The Journal of Social Sciences Research
ISSN(e): 2411-9458, ISSN(p): 2413-6670
Special Issue. 5, pp: 984-994, 2018
URL: https://arpgweb.com/journal/journal/7/special_issue
DOI: https://doi.org/10.32861/jssr.spi5.984.994

Academic Research Publishing Group

Original Research Open Access

Corporate Accountability in Disclosing Carbon Information: Evidence from a Developing Nation

Faizah Darus*
Faculty of Accountancy and Accounting Research Institute, Universiti Teknologi MARA, Shah Alam, Selangor, Malaysia

Hidayatul Izati Mohd Zuki
British Telecom Malaysia, Kuala Lumpur, Malaysia

Haslinda Yusoff
Faculty of Accountancy, Universiti Teknologi MARA, Shah Alam, Selangor, Malaysia

Noraslinda Mat Aris
Faculty of Accountancy, Universiti Teknologi MARA, Shah Alam, Selangor, Malaysia

Abstract

The issue of climate change has been a significant concern globally both in the developed and developing economies. This study aims to uncover the quality of carbon information disclosed in a developing country i.e. Malaysia. A content analysis of the annual and sustainability reports of Top 100 companies in environmentally-sensitive industries in Malaysia over a two-year period in 2011 and 2014 was undertaken. The results revealed that the quality of carbon information provided by companies improved over the two-year period and the changes were significant. The companies were also beginning to translate quantitative details into monetary amounts. The dimension *Carbon reduction and costs* had the highest mean score for both years. The findings revealed that the construction industry had the lowest mean score for all dimensions in both years and this finding is a concern as activities of the construction industry are generally known to have numerous effects on the environment. The findings from the study revealed that companies are taking the initiatives to set carbon reduction targets to be achieved in the future, hence, a signal of enhanced corporate environmental accountability. Nevertheless, the overall low disclosure of carbon information may require the intervention from stakeholders to improve the quality of the report.

Keywords: Carbon; Disclosure; Environmentally-sensitive industry; Malaysia.

1. Introduction

Many stakeholder groups have now become more vocal in insisting companies to include social and environmental considerations into their decision-making process (Fatima *et al.*, 2015). Companies are being pressured to be accountable for the effect of their business operations on the society and the environment. As such companies are motivated to engage in strategic social responsibility practices to be consistent with demands from society and for economic reasons (Darus *et al.*, 2014). In the context of environmental issues, climate change has affected the environment, humankind, and economy in many ways including resulting in a decrease of food supply (Aaheim *et al.*, 2012; Ahmad and Hossain, 2015; Dyer, 2011). The urgency of climate change issue is getting the attention of both scientific study on climate and the policymakers on climate management (Munasinghe and Swart, 2005). One of the critical issues related to climate change is global warming which is caused by carbon emissions resulting in an increase of the world temperature (Ahmad and Hossain, 2015). The main contributors to carbon emissions are human activities which include the burning of fossil fuels, deforestations, and open burning (UNEP & UNFCCC, 2002). Therefore, it is critical nowadays for companies to manage their carbon emissions and to take the initiatives to inform stakeholders of their efforts in controlling carbon emissions through disclosure. Carbon disclosure is currently part of CSR disclosure as it involves the environment that the companies are operating in. According to King (2009), carbon information is required by stakeholders to aid decision making. Carbon disclosures have become an increasingly important medium and are often presented as a useful voluntary mechanism for internal and external decision making (Andrew *et al.*, 2011).

In Malaysia, carbon disclosure is on a voluntary basis with the introduction of MYCarbon initiatives in 2012 that encourages the voluntary disclosure of carbon information. However, many companies in Malaysia are unaware of the carbon agenda and its importance. Although, some companies have disclosed carbon information but the disclosure made could be mimicking the companies in Western countries instead of trying to curb carbon emissions (Amran and Siti-Nabiha, 2009). Carbon disclosure is vital as the disclosure made by the companies reflects their carbon performance (Luo and Tang, 2014b); this which implies an act of corporate environmental accountability. As (Luo *et al.*, 2013) suggested that developing countries should be playing an essential role in the transition towards a low-carbon economy and thus, it is vital that information about carbon emission be presented to stakeholders. To this

*Corresponding Author

end, the current study aims to examine the carbon disclosure practices of public-listed companies in Malaysia by investigating the annual and sustainability reports of 100 top companies in Malaysia in 2011 and 2014, to allow a comparison of the disclosure trend of the companies' carbon disclosure practices over two years. Thus, an investigation of the state of carbon information disclosed by companies before and after the implementation of MYCarbon would be possible.

More specifically, this study aims to answer the following research questions:

1. How has the carbon disclosure by public-listed companies in Malaysia changed from 2011 to 2014?
2. Did the quality of carbon information improved over the two year period?
3. Is the provision of carbon information different among companies in environmentally sensitive industries?

In this study, the disclosure of carbon information made by public-listed companies in Malaysia in their annual and sustainability reports is seen as a result of their initiatives to remain relevant to the demands of the stakeholders and as legitimation strategy and to ensure compliance with societal expectations. From the perspective of legitimacy theory it is argued that there is a social contract either expressed or implied between the organizations and the society (Shocker and Sethi, 1974) and to remain legitimate, organizations need to fulfil these social contracts. Therefore, the carbon agenda is viewed as being part of the organizations' business strategies to stay legitimate in the eyes of their stakeholders (Haigh and Shapiro, 2011; Hrasky, 2011).

