

## **Main Effects of Executive Pay and Board Diversity on Sustainability: Evidence from the Top Global 100 Firms**

By RAVI CHINTA\*

*Water productivity has become a major driver of the current sustainability wave in the business world. However, there is scant research on factors that drive sustainability at the firm level. Our study examines the main and interaction effects of “CEO-to-average worker pay” and “gender diversity on board of directors” on water productivity at the firm level. Based on data from the top Global 100 sustainable firms, my study shows that both “CEO-to-average worker pay” and “gender diversity on board of directors” have positive main effects but a negative interaction effect on water productivity at the firm level.*

**Keywords:** Sustainability; Water Productivity at Firm Level; Women on Corporate Boards; CEO-to-average worker pay

JEL Classification: M14

### **I. Introduction**

Water has become a scarce resource for humanity (Cosgrove and Rijsberman, 2000 and 2014). Across the world, humans are facing crises of sustainability, resilience, and adaptation with respect to water sources. Can humans sustain the earth to provide water sources for future generations? Hoekstra and Chapagain (2011) note that globalization of water issues is a new phenomenon especially when fresh water resources are discussed. Shortages of water will radically change population movements across and within nations. Problems associated with climate change or sustainable water supply have long-term consequences such as increasing economic inequality or break-up of communities. Escalating resource use at individual levels has led to a swirl of compounding pressures at the collective level potentially destabilizing human existence. In short, sustainability has become a concern for all. In a landmark report, the Brundtland Commission (World Commission on Environment and Development, 1987, p. 70) defined sustainable development as

*“... development that meets the needs of the present without compromising the ability of future generations to meet their own needs.”*

Note that the above definition makes no mention of human well-being. In the Commission's view, sustainable development requires that future generations have no less of the means to meet their needs than humanity does currently. In their view, “sustainable development” requires that relative to their populations each generation should bequeath to its successor at least as large a quantity of what may be called an economy's “productive base” as it had itself inherited from its predecessor. That raises another problem with the Commission's reasoning: it does not explain

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how the productive base should be measured. In sustainability and ecological conservatism literature, water is considered an essential and universal part of economy's "productive base." Economists (Arrow *et al.*, 2012) contend that the "productive base" of an economy is directly correlated to a comprehensive measure of the economy's wealth, and go on to apply that method to assess sustainable development at the level of nations. Historically, it is known that civilizations grew around river basins, and nations with abundant water resources were consistently richer and more advanced than nations with arid lands. In this paper, I apply the same paradigm at the level of a firm to study sustainable development at the firm level with a particular focus on water usage at the firm level. Specifically, I study firm-level investments to make assessments about sustainable development at the firm level. Sustainability at the firm level is often understood as long-term survival of the firm (de Geus, 1997). However, I define sustainability at the firm level, in my study, in terms of green practices of the firm and in particular water conservation practices at the firm level. Long-term survival of the firm is a much broader construct that may include such things as successful business strategies; these may have nothing to do with green practices of the firm. My study makes this conceptual distinction, and focuses on green practices of the firm and specifically water conservation practices at the firm level.

## II. Sustainability as a Firm-Level Imperative

Per Hilton (2003, p. 372), it is crucial for any company to focus on customers' needs and desires during its decision making processes. Customers are becoming more demanding in their decision making, particularly due to the flow of information regarding the need to combat global warming using recycled and renewable resources, among others. The majority of U.S. adults (82 percent) are knowledgeable about which companies and brands have a strong history of sustainability. Of those, a staggering 80 percent consider the history of the company's sustainability when purchasing its products (Marketing Weekly News, 2012).

Elkington (1999, p. 28) suggests that businesses have a moral responsibility to ensure that sustainability is on their growth agenda. Even if companies are created as profit-seeking entities, their long-term profitability may not be achievable if their social and environmental issues are not managed properly. Some management leaders have been paying greater attention to the potential relationship between the way they run their businesses and the implications for the environment, society, and sustainable development. Such interlocking requires a sustainability revolution leading to a paradigm shift (Edwards, 2005).

