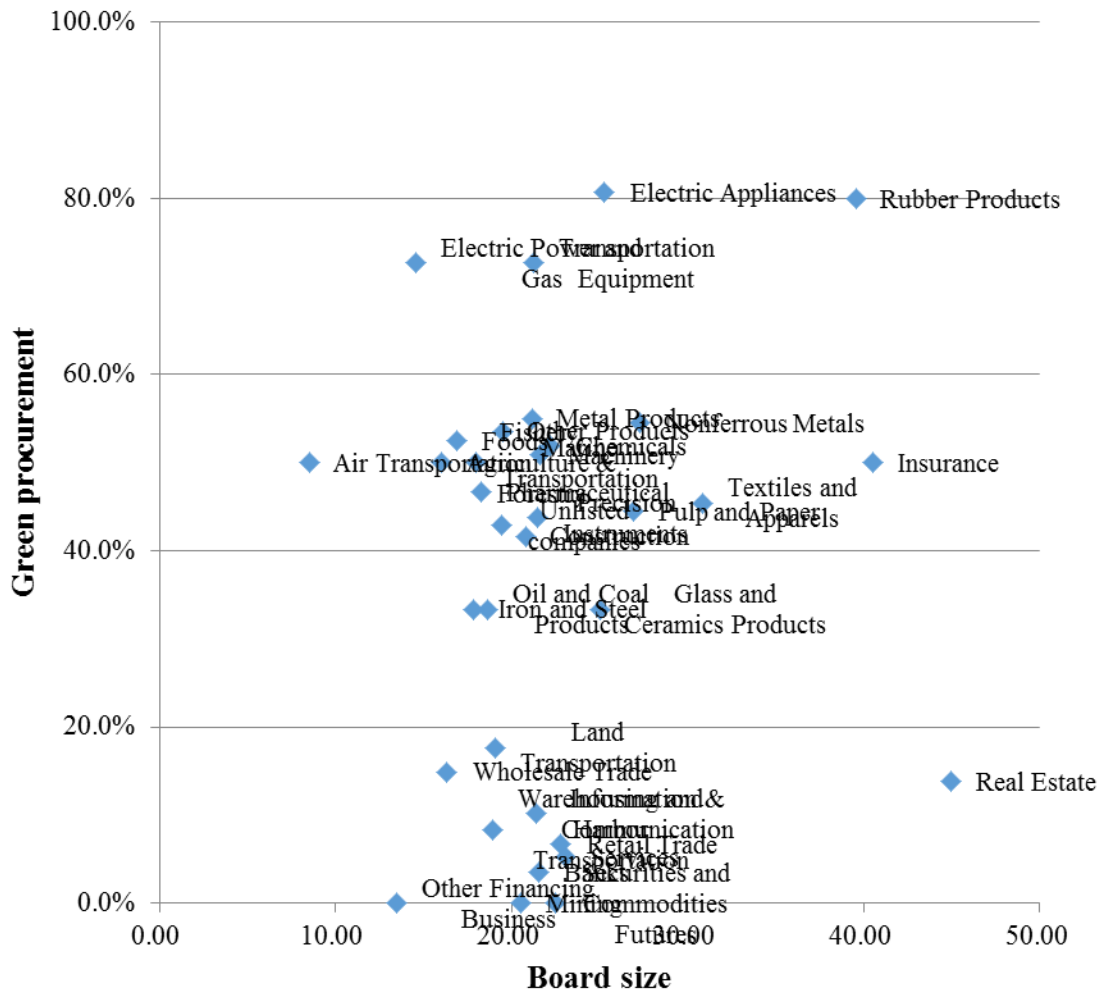
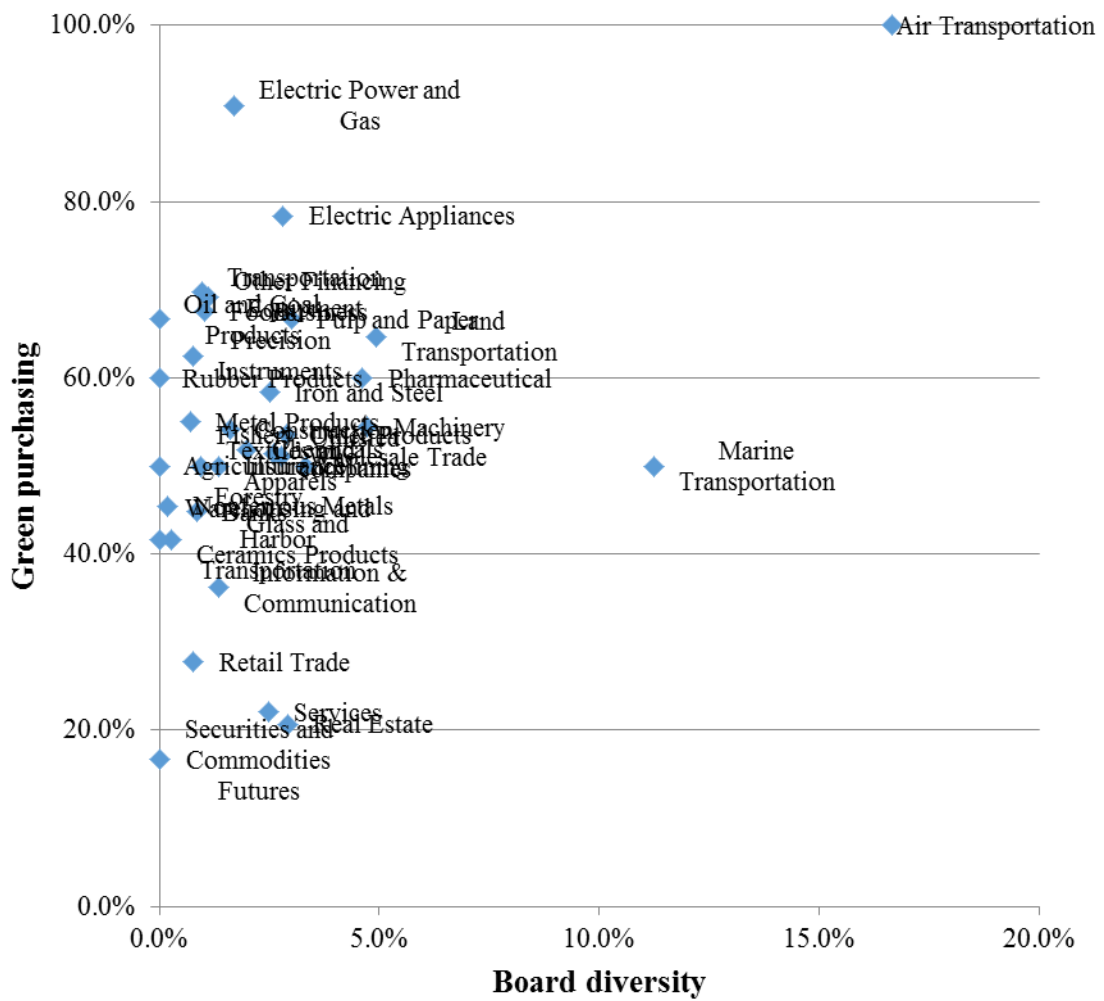Figure 2. Board size and