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ANTECEDENTS AND CONSEQUENCES OF WATER PERFORMANCE: A CASE OF GLOBAL ENERGY COMPANY

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Abstract

This paper aims to investigate the level of water disclosure as companies are rising and strategizing for water sustainability to build resilience for climate change within the energy industry. The board characteristics are the governance mechanisms to achieve the sustainable goals. The level of disclosure include the quantitative information by GRI core indicators on water. This study only include the water performance from the GRI indicators as follows: (i) total water withdrawal, (ii) total water discharge, and (iii) percentage and total volume of water recycled and reused. The sample companies are the CDP A-List Climate companies in energy industry. The practice in establishing the specific environmental or sustainability unit or affairs may vary depends on the companies. This study found that the presence of sustainable committee in the board of the companies will enhance the water sustainability performance. The board characteristics and water elements as stipulated in GRI are also tested for the significant relationship with the financial performance of the companies.

Keywords: Water governance, water disclosure, energy industry, sustainability reports, board characteristics.

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1. Introduction

Global water withdrawals for energy production in 2010 were estimated at 583 billion cubic metres (bcm), or some 15% of the world's total water withdrawals (World Energy Outlook, 2012). The demand for water forecasted to increase 85% in water consumption by the energy sectors resulting in a 40% short fall between supply and demand by 2030 (United Nation, 2012). The trend in water consumption for energy sectors are driven by a move to advanced efficiency power plants with more developed cooling techniques. Energy and water are interconnected. At least 50% of electricity will remain from non-renewable sources using coal, gas and nuclear power plants highly reliant on water cooling (see for example, International Energy Outlook, 2013).

Global water demand is mainly affected by the progress of a population, development and expansion, food and energy programmes, and macroeconomic processes such as industry globalization and growing consumption. The global water demand is expected to rise by 55% by 2050. This is generally due to demands from industrial, thermal power generation and household use which will increase in future. Challenging demands makes the decision of distributing and control development of sectors more complex to sustainability issues, specifically water-food-energy nexus. Demand over water emphasises the complicated policy options that are posed by the water-food-energy-nexus and the exchanges involved in organising each sector. Excessive water withdrawals for agriculture, industrial and energy can lead to intensify water scarcity.

The energy production currently account for 15% of the world's total freshwater withdrawal, (WWAP, 2014), and by the year 2035 are projected to increase by 20% (IEA, 2012).Of the primary global energy use, the industrial sector accounts for about 37% (UNIDO, 2008) and this may increase in forthcoming years. To enhance both water and energy efficiency in these sectors alone may lead to significant savings and have positive consequences, especially in areas where water resources are most scarce. Nevertheless, the immense challenge remains in reducing the water intensity of fuel and power generation. The availability of water for energy production will be a significant issue in achieving the Sustainable development Goal (SDG) on energy and in reaching the related targets. The most related SDG for energy is the dedicated SDG7. Even though the electricity production were to double for renewables like solar and wind power, there would still be a demand to depend on water-intensive supplies of energy to attain global access to reasonable, sustainable and consistent energy services and to support world trade and industrial progress.

The challenge of the water crisis is first and foremost a 'crisis of governance' (Vörösmarty et al, 2010). The water governance framework includes, among other things, risk assessment (external and in-house gauge), engineering process, leadership and management, accounting and auditing, and reporting to enhance accountability (Gupta, 2013). Adapting to climate change, which affects the availability of water resources, will depend on the characteristics of the industry. Climate impacts will vary from sector to sector. Therefore, companies need water policies that are relevant, risk-sensitive, and far-reaching enough to address their business impacts, risks, and the very real threat that water scarcity can mean to business continuity (Gallagher, 2014). Hence, to align with the SDGs, companies are necessary to work strategically on water sustainability including corporate governance, measurement and reporting.