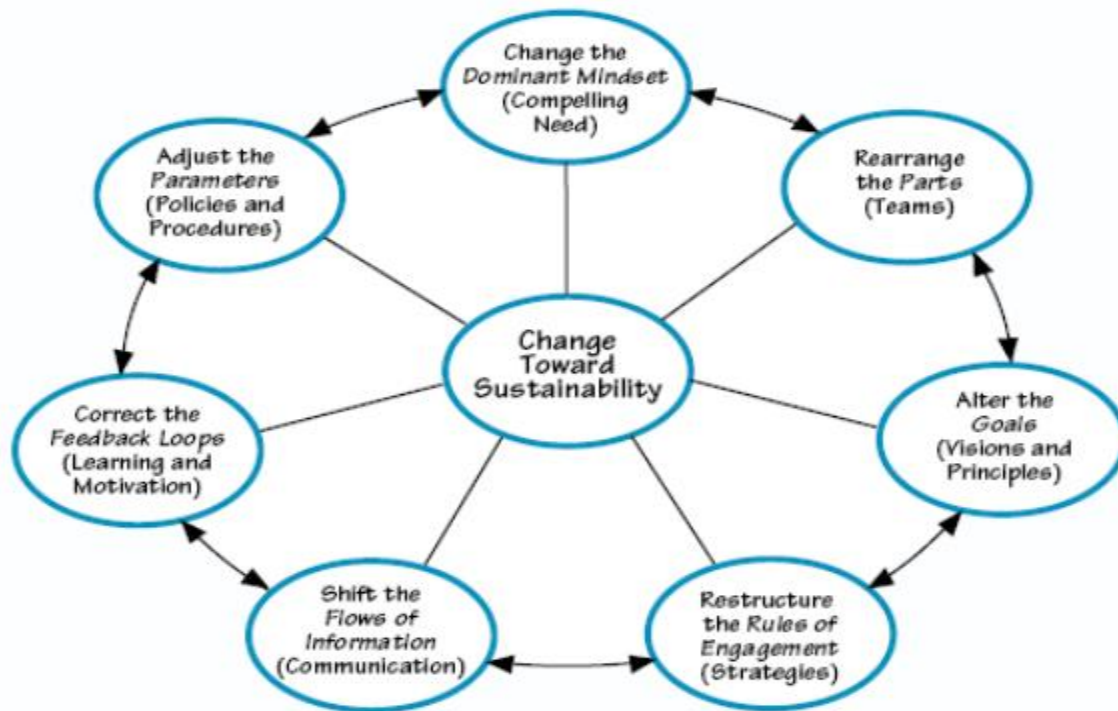
Edwards (2005) suggests that efficient management of firm resources is also ethical and compassionate. "The future belongs to those who understand that doing more with less is compassionate, prosperous and enduring and thus more intelligent, even competitive." (Edwards 2005, p. 49). It is no wonder that the TQM (Total Quality Management) paradigm that has swept the corporate world in the past few decades dovetails very well with the current emphasis on sustainability. The big difference is that while TQM was predominantly focused on the continuous improvement of the business processes within a firm, the sustainability thrust of today is broader in scope and views the global supply chain as a business ecosystem within much larger time frames.

Globalization, ethics, technology, and now sustainability have become powerful forces on businesses. In particular, the sustainability emphasis in a given company depends on its relationships with its stakeholders, suppliers, distributors, and clients. Hence, to address the concept of sustainability, the whole company – as well as all the parties in the value chain – should

become involved in a new way of thinking and behaving (Hilton, 2003, p. 376). Hart (as cited in Elkington, 1999, p. 72) states that “the more humans learn about the challenges of sustainability, the clearer it is that they are poised at the threshold of an historic moment in which many of the world’s industries may be transformed.” Companies should take into account the externalities, such as pollution and emission of toxic gases, generated by their activities in order to avoid complications – complaints or even lawsuits – that can diminish performance and lessen the value of their business. The environmental bottom line brings a new form of evaluating the influence of companies on environmental problems by relating their performance to the amount of emissions/waste produced per unit of a volume/value of production (Elkington, 1999, p. 82). Debora D. Anderson, Vice President, Environmental Quality Worldwide, Procter and Gamble, lucidly states that sustainability is a new business imperative that “will be the price of entry that society will demand for business success in the 21st century” (as cited in Elkington, 1999, p. 1). The advantages of sustainability from a corporate perspective are manifold. First, there is cost reduction through increased efficiency. Second, reputational plaudits flow from both the market and from customers. Third, the increased brand value can give the company a competitive edge. Fourth, improved risk management at the firm level stems from firm-level investments in sustainability initiatives (Dow Jones Sustainability World Index, 2014).

While sustainability appears to be a conceptually sound pursuit for all businesses (Chinta *et al.*, 2014), one key question remains unanswered: why are all firms not pursuing sustainability as a primary strategy? What are the promoters and inhibitors of sustainability efforts at the firm level? Is it too expensive or resource-intensive to be an affordable venture for most firms? What factors influence and impel firms to become sustainable? At one time, quality initiatives were thought to be too costly and hence not pursued, but over time quality has become a minimum requirement to be in business as more and more competitors have adopted quality as an integral part of their activities. Adoption of quality measures required a mindset or a strong belief system that challenged the existing paradigms that had formerly prevented their adoption. In a similar vein, could sustainability be slow moving and gradually grow into a widespread phenomenon as more and more firms develop the mindset (a top management emphasis) to adopt it?