green procurement
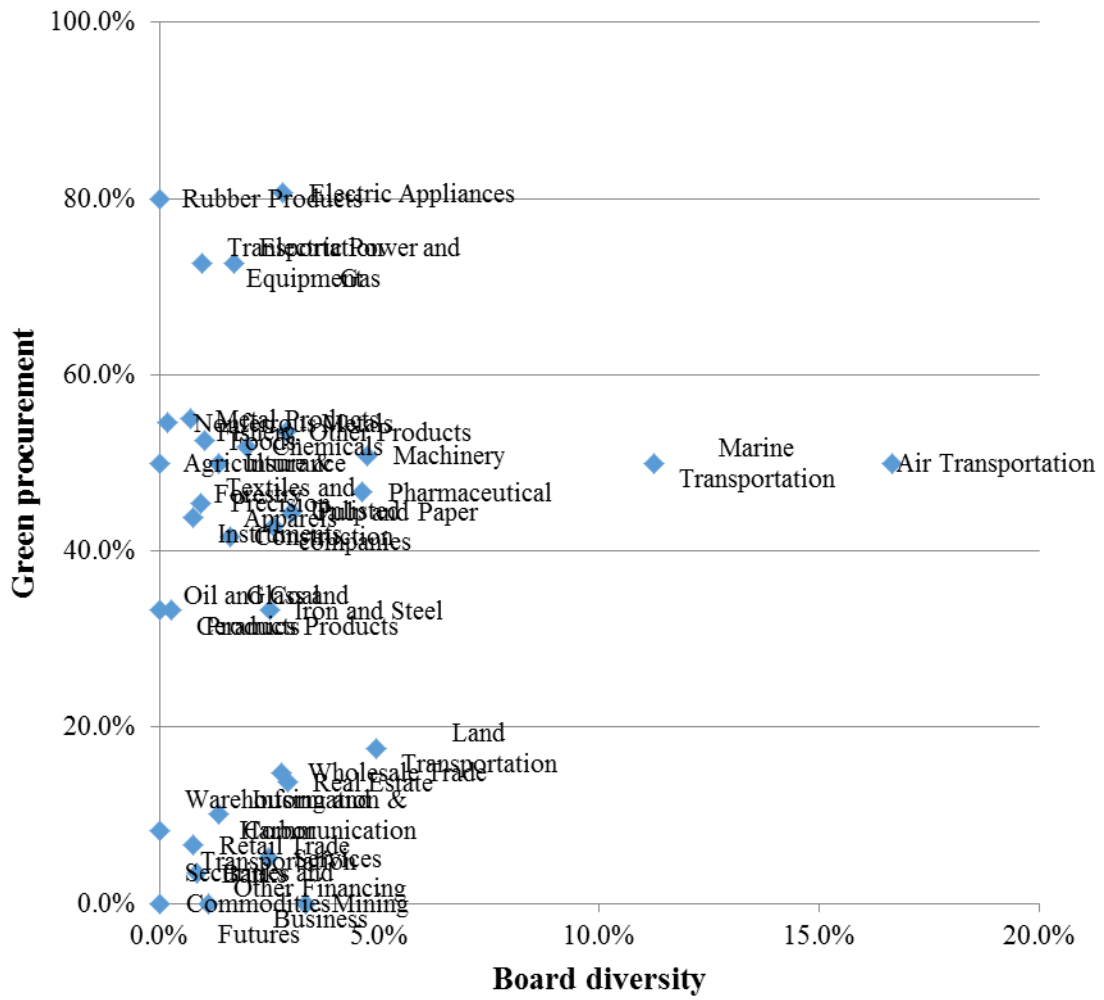
Figure 3. Board diversity and green purchasing