The findings of this study will help to identify the extent to which environmentally-sensitive industries in Malaysia address the carbon disclosure issues surrounding the companies' business operations and the efforts taken to manage and mitigate such problems.

The remainder of this paper is organized as follows. Section 2 considers the theoretical foundations, while Section 3 contains a literature review. Section 4 presents the research methodology, and the research findings are presented in Section 5. The last part (Section 6) includes the conclusion and the implications of the results.

2. Literature Review

2.1. Theoretical Foundations

Legitimation strategy is often argued as one of the factors that contributed to corporations' decisions to voluntarily disclose information in their external financial reports (Brown and Deegan, 1998; Buhr, 1998; Campbell, 2000; Chalmers and Godfrey, 2004; Deegan and Rankin, 1996; Deegan and Gordon, 1996; Deegan *et al.*, 2000; Deegan *et al.*, 2002; Hutchings and Taylor, 2000; Nasi *et al.*, 1997; O' Donovan, 2002; Patten, 1991;1992; Woodward *et al.*, 2001). These studies have tested the robustness of legitimacy theory by investigating management's motives for disclosing voluntary information. The concept of organizational legitimacy posits that 'to continue operating successfully, corporations must act within the bounds of what society identifies as socially acceptable behaviour' (O' Donovan, 2002).

Therefore, as part of the legitimation strategy, organizations are voluntarily disclosing information to manage their legitimacy. This disclosure is because legitimacy is a measure of the adequacy of societal perceptions of a corporation's behaviour compared to the society's expectations of its corporate activity (Nasi *et al.*, 1997). Therefore, an organization needs to manage its corporate image with the societal expectations of its action. In this study, it is argued that Malaysian companies will voluntarily disclose carbon information in their annual and sustainability reports to ensure that their activities are seen to be in compliance with societal expectation, and it is expected that the environmentally-sensitive industries will better manage their carbon activities to gain acceptance from the stakeholders and the general public.

2.2. Carbon Disclosure

The disclosure of environmental initiatives undertaken by organizations is crucial as it helps to mitigate information asymmetry between the companies and their stakeholders about related ecological matters (Cormier *et al.*, 1999; Lin, 2008). The disclosure of carbon information prominently started in developed nations, such as the United Kingdom and United States of America (Luo *et al.*, 2013; Luo and Tang, 2014a). International standards such as ISO 14001 and Global Reporting Initiatives (GRI) have included carbon as an element in environmental disclosure guidelines. The disclosure of carbon information is the public reporting of a company's climate change initiatives (CDP, 2015). It is called carbon disclosure because the main contributors to climate change are carbon and greenhouse gases (GHG) emissions. There are six types of emissions that are considered as the leading causes of climate change. These are carbon dioxide (CO2), methane (CH4), hydrofluorocarbons (HFCs), nitrous oxide (N2O), perfluorocarbons (PFCs), and sulphur hexafluoride (SF6) (UNFCCC, 1998).

The pressure for developing countries to disclose carbon information has prompted China and Malaysia to start mimicking the West and to publish their carbon emissions and to take measures to manage their disclosures (Amran and Siti-Nabiha, 2009). China is one of the developing countries that have started its carbon disclosure initiatives. Although carbon disclosure is relatively new in China, companies in the country have begun disclosing carbon information (Lin, 2008; Peng *et al.*, 2014). In Malaysia, carbon disclosure is also relatively new; however with the introduction of MYCarbon efforts to improve carbon information provided to stakeholders is expected to grow. MYCarbon initiatives invite companies to join the programme, and by participating in the plan, companies would comply with the carbon disclosure requirements.

3. Research Methodology

3.1 The Sample

The sample for this study consisted of public listed companies (PLCs) on the main board of Bursa Malaysia. According to Fatima *et al.* (2015), eight industries, namely industrial products, consumer products, plantation, mining, construction, property, trading and services, and infrastructure project companies (IPC) are considered as environmentally sensitive industries. This study examines seven out of the eight environmentally sensitive industries. The mining industry was not investigated because some of the companies in the mining industry were not present in 2011 and 2014. Environmental sensitive industries were chosen as companies in these industries are more involved in environmental activities and are expected to provide more information about their carbon disclosure. The year 2011 was chosen as that was the year before the launch of MYCarbon in Malaysia. MYCarbon was launched in 2012 and is an initiative by the government to reduce carbon emission by 40% by 2020 (Fatima *et al.*, 2015; Soon, 2012). The initial stage of MYCarbon encourages voluntary carbon disclosures by companies. The year 2014 was chosen to examine the state of carbon disclosure two years after the launched of MYCarbon in 2012. Therefore, the findings from the study would provide information about the state of carbon disclosure in Malaysia before the introduction of MYCarbon and subsequently two years after its implementation (2014). The final sample for this study consisted of the top 100 companies. The top 100 companies were chosen based on the largest market capitalization at the end of 2014, and these companies must exist in 2011 and 2014. Table 1 summarises the industries and the number of companies in each industry that forms the sample for this study.