Understanding the factors that promote sustainability at the firm level is a question I want to focus on in this study. However, sustainability is a very broad area and is as multi-faceted as the scope of any business. A conceptual handle is required to study sustainability at the firm level. Fortunately, Doppelt (2003) and Hitchcock and Willard (2008) provide a conceptual framework to help companies evaluate their errors and governance systems, and change initiatives in the sustainability area so as to permanently embed sustainability in their business processes, values, and culture (see Figure 1 by Doppelt, 2003).

**Figure 1: The Wheel of Change Toward Sustainability**

The "Wheel of Change Toward Sustainability" shows how the seven interventions interact to form a continuous reinforcing process of transformation toward sustainability.

Interestingly, the sustainability call of the Bundtland report, which addresses global environmental issues, can be applied with equal force to the corporate environment. Due to the fact that limited environmental resources are often overexploited, there is a need to integrate environmental and social decisions into the economic decision-making processes of businesses (Dresner, 2002, p. 33). According to Doppelt (2003, p. 139), in business, sustainability means "managing human and natural capital with the same vigor business professionals apply to the management of financial capital."

Businesses are expected to follow regulations as well as respond to societal expectations. "Corporate behavior must not only ensure returns to shareholders, wages to employees, and products and services to customers, but it must also respond to societal and environmental concerns" (Elgar, 2008, p. 178). Given these enhanced expectations from the stakeholders of a firm, the assessment of firm-level sustainability takes front stage. It is well recognized that multiple metrics will be required to assess firm-level sustainability, and that these different measures will be driven differently by the top management of various firms.

### III. Firm-Level Sustainability Assessment

The International Standards Organization (ISO) is a non-governmental organization that links the public and private sectors with the intention of promoting international commerce. It was launched in 1947 as the largest developer and publisher of international standards in the world. Technical committees are responsible for developing the ISO standards (ISO, 2014).

The ISO 14001, launched in 1993, is focused on the environmental dimension, for which it proposes a set of requirements to be implemented in the operational processes of companies to emphasize the potential benefits of improving their environmental performance. According to the ISO 14001, the companies that earn its certification are likely to have the following advantages:

- (a) fortifying the company's image and participation in the market;
- (b) preserving natural resources and energy;
- (c) developing a well-structured production process capable of improving production efficiency and environmental performance;
- (d) maximizing results of production;
- (e) decreasing costs by promoting efficiency in energy and water consumption, disposal of waste, recycling paper and energy, and insurance costs reduction;
- (f) developing products and technologies that are more environmentally friendly;
- (g) promoting better management of resources and dangerous substances;
- (h) having better control of the environmental risks and reduction of associated costs through monitoring that guarantees risk prevention and/or minimization;
- (i) providing better communication with employers, stakeholders, distributors, suppliers, government, and society;
- (j) improving work conditions;
- (k) adding value in the relationship with internal and external interest parties, including employees, shareholders, customers, suppliers, organizations of environmental control, and community;
- (l) meeting the certification criteria of company's clients; and
- (m) improving companies' and society's awareness of the importance of environmentally friendly behavior.

#### **IV. Focus of the Study and Research Hypotheses**

Recognizing that sustainability is a very broad subject area that spans multiple levels of analysis, I limited my research study to firm-level water conservation practices in sustainability as a proxy measure for a firm's sustainability performance. Furthermore, I was also interested in factors that promote firm-level sustainability practices. Specifically, I was interested in the impact of gender diversity, i.e., female representation, on boards of directors (BODs) on water conservation practices within firms. Reed (2008) suggests that the complex and dynamic problem of water sources in the world requires flexible and transparent decision making that embraces a diversity of knowledge and values. At the firm level, the CEO and the board of directors bring about the needed diversity of knowledge and values.

The impact of the CEO on firm strategy is direct and unquestionable. However, excessive CEO pay is seen as an increasingly alienating factor that distances the CEO from the long-term interests of a firm (Heineman, 2008; Rappaport, 1999). Recent empirical findings confirmed that CEO compensation and green management practices are negatively correlated (Goktan, 2014). In a finer grain analysis of 500 firms in the U.S., Cordeiro and Sarkis (2008) reported that even when there is a positive link between CEO compensation and environmental performance, the linkage is restricted to only Investor Responsibility Research Council (IRRC) compliances and spill indices but do not include toxic emission indices. In a more nuanced and long-term perspective, Berrone and Gomez-Mejia (2009) found that firms' longer term environmental strategies merely function as a symbol since these strategies are not tied to CEO compensation. Bertrand and Mullainathan

(2001) and Jo and Kim (2008) also found that significant non-disclosure problems arose from short-term thinking by highly paid executives. Based on these prior findings, I posit that very high levels of CEO pay would lead to short-term thinking. Thus, the next hypothesis is as follows:

**H<sub>01</sub>:** The greater the CEO pay relative to the average worker, the lesser would be the firm's sustainability productivity measures.