Figure 4. Board diversity and green procurement

Chapter 4. Sustainable Consumption and Production: The Porter Hypothesis testing in ASEAN and Japan

Wencheng Guo, Michiyuki Yagi, and Katsuhiko Kokubu

Abstract

The study investigates the relationship among environmental regulation, environmental performance, innovation and competitiveness in ASEAN countries, where sustainable consumption and production has become a concerned topic. We choose three ASEAN countries - Thailand, Philippines and Indonesia, also Japan, to test Porter Hypothesis. From the macro viewpoint, we test whether environmental regulation stimulates innovation and enhance countries' environmental performance and competitiveness to provide some evidence for policy makers when they make environment-related policies.

1. Introduction

The Sustainable Development Goals (SDGs), officially known as the 2030 agenda for Sustainable Development, are an intergovernmental set of 17 Goals with 169 targets. As a central component of the goals (SDG 12), achieving sustainable consumption and production (SCP) will require a set of indicators to monitor the impact of policies and initiatives promoting this shift in consumption and production patterns, as well as the institutional capacity to implement them effectively (United Nations, 2015). The need for monitoring to support national policies and increasing reporting requirements from various global initiatives on sustainable development issues is generating a significant burden on countries. This suggests the need to converge towards common statistical standards that can relate and interconnect with one another (UNEP, 2015).

The challenges faced in protecting the natural resources and advancing the material well-being of society, are tackled in different ways by the different member states of Association of South East Asian Nations (ASEAN). Some governments focus on enacting new laws and regulations at the national level. Others establish or strengthen requisite institutions. Joining international organizations and signing to international agreements and conventions, is another strategy which has been used. Since 1977, ASEAN has nevertheless embarked on regional initiatives aimed at tacking such challenges. Several agreements and frameworks have been drawn up. They are part of the process of regional cooperation and community building (Koh, 2009).

The motivation of this study is that ASEAN continues to be actively engaged in addressing global environmental issues in accordance with the principle of common but differentiated responsibilities. ASEAN is expected to reach a critical milestone by the end of 2015 through the launch of the ASEAN Community. This milestone event in Southeast Asia's regional integration process happens to coincide with the adoption of a new global set of development goals – the Sustainable Development Goals (SDGs) – which will replace the Millennium Development Goals (MDGs) from 2016 (Olsen et al., 2015). SDGs carry forward the unfinished MDG agenda in the first 7 Goals and build with cross-cutting issues such as economic growth, job creation, industrialization, inequality, and peace and justice (SDGs 8, 9, 10, and 16), and the ecological sustainability related

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goals (SDG 11-15), besides stronger means of implementation through a reinvigorated global partnership (SDG-17) (ESCAP, 2016).

This study examines whether economic regulations can lead to environment-related innovation and the innovation can improve environmental performance and how it is related to countries competitiveness at country level, including 3 countries in ASEAN, Thailand, Philippines and Indonesia, and make a comparison with Japan for each. This study follows Porter hypothesis framework. Porter Hypothesis mentioned that if properly designed, environmental regulations can lead to "innovation offsets" that will not only improve environmental performance, but also partially—and sometimes more than fully—offset the additional cost of regulation (Ambec et al., 2013). In addition, Porter and van der Linde (1995) explained that there are some reasons why properly crafted regulations may lead to these outcomes, for example, "regulation creates pressure that motivates innovation and progress" (Ambec et al., 2013).

This paper is organized as follows. Section 2 introduces the background of Porter hypothesis. Sections 3 and 4 explain the methodology and data, respectively. While section 5 shows the results, section 6 discusses and concludes the paper.