Table-1. Distribution of companies based on industry classification

No.	Industry	Number	%
1.	Industrial Products	19	19
2.	Consumer Products	14	14
3.	Construction	3	3
4.	Plantation	11	11
5.	Properties	13	13
6.	Infrastructure Project Companies (IPCs)	4	4
7.	Trading/Services	36	36
	Total	100	100

The data for carbon disclosure was mainly extracted from the annual and sustainability reports. The corporate reports were downloaded from Bursa Malaysia and the respective companies' official websites. Corporate reports were chosen as they act as the primary communication tools for all stakeholders. A content analysis was adopted in analyzing the corporate annual and sustainability reports of the selected listed firms. The content analysis in assessing carbon disclosure in Malaysia was carried out using a widely adopted carbon disclosure index built based on CDP information sheet (Choi *et al.*, 2013; Luo *et al.*, 2013; Peng *et al.*, 2014).

3.2. Carbon Disclosure

The carbon disclosure was assessed based on the quality of carbon information disclosed as such information was considered as more important than evaluating the quantity of disclosure (Sulaiman *et al.*, 2014). The same carbon disclosure index was used for both years, and the scores for the same companies were compared between 2011 and 2014. The carbon disclosure index employed in this study was adapted from Choi *et al.* (2013); Luo *et al.* (2013); Peng *et al.* (2014); and Saka and Oshika (2014). A slight variation was made to the index to suit the Malaysian context. The index uses a scoring of 0 to 4 (Fatima *et al.*, 2015; Yusoff *et al.*, 2015; Yusoff *et al.*, 2016). A score of '4' was given to carbon information disclosed quantitatively with monetary values. A score of '3' was given to carbon information disclosed quantitatively with no monetary values. A score of '2' indicated specific information on carbon disclosure but non-quantitative. General information disclosed was awarded a score of '1'. If there was no carbon information, a score of '0' was given. The scoring procedures are set out in Table 2.

In general, the highest score a company can be given is seventy-two (72) by obtaining the maximum score of '4' for all eighteen (18) items in the carbon disclosure index, which were divided into five categories. Table 3 provides the list of the five categories, the number of items in each category and the possible maximum score for each category together with the total possible items and maximum scores. The attributes for each carbon disclosure dimensions are listed in Table 4.

Table-2. The Scoring Procedures of the Carbon Disclosure Index

Score	Description of scoring
0	Items are not disclosed.
1	Items disclosed are qualitative and in general terms.
2	Items disclosed are qualitative and in specific terms.
3	Items disclosed are quantitative and non-monetary.
4	Items disclosed are quantitative and monetary.

Table-3. Carbon Dimensions and the Number of Items and Maximum Score for Carbon Disclosure Index

No.	Dimensions	Items	Max. Score
1.	Climate change risks and opportunities	2	8
2.	Carbon emissions accounting	7	28
3.	Energy consumption accounting	3	12
4.	Carbon reduction and costs	4	16
5.	Carbon emission accountability	2	8
	Total Scores	18	72

Table-4. Dimension and Attributes of Carbon Disclosure Index

No.	Dimension	Attribute	Measurement
1.	Climate change risks and opportunities (CC)	Assessment of risks and opportunities by the organisations on climate change.	CC1 – Description of the risks (regulatory, physical or general) relating to climate change and actions taken or to be taken to manage the risks. CC2 – Description of current (and future) financial implications, business implications, and opportunities of climate change.
2.	Carbon emissions accounting (GHG)	The methods used in accounting for GHG emissions.	GHG1 – Description of the methodology used to calculate GHG emission (e.g. GHG protocol or ISO). GHG2 – Existence of external verification on quantity of GHG emission – if so by whom and on what basis. GHG3 – Evidence of total GHG emission – metric tonnes of CO_2-e emitted, cost associated. GHG4 – Evidence of disclosure by Scopes 1 and 2, or Scope 3 direct GHG emissions. GHG5 – Evidence of disclosure of GHG emission by sources (e.g. coal, electricity, etc.). GHG6 – Evidence of GHG emission in comparison with previous years. GHG7 – Description of reasons for the changes in level of emission from year to year.
3.	Energy consumption accounting (EC)	The methods used to assess energy consumption as a result of business operations and its associated disclosure.	EC1 – Evidence of total energy consumed in business operations (e.g. tera-joules or peta-joules). EC2 – Evidence of energy used from renewable sources. EC3 – Description of disclosure by type, facility, or segment.
4.	Carbon reduction and costs (RC)	Assessment of GHG reduction plan and its progress.	RC1 – Evidence of detailed plans or strategies to reduce GHG emission. RC2 – Specification of GHG emission reduction target level and target year. RC3 – Description of emission reduction and associated costs or savings to date as a result of the reduction plan. RC4 – Description of future emission factored into capital expenditure planning.
5.	Carbon emission accountability (ACC)	The monitoring mechanism used by the organisation with regards to climate change issues.	ACC1- Evidence of specific board committee (or other executive body) that has the overall responsibility for actions related to climate change. ACC2 – Description of the mechanism by which the board (or other executive body) reviews the company's progress regarding climate change.

The disclosure of the carbon information was assessed using an equal-weighted index, which means that a point is awarded for each item concerning the carbon dimension as listed in Table 3. Each item was pilot tested on a sample of ten corporate reports to ensure the suitability of the items. A disclosure score for each company was totaled and is not given any specific percentage as it is considered that each item of disclosure is equally important. The carbon disclosure index for each dimension was constructed as follows:

$$\sum_{i=1}^{m_j} \frac{d_j}{N}$$

The index indicates the score for the disclosure of carbon information for a company *j*, where *N* is the maximum number of relevant items a company may disclose and *dj* is ranked from a score of 0 to 4. The total maximum score for a company *mj* is 72, comprising each dimension; *Climate change risks and opportunities* (8), *Carbon emissions accounting* (28), *Energy consumption accounting* (12), *Carbon reduction and costs* (16), *Carbon emission accountability* (8).