Gender diversity in BODs has been suggested to increase sustainability practices such as longer term strategic outlook of firms (McInerney-Lacombe *et al.*, 2008; Bear *et al.*, 2010; Bernardi *et al.*, 2009; Terjesen *et al.*, 2009), greater consideration of business ethics (Nielsen and Huse, 2010; Williams, 2003), and increased economic growth and social responsiveness (Galbreath, 2011). Recently, research results, based on the 329 largest companies in the United Kingdom, reported that the higher percentage of women on BODs of a company, the more likely that company will disclose its Greenhouse Gas (GHG) information (Liao *et al.*, 2015). These studies lead to the following hypothesis with respect to our narrower focus on water conservation:

**H<sub>02</sub>:** The greater gender diversity on the board of directors, the greater would be the firm's water conservation.

In addition to empirically investigating the main effects of "CEO-to-average worker pay" and "gender diversity in board of directors," the interaction effect of these two independent variables would also be of interest. Regression models with interaction effects should also include the main effects of the variables that were used to compute the interaction terms, even if these main effects are not significant (Aiken *et al.*, 1991; Jaccard and Turrisi, 2003) because otherwise, main effects and interaction effects can get confounded. Hence the third hypothesis of this research is as follows.

**H<sub>03</sub>:** "CEO-to-average worker pay" and "gender diversity on board of directors" would exhibit a significant interaction effect on water productivity at the firm level.

### *A. Variables and Measures*

A global consulting firm called Corporate Knights surveys a large number of firms engaged in the sustainability of their business environments, specifically the conduct of the businesses in four specific areas: energy consumption, greenhouse gas emissions, water usage, and waste practices. Additionally, the consulting firm also collects data on five firm-level attributes such as R&D intensity, CEO pay, tax burden, board diversity, and disclosure practices. Corporate Knights also publishes the data for the top Global 100 firms in the area of sustainability.

Our research is based on the compilation of two years of data from Corporate Knights<sup>1</sup> for the years 2010 and 2011 for the following two variables. Detailed descriptions of measurement of the two variables with detailed measurements as referenced in the existing literature are provided in Table 1.

1. Water Productivity (Molden *et al.*, 2003; Pereira *et al.*, 2012)
2. CEO-to-average worker pay (Bebchuk and Fried, 2003; Gabaix and Landier, 2008)
3. % Women on board (Erkut *et al.*, 2008; Storvik and Teigen, 2010)

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<sup>1</sup> Data publicly available at <http://www.corporateknights.com> at no charge.

**Table 1: Variable Measurement**

<b>Construct</b>	<b>Calculation Methodology</b>	<b>Rationale</b>
<b>#1. Water productivity</b>	The water productivity score ranges from 0-100%. It is calculated by dividing an entity's total revenue in USD for a particular fiscal period by total water withdrawn (GRI: EN8) in cubic meters for the same period. An entity's water productivity score is a function of two sub-scores: i) a group percentile score; and ii) an improvement factor score. The group percentile score is obtained by percentile ranking the entity's water productivity score against that of industry group peers in the same equity index as the entity in question. The improvement factor score is determined by measuring the trailing two-year improvement in the entity's group percentile score. An improvement factor score of 25% is awarded if water productivity has increased by at least 12.5% over the preceding two years. If this condition is not met, an improvement factor score of 0 is given. The final equation for an entity's water productivity score is represented below: <b>Water productivity score = (.75 x the group percentile score) + the improvement factor score (0 or .25)</b>	Water is a vital yet largely underappreciated input in many industrial sectors, including oil and gas and mining. Global fresh water scarcity has been identified by several international bodies as a growing threat to peace and prosperity in certain regions. Interruption of water supply can lead to lowered production, with negative effects on long-term competitiveness.
<b>#2. CEO-to-average worker pay</b>	The CEO-to-average worker pay score ranges from 0-100%. It is the ratio of CEO compensation for a particular year in USD divided by the average employee compensation in USD over the same time period. Average employee compensation is calculated by dividing the company's total wage bill for a particular year by the total number of employees over the same period. The CEO-to-average worker pay score is obtained by percentile ranking a company's ratio against that of every company in the equity index under consideration irrespective of industry group. The higher the ratio, the lower the pay equity score.	A disproportionate share of compensation expenditure going to one person can lead to lower overall workforce motivation, and can also be indicative of potential governance risks, or misalignments of interests.
<b>#3. Women on BOD</b>	The Board Diversity score for a firm ranges from 0-100%. It is calculated as the percentage of women on the entity's board of directors multiplied by two, up to a maximum of 100%.	An emerging body of research suggests that companies with more diverse boards, especially with respect to gender, have higher performance on key financial metrics such as Return on Equity, Return on Sales and Return on Invested Capital. CalPERS, the largest pension fund in the U.S., calls it the Diversity Return on Investment (DROI).