2. Background

2.1 Porter hypothesis

Porter hypothesis was formulated by the economist Michael Porter in an article in 1995 (Ambec et al., 2013). The hypothesis suggests that strict environmental regulation triggers the discovery and introduction of cleaner technologies and environmental improvements, the innovation effect, making production processes and products more efficient. The cost savings that can be achieved are sufficient to overcompensate for both the compliance costs directly attributed to new regulations and the innovation costs.

Porter hypothesis can be divided into the three types: weak, strong, and flexible versions (Ambec et al., 2013). Weak version is that properly designed environmental regulations may spur

innovation. This has often been called the "weak" version of the Porter hypothesis because it does not indicate whether that innovation is good or bad for firms. Strong version is that in many cases this innovation offsets any additional regulatory costs. That is, environmental regulation can lead to an increase in firm competitiveness. Finally, in what has been called the "narrow" version of the Porter hypothesis, it is argued that flexible regulatory policies give firms greater incentives to innovate and thus are better than prescriptive forms of regulations.

2.2 Review of recent environmental policies

Following Zhao and Schroeder (2010), we review recent environmental policies in Thailand, Indonesia, and Japan. Against the backdrop of the global financial crisis and economic recovery plans, many Asian countries have implemented stimulus packages, partly dedicated to 'greening' the economic structure. The effects of some of these measures are now visible in the recovery that is occurring across the region.

Thai government's "strong Thailand" programme is nominally worth around US$ 42 billion, or 16% of GDP over three years. In Thailand, the National Sustainable Consumption Strategies have been developed to accommodate the 10th National Economic and Social Development Plan, which was effective from 2006 to 2011. The plan aimed to achieve sustainable development via traditional Thai cultural and religious principles of moderation and sufficiency. On the other hand, Indonesia issued the plan 'Sustainable Consumption and Production Programme (under development)', to support for Indonesia National Action Plan on climate change.

South Korea and Japan have stimulus packages worth about 5.5% of GDP, similar in size to programmes in India, Philippines and Vietnam. Japan issued 'Fundamental Plan for Establishing a Sound Material-Cycle Society' in 2003, to restrain the consumption of natural resources; reduce material input and resource extraction; minimize water consumption; and reduce energy consumption.

3. Methodology

Porter hypothesis framework is useful to examine whether environmental regulations can stimulate innovation and enhance competitiveness. Using this framework, we can examine how Porter hypothesis works at the country level. We used Porter hypothesis that would lead us a way to achieve the goal of SCP by making reasonable environmental policies.

Following the Porter hypothesis, we examine 3 hypotheses. Regarding weak version of the hypothesis, we test (H1) environmental regulations can stimulate innovation. Regarding the strong version of Porter hypothesis, we test (H2) innovation can lead to competitiveness and (H3) there is a positive relationship between environmental innovation and a good environmental performance.

To test the 3 hypotheses, we examine four categories: environmental regulation, environmental innovation, competitiveness and environmental performance. We examine the relationship between environmental regulation and environmental innovation (H1), environmental innovation and competitiveness (H2), and environmental innovation and environmental performance (H3). We review the above 3 hypothesis from macro viewpoint in ASEAN countries and Japan from 2005 to 2013. By conducting these three hypotheses, we expect positive relationship between environmental regulation and environmental innovation is positive (H1), environmental innovation and competitiveness (H2), and environmental innovation and environmental performance (H3).

4. Data

This study uses OECD statistics and World Bank Open Data (Table 1). In terms of proxy for environmental regulations, we use environmental policy stringency index (EPS), environmentally related tax revenue (ETR), and fuel price (FP). Each indicator may have missing values since not all variables are obtainable in the countries. EPS is that a country-specific and internationally-comparable measure of the stringency of environmental policy, which is calculated by OECD statistics. Stringency is defined as the degree to which environmental policies put an explicit or implicit price on polluting or environmentally harmful behavior. The index ranges from 0

(not stringent) to 6 (highest degree of stringency). The index is based on the degree of stringency of 14 environmental policy instruments, primarily related to climate and air pollution. ETR, also calculated by OECD statistics (US$, 2010 USD PPP), that contains detailed qualitative and quantitative information on environmentally related taxes, fees and charges, tradable permits, deposit-refund systems, environmentally motivated subsidies and voluntary approaches used for environmental policy. Environmentally related taxes are an important instrument for governments to shape relative prices of goods and services. FP (US$ per liter) is used for Thailand because Thailand does not have specific environmental tax; we use the price of gasoline in replace (Deloitte Touche Tohmatsu Limited, 2015).

In terms of environmental innovation, we chose environmentally related patents per capita (PR). PR is calculated by selected environment-related technologies, divided by all technologies (total patents). Further, we use GDP per capita (GDPper) for competitiveness. Again, we use metric tons of CO_2 per capita (CO_2) to represent environmental performance which is a common and widely used indicator to measure the effect of country or regions environmental performance.

