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A Global Corporate Sustainability Model

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Abstract

Sustainability is a highly visible topic with more and more global firms seeking to improve their sustainability index as a strategic corporate objective. To be considered a "sustainable company", a firm must operate in a manner without leaving a significant footprint on the environment. Recently, the world's largest Energy Sustainability Group (ESG) research consortium, the Global Sustainability Research Alliance (GSRA) isolated the top ten per cent of sustainability and financial performers from a universe of 3000 developed and emerging market firms. It then turned these 300 over to the Corporate Knights Research Group (CKRG) which winnowed the group down to the top 100 "most sustainable companies" in the world in 2010.

This paper presents the results of an investigation to determine a list of variables that could help to explain why some companies are more successful than others in improving their sustainability ranking. Using data collected on the top 100 sustainable companies identified by CKRG, a regression model was developed which explained approximately 50% of the variability in sustainability. To arrive at the final model stepwise regression was performed on a pool of 9 independent variables thought to be related to a firm's sustainability ranking. The final model contained the following 6 independent variables: (1) leadership diversity; (2) Industry Group Percentile based on waste productivity; (3) Industry Group Percentile based on water productivity; (4) sustainability leadership; (5) Industry Group Percentile based on energy productivity; and (6) percent tax paid in cash.

Background

For an organization to be considered a "sustainable company," the most notable factor is to operate without leaving a significant footprint on the environment. This could mean using less toxic chemicals, conserving energy or by offering a recycling program. Research has been conducted by numerous groups on diversity factors such as industry, management experience, gender, age and ethnicity. These studies compare the correlation of diversity to revenue. The benefit of being a sustainable organization is the value created for stockholders, stakeholders, clients and, of course, the environment.

Today, many companies still believe that the closer they are to the environmental-friendly category, the closer they are to losing their competitive advantage. Senior leaders across many industries in the U.S. today are concerned about sustainability due to the perception that it will add to their cost and will not deliver immediate benefits. CEOs and Board of Directors are concerned that producing "green" products will put them at a relative disadvantage compared to their rivals in developing countries that do not face the same pressures. Executives act as though they must choose between the huge social benefits of offering sustainable products or processes and the financial impact of doing so, but this is not true. The reality is sustainability development can potentially lead to lower costs as companies end up reducing input materials and create increased revenue from an improved product offering.

Research shows that companies who have successfully started their sustainability journey develop five distinct stages of change (Nidumolu, Prahalad, Rangaswami, 2009).

Stage 1: Viewing Compliance as Opportunity

- Ensure compliance with norms are viewed as an opportunity for innovation
- Ability to anticipate and shape regulations
- Skills to work with other companies to implement creative solutions
- Experiment with sustainable technologies, materials, and processes

Stage 2: Making Value Chains Sustainable

- Increase efficiencies throughout the value-chain
- Redesign operations to use less energy and water, and produce fewer emissions
- Convince suppliers and retailers to make operations more eco-friendly
- Increase the use of clean energy sources such as wind and solar power

Stage 3: Designing Sustainable Products and Services

- Develop sustainable product offerings or redesign existing ones to be more eco-friendly
- Understand which products and services are unfriendly to the environment
- Management's ability to scale both suppliers of green materials of green products
- Develop compact and eco-friendly packaging for products

Stage 4: Developing Business Models

- Find innovative ways of developing and adding value, which will change competition
- Capacity to understand consumer's needs and figure out how to meet the demand
- Realize the value of partnership when developing a "green" product offering
- Develop new delivery technologies that change value chain relationships

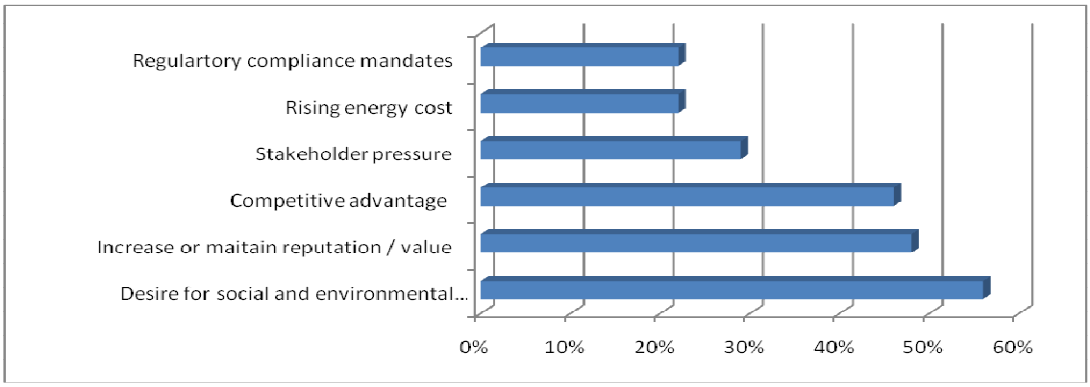
Stage 5: Creating Next-Practice Platforms