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2. Problem Statement

Sustainable Development Goal (SDG) 6 aims to ensure availability and sustainable management of water and sanitation for all (SDG Industry Matrix, 2017). The opportunities to achieve the goal are suggested through, among others, (1) invest in integrated water resource and watershed management by reducing and recycling water used in extraction and production, in conjunction with other stakeholders, seeking to enhance watershed functions which impact people, animals and plants, and (2) impute a value for water (as part of a broader approach to natural capital accounting) and use the economic value in strategic and operational decision making, internal management reporting and external integrated reporting. In line with Paris Agreement, the SDGs implementation lead the start of a new strategy for the world and provide a clear message to the businesses.

Water is fundamental to the production of energy. It drives turbines for low-carbon hydropower; provides cooling for power generation; facilitates the extraction and processing of fuels; and, increasingly, irrigates biomass crops. The low carbon ambitions of companies in the energy sector are therefore closely connected with their water management practices. For example, Cenovus Energy Inc. explains how emerging regulations on the treatment of wastewater drove an increase in its energy use and, consequently, their GHG emissions. Conversely, Noble Energy, Inc., Husky Energy Inc. and Sasol Limited identified water reduction efficiencies that reduced the energy required for operations and helped lower resulting GHG emissions (CDP Global Water Report, 2016).

The CDP (2016) report also found that most energy companies from the survey, of equal concern 91% companies do not conduct water-risk assessment which leave the companies unaware of the opportunities and vulnerable to the water risks. Thus, this exposure is pricing the energy sector, with 47% companies subject to penalties in the reporting year compared to other sectors (other seven sectors in the survey include consumer discretionary, consumer staples, healthcare, industrials, information technologies, materials and utilities). The penalties accrued to US$78million which is seven times of the reported amount in 2015. Hence, this sector indicates a lack of ambition and forward-planning to reduce their impact on water resources with the lowest number of companies having water related targets

3. Research Questions

Having discussed the water-energy nexus, this paper aims to response the following research questions: RQ1 - What governance mechanisms are necessary to implement water sustainability within energy companies? RQ2 – How board characteristics and water sustainability effort impact the financial performance of the companies?

4. Purpose of the Study

The CEO Water Mandate (2014) stated that possible disclosures practices differ due to the relevance of the water information to the companies. Leadership quality indicated by the initiative in providing a comprehensive and complete disclosure to the stakeholders. Meanwhile, the Global Reporting Initiatives (2015) stipulates four water related elements: (1) G4-EN8 Total withdrawal by source, (2) G4-EN10 Percentage and total volume of water recycled and reused, (3) G4-EN22 Total water discharge by quality

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and destination, and (4) G4-EN23 Total weight waste by type and disposal method. Although these water information guideline is available, companies may differ in the best practices of water reporting disclosure depending on the ability and capacity of the companies in implementing the methods in measuring water data.

The decision to use water more efficiently may have tie-ins to the decision making processes, making the decision to disclose their behaviours (Kleinman, Kue, & Lee, 2017). De Souza, Buck, Espinach, Kriege, and Hagen (2015) relate the corporate governance, as measured by the GRI to the CDP reports. Thus, this study aims to know the governance mechanisms that necessary to implement water sustainability within energy companies and the extent to which these governance characteristics and water element impact the financial performance of the companies

5. Research Methods

This study focus on water related information and disclosure by five CDP Climate A-List, global based energy companies because energy sector is one of the high water risk profile industry (Ceres Aqua Gauge, 2011). The A-List companies based on CDP reports are companies that achieved more than 75% points in leadership level (out of four consecutive level: disclosure, awareness, management and leadership). If the companies indicate good points of leaderships, this may indicate that there are good practices of corporate governance related to water management. We argue that the water risk faced by the energy sectors will enhance the water policy of the companies. The five companies listed under CDP Climate A-List from different countries: Compañía Española de Petróleos, S.A.U. CEPSA (Spain), Eni SpALimited (Italy), Galp Energia SGPS SA (Portugal), Neste Corporation (Finland) and Vermilion Energy Inc. (Canada).

Data were collected using secondary method. The data for board characteristics, water information and companies' profitability performance from the annual reports, information circular or corporate governance statement and sustainability reports respectively. All the data were collected for ten years from 2007-2016 and make up the sample of this study. Further, theRQ1 and RQ2 will be answered by using relationship analysis between the variables.