5. Results

Table 2 shows the variables related to Porter hypothesis in Japan, Indonesia, Thailand, and Philippines. Table 3 summarizes tendencies of each proxy in Table 2. In terms of environmental regulations, only Philippines shows a negative trend since the ETR is decreasing from 2005 but only increases in 2009 and 2012. On the other hand, the other 3 countries have a positive trend on this item. Further, Japan shows increasing trend) in environmental innovations exception to 2013. On the other hand, Indonesia and Thailand also rise, but relatively fluctuated in Philippines.

Nevertheless, in terms of competitiveness, the GDP per capita in ASEAN countries raises remarkably but slightly in Japan. Again, the environmental performance of Indonesia and Philippines is stable, while Japan has a positive trend, and negative trend in Thailand.

Following the above results, we conclude the three hypotheses as follows. In Japan, H1

has been accepted since the positive relationship between environmental regulation and innovation. H2 has also been accepted since the environmental innovation and competitiveness both increase slightly. H3 has been accepted since the environmental performance has also been improved a little bit. In the same way, we conclude the other 3 countries as follows. In Indonesia and Thailand, H1 and H2 are accepted but not in Philippines. None of the three countries show an apparent relationship between environmental regulation and performance, and therefore, H3 is not accepted.

6. Conclusions

The purpose of this study is to test whether good environmental regulations can lead to improved innovation, thus to positively influence countries' environmental performance or competitiveness, motivated by Porter hypothesis, to provide some evidence for policy makers when they make environment-related policies. This study finds that in Japan, there is a positive relationship between environmental regulation and a good environmental innovation (H1), environmental innovation and competitiveness (H2), and environmental innovation and performance (H3). On the other hand, in Indonesia and Thailand, it shows the similar result that H1 and H2 are accepted; however, in Philippines, there is no obvious trend that can verify our hypothesis. In addition, H3 is not accepted. One of the most interesting findings is that while environmental regulations of Philippines falls, the environmental performance also falls but with a relatively fluctuated innovation.

This study contributes to Porter Hypothesis theory by adding new findings considering comparative analysis of companies in ASEAN and Japan positively participating in SCP, which reveals that environmental stringency does have a positive influence on environmental innovation, competitiveness, and performance. It implicates that policy makers should be active in making environmental regulations because it may help to improve the environmental performance and enhance the country's competitiveness.

Remaining issues of this study are as follows. Firstly, even though environmental innovation can

improve competitiveness (in Japan, Thailand, and Indonesia), the trend of innovation is not apparent. Besides GDP per capita usually rises a lot among ASEAN counties these years due to their industrial development, the evidence that environmental innovation can directly lead to better competitiveness that is still weak. Secondly, according to Porter hypothesis, it is still unsolved that whether environmental regulations directly influence competitiveness and performance or it influences these two by affecting innovation. Finally, it is hard to make any conclusions for Philippines. In the future research, we need more available data to test the fluctuation on innovation as well as figure out the reason why ETR of Philippines goes down, which is different from any other countries.

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Table 1. Variables Explanation

Proxy	Variable	Name	Source
Environmental Regulation	EPS	Environmental Policy Stringency Index: from 0 (not stringent) to 6 (highest degree of stringency)	OECD stat.
	ETR	Environmentally related tax revenue (US$, 2010 USD PPP)	OECD stat.
	FP	Pump price for gasoline (US$ per liter)	World Bank
Environmental Innovation	PR	Environmentally-related Patents Ratio: = Selected environment-related technologies / All technologies (total patents)	OECD stat.
Competitiveness	GDPper	GDP per capita (US$)	World Bank
Environmental performance	CO2	CO_2 emissions, metric tons of CO_2 per capita (tons)	OECD stat.

Notes: OECD statistics <http://stats.oecd.org/>. World Bank Open Data <http://data.worldbank.org/>.