- Knowledge of how renewable and nonrenewable materials impact businesses
- Build business platforms to enable all to manage energy in radically different ways
- Design technologies that will allow industries to use energy produced as a by-product

Pressures Driving Sustainability Initiatives

Today, top performing organizations view sustainability as a "must have" strategy to ensure long term success. In today's business environment the top pressure driving sustainability development is the desire for social and environmental stewardship, closely followed by brand reputation. Other pressures including the reaction to volatile energy costs and a firm's ability to prove to its stakeholders they are managing resources in an efficient manner.

Figure 1. Top Sustainability Pressures

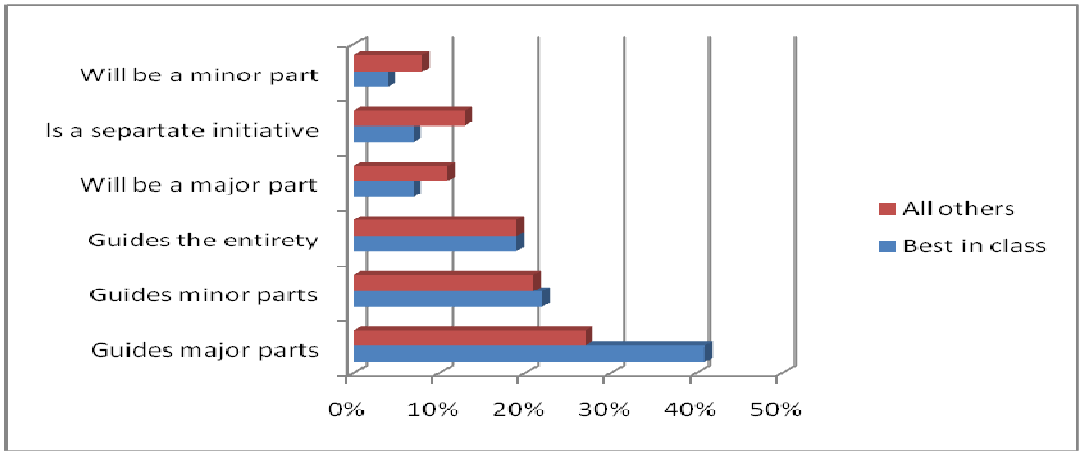


Source: Aberdeen Group, May 2009

Sustainability's Role in Corporate Strategy

A successful sustainability strategy will improve operational efficiencies, brand value, and social and environmental performance. Figure 2 illustrates just how important the role of sustainability is becoming in corporate strategy today. Of the "Best in Class" 41% use sustainability to guide major portions of corporate strategy.

Figure 2. Role of Sustainability in Strategy



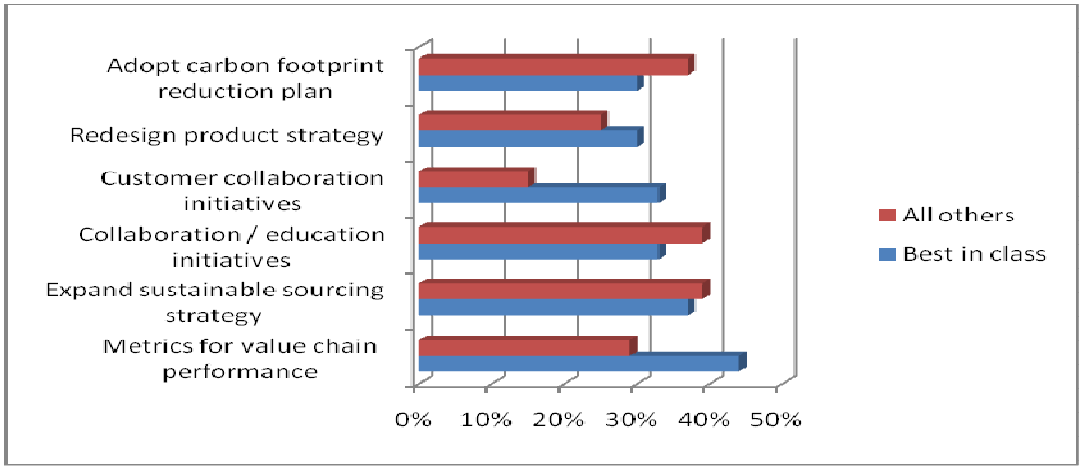
Source: Aberdeen Group, May 2009

Top Strategic Actions

Firms that have successfully implemented sustainability strategies often required a change in corporate culture/values. These firms take an integrated view of the supply chain and focus intently on their customer base.