### B. Data Analyses and Findings

Table 2 shows the descriptive statistics of the three variables in the study. The data yielded 146 independent observations of firms with no missing data.

**Table 2: Descriptive Statistics**

	N	Minimum	Maximum	Mean	Std. Deviation
Water Productivity	146	\$16	\$8,239,535	\$77,525.36	\$682,098
CEO-to-Average Worker Pay	146	4.88	516.53	87.95	56.73
% Women on BOD	146	0%	50.0%	12.8%	10.9%

Table 3 shows the bi-variate correlations between the three variables in my study in addition to the Kendall's Tau, which is a non-parametric correlation between pairs of variables. Spearman's rho, which is another non-parametric correlation matrix, showed similar results, but is not mentioned here. The table reveals the following empirical results.

**Table 3: Bi-Variate Correlations**

		Water Productivity	CEO-to-Average Worker Pay	% Women on BOD
Water Productivity	Kendall's Tau	1	-.007	.112
	Sig. (2-tailed)		.911	.060
	N	146	146	146
CEO-to-Average Worker Pay	Kendall's Tau		1	-.095
	Sig. (2-tailed)			.133
	N		146	146
% Women on BOD	Kendall's Tau			1
	Sig. (2-tailed)			
	N			146

\*\* Significant at 0.01 level.

Table 4 shows the regression that was run with "Water Productivity" as the dependent variable and two independent variables, namely, "CEO-to-average worker pay" and "% Women on board." The overall model fit in the regression analysis in Table 4 shows that these two independent variables explain 31.4 percent of variance in the dependent variable - "Water Productivity." The Durbin-Watson  $d = 1.846$  is between the two critical values of  $1.5 < d < 2.5$  and therefore one can assume that there is no first order linear auto-correlation in the multiple linear regression data. However, a cautionary note is in order as Pindyck and Rubinfeld (1976) and Asher (1976) suggest that ordinary least squares regression models do not indicate causality and may involve reciprocal causation between the dependent variable and the independent variables and propose the use of structural equations models with latent variables (Bollen, 1989; Kelloway, 1998). Despite this limitation, the multiple regression model improves our explanation of the variance in the dependent variable which is "Water productivity." Moreover, "Water productivity" is an outcome variable and is not a managerial (discretionary) variable. Hence, it is rational to suggest that the independent variables in my study, namely, "CEO-to-average worker pay" and



“% Women on board” lead to the dependent variable – “Water productivity”, and are not a result of “Water productivity.”

**Table 4: Overall Model Fit<sup>a</sup>**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.561 <sup>b</sup>	.314	.300	575769.64650 9830000000	1.846

a. Predictors: CEO-to-Average Worker\_Pay, % Women on BOD, and [CEO-to-Average Worker\_Pay\*Women on BOD].

b. Dependent Variable: Water Productivity.

Table 5 shows the F-test; the linear regression's F-test has the null hypothesis that there is no linear relationship between the variables (in other words  $R^2=0$ ). The F-test (F value of 20.983 in Table 5) is highly significant, thus one can assume that there is a linear relationship between the variables in our model. Taken together, tables 4 and 5 indicate the overall model examining the variance in “Water Productivity” as a function “CEO-to-average worker pay” and “% Women on board” is statistically significant. However, hypotheses 1 to 3 focus on the individual main effects and interaction effects of “CEO-to-average worker pay” and “% Women on board” on “Water Productivity.” The individual parameter estimates for these effects are shown in Table 6.

**Table 5: ANOVA<sup>a</sup>**

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	21156024255488	3	7052008085162	20.983	.000 <sup>b</sup>
Residual	46042417129948	137	336076037444		
Total	67198441385437	140			

a. Dependent Variable: Water Productivity.

b. Predictors: CEO-to-Average Worker\_Pay, % Women on BOD, and [CEO-to-Average Worker\_Pay\*Women on BOD].

Table 6 shows the multiple linear regression estimates including the intercept and the significance levels. It also shows that the individual effects and the interaction effect of “*CEO-to-Average Worker Pay*” and “*% Women on Board*” are statistically significant at  $p < 0.01$  levels. That is, all three hypotheses stated above are supported. Simply stated, the higher the “*CEO-to-Average Worker Pay*,” the greater would be “*Water Productivity*.” Similarly, the higher the “*% Women on Board*,” the greater would be “*Water Productivity*.”

However, the interaction effect between “*CEO-to-average worker pay*” and “*gender diversity in board of directors*” on “*water productivity at firm level*” is negative though statistically significant. This is an interesting empirical finding. What this means is that as “*CEO-to-average worker pay*” increases the effect of “*gender diversity in board of directors*” on “*water productivity at firm level*” decreases; and also as “*gender diversity in Board of Directors*” increases the effect of “*CEO-to-average worker pay*” on “*water productivity at firm level*” decreases. This is an interesting revelation of the dynamics between “*CEO-to-average worker pay*” and “*gender diversity in board of directors*” in the area of sustainability and deserves further research at a more granular level to uncover the reasons for the negative interaction between “*CEO-to-average worker pay*” and “*gender diversity in board of directors*.” One pragmatic explanation of this negative interaction in the area of sustainability is that as more women join the board of directors, they present a countervailing force to mitigate the power of the CEO, and vice versa. Future research at a more granular level will unravel the right balance between these two forces at play in resource allocation in firm-level sustainability.

**Table 6: Regression Coefficients<sup>a</sup>**

Regression Model	Unstandardized Coefficients		Standardized Coefficients	<i>t</i>	Sig.
	B	Std. Error	Beta		
(Constant)	-1136415.971	180240.331		-6.305	.000
CEO-to-Average Worker_Pay	14145.282	1811.324	1.179	7.809	.000
% Women on BOD	5739832.912	1035914.240	.903	5.541	.000
[CEO-to-Average Worker_Pay *Women on BOD]	-69283.626	10907.346	-1.286	-6.352	.000

a. Dependent Variable: Water Productivity.

### C. Discussion

First, it is interesting to note that the percent of women directors on corporate boards is positively correlated with water productivity. One implication of our findings is that having more women directors on corporate boards would push the firms toward greener practices at the firm level.

Second, the results also show that “*CEO pay/Average worker pay*” is positively correlated to water productivity. The implication of this finding is that CEOs who enjoy higher pay levels are more concerned about sustainability. Future research should unpack this curious correlation to reveal how pay skewness in hierarchy could lead to higher levels of water productivity. Manipulating the “*CEO pay/Average worker pay*” as a design variable to make firms greener is a recommended strategy for future research.

Third, the results show a statistically significant but negative coefficient for the interaction effect between “*CEO pay/Average worker pay*” and “*percent of women on corporate boards.*” This is an interesting finding that also suggests future research to understand the dynamics between these two variables in terms of their impact on firm-level sustainability efforts.

## V. Limitations and Future Research

There are several limitations of the current study I would like to highlight in the spirit of self-critique and also for identifying areas for future research. Industry effects are not included in our study, and I recommend that future studies replicate our study by including industry effects as part of the predictor variables. Likewise, the imperatives for each of the three measures in our study may be very contextual, that is, determined by factors such as the location of the plant (near a water source), the type of production function (manufacturing or service), the regulatory environment (EPA regulations), the resource availability (firm profitability and competition), firm strategy, competitive environment, etc. Future research may expand the scope of the study by including some other variables that represent the broader construct of sustainability, such as energy productivity, waste productivity, etc. “*Women directors on corporate boards*” is an intriguing variable, especially when seen as a contributing factor to firm-level sustainability. My study did not examine the professional backgrounds of the women directors, and future research should focus on that characteristic of women directors since those with engineering and other professional backgrounds would have significantly greater impact on firm-level sustainability practices. Future research could also develop specific sustainability levels of performance in other productivity measures not considered in my study. For example, following Tol (2009), one can assume that the damage from global emissions is \$50 per ton carbon. Based on this simple quantification, future research studies could develop benchmarks for GHG productivity for various groups of firms. Another example is country-level comparisons that are empirically based on sustainability studies such as ours. Viscusi and Aldy (2003) performed a cross-country meta-analysis and concluded that the value of a statistical life in other countries is approximately proportional to the 0.6 power of per capita GDP. This implies a value of a statistical life for the U.S. of \$6.3 million, for Brazil of \$2.4 million, for Venezuela of \$2.1 million, for China of \$1.7 million, and for India of \$1.3million (Arrow *et al.*, 2012, p. 27). In today’s particular context, capital cities such as Beijing and New Delhi and even smaller cities such as Flint, Michigan, are struggling with air pollution and water problems, key measures of sustainable environment.

## VI. Conclusion

My study is focused on a narrow measure of sustainability as measured by water productivity. While the results reveal interesting managerial variables that significantly impact water productivity, I believe that the study has implications for broader research on sustainability. Proponents of sustainable development advocate that economic development is intimately tied to environmental integrity and social equity. Increasingly, I see that many firms are now subject to intense public scrutiny with society’s increasing environmental consciousness. In response, management research and conceptual thinking on ecological sustainability have expanded from a narrow focus on the concept of pollution control to a broader concept of being socially responsible that integrates environmental issues into functional considerations. The gains in firm-level water productivity work as motivators to tangibly demonstrate the determinants of corporate social

responsibility (CSR). My research findings provide empirical evidence that suggests specific ways to influence water productivity, and I believe that when extended to other measures of sustainability (energy productivity, waste productivity), understanding the drivers of sustainability at the firm level will improve sustainability practices. This is how growing empirical evidence adds to the development of reliable theories in practice.

### References

- Aiken, Leona S., Stephen G. West, and Raymond R. Reno.** 1991. *Multiple Regression: Testing and Interpreting Interactions*. Thousand Oaks, CA: Sage Publications.
- Arrow, Kenneth J., Partha Dasgupta, Lawrence H. Goulder, Kevin J. Mumford, and Kirsten Oleson.** 2012. "Sustainability and the Measurement of Wealth." *Environment and Development Economics*, 17(3): 317-53.
- Asher, Herbert B.** 1976. "Causal Modelling." Sage University Paper Series on Quantitative Applications in the Social Sciences, 07-003. Beverly Hills, CA: Sage Publications.
- Bear, Stephen, Noushi Rahman, and Corinne Post.** 2010. "The Impact of Board Diversity and Gender Composition on Corporate Social Responsibility and Firm Reputation." *Journal of Business Ethics*, 97(2): 207-21.
- Bebchuk, Lucian Ayre, and Jesse M. Fried.** 2003. "Executive Compensation as an Agency Problem." *The Journal of Economic Perspectives*, 17(3): 71-92.
- Bernardi, Richard A., Susan M. Bosco, and Veronica L. Columb.** 2009. "Does Female Representation on Boards of Directors Associate with the 'Most Ethical Companies' List?" *Corporate Reputation Review*, 12(3): 270-80.
- Berrone, Pascual, and Luis R. Gomez-Mejia.** 2009. "Environmental Performance and Executive Compensation: An Integrated Agency-Institutional Perspective." *The Academy of Management Journal*, 52(1): 103-26.
- Bertrand, Marianne, and Sendhil Mullainathan.** 2001. "Are CEOs Rewarded for Luck? The Ones Without Principles Are." *Quarterly Journal of Economics*, 116(3): 901-32.
- Bollen, Kenneth A.** (1989). *Structural Equations with Latent Variables*. New York: John Wiley & Sons.
- Chinta, Ravi, Fiona Sussan, and Alan. Jin.** 2014. "Energy Consumption, Green-House Gases Emissions, Water Usage and Waste Practices: Evidence from Top Global 100 Firms in the Area of Sustainability." *Journal of Strategic Innovation and Sustainability*, 10(1): 49-63.
- Cordeiro, James J., and Joseph Sarkis.** 2008. "Does Explicit Contracting Effectively Link CEO Compensation to Environmental Performance?" *Business Strategy and the Environment*, 17(5): 304-17.
- Cosgrove, William J., and Frank R. Rijsberman.** 2000. "Challenge for the 21st Century: Making Water Everybody's Business." *World Water Council, Paris*. 149-56.
- Cosgrove, William J., and Frank R. Rijsberman.** 2014. *World Water Vision: Making Water Everybody's Business*. New York: Routledge.
- de Geus, Arie** 1997. *The Living Company*. Boston: Harvard Business School Press.
- Doppelt, Bob.** 2003. *Leading Change toward Sustainability*. Saltaire, UK: Greenleaf Press.
- Dow Jones Sustainability World Index.** 2014. <http://www.sustainability-indices.com/> (accessed August 15).
- Dresner, Simon.** 2002. *The Principles of Sustainability*. London: Earthscan Publications.

- Edwards, Andres R.** 2005. *The Sustainability Revolution: Portrait of a Paradigm Shift*. Gabriola Island, Canada: New Society Publishers.
- Elgar, Edward.** 2008. "Sustainable Development and Free Trade, Institutional Approaches." In *Sustainable Water Trade under WTP Law*, ed. Shawkat Alam, 171–88. London and New York: Routledge.
- Elkington, John.** 1999. *Cannibals with Forks: The Triple Bottom Line of the 21<sup>st</sup> Century Business*. Oxford: Capstone Publications Ltd.
- Erkut, Sumru, Vicki W. Kramer, and Alison M. Konrad.** 2008. "Critical Mass: Does the Number of Women on a Corporate Board Make a Difference." *Women on Corporate Boards of Directors: International Research and Practice*, 222-32.
- Gabaix, Xavier, and Augustin Landier.** 2008. "Why has CEO Pay Increased so Much?" *The Quarterly Journal of Economics*, MIT Press, 123(1): 49-100.
- Galbreath, Jeremy.** 2011. "Are There Gender-Related Influences on Corporate Sustainability? A Study of Women on Boards of Directors." *Journal of Management & Organization*, 17(1): 17-38.
- Goktan, A. Banu.** 2014. "Impact of Green Management on CEO Compensation: Interplay of the Agency Theory and Institutional Theory Perspectives." *Journal of Business Economics and Management*, 15(1): 96-110.
- Heineman, Ben W.** 2008. *High Performance with High Integrity*. Boston: Harvard Business Press.
- Hilton, Steve.** 2003. "How Brands Can Change the World." *Journal of Brand Management*, 10(4): 370-77.
- Hitchcock, Darcy E., and Marsha L. Willard.** 2008. *The Step-by-Step Guide to Sustainability Planning: How to Create and Implement Sustainability Plans in Any Business or Organization*. London: Earthscan Publications Ltd.
- Hoekstra, Arjen Y., and Ashok K. Chapagain.** 2011. *Globalization of Water: Sharing the Planet's Freshwater Resources*. New York: John Wiley & Sons.
- ISO.** 2014. "About Us". <http://www.iso.org/iso/about.htm> (accessed August 15).
- Jaccard, James, and Robert Turrisi.** 2003. *Interaction Effects in Multiple Regression*, 2nd ed. Sage University Paper Series on Quantitative Applications in the Social Sciences, Vol. 72. Beverly Hills, CA: Sage Publications
- Jo, Hoje, and Yongtae Kim.** 2008. "Ethics and Disclosure: A Study of the Financial Performance of Firms in the Seasoned Equity Offerings Market." *Journal of Business Ethics*, 80(4): 855-78.
- Kelloway, E. Kevin.** 1998. *Using USREL for Structural Equation Modeling: A Researcher's Guide*. Thousand Oaks: CA, Sage Publications.
- Liao, Lin, Le Luo, and Qingliang Tang.** 2015. "Gender Diversity, Board Independence, Environmental Committee and Greenhouse Gas Disclosure." *The British Accounting Review*, 47(4): 409-24.
- Marketing Weekly News.** 2012. "Despite Proliferation of Green Products, Over Forty Percent of American Adults Believe the Movement is Just Getting Started." <http://bi.galegroup.com/global/article/GALE%7CA293450994/97f47f8e56968c4de45db4b8750308fc> (accessed August 15, 2014).
- McInerney-Lacombe, Nancy, Diana Bilimoria, and Paul F. Salipante.** 2008. "Championing the Discussion of Tough Issues: How Women Corporate Directors Contribute to Board Deliberations." In: *Women on Corporate Boards of Directors: International Research and Practice*, ed. Susan Vinnicombe, Val Singh, Ronald Burke, Diana Bilimoria and Morten Huse. 123–39.

- Molden, D., H. Murray-Rust, R. Sakthivadivel, and I. Makin.** 2003. "A Water-Productivity Framework for Understanding and Action." In *Water Productivity in Agriculture: Limits and Opportunities for Improvement*, ed. J. W. Kijne, R. Barker, and D. Molden. -1-18. Cabi Publishing.
- Nielsen, Sabina, and Morten Huse.** 2010. "The Contribution of Women on Boards of Directors: Going Beyond the Surface." *Corporate Governance: An International Review*, 18(2): 136-48.
- Pereira, Luis S., Ian Cordery, and Iacovos Iacovides.** 2012. "Improved Indicators of Water Use Performance and Productivity for Sustainable Water Conservation and Saving." *Agricultural Water Management*, 108: 39-51.
- Pindyck, Robert S., and Daniel L. Rubinfeld.** 1976. *Economic Models and Economic Forecasts*. New York: McGraw-Hill.
- Rappaport, Alfred.** 1999. "New Thinking on How to Link Executive Pay with Performance." *Harvard Business Review*. March-April.
- Reed, Mark S.** 2008. "Stakeholder Participation for Environmental Management: A Literature Review." *Biological Conservation*, 141(10): 2417-31.
- Storvik, Aagoth, and Mari Teigen.** 2010. "Women on Board." *The Norwegian Experience*. Friedrich Ebert Stiftung. Germany.
- Terjesen, Siri, Ruth Sealy, and Val Singh.** 2009. "Women Directors on Corporate Boards: A Review and Research Agenda." *Corporate Governance: An International Review*, 17(3): 320-37.
- Tol, Richard S. J.** 2009. "The Economic Effects of Climate Change." *Journal of Economic Perspectives*, 23(2): 29-51.
- Viscusi, W. Kip, and Joseph E. Aldy.** 2003. "The Value of a Statistical Life: A Critical Review of Market Estimates Throughout the World." *Journal of Risk and Uncertainty*, 27(1), 5-76.
- Williams, Robert J.** 2003. "Women on Corporate Boards of Directors and Their Influence on Corporate Philanthropy." *Journal of Business Ethics*, 42(1): 1-10.
- World Commission on Environment and Development.** *Our Common Future*. 1987. New York: Oxford University Press.