Table 2. Variables in ASEAN and Japan

Country	Year	EPS	ETR	FP	PR	GDPper	CO2
Japan	2005	1.67	583.21	–	0.077	35781.27	9.69
	2006	1.63	581.74	1.1	0.081	34075.98	9.63
	2007	1.69	580.59	–	0.082	34033.70	9.77
	2008	1.69	552.36	1.4	0.084	37865.62	9.42
	2009	1.73	543.15	–	0.102	39322.61	8.60
	2010	2.03	538.99	1.6	0.111	42909.23	9.13
	2011	2.71	–	–	0.115	46203.71	9.29
	2012	2.63	–	2.0	0.099	46679.27	–
	2013	–	–	–	–	38633.71	–
Indonesia	2005	0.44	–	–	0.054	1263.58	1.51
	2006	0.44	–	–	0.066	1590.18	1.51
	2007	0.44	–	–	0.063	1860.62	1.62
	2008	0.44	–	–	0.037	2167.86	1.75
	2009	0.44	–	–	0.089	2262.72	1.70
	2010	0.44	–	–	0.093	3125.22	1.81
	2011	1.10	–	–	0.070	3647.63	1.90
	2012	1.10	–	–	0.072	3700.52	–
	2013	–	–	–	–	3623.53	–
Thailand	2005	–	–	–	0.090	2874.43	3.89
	2006	–	–	0.7	0.074	3351.12	3.99
	2007	–	–		0.095	3962.75	3.99
	2008	–	–	0.9	0.092	4384.78	3.98
	2009	–	–		0.098	4231.14	4.20
	2010	–	–	1.4	0.158	5111.91	4.47
	2011	–	–		0.121	5539.49	4.53
	2012	–	–	1.6	0.081	5917.92	–
	2013	–	–	–	–	6229.17	–
Philippines	2005	–	22.37	–	0.204	1196.62	0.87
	2006	–	16.897	–	0.100	1395.21	0.77
	2007	–	14.75	–	0.080	1678.85	0.78
	2008	–	14.72	–	0.105	1929.13	0.84
	2009	–	15.35	–	0.183	1836.87	0.82
	2010	–	12.66	–	0.119	2145.24	0.88
	2011	–	13.79	–	0.096	2371.85	0.87
	2012	–	14.10	–	0.099	2604.66	–
	2013	–	12.93	–	–	2786.95	–

Table 3. Summary in ASEAN and Japan

	Environmental Regulation			Environmental Innovation	Competitiveness	Environmental performance*4
	EPS	ETR	FP	PR	GDPper	CO2
Japan	rise	stable	rise	rise slightly	rise slightly*3	rise slightly
Indonesia	rise	–	–	rise slightly*1	rise	stable
Philippines	–	fall	–	fluctuate*2	rise	stable
Thailand	–	–	rise	rise slightly*3	rise	fall

Notes:

*1: From 2011, however, it falls.

*2: It falls dramatically from 2006 but kept relatively stable then.

*3: It falls from 2011.

*4 Since we use metric tons of CO_2 per capita as an indicator to measure the performance, it is important to be noticed that a high degree of CO_2 emissions shows a negative performance. Therefore, the tendency shown in the table is the trend of performance but not CO_2 emissions.

Chapter 5. Green product development in Japan and Thailand:

Academic, business and consumer perspectives

Minhwa Kang, Michiyuki Yagi, and Katsuhiko Kokubu

Abstract

Recently, the concept for sustainable management and green product development has been gaining momentum comparing to the past. One of the important issues of green product development is how green product development is affected by the stakeholders. This study reviews the concept of green product development and analyze the green product development with three perspectives; academic, industry, and consumers. This study compares Japan and Thailand, and discusses the steps of development for green product of advanced countries and newly industrialized country.

Key words: Green product development; Sustainable consumption and production; Thailand and Japan

JEL classification: O53, Q55, Q56

1. Introduction

Comparing to past, the importance of recognition of green product development has been given prominence as the range of stakeholder has been wider with complicated business. The concept of sustainable management started to attract attention of business researchers, industry and customers. Green product development is the one of ways for sustainable management. According to Vinodh and Rajanayagam (2010), the main objective of green production system is decreasing environmental impact by merging product and product design effects with process planning and control in order to identify, measure, evaluate and handle the flow of environmental waste.

The study on sustainable management is famous in Japan and many studies contributed in this filed (e.g. Drieessen et al., 2013; Jasti et al., 2015) With regard to Thailand, the green product development is considered while the expansion business of multinational-company– especially in case of manufacturing company as labor cost becoming higher and higher. When they consider the business expansion to Thailand, main issue is to achieve the economic performance, however, now necessity of sustainable management and consumption is recognized. Therefore, it will be worth reviewing for multinational company SCP in Thailand.

With the rapid economic development, Thailand has severe economic problems that lead to serious problems. In the past, Thailand was an agricultural country. However, many globalization companies have expanded their business to Thailand and the structure of Thailand has started to transform to industrially development country. Therefore, green product development is essential concept for both countries for sustainable management.

The motivation of this study is "sustainable management" as it has become an important concept in business. One of the important issues of green product development is how green product development is affected by the stakeholders – consumers, business and academic. This study reviews the concept of green product development and analyzes the green product development with three perspectives; academic, industry, and consumers. By comparing to two countries (Japan and Thailand), we aim to discuss the steps of development for green product of advanced countries and newly industrial country –Japan and Thailand as case.

This paper is constructed as follows. Section 2 explains the background of study, and

section 3 introduces the data explaining present condition of two countries. Section 4 discusses the result and contribution.

2. Background

Though the importance of green product has been recognized, there is no specific definition for green product development. The definition suggested by academic field and researchers are unclear (Jasti et al., 2015). However, there is a framework to explain green product development proposed by Jasti et al. (2015). As there are many stakeholders, or green product development, it cannot be performed only business activity or industrial activity., This study explains green product development with other insights. For example, it is essential to seek stakeholder's commitment because of their high influencing abilities and expertise to impact organizational learning (Jasti et al., 2015).

The framework for green product development can be divided into 3 perspectives: academic, business (industry), and consumers. Nowadays, green concepts are well established in academic field. In this perspective, education is considered to play an important role for sustainable management (Brundtland, 1985, and many researches support the assertion (e.g., Durif, 2010; Drieessen et al., 2013; Johansson and Sundin, 2014; Mazar and Zhong, 2010). The recognition is needed regarding sustainable management and green product development – what the meaning of sustainable management is and why the meaning of sustainable management is important.

In terms of business (industry), green product development emphasizes "end of pipe technology" where the firms are aware of ecological issue through the process of production and product design. Green product development consists of eight stages of product development and pollution analysis which are the procedures to identify the environmental hazards, identify the sources of pollution during the product's life cycle and minimize the environmental impacts (Bhat, 1993). It is worth reviewing the R&D expenditure for both countries because R&D expenditure can be interpreted as willingness of company for innovation.

Significant investment in green R&D symbolizes that a company has integrated

sustainability into its core strategy. It serves as a strong indicator for investors who are betting on increasing consumer demand for green products. On the other hand, green patent can indicate the willingness and interest regarding environmental recognition of companies. The degree of green patents will be related to the green product development.

In terms of consumers, it is meaningful to review the green product development with consumer perspective. In past, consumers had considered just from two perspectives: product price and quality. Nowadays, however, the consumers' behavior on purchasing has been changed. The increased concern and feeling of responsibility for society have led to remarkable growth in the global market for environment-friendly products (Hunt and Dorfman, 2009). However, the specific key issues are waste and energy (Avalon et al., 2014). Waste problem in Thailand is one of big problems. The amount of trash has increased and the government has been emphasized on the importance of recycling. Government educated the importance of recycling to Thailand citizen. On the other hand, regarding energy, the decision for purchasing green product has been started with the recognition for importance of environment. Reviewing waste and energy literature, we may be able to see consumers' recognition level for environment and green product.

3. Methodology

This study compares two countries, Japan and Thailand, following green product development from three perspectives: academic, business (industrial), and consumers. From academic perspective, we focus on the number of universities in both countries because the number of university means the educational institutes for role of letting people know the importance of sustainable management and green product development. Further from business perspective, we examine R&D and environmental-related patents. Regarding environmental-related patents, we focus on 4 items; percentage (%) of all technologies, the number of inventions worldwide, inventions per capita, and percentage (%) of international collaboration of environmentally-related technology in all technologies. From consumer perspective, we review final energy consumption expenditure and waste for two countries.

Regarding waste, this study focuses on the recycling rate as proxy to the recognition for green product.

4. Data

For the academic perspective, the number of university under Ministry of Education, Culture, Sports, Science and Technology, Japan and Ministry of Education, Thailand are considered in this study. OECD and World Bank data have been used for R&D and patent, respectively. From consumer perspective, final energy consumption data is obtained from Ministry of Environment in Japan and Ministry of Energy in Thailand. Finally, waste data is obtained from statistics in Thailand and Japan.

5. Results

From academic perspective, Table 1 shows the number of universities in Japan and Thailand in 2012. It shows that there are more universities in Japan than Thailand, implying the more education institute the more people recognize the importance of green product development. We can assume that the educational infrastructure in Japan is prepared even more than Thailand.

In terms of business perspective, Table 2 shows R&D expenditure for both countries in 2012. R&D expenditure can be interpreted as willingness of companies for innovation. It shows that the expenditure for R&D of Japan is about 14 times as much as Thailand's expenditure. Further, Table 3 shows patent of Japan and Thailand from 1990 to 2012. It shows that Japan is a maturity country for patent related to the environment. However, it is interesting that the rate of development of environment-related technologies had been increased since 2000 in Thailand. With regard to international collaboration in the development of environment-related technologies, the tendencies for Thailand are similar with Japan. However, the rate is fluctuating with lower percentages.

From consumer perspective, Table 4 shows final energy consumption expenditure by energy source in Thailand from 2008 to 2012. It shows that energy consumption has been

constantly increased in Thailand. Again, the renewable energy consumption has been slightly increased indeed.

Table 5 and 6 show the amounts of waste in Thailand (2001-2008) and Japan (2013), respectively. The amount of trash has become increased and the government has been emphasized on the importance of recycling. From the recycling rate, we can assume the recognition for green product. The higher importance of water recycling indicates that consumers recognize the essence of potential environment impact. In Japan, the amount of waste for per person is about 958g per day, and the recycle rate is about 20.6% in 2013. The figure is similar with Thailand. However, there are little differences in trash disposal and recycling rate between Thailand and Japan. This implies that consumer recognition for green product development has little differences.

6. Conclusions

The purpose of this study is to examine and anticipate the green product development for Japan and Thailand. This study compares Japan and Thailand from the academic, business, and consumer perspectives.

This study finds that the education level in Japan is higher than Thailand. Moreover, the enrollment rate of university in Japan is 5 times higher than Thailand. From business perspective, there are many companies in Japan that have already tried to develop green product. However, Thailand suffers from the environmental problem as it is a newly industrialized country. It is the first stage for Thailand to recognize the importance for green product development. On the other hand, in Japan, R&D expenditure is 14 times higher than Thailand. There are many differences in the perspectives of business and academic. Therefore, there is potential for Thailand to develop the green product as the recognition for environment importance. However, in terms of consumer perspective, there seems little difference in trash disposal and recycling rate between Thailand and Japan. This implies that consumers' recognition for green product development has little difference.

The limitation of this study is the exact definition for green development should be established. Furthermore, the case of maturity country for sustainable management, should

consider for further research.

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Table 1. The number of University in Japan and Thailand in 2012

Country	National university	Public university	Private university	ETC	Total
Japan	86	95	597	–	778
Thailand	–	92	69	3	164

Table 2. R&D expenditure in Japan and Thailand in 2012

Country	R&D expenditure	as a % of GDP
Japan	133,226	3.39
Thailand	1,233	0.25

Units: US dollar

Source: OECD statistics <http://stats.oecd.org/>

Table 3. Environment-related patents in Japan and Thailand.

| | Development of environment-related technologies | | | | | | International collaboration in development of environment-related technologies | |
| | (1)% all technologies | | (2) % inventions worldwide | | (3) Inventions per capita | | (4) % collaboration in all technologies | |
Year	Thailand	Japan	Thailand	Japan	Thailand	Japan	Thailand	Japan
1990	0	5.47	0	30.1	0	13.96	–	6.02
1995	6.97	6.33	0.01	29.47	0.01	15.01	0	7.04
2000	1.94	7.24	0.01	31.57	0.01	26.31	5.95	8.37
2001	6.96	7.72	0.02	32.54	0.03	27.69	6.25	8.83
2002	5.95	7.53	0.01	30.77	0.02	28.29	9.62	8.47
2003	10.86	7.92	0.03	31.7	0.06	30.29	0	8.59
2004	4.01	7.81	0.01	31.28	0.02	31.93	0	8.54
2005	2.22	7.94	0.01	30.4	0.01	32.58	8.05	8.65
2006	10.49	8.22	0.03	28.62	0.07	34.02	5.95	9.17
2007	13.46	8.68	0.04	27.79	0.1	35.58	6.36	9.75
2008	9.81	8.29	0.03	23.83	0.08	31.28	9.7	9.64
2009	7.01	9.82	0.02	23.77	0.06	34.05	0	11.23
2010	22.97	10.63	0.06	24.76	0.19	40.64	12.63	13.23
2011	2.92	10.96	0.01	25.44	0.02	42.51	10.58	16.06
2012	4.86	9.48	0.01	23.46	0.03	34.68	4.72	11.71

Source: OECD statistics < http://stats.oecd.org/>

Table 4. Final energy consumption expenditure by energy source in Thailand (2008-2012)

Year	2008	2009	2010	2011	2012
Petroleum Products	1092113.58	960067.42	1106667.85	1220581.85	1311027.18
Electricity	397923.71	431165.4	474670.88	471604.11	550672
Natural Gas	53866.98	49271.84	68723.6	97665.65	122509.42
Lignite/Coal	28672.51	28610.66	29737.78	31195.45	31606.59
Renewable Energy	103990.79	115267.48	129369.72	119672.56	122626.95
Consumption growth	–	−5.50%	14.19%	7.27%	10.19%
Renewable energy growth	–	10.84%	12.23%	−7.50%	2.47%

Source: The ministry of energy in Thailand

Note: unit is THB Million. THB is the money unit of Thailand.

Table 5. Amount of waste in Thiland

Description	2001	2002	2003	2004	2005	2006	2007	2008
1. BMA (unit:)	9317	9616	9340	9356	8291	8403	8532	8780
2. Municipality and Pattaya	11903	11976	12100	12500	12635	12912	13600	14766
3. Sanitary distric	–	–	–	–	–	–	–	–
4. Out of Municipailty and santitary district	17423	17632	17800	18100	18295	18697	18200	17477
Total Waste generation (t/d)	36643	39225	39240	39956	39221	40012	40332	41023
Waste Recycle Amount (t/d)	6027	7123	7671	8493	8630	8740	8904	9239
%of generated waste	15.6	18.2	19.5	21.3	22	21.8	22.1	22.7

Source: Chiemchaisri, C., 2011, "Development of Waste Statistics to estimate Activity Data:

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Table 6. The present condition for waste in 2013 in Japan

The sum amount of waste	4487 miliion ton
The amount of waste for per person	958g
The rate for disposal	454 million ton
Decreased rate for disposal	98.60%
Reclamation rate	1.40%
Recycle rate	20.60%

Source: Ministry of environment in Japan <https://www.env.go.jp>

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