In addition, top performers incorporate sustainability metrics to assist in the continuous improvement of their sustainable sourcing strategy.

Figure 3. Strategic Actions in Sustainable Development



Source: Aberdeen Group, May 2009

Implementing an effective sustainability strategy requires numerous steps, processes, and an extreme focus on metrics and communication. The top firms who are able to implement such a strategy excel at matching hard to grasp environmental concepts to clear, actionable, and measurable initiatives. This research strives to identify key areas that organizations must focus on to successfully implement a meaningful and effective sustainability strategy.

IV. Problem Statement / Hypotheses

Null Hypothesis:

There is no relationship between corporations that are ranked as sustainability leaders and the following factors: (1) leadership diversity; (2) Industry Group Percentile (IGP) based on waste productivity; (3) IGP based on water productivity; (4) IGP based on energy productivity; (5) sustainability leadership; (6) Percent tax paid in cash; (7) IGP based on carbon productivity; (8) firm transparency based on percentage of data provided; and (9) sustainability remuneration.

Alternative Hypothesis:

There is a relationship between corporations that are ranked as sustainability leaders and the following factors: (1) leadership diversity; (2) Industry Group Percentile (IGP) based on waste productivity; (3) IGP based on water productivity; (4) IGP based on energy productivity; (5) sustainability leadership; (6) Percent tax paid in cash; (7) IGP based on carbon productivity; (8) firm transparency based on percentage of data provided; and (9) sustainability remuneration.

Research Design and Methodology

Recently, the world's largest Energy Sustainability Group (ESG) research consortium, the Global Sustainability Research Alliance (GSRA) isolated the top ten per cent of sustainability and financial performers from a universe of 3000 developed and emerging market firms. It then turned these 300 over to the Corporate Knights Research Group (CKRG) which winnowed the group down to the top 100 "most sustainable companies" in the world in 2010 (Corporate Knights Research Group, 2010) .

This data of top ranked sustainable organizations was assembled across various industry sectors. The data contained elements relating to the 'green' impact of the organization such as energy, carbon, CO2, water and waste productivity. Data was also collected relating to the organizational leadership including leadership diversity (% of women on the board), sustainability leadership (the existence of sustainability committee(s) in the company and whether a director is on the committee), sustainability remuneration (if one or more of the organization's leaders have their pay linked to sustainability goals) and transparency (% of data the company provides regarding their sustainability efforts).

A regression model was developed to examine a pool of 9 variables to determine which ones contribute to corporate sustainability ranking. The sustainability research model allows for the analysis of several independent measurements to predict the variables which correlate to corporate sustainability global ranking. Stepwise multiple regression analysis was the appropriate statistical tool used to identify the significant variables. For the analysis, all nine independent variables in the hypothesis were identified for consideration and determination as to whether or not it had relationship to sustainability ranking. A stepwise multiple statistical regression was then executed, which identified potential independent variables one at a time. This process was repeated until a model was reached that was both efficient and had sufficient explanatory power.

Dependent Variable:

Corporate Sustainability Ranking

Independent Variables:

- *Industry Group Percentile for Energy Productivity* (US$) –Energy Productivity is Sales (US$) / Total direct and indirect energy consumption in gigajoules. The IGP for energy productivity was used to better normalize this variable within the various industries investigated.
- *Industry Group Percentile for Carbon Productivity* (US$) – Carbon Productivity is Sales (US$) / Total CO2 and CO2 equivalents emissions in tons. The IGP for carbon productivity was used to better normalize this variable within the various industries investigated.
- *Industry Group Percentile for Water Used* (US$) – Water Used is Sales (US$) / Total water use in cubic meters. The IGP for Water Productivity was used to better normalize this variable within the various industries investigated.
- *Industry Group Percentile for Waste Productivity* (US$) – Waste Productivity is Sales (US$) / Total amount of waste produced in tons. The IGP for Waste Productivity was used to better normalize this variable within the various industries investigated.

- *Leadership Diversity* - % of women on the board was used as the measure of leadership diversity.
- *Sustainability Leadership* – a weighted discrete variable based on: (1) if a sustainability committee existed in the firm; and (2) whether a director was on it.
- *Sustainability Remuneration* – whether or not at least one senior officer has his/her pay linked to sustainability. This is a binary variable, 0 = no, 1 = yes
- *Transparency* - % of data points on which the company provided data.
- *% Tax* - % of tax obligation to the government paid in cash

The following table shows the means and standard deviations for the continuous variables that are thought to be important in determining a corporation's ranking in the Global 100. Since one of the variables in the model is binary, a separate table was constructed that lists the possible values the variable can assume and the associated frequencies.