4. Findings and Discussions

Table 5 presents the descriptive statistics for the carbon disclosure in this study. The final sample for the study is eighty-six (86) companies after the removal of fourteen (14) outliers from the data file.

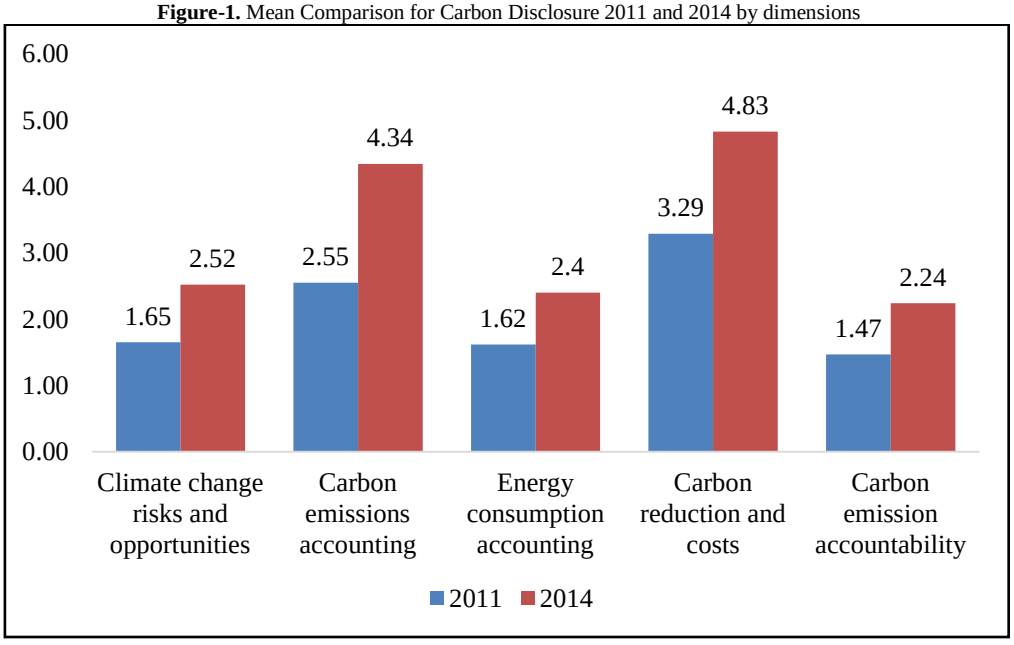
Table-5. Descriptive Statistics for Carbon Disclosure

Variables	N	Minimum	Maximum	Mean	Std. Deviation
Carbon Disclosure Quality 2011 (total score)	86	0.00	48.00	10.57	12.84
Carbon Disclosure Quality 2014 (total score)	86	0.00	53.00	16.33	15.81

The results from Table 5 revealed that the quality of carbon disclosure for 2011 has a minimum score of 0 and a maximum of 48 with a mean score of 10.57. The possible maximum score for carbon disclosure is 72. The results indicate that the carbon disclosure quality in 2011 is still low. The information on carbon disclosure quality in 2014 however, improved slightly where the maximum score has increased from 48 to 53.00. The mean score has also increased from 10.57 to 16.33. Therefore, after two years of implementation of MYCarbon, there seemed to be some improvement in the disclosure of carbon information even though the information disclosed is still rather low. The findings are consistent with Luo *et al.* (2013), who found that the carbon disclosure quality in developing countries is still low.

Figure 1 Presents the comparative results of the carbon disclosure by dimension for 2011 and 2014

Figure-1. Mean Comparison for Carbon Disclosure 2011 and 2014 by dimensions



The results for the two years indicate that there is an increase in the mean score for all dimensions from 2011 to 2014 suggesting that the quality of carbon information improved over the two years. The results also revealed that the pattern of information disclosed remains the same over the two-year period. The dimension *Carbon reduction and costs* have the highest mean score both in 2011 and 2014 (3.29 and 4.83 respectively) followed by the *Carbon emissions accounting* dimension with a mean score of 2.55 in 2011 and 4.34 in 2014. *Climate change risks and opportunities* dimension is in third place followed by the *Energy consumption accounting* dimension. The lowest mean score for the two years relates to the dimension *Carbon emission accountability* (mean score of 1.47 in 2011 and 2.24 in 2014 respectively).

The results suggest that the companies were taking the initiatives to reduce carbon emissions even though they are incurring some costs in doing so. They are also setting carbon reduction targets to be achieved in the future. The companies also are taking the initiatives to account for their carbon emission and have started to reveal the methods that they are using to account for such emissions. These acts therefore suggest an increase of corporate environmental accountability.

The dimension for *carbon emission accountability* is the least disclosed information because companies do not have a proper committee or body that is responsible for carbon action. Since carbon disclosure in Malaysia is still new, the companies do not feel the need to appoint a high ranking officer to manage carbon action. The inexistence of a proper committee or body has subsequently resulted in companies not having an appropriate mechanism to track the progress of the companies' carbon performance. For these dimensions, the companies seemed to be disclosing information that is of general and qualitative type. Table 6 presents a comparison between carbon disclosure by items in 2011 and 2014 and the ranking for each of the item.

Table-6. Comparison of Carbon Disclosure 2011 and 2014 by Items and Ranking

No	Dimension/Items	Mean		Ranking	
		2011	2014	2011	2014
	Climate change risks and opportunities				
1.	Description of the risks (regulatory, physical or general) relating to climate change and actions taken or to be taken to manage the risks.	0.86	1.26	2	3
2.	Description of current (and future) financial implications, business implications and opportunities of climate change.	0.79	1.27	5	2
	Carbon emissions accounting				
3.	Description of the methodology used to calculate GHG emissions (e.g. GHG protocol or ISO).	0.45	0.85	12	12
4.	Existence of external verification on the quantity of GHG emissions – if so by whom and on what basis.	0.09	0.14	18	18
5.	Evidence of total GHG emissions – metric tonnes CO_2-e emitted, cost associated.	0.59	0.87	9	11
6.	Evidence of disclosure by Scopes 1 and 2, or Scope 3 direct GHG emissions.	0.15	0.41	17	17
7.	Evidence of disclosure of GHG emissions by sources (e.g. coal, electricity, etc.).	0.42	0.65	14	15
8.	Evidence of GHG emissions comparison with previous years.	0.42	0.69	15	14
9.	Description of reasons for the changes in level of emissions from year to year.	0.42	0.73	16	13
	Energy consumption accounting				
10.	Evidence of total energy consumed in business operations (e.g. tera-joules or peta-joules).	0.70	0.93	6	8
11.	Evidence of energy used from renewable sources.	0.49	0.90	10	10
12.	Description of disclosure by type, facility or segment.	.43	0.57	13	16
	Carbon reduction and costs				
13.	Evidence of detailed plans or strategies to reduce GHG emissions.	1.34	1.83	1	1
14.	Specification of GHG emissions reduction target level and target year.	0.65	0.94	8	7
15.	Description of emissions reductions and associated costs or savings to date as a result of the reduction plan.	0.83	1.15	3	4
16.	Description of future emissions factored into capital expenditure planning.	0.48	0.91	11	9
	Carbon emission accountability				
17.	Evidence of specific board committee (or other executive body) that has overall responsibility for actions related to climate change.	0.66	1.10	7	6
18.	Description of the mechanism by which the board (or other executive body) reviews the company's progress regarding climate change.	0.80	1.14	4	5

Overall, the ranking of the items changed from 2011 to 2014. However, the ranking for some items remained the same. Item number 13 (*Evidence of detailed plans or strategies to reduce GHG emissions*) ranked first both in

2011 and 2014. Items number 3 (*Description of the methodology used to calculate GHG emissions*), 4 (*Existence of external verification on the quantity of GHG emissions – if so by whom and on what basis*), 6 (*Evidence of disclosure by Scopes 1 and 2, or Scope 3 direct GHG emissions*), and 11 (*Evidence of energy used from renewable sources*) remained at 12, 18, 17, and 10 respectively for both years. This indicates that for both 2011 and 2014, the companies were taking the initiatives to reduce their carbon emissions and the related costs by having detailed plans and strategies. This is a positive move as it suggests that these companies are developing proper strategies and plans to curb carbon emissions. The lowest ranked item relates to item number 4 (*Existence of external verification on the quantity of GHG emissions – if so by whom and on what basis*) where companies seemed to focus least on the verification of their carbon information. This is a concerned as it indicates that the companies are not having an external party to verify the quantity of their carbon emission disclosed which will have a subsequent effect on the credibility of subsequent accounting information that is being provided to stakeholders.

Table 7 presents the mean comparison for carbon disclosure by dimension for the industries examined. In general, all the industries had an increased in mean value in all dimensions from 2011 to 2014. There is only one drop in the mean value from 2011 to 2014 (- 0.27) for the dimension *Energy consumption accounting* for the Properties industry. The highest increase in mean value is for the dimension *Carbon reduction and costs* in the Construction industry at 2.67 (3.00-0.33). Although the Construction industry scored the lowest mean value for all dimensions for both 2011 and 2014, there is an increase in mean value over the years. Therefore, there is still an improvement in the disclosure for the Construction industry for all the dimensions.

The IPC industry leads in three out of the five dimensions in 2011 while in 2014 the Trading/Services industry leads in three out of the five dimensions. The IPC industry in Malaysia consists of mainly telecommunications companies; therefore, perhaps they are more visible as they interact more with consumers than the other industries. Also, the smartphones market was blooming in 2011 resulting in intense competition among the telecommunications companies. The fierce competition could be the reason for them to take the extra initiatives to appear as better corporate citizens to gain more market share. However, in 2014 the Trading/Services industry overtook the IPC results in 2011. This result suggests that companies in this industry are moving forward at a faster pace than other industries in putting in place carbon initiatives. Companies in the Trading/Services companies are also very large and most likely have superior financial resources thus enabling them to invest more in carbon initiatives. Based on market capitalization at the end of the year 2014, six (6) out of the top ten (10) biggest companies in Malaysia are from the Trading/Services industry. Construction industry scored the lowest score for all dimensions in both 2011 and 2014. This result is a concern as activities of companies in this industry are generally known to have numerous effects on the environment, and it is expected that companies in this industry would take better initiatives to mitigate the impact carbon emissions as a result of their activities.

Table-7. Mean Comparison for Carbon Disclosure between 2011 and 2014 by Dimension by Industry

		Dimensions									
Industries		Climate change risks and opportunities		Carbon emissions accounting		Energy consumption accounting		Carbon reduction and costs		Carbon emission accountability	
	N	2011	2014	2011	2014	2011	2014	2011	2014	2011	2014
Trading/ Services	30	1.73	2.67	2.93	4.97	1.83	3.03	3.67	5.63	1.80	2.67
Constructions	3	0.00	2.00	0.00	0.67	0.00	0.00	0.33	3.00	0.00	0.67
Consumer Products	14	2.14	2.43	2.79	4.00	2.21	1.86	3.50	4.43	1.57	2.36
Industrial Products	15	1.80	2.47	2.53	5.47	1.47	3.33	3.47	5.27	1.20	2.00
IPC	4	1.50	2.50	4.00	5.25	3.00	3.00	4.00	4.25	1.50	2.50
Plantations	9	1.33	2.67	3.67	4.67	0.89	2.11	2.67	5.22	1.00	2.11
Properties	11	1.36	2.36	0.45	1.91	1.00	0.73	2.82	2.91	1.55	1.73

Table 8, 9 10 and 11 present the results of the Paired t-tests conducted to assess the differences in the mean values for the two groups by dimension and by items. Table 8 shows that there is an increase in the mean score from 2011 to 2014 (from 10.57 to 16.33) while the results from Table 9 revealed that the increase in the mean is significant.

Table-8. Paired t-tests for Carbon Disclosure for 2011 and 2014

	Mean	**N**	**Std. Deviation**	**Std. Error Mean**
CDQ2011	10.57	86	12.84	1.384
CDQ2014	16.33	86	15.81	1.704

Table-9. Paired t-tests for Carbon Disclosure between 2011 and 2014

		95% Confidence Interval of the Difference				
	Mean	Lower	Upper	t-values	df	*p*-values
CDQ2011-CDQ2014	-5.76	-7.89	-3.62	-5.368	85	.000

Table 10, it seems all the dimensions have a significant mean difference from year 2011 to 2014 except for *Carbon emissions accounting* and *Energy consumption accounting*. Therefore, even though *Carbon emissions accounting* dimension had the second highest increase in disclosure from 2011 to 2014, such an increase however proved to be insignificant. In addition, items 4, 10 and 12 had resulted with insignificant mean scores (see Table 11). This finding suggests that more efforts are needed to improve initiatives on *Carbon emission accounting* relating to the verification of external parties on the quantity of GHG emissions. Further, *Energy consumption accounting* pertaining to evidence of total energy consumed and its description by type, facility or segment also requires further initiatives to improve the process.

Table-10. Paired t-tests for Carbon Disclosure between 2011 and 2014 by Dimensions

No.	Dimensions	Mean Difference (2011-2014)	t-values	df	p-values
1.	Climate change risks and opportunities	-0.437	-4.936	85	.000
2.	Carbon emissions accounting	-0.256	-2.623	85	.073
3.	Energy consumption accounting	-0.260	-2.160	85	.086
4.	Carbon reduction and costs	-0.384	-3.374	85	.003
5.	Carbon emission accountability	-0.390	-4.888	85	.000

Table-11. Paired t-tests for Carbon Disclosure between 2011 and 2014 by Items

No	Dimension/Items	Mean Difference (2011-2014)	t-values	df	*p*-values
	Climate change risks and opportunities				
1.	Description of the risks (regulatory, physical or general) relating to climate change and actions taken or to be taken to manage the risks.	-0.395	-4.754	85	.000
2.	Description of current (and future) financial implications, business implications, and opportunities of climate change.	-0.478	-5.117	85	.000
	Carbon emissions accounting				
3.	Description of the methodology used to calculate GHG emissions (e.g. GHG protocol or ISO).	-0.395	-3.633	85	.000
4.	Existence of external verification on the quantity of GHG emissions – if so by whom and on what basis.	-0.047	-.728	85	.468
5.	Evidence of total GHG emissions – metric tonnes CO_2-e emitted, cost associated.	-0.279	-2.826	85	.006
6.	Evidence of disclosure by Scopes 1 and 2, or Scope 3 direct GHG emissions.	-0.256	-3.360	85	.001
7.	Evidence of disclosure of GHG emissions by sources (e.g. coal, electricity, etc.).	-0.233	-2.322	85	.023
8.	Evidence of GHG emissions comparison with previous years.	-0.267	-2.575	85	.012
9.	Description of reasons for the changes in level of emissions from year to year.	-0.314	-2.920	85	.004
	Energy consumption accounting				
10.	Evidence of total energy consumed in business operations (e.g. tera-joules or peta-joules).	-0.233	-1.975	85	.052
11.	Evidence of energy used from renewable sources.	-0.407	-3.220	85	.002
12.	Description of disclosure by type, facility or segment.	-0.140	-1.284	85	.203
	Carbon reduction and costs				
13.	Evidence of detailed plans or strategies to reduce GHG emissions.	-0.488	-4.186	85	.000
14.	Specification of GHG emissions reduction target level and target year.	-0.291	-3.271	85	.002
15.	Description of emissions reduction and associated costs or savings to date as a result of the reduction plan.	-0.326	-2.799	85	.006
16.	Description of future emissions factored into capital expenditure planning.	-0.430	-3.238	85	.002

	Carbon emission accountability				
17.	Evidence of specific board committee (or other executive body) that has overall responsibility for actions related to climate change.	-0.442	-5.747	85	.000
18.	Description of the mechanism by which the board (or other executive body) reviews the company's progress regarding climate change.	-0.337	-4.028	85	.000

5. Conclusion

This study aims to examine the carbon disclosure practices of public-listed companies in Malaysia by investigating the annual and sustainability reports of the top 100 companies in Malaysia in 2011 and 2014. The results of the study indicate that there is an increase in the mean score for all dimensions from 2011 to 2014 suggesting that the quality of carbon information improved over the two years. The improvement in the disclosure of carbon information indicates that the carbon performance among these companies have grown over the two years as carbon disclosure has been found to influence carbon performance (Dam and Scholtens, 2008; Sueyoshi and Goto, 2010). Such an improvement signals an enhanced corporate accountability amongst the studied public listed companies in Malaysia. Regarding industry, the mean score for all dimensions of the environmentally-sensitive industries showed an increase in disclosure from 2011 to 2014 with the IPC and Trading/Services industries being leaders in the provision of carbon information.

Even though there is an increase in carbon information provided by the companies over the two years, the overall disclosure is still relatively low. Therefore, the voluntary requirement for carbon disclosure may need to be revisited to put pressure on companies to manage their carbon emissions. The voluntary state of carbon disclosure in Malaysia may have caused the companies not to feel obligated to provide carbon information in detail. These companies are emitting carbon, but efforts to disclose and to quantify their total usage seemed to be minimal. This action could be because the awareness about accounting for carbon emissions may still be lacking and companies do not want to be seen as heavy carbon emitters through the disclosure of the quantity of total energy used as this could hurt the companies.

This study contributes to the growing body of knowledge on the disclosure of carbon information which is a crucial area of research since very few studies have been carried out in this area especially in developing countries such as Malaysia. The findings from the study provide a new perspective on the efforts taken by environmentally-sensitive industries to manage carbon emissions thus offer insights on possible ways towards greater corporate accountability.

The conclusions drawn from the study must be interpreted with caution as the focus of the research is targeting environmentally-industries for a two year period. Furthermore, the interpretations and conclusions drawn from this study are based solely on descriptive statistics since the purpose of this study is to obtain an initial insight about the disclosure of carbon information provided by companies in the environmentally-sensitive industries. Future studies may focus on examining the trend of the voluntary disclosure of carbon information over a period to allow for further insight into the impact of the introduction of MYCarbon in Malaysia.

Acknowledgements

We wish to thank the Institute of Quality and Knowledge Advancement, Institute of Research Management and Innovation, and Accounting Research Institute for their support in funding this project.

References

Aaheim, A., Aaheim, A., Amundsen, H., Dokken, T. and Wei, T. (2012). Impacts and adaptation to climate change in European economies. *Global Environmental Change*, 22(4): 959-68.

Ahmad, N. N. N. and Hossain, D. M., 2015. "Climate change and global warming discourses and disclosures in the corporate annual reports: A study on the Malaysian companies." In *Procedia - Social and Behavioral Sciences.* pp. 246-53.

Amran, A. and Siti-Nabiha, A. K. (2009). Corporate social reporting in malaysia A case of mimicking the west or succumbing to local pressure. *Social Responsibility Journal*, 5(3): 358-75.

Andrew, J., Jane, A. and Corinne, C. (2011). Carbon disclosures: Comparability, the carbon disclosure project and the greenhouse gas protocol. *Australasian Accounting, Business & Finance Journal*, 5(4): 5-17.

Brown, N. and Deegan, C. M. (1998). The public disclosure of environmental performance information - a dual test of media agenda setting theory and legitimacy theory. *Accounting and Business Research*, 29(1): 21-41.

Buhr, N. (1998). Environmental performance, legislation and annual report disclosure: The case of acid rain and falconbridge. *Accounting, Auditing and Accountability Journal*, 11(2): 163-90.

Campbell, D. (2000). Legitimacy theory or managerial reality construction? Corporate social disclosure in Marks and Spencer plc corporate reports, 1969-1997. *Accounting Forum*, 24(1): 80-94.

CDP (2015). CDP Global Climate Change Report 2015. Available: https://www.cdp.net/en-US/Results/Pages/reports.aspx

Chalmers, K. and Godfrey, J. M. (2004). Reputation costs: The impetus for voluntary derivative financial instruments reporting. *Accounting Organizations and Society*, 29(2): 95-126.

Choi, B. B., Lee, D. and Psaros, J. (2013). An analysis of australian company carbon emission disclosures. *Pacific Accounting Review*, 25(1): 58-79.

Cormier, D., Denis, C. and Michel, M. (1999). Corporate environmental disclosure strategies: Determinants, costs and benefits. *Journal Of Accounting, Auditing & Finance*, 14(4): 429-51.

Dam, L. and Scholtens, B. (2008). Environmental regulation and MNES location: Does CSR matter? *Ecological Economics*, 67(1): 55-65.

Darus, F., Fauzi, H., Purwanto, Y., Yusoff, H., Amran, A., Zain, M. M., Naim, D. M. A. and Nejati, M. (2014). Social responsibility reporting of Islamic banks: Evidence from Indonesia. *International Journal of Business Governance and Ethics*, 9(4): 356-80.

Deegan, C. and Rankin, M. (1996). Do australian companies report environmental news objectively? An analysis of environmental disclosures by firms prosecuted successfully by the environmental protection authority. *Accounting, Auditing and Accountability Journal*, 9(2): 50-67.

Deegan, C. and Gordon, B. (1996). A study of the environmental disclosure practices of australian corporations. *Accounting and Business Research*, 26(3): 187-99.

Deegan, C., Rankin, M. and Voght, P. (2000). Firms' disclosure reactions to major social incidents: Australian evidence. *Accounting Forum*, 24(1): 101-30.

Deegan, C., Rankin, M. and Tobin, J. (2002). An examination of the corporate social and environmental disclosures of BHP from 1983-1997: A test of legitimacy theory. *Accounting, Auditing and Accountability Journal*, 15(3): 312-43.

Dyer, G. (2011). *Climate wars the fight for survival as the world overheat.* Oneworld: Oxford.

Fatima, A. H., Abdullah, N. and Sulaiman, M. (2015). Environmental disclosure quality: Examining the impact of the stock exchange of Malaysia's listing requirements. *Social Responsibility Journal*, 11(4): 904-22.

Haigh, M. and Shapiro, M. A. (2011). Carbon Reporting: Does It Matter? *Accounting Auditing & Accountability Journal*, 25(1): 105-25.

Hrasky, S. (2011). Carbon footprints and legitimation strategies: Symbolism or action? *Accounting, Auditing & Accountability Journal*, 25(1): 174-98.

Hutchings, G. and Taylor, D. (2000). The intra-industry capital market and corporate reporting effects of the BHP Ok Tedi environmental event. *Asian Review of Accounting*, 8(Special Issue): 33-54.

King, R. (2009). Investors demand carbon-risk disclosure. Available: www.businessweek.com/technology/content/jun2009/tc2009061_144414_page_2.htm

Lin, L. W. (2008). Corporate social and environmental disclosure in emerging securities markets: China as a case study. (3337847 J.S.D.), university of illinois at urbana-champaign, Ann Arbor. Available: http://search.proquest.com.ezaccess.library.uitm.edu.my/docview/304607137?accountid=42518ProQuestDissertations&ThesesGlobaldatabase

Luo, L. and Tang, Q. (2014a). Carbon tax, corporate carbon profile and financial return. *Pacific Accounting Review*, 26(3): 351-73.

Luo, L. and Tang, Q. (2014b). Does voluntary carbon disclosure reflect underlying carbon performance? *Journal of Contemporary Accounting & Economics*, 10(3): 191-205. Available: http://dx.doi.org/10.1016/j.jcae.2014.08.003

Luo, L., Tang, Q. and Lan, Y. C. (2013). Comparison of propensity for carbon disclosure between developing and developed countries: A resource constraint perspective. *Accounting Research Journal*, 26(1): 6-34.

Munasinghe, M. and Swart, R. (2005). *Primer on climate change and sustainable development facts, policy analysis and applications.* Cambridge University Press: Cambridge.

Nasi, J., Nasi, S., Phillips, N. and Zyglidopoulos, S. (1997). The evolution of corporate social responsiveness. *Business and Society*, 36(3): 296-321.

O' Donovan, G. (2002). Environmental disclosures in the annual report: Extending the applicability and predictive power of legitimacy theory. *Accounting, Auditing and Accountability Journal*, 15(3): 344-71.

Patten (1991). Exposure, legitimacy, and social disclosure. *Journal of Accounting and Public Policy*, 10: 297-308.

Patten (1992). Intra-industry environmental disclosures in response to the Alaskan oil spill: A note on legitimacy theory. *Accounting, Organisations and Society*, 17(5): 471-75.

Peng, J., Li, Y. and Xiong, D. (2014). An empirical research on the impact of carbon information disclosure on investment recommendation. *Management & Engineering*, 16(1): 101-10.

Saka, C. and Oshika, T. (2014). Disclosure effects, carbon emissions and corporate value. *Sustainability Accounting, Management and Policy Journal*, 5(1): 22-45.

Shocker, A. D. and Sethi, S. P. (1974). *An approach to incorporating social preferences in developing corporate action strategies' in the unstable ground: Corporate social policy in a dynamic society, Sethi, S. P.*: Melville, CA.: John Wiley & Sons.

Soon, H. Y. (2012). National carbon disclosure programme for Malaysia, Local emission factor workshop.

Sueyoshi, T. and Goto, M. (2010). Measurement of a linkage among environmental, operational, and financial performance in japanese manufacturing firms: A use of data envelopment analysis with strong Complementary slackness condition. *European Journal of Operational Research*, 207(3): 1742-53. Available: http://dx.doi.org/10.1016/j.ejor.2010.07.024

Sulaiman, M., Abdullah, N. and Fatimaa, A. H. (2014). Determinants of environmental reporting quality in Malaysia. *International Journal of Economics, Management and Accounting*, 22(1): 63-90.

UNEP & UNFCCC (2002). Climate change information kit. *France: UNEP*:

UNFCCC (1998). Kyoto protocol. Available: http://unfccc.int/resource/docs/convkp/kpeng.pdf

Woodward, D., Edwards, P. and Birkin, F. (2001). Some evidence on executives' views of corporate social responsibility. *British Accounting Review*, 33: 357-97.

Yusoff, H., Darus, F. and Rahman, S. A. A. (2015). do corporate governance mechanism influence environment reporting practices? Evidence from an emerging country. *International Journal of Business Governance and Ethics*, 10(1): 76-96.

Yusoff, H., Abdul, J. A. D. and Darus, F. (2016). Corporate governance and corporate social responsibility disclosures: An emphasis on the CSR key dimensions. *Journal of Accounting and Auditing: Research and Practice*, 2016(2016): 1-14.