Table 01. Measurement of variables

No	Variables	Measurement	Source(s)
1	W_W	Water withdrawal actual number in thousand m^3	Annual reports Sustainability reports
2	W_Disc	Water discharge actual number in thousand m^3	Annual reports Sustainability reports
3	W_Rec	The percentage and total volume of water recycled and reused	Annual reports Sustainability reports
4	B_Ind	The percentage of independent non-executive directors out of total directors	Annual reports Information Circular
5	B_Div	The percentage of female directors out of total directors	Annual reports Information Circular
6	B_Env	0 = if company only mention about environmental management; 1 = if the Board state about focusing on environment (board's function); 2 = if the company has	Annual reports

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		established sustainability committee/sustainability affairs unit/environmental committee	
7	C_Dual	1 = if the Chairman of the Board is also the CEO; 0 = if otherwise	Annual reports
8	ROA	Return on Assets	Annual reports
9	ROE	Return on Equity	Annual reports
10	ROIC	Return on Invested Capital	Annual reports
11	EPS	Earnings per Share	Annual reports

Hence, the regression model for RQ1 is as follows:

Model 1: $CG\_WE = \beta_0 + \beta_1 B\_Ind + \beta_2 B\_Div + \beta_3 B\_Env + \beta_4 C\_Dual + \varepsilon$

The regression models for RQ2:

Model2: $WE\_CP = \beta_0 + \beta_1 W\_W + \beta_2 W\_Disc + \beta_3 B\_Ind + \beta_4 B\_Div + \beta_5 B\_Env + \beta_6 C\_Dual + \varepsilon$

Where; CG denotes the Corporate Governance, WE denotes the Water |Elements; and CP denotes the Company Performance

6. Findings

The board characteristics are found not all correlated with the water elements in Table 02. Water elements include W_W, W_Disc and W_Rec which denote water withdrawal, water discharge and water recycle respectively. The W_W is insignificant and not correlated with any board characteristics. Meanwhile, the W_Disc, or water discharge is positively correlated with B_Ind. This may reflect that with higher number of board independence, the water discharge is also higher. The volume of water discharge may not be the same volume for water withdrawal. The independent board may highlight the water discharge to the maximum used volume to reduce the volume of waste water. In the meantime, the W_Rec is negatively correlated with C_Dual. The significant negative correlations may indicate that the percentage and total volume of recycled and reused water is higher in a company without duality of chairman's role. This shows that the CEO or Chairman may emphasises on the water sustainability if not holding duality role. With one role of the imperative position, the person may emphasise more on the water sustainability.

Table 02. Corporate governance and water elements

	W_W	**W_Disc**	**W_Rec**	**B_Ind**	**B_Div**	**B_Env**	**C_Dual**
W_W	1	.713**	-.476**	-.111	-.201	.110	-.267
W_Disc		1	-.632**	.287*	-.064	-.103	0.00
W_Rec			1	-.241	-.180	.046	-.420**
B_Ind				1	.415**	.411**	.688**
B_Div					1	.104	.695**
B_Env						1	.395**
C_Dual							1

The correlations of variables used to answer RQ2 from Table 03 only refers to the first three rows. In Table 03, the W_W is insignificant with the corporate financial performance. W_Disc is positively

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correlated with ROA which indicate that the water discharge strongly impacted the return on asset of the companies. The maximum use of water reflect the proportion of the yield and resources of the companies. The W_Rec is negatively correlated with ROA and EPS. These may indicate that the higher the percentage of water recycled or reused will lower the return on asset and earnings per share. This may implies that the costs of water recycle may hold back the returns on asset and earnings per share of the companies.

Table 03. Water elements and corporate performance

	W_W	**W_Disc**	**W_Rec**	**ROA**	**ROE**	**ROIC**	**EPS**
W_W	1	.713**	-.476**	.234	.024	.123	-.269
W_Disc		1	-.632**	.376**	.142	.278	.160
W_Rec			1	-.442**	-.198	-.270	-.317*
ROA				1	.801**	.919**	.406**
ROE					1	.908**	.528**
ROIC						1	.471**
EPS							1

The results of the regression is presented in Table 04. The first set of the columns corresponds to H1 and the second set corresponds to H2. For H1, we present three models and four models for H2. The models are different in terms of water element with the board characteristics. Model 1a indicates the highest adjusted R square of 0.435, p-value <0.000. Meanwhile Model 1b also provide significant variables to the water element, W_Disc with adjusted R square of 0.262, p-value < 0.000. This Model 1b indicates that all four board characteristics are significant with the water discharge, or W_Disc. In both models, three common variables including B_Ind, B_Env and C_Dual have significant relationship with W_W and W_Disc. For Model 1c, with adjusted R square of 0.149, p-value <0.05 shows that the W_Rec or water recycle has significant relationship with B_Ind and C_Dual. This may indicate that the higher the percentage of non-executive directors will lead to higher percentage of water recycle. The non-executive directors place higher value for water sustainability by promoting and supporting the water recycle in the sample companies.

In the second set, Model 2a indicates the best model for H2. The model has adjusted R square of 0.150, p<0.05. The significant variables for this model include W_Disc and W_Rec with ROA. Model 2c also significant with a lower adjusted R square of 0.121, p<0.05. The three variables of water elements, W_W, W_Dics and W_Rec are significant with ROIC. Nevertheless, Model 2b and 2d are not significant. The results also suggest that the water elements such as amount of water discharge and water recycle have negative relationship with the ROA and ROIC which may explained by the costs incurred for water used and reused in the companies. The costs of water discharged and recycled are highly determined by the technology used by the companies. The recycling technology considered as new and the costs are expected to negatively affect the return. This may implies that the companies are willing to invest in the recycling technology despite the low return to achieve long term goals of water sustainability.

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Table 04. Regression Models

	CG_WE models			**WE_CP models**			
	1a = W_W	1b = W_Disc	1a = W_Rec	2a = ROA	2b = ROE	2c = ROIC	2d = EPS
Intercept	-2.835***	-3.228***	-0.557	7.352***	5.181***	6.796***	4.859***
B_Ind	0.571*** (4.113)	0.425*** (2.679)	0.446** (2.615)				
B_Div	-0.058 (0.339)	0.476** (2.421)	0.256 (1.214)				
B_Env	0.372*** (3.031)	0.322** (2.297)	-0.134 (-0.888)				
C_Dual	-0.690*** (-3.506)	-0.900*** (-4.002)	-0.676*** (-2.802)				
W_W				0.229 (1.189)	0.296 (1.463)	0.361* 1.840	-0.041 (-0.197)
W_Dics				-0.421** (-2.234)	-0.397* -2.007	-0.447** -2.334	-0.159 (-0.773)
W_Rec				-0.338** (-2.471)	-0.192 -1.339	-0.251* -1.807	-0.168 (-1.130)
Observations	50	50	50	50	50	50	50
Adjusted R^2	0.435	0.262	0.149	0.150	0.063	0.121	0.009
F-statistic	10.416***	5.347***	3.145**	3.873**	2.093	3.250**	0.847

***Correlation is significant at the 0.01 level
**Correlation is significant at the 0.05 level
*Correlation is significant at the 0.1 level

7. Conclusion

As discussed earlier energy industry as one of the high risk profile industry for water issues is expose to water risks, driven primarily by water scarcity, regulatory uncertainty and drought. Companies are raising their ambitions and taking steps to mitigate the water scarcity issues. Yet, with good corporate governance, the efficiency in water management leads to future cost savings and improve the brand value of the companies. The board strategizes corporate water efficiency through sound corporate governance. Nonetheless, this study is not without its limitations. First, the generalisability of this study depends on the sample and time period of the study. The sample only consists of five energy companies which it may not hold for other firms and other period of study. Second, this study only refers to sources of the water information from the annual reports, sustainability reports and information circular. Other reports are not included in this study. Another caveat is related to the variables that could explain the variation of the adjusted R square. Further research may include other variables for example, ownership concentration and the legal system of the country.

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