Table I: Means and Standard Deviations for Continuous Variables in the Model

Variable	Number of Observations	Mean	Standard Deviation
Industry Group Percentile Energy Productivity	80	0.57	0.27
Industry Group Percentile Carbon Productivity	86	0.52	0.29
Industry Group Percentile Water Productivity	70	0.60	0.29
Industry Group Percentile Waste Productivity	61	0.57	0.30
Leadership Diversity	100	0.13	0.09
Percent Tax Paid	90	0.81	0.27
Sustainability Leadership	100	0.46	0.42

Table II: Counts and Percents for Discrete Variable in Model

Sustainability Remuneration	Count	Percent
No	60	60.0
Yes	40	40.0

Results

The initial *regression equation* was:

$$\hat{R} = b_0 + b_1 IGPEP + b_2 IGPCP + b_3 IGPWP + b_4 IGPWasP + b_5 LD + b_6 PTP + b_7 SL + b_8 T + b_9 SR$$

Where $\hat{R}$ is estimated rank, b_0 is the constant, and b_k b_k is the estimated coefficient on the k[th] independent variable, and IGPEP is industry group percentile energy productivity, etc. A backward elimination stepwise regression procedure was used to generate the final regression equation, which contains only those independent variables having estimated regression coefficients with p-values less than 0.10. The results of the stepwise procedure resulted in 3 of the original 9 variables being left out of the model.

Step 1 resulted in elimination of Industry Group Percentile Carbon Productivity since the estimated regression coefficient had a corresponding p-value of 0.908. Variable eliminated in step 2 was Sustainability

Remuneration. This p-value associated with this variables estimated regression coefficient was 0.564. Finally, on the third step Transparency was eliminated from the analysis. This variable's estimated regression coefficient had a p-value of 0.196.

Table III: Multiple Regression Results (n = 47)

Variable	Estimated Coefficient	T-Statistic	P-Value
Constant	125.7	6.51	0.000
Leadership Diversity	-108.0	-2.81	0.008
Industry Group Percentile Waste Productivity	-40.0	-3.49	0.001
Industry Group Percentile Water Productivity	-51.0	-3.33	0.002
Sustainability Leadership	-21.2	-2.69	0.010
Industry Group Percentile Energy Productivity	37.0	2.15	0.038
Percent Tax Paid	-29.0	-1.74	0.089
F = 6.83	P-Value = 0.000	R-Squared = 50.0%	

The sample evidence suggests the regression model resulting from the use of the stepwise regression procedure has good explanatory power. The computed value of the F statistic is 6.83, with a corresponding p-value of 0.000. Furthermore, this model explains 50.0% of the variation in dependent variable, rank.

Conclusions

Reject the null based on the six exogenous variables that were found to be significant in the six variable sustainability model. It is concluded that there may well be a relationship in the top global sustainability firms and the following factors: (1) leadership diversity; (2) Industry Group Percentile (IGP) based on waste productivity; (3) IGP based on water productivity; (4) IGP based on energy productivity; (5) sustainability leadership; and (6) percent tax paid in cash. Three variables were found to have an insignificant effect on sustainability success. These variables were: (1) IGP based on carbon productivity; (2) firm transparency based on percentage of data provided; and (3) sustainability remuneration.

To embrace sustainability, a company's leadership should consider:

- Creating more racially diverse boards
- Creating gender diverse boards
- Adopting environmentally friendly ways of doing business
- Avoid shying away from investing in sustainable business practices
- Letting their shareholders and customers know that they are embracing an extraordinary business concept

Sustainability and diversity are not new concepts; nevertheless, many companies never thought that they could provide gains. However, many of these companies now grasp that these are necessary elements for any company who wants to remain competitive in this global business environment. Companies who embrace sustainability and diversity amongst their leadership will thrive and the companies that do not embrace it will be challenged.

Recommendations

Each variable found to be significant needs further research. The model developed was a cross-sectional model based on 2010 data derived from active surveys on sustainability. In the coming years there will be data available that will allow for more in-depth and accurate longitudinal surveys. These need to be conducted as a natural follow-on to this research.

In the area of diversity there is much more research that could be conducted. Women on the board of directors was used as a surrogate for board diversity, when in fact board diversity is also dependent on many other dimensions e.g. ethnic diversity, the variation in outside directors (coming from within the firm, related outsiders or independent outsiders). Fifty years ago most companies' boards had a make-up of strictly white males. However, this and other research (Bradley et. al., 2010) has shown that companies in our present business environment who have allowed diversity on their boards are witnessing significant competitive advantages. Even the top 50 global companies have seen that diversity on their boards have created significant benefits for their shareholders, stakeholders, clients and also the environment.

In the past companies perceived that being environmