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THE DEVELOPMENT AND APPLICATION OF WATER GOVERNANCE MATRIX: A CASE OF MALAYSIA

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ABSTRACT

The study proposes a framework (in the form of a matrix) to map organisations on their level of water-related risk, taking into consideration 'industry intensity' and 'corporate commitment towards water protection and preservation'. On the basis of Ceres (2011), 'industry intensity' is measured as either low, medium, or high. Furthermore, 'corporate commitment' - measured along the same classification (low, medium, or high) – is based on the extent of corporate disclosure of water policies, initiatives, and performance. These indicators are then aggregated and used to develop a matrix - called Water Governance Matrix (WaGM) - which measures the level of riskiness of an organisation towards water - high (red), moderate (yellow), and low (green). An exploratory study of 30 top public listed companies in Malaysia reveals that only one company falls under the low-risk category, while more than 50% falls under the high-risk category; mainly due to low corporate water disclosure. This innovative matrix is of importance for organisations to monitor and manage their water risk and for stakeholders to make informed investment and other decisions about the organisations.

Keywords: water governance, industry intensity, content analysis, Malaysia.

INTRODUCTION

In December 2015, Malaysia suffered from the El Nino phenomenon, causing the reduction in surge monsoons and changing the weather condition into hot and dry condition with inconsistent rainfall patterns. The rainfall inconsistency, in turn, has affected the climate modeling and at the same time induced greater awareness among the stakeholders and regulators of the negative impacts brought about by organisational activities especially those originating from the industrial sectors. These sectors (e.g., mining, oil and gas production, forestry and electricity generation), more often than not, are relying on water for economic viability (de Loë et al., 2016). Hence, they encounter significant water-related challenges, either through sizeable demand or through their wastewater discharges (Ceres, 2011). While ensuring a stable economic growth for business maturity, good water governance needs to be adopted consistently. According to Montgomery et al. (2016), water governance could be a tool to achieve specific outcomes that are essential in resolving water issues through creating structures and processes that allow for equitable negotiation between stakeholders. Ultimately, good water governance will lead to good firm performance, financially and non-financially. Thus, the presence of water governance model is of paramount importance.

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In the absence of any specific model for water governance, this paper aims to develop a matrix that could be used for companies to outline strategies to manage their water risk and for stakeholders to help them making informed economic and other decisions about the companies. The matrix considers both the industry intensity (Ceres, 2011) and corporate commitment towards water protection and preservation. The outcome of the matrix is the classification of companies into high, moderate or low water risk. It then applies the matrix on a sample of public listed companies in Malaysia.

This study contributes to the dearth of literature in water governance through the development of a unique, yet comprehensive, matrix that considers both the background of the industry and the extent of corporate commitment on water. Unlike the issue of carbon which has received considerable attention by both the practice and academia, water-related issue has not been widely researched. We address this gap by providing the most recent evidence of the issue in one of the world's emerging economies, Malaysia. The matrix could be a guideline for companies in terms of how far they need to go in assessing their water risk. By doing so, it assists the companies to understand their strengths and weaknesses in their existing policies and practices for improvements in the future. The findings of this study also will help in creating the awareness among the public of the importance of water issue. Considering the low commitment towards water protection and preservation shown by companies through their corporate reporting, regulators and other authoritative bodies might consider making it mandatory for public listed companies to disclose any initiatives, policies, and performance on water-related aspects. This would ensure greater accountability, comparability, and consistency from the companies.

The remaining sections of this paper are structured as follows. Section 2.0 provides the review of water governance. Section 3.0 presents the development of Water Governance Matrix (WaGM). Section 4.0 discusses the findings from the analysis of 30 Malaysia public listed companies. Section 5.0 concludes the paper.

WATER GOVERNANCE

The Institute of Water Policy (IWP) broadly defines water governance as the set of water laws, policies, programmes and projects adopted by a country or a state to develop and manage its water resources to meet the current and future needs of its population (Mohamad et al., 2008). Water governance is even more essential nowadays than in the past due to accelerating climate change problem. According to the Intergovernmental Panel on Climate Change (2007), climate change has resulted in the increase in global air and ocean temperatures, the widespread melting of ice and snow, and increase in sea levels. If left unattended, the problems will lead to negative health consequences for humans due to shortage of food supply and fresh water.

Water scarcity exists when there is imbalance in the supply and demand of water. The world water supply is inadequate, deteriorating in quality and low flow of surface water (Saimy and Yusof, 2013) but the demand for water is higher nowadays (Braadbaart and Braadbaart, 1997). The problem persists not only in Malaysia but also in other countries as well. According to Saimy and Yusof (2013), good water governance is needed in Malaysia to handle water problems complexity, for a better or efficient water use and management.

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The important tool in implementing a good water governance is the legislation, where the legal instrument will support the water policies, programmes or projects to ensure economic, social and environmental sustainability so that the water scarcity problem will be given continuous attention and prevention (Shah et al., 2009: Mohamed et al., 2009). The need for strict regulatory intervention could improve the management of water resources, supplies and services, so as to be continuously aware of the water quality and quantity, to prioritise water-related issues, and to protect the natural resource from being declining drastically. In Malaysia, issues pertaining to water are under the purview of the Ministry of Energy, Green Technology and Water. Both Water Service Industry Act 2006 [Act 655] and National Water Services Commission Act [Act 654] become the framework governing the issues.

Other than governance through legislations, companies could play important role in protecting and preserving water. They use and discharge water during day-to-day operations hence how they manage and control water consumption and discharges are of significantly importance. However, as compared to carbon emissions (which is also associated with climate change), the issue of water has received scant attention by researchers. In the field of corporate reporting literature, to the best of our knowledge, a study by Mohd Remali et al. (2016) is the only study investigating this issue. Based on the assessment of annual reports of 10 Malaysian companies for the year 2014, the disclosure was described as fairly low. This could be due to the fact that this issue is still considered as less critical as compared to other the attention and exposure in other developed economies.

Considering the scant attention paid on the issue of water reporting and the need for a matrix or model to assess companies' risks towards water, hence this study is conducted to address these issues.

THE WATER GOVERNANCE MATRIX (WaGM)

The stages in developing and applying WaGM involve: (i) identification of industries' water intensity; (ii) assessment of corporate commitment towards water issues; and (iii) mapping the companies on WaGM.

Identification of Industries' Water Intensity

For the purpose of this study, the industry profile is determined based on the classification developed and used by the World Wide Fund for Nature (WWF) and German investment bank DEG and published by Ceres' "The Ceres Aqua Gauge: A Framework for 21st Century Water Risk Management". They classified the industries into high, medium, and low priority sectors based on the degree of use and pollution of water. Figure 1 shows the water risk profile by industry.

Industry	Risk Profile
Agriculture (plant & animal products)	High
Beverage producers	High
Biomass power production	High
Chemicals	High
Clothing & apparel	High
Electric power production (gas, coal, oil, nuclear)	High
Food producers (incl. tobacco)	High
Food retailers	High
Forestry & paper	High
Freshwater fishing & aquaculture	High
Hydropower production	High
Mining	High
Oil & gas	High
Pharmaceuticals & biotechnology	High
Technology hardware & equipment, semiconductors	High
Water utilities and services	High
Construction & materials	Medium
Gas distribution & multi-utilities	Medium
Manufacturing of: industrial goods, household goods, home construction, personal leisure goods	Medium
Media (printed)	Medium
Real estate	Medium
Transportation (industrial and personal)	Medium
Travel & leisure (non-transportation)	Medium
Financial services, banks, insurance	Low
General retailers (non-food) & storage (warehousing)	Low
Health care & services	Low
Industrial support services, professional service firms, administration, wholesale, trade, education, arts	Low
Media (non-printed)	Low
Renewable power production (e.g. wind, solar)	Low
Salt water fishing and aquaculture	Low
Software & computer services	Low
Telecommunications	Low

Figure 1: Water risk profile by industry (Source: WWF/DEG in Ceres, 2011)

Despite being useful, this classification does not consider any initiatives undertaken by the individual companies to mitigate their water risks. For example, it could be that a company operates in a 'dirty' industry, but it has policies and system in place to manage and control the impacts of its activities on water. In this case, they should be a better way classifying the individual companies. WaGM addresses this issue by considering the level of corporate commitment towards water protection and preservation using corporate disclosure as the basis.

Assessment of Corporate Commitment towards Water Issues

In the absence of locally established guidelines in the area of water reporting, this research has developed a disclosure index - water disclosure index (WDI) - based on the GRI's Sustainability Reporting Guidelines (specifically focusing on the water-related indicators, i.e., EN8 until EN10) and several information requested by CDP 2015 Water Information Request. In this regard, previous literature (see, for example, Clarkson et al., 2008; Van Staden and Hooks, 2007) have suggested that disclosure could be a proxy for corporate commitment on environmental issues when they found a positive relationship between environmental performance and environmental reporting.

The GRI's guidelines have been developed through a series of stakeholder consultations and past researchers have used the guideline to evaluate the extent of sustainability reporting among corporate sectors (see for example Dumay et al., 2010; Clarkson et al., 2008; Alazzani and Wan-Hussin, 2013). As for the CDP Water information Request 2015, it contains suggested questions that work to catalyse action on corporate water stewardship to safeguard water resources and address the global water crisis (CDP, 2015).

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Based on GRI and CDP, there are eight items related to water. The items were modified to ensure their suitability in the context of Malaysia. To avoid subjectivity, each item is scored on a dichotomous basis in which 1 (one) is awarded if the item is being disclosed and 0 (zero) if otherwise. Table 1 presents the final WDI consisting of eight items with a total maximum score of eight.

No	Items	Details
A	GRI - G4 EN8: Total water withdrawal by source	1.0 Report the water withdrawn and used from the surface water/ground water; the waste water in and outside organisation; the collected rainwater in organisation; the total volume of rainwater collected
B	GRI - G4 EN9: Water sources significantly affected by withdrawal of water	2.0 Report the number of water sources affected by withdrawal of water; the size of water sources held by organisation; whether the source is designated as a protected area; the benefit or water sources for communities; the biodiversity value of the water sources
C	GRI - G4 EN10: Percentage and total volume of water recycled and reused	3.0 Report the total volume of water recycled in organisation; the source and the volume of water recycled; the total volume of water reused in organisation; the source and the volume of water reused; the total volume of water recycled as percentage of water withdrawal reported under G4 EN8; the total volume of water reused as percentage of water withdrawal reported under G4 EN8.
D	CDP's 2015 water information request	4.0 Water risks: Report the water risk that could generate substantive change in operations, revenue, and expenditure of the organization 5.0 Facility level water accounting: Report the total volume of water discharge by the organisation 6.0 Governance & strategy: Report the management in organization involved in water responsibilities 7.0 Compliance, Complaints and Senses: Report whether the organization has been imposed by any fines or civil penalties regarding water or environmental regulations 8.0 Targets and initiatives: Report the organisation target and goals related to water

Table 1: Water Disclosure Index

Based on the score obtained by the companies, they are classified into high, medium, or low in terms of commitment. In essence, if the score obtained is between 0 to 2, the companies will be regarded as having 'low' commitment to water protection and preservation; if between 3 to 5 as 'medium', while a score of 6 to 8 is considered as 'high'.

Mapping the Companies on WaGM

The final step is to map companies on WaGM which assesses the levels of water risk faced by companies. They are divided into high (red boxes), moderate (yellow), and low (green). Such a matrix allows companies from the high intensity industry to be flagged as 'moderate' if they have policies, systems, and initiatives to mitigate their impact on water. Similarly, companies from the low intensity industry could also be flagged as 'moderate' if they do not take necessary actions to manage and control their impact.

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CORPORATE COMMITMENT	INDUSTRY INTENSITY: Low Industry	Medium Industry	High Industry
Low Commitment	Moderate Risk	High Risk	High Risk
Medium Commitment	Low Risk	Moderate Risk	High Risk
High Commitment	Low Risk	Low risk	Moderate Risk

Figure 2: Water Governance Matrix (WaGM)

This matrix enables companies to understand their water-related risks hence to institute appropriate mechanisms to manage those risks. For stakeholders, this will help them to make informed economic and other decisions about the companies. For example, shareholders might want to avoid investing in companies in the high intensity industry with low commitment towards water as they are considered as highly risky.

APPLICATION OF WaGM IN MALAYSIA

As of 1 April 2016, there were 814 companies listed on Bursa Malaysia. Since this study is exploratory, the selection of companies to be analysed is limited to top 10 companies for each category of industry intensity (based on market capitalisation). This makes the sample consists of 30 companies. Table 2 depicts the list of companies included in the sample.

No	Intensity	Companies	Industries
1	High	Tenaga Nasional Berhad	Electric power production
2		Sime Darby Berhad	Diversified industrial
3		Petronas Chemical Group	Chemicals
4		IOI Corporation Berhad	Food producers
5		YTL Corporation Berhad	Gas, water, and multi-utilities
6		Kuala Lumpur Kepong Berhad	Food producers
7		British American Tobacco	Tobacco
8		UMW Holdings Berhad	Automobiles & parts
9		Nestle (M) Berhad	Food producers
10		PPB Group Berhad	Food producers
11	Medium	IHH Healthcare Berhad	Healthcare & services
12		Genting Berhad	Leisure
13		Hong Leong Industries Berhad	Manufacturing
14		KlCC Prop&Reits-Stapled Sec	Real estate
15		Hap Seng Consolidated Berhad	Real estate
16		IJM Corporation Berhad	Construction
17		Gamuda Berhad	Construction
18		S P Setia Berhad	Real estate

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No	Intensity	Companies	Industries
19		Lafarge Malaysia Berhad	Materials
20		Malaysia Airports Holdings Berhad	Transportation
21	Low	Malayan Banking Berhad	Banking
22		Public Bank Berhad	Banking
23		Axiata Group Berhad	Communication
24		Maxis Berhad	Telecommunications
25		Digi.Com Berhad	Communication
26		CIMB Group Holdings Berhad	Banking
27		Telekom Malaysia Berhad	Telecommunications
28		RHB Capital Berhad	Banking
29		Astro Malaysia Holdings Berhad	Media
30		AMMB Holdings Berhad	Banking

Table 2: List of sample companies

Content analysis of annual reports for the year 2014 was conducted to determine the corporate commitment towards water issues. Annual reports were chosen since they are published publicly on a consistent basis due to regulatory requirements (Mohd. Remali et al., 2016), while the year 2014 was chosen as the year of analysis since it is the latest report produced by the time this study is conducted.

Overall, the disclosure by companies is fairly low. The highest score was obtained by Nestle (M) Berhad with 6 (out of 8), followed by Sime Darby Berhad, YTL Corporation Berhad, Lafarge Malaysia Berhad and Malaysia Airports Holdings Berhad with 4. There were 6 companies (20 percent) that did not provide any disclosure on water. Such a low disclosure indicates that companies are not aware of the need to disclose such information. This is not surprising since the disclosure at present is voluntary in nature. Additionally, since it is voluntary, disclosure beyond what is required by the standards may be deemed as detrimental to companies' competitive advantage and it increases the cost for companies in compiling and preparing such report. However, without disclosure, public will never know if companies do take actions on mitigating their water-related risks.

Table 3 presents the findings for WaGM in Malaysia. Based on the table, more than one-half of the companies fall under the high-risk profile (red), while only one is considered as low-risk profile (green). Even though Nestle (M) Berhad obtained a score of 6 for commitment, stakeholders still need to consider the risk associated with the business that it operates which consumes voluminous amount of water. The majority of companies in the low water intensive category are considered as having moderate risk since the evidence on commitment which is assessed through corporate reporting is very minimal.

No	Companies	Commitment	Risk
	HIGH WATER INTENSIVE		
1	Tenaga Nasional Berhad	3	HR
2	Sime Darby Berhad	4	HR
3	Petronas Chemicals Group	3	HR
4	IOI Corporation Berhad	2	HR
5	YTL Corporation Berhad	4	HR

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6	Kuala Lumpur Kepong Berhad	2	HR
7	British American Tobacco Berhad	0	HR
8	UMW Holdings Berhad	0	HR
9	Nestle (M) Berhad	6	MR
10	PPB Group Berhad	2	HR
	MEDIUM WATER INTENSIVE		
11	IHH Healthcare Berhad	0	HR
12	Genting Berhad	2	HR
13	Hong Leong Industries Berhad	2	HR
14	KlCC Prop&Reits-Stapled Sec	3	MR
15	Hap Seng Consolidated Berhad	0	HR
16	IJM Corporation Berhad	2	HR
17	Gamuda Berhad	2	HR
18	S P Setia Berhad	2	HR
19	Lafarge Malaysia Berhad	4	MR
20	Malaysia Airports Holdings Berhad	4	MR
	LOW WATER INTENSIVE		
21	Malayan Banking Berhad	0	MR
22	Public Bank Berhad	2	MR
23	Axiata Group Berhad	2	MR
24	Maxis Berhad	1	MR
25	Digi.Com Berhad	0	MR
26	CIMB Group Holdings Berhad	2	MR
27	Telekom Malaysia Berhad	3	LR
28	RHB Capital Berhad	1	MR
29	Astro Malaysia Holdings Berhad	2	MR
30	AMMB Holdings Berhad	2	MR

HR = high risk, MR = moderate risk, LR = low risk

Table 3: Application of WaGM

CONCLUSION

This study develops a matrix which map companies based on their water-related risks drawing upon the industry intensity classification and organisational commitment towards water protection and preservation. The matrix was derived on the basis of Ceres (2011)'s industry classification and the level of corporate disclosure on water policies, initiatives, and performance. Companies are regarded as either high, moderate, or low risk. It then applied the matrix on 30 public listed companies and found a predominance of the sample in the high risk category. The findings of this study could be used by companies and their stakeholders to have a better view of corporate water-related risk. The lack of disclosure, as found in the analysis of top Malaysian companies, could become the basis for authoritative bodies to revisit the need to have a mandatory disclosure for better accountability, consistency, and comparability.

There are several limitations inherent in this study. First, the water disclosure index used in the matrix might not be a good proxy for corporate commitment towards water protection and preservation. Alternatively, researchers might use primary data collection method such as

questionnaire survey or interview to measure corporate commitment. Additionally, the items included in the index might be too brief and the use of dichotomous scoring system might have ignored the richness of information being reported. Second, we only analysed annual reports but not other corporate media. It has been argued in the past that the medium of reporting influenced the nature and type of information reported therein. The use of other media including company websites and stand-alone sustainability reports might overcome this limitation. Finally, the analysis of Malaysian companies suffers from small observations. Increasing the sample size will improve the generalizability of the findings.

REFERENCES:

Alazzani, A. & Wan-Hussin, W. N. (2013). Global Reporting Initiative's environmental reporting: A study of oil and gas companies. *Ecological indicators*, 32, 19-24.

Braadbaart, O. & Braadbaart, F. (1997). Policing the urban pumping race: Industrial groundwater overexploitation in Indonesia. *World Development*, 25 (2), 199-210.

CDP (2015). 2015 Water Information Request. Retrieved from https://www.cdp.net/CDP%20Questionaire%20Documents/CDP-Water-Information-request-2015.pdf

Ceres (2011). The Ceres Aqua Gauge: A framework for 21st century water risk management. Retrieved from https://www.ceres.org/resources/reports/aqua-gauge

Clarkson, P. M., Li, Y., Richardson, G. D., & Vasvari, F. P. (2008). Revisiting the relation between environmental performance and environmental disclosure: An empirical analysis. *Accounting, Organizations and Society, 33*, 303-327.

de Loë, R. C., Murray, D., & Brisbois, M. C. (2016). Perspectives of natural resource sector firms on collaborative approaches to governance for water. *Journal of Cleaner Production*, 135, 1117-1128.

Dumay, J., Guthrie, J., & Farneti, F. (2010). GRI sustainability reporting guidelines for public and third sector organizations: A critical review. *Public Management Review*, 12 (4), 531-548.

GRI. (2013). G4 *Sustainability reporting guidelines*. Amsterdam, Netherlands: Global Reporting Initiative. Retrieved from https://www.globalreporting.org/standards/g4/Pages/default.aspx

Mohamad, J. M., Firuza-Begham & Wan-Sobri, W. M. A. (2008). Water governance in Peninsular Malaysia: Strategies for reform.". In *International Sustainable Development Research Conference.* Hong Kong, pp. 1-10.

Mohamed, A.F., Wan Yaacob, W. Z., Taha, M.R., & Samsudin, A.R. (2009). Groundwater and soil vulnerability in the Langat basin Malaysia. *European Journal of Scientific Research*, 27 (4), 628 - 635.

Mohd. Remali, A. R., Husin, N. M., Mohd. Ali, I., & Alrazi, B. (2016). An exploratory study on water reporting among top Malaysian public listed companies. *Procedia Economics and Finance*, 35, 64-73.

Montgomery, J., Xu, W., Bjornlund, H., & Edwards, J. (2016). A table for five: Stakeholder perceptions of water governance in Alberta. *Agricultural Water Management*, 174, 11-21.

Saimy, I. S., & Yusof, N. A. M. (2013). The need for better water policy and governance in Malaysia. *Procedia-Social and Behavioral Sciences*, 81, 371-375.

[Type here]

Shah, T., Burke J. & Villholth, K. (2009). Groundwater: A water assessment of scale and significance. Proceedings of the Groundwater Management in Malaysia Status and Challenges, Putrajaya, 25-26 March, 15-47.

Van Staden, C. J., & Hooks, J. (2007). A comprehensive comparison of corporate environmental reporting and responsiveness. *The British Accounting Review,* 39, 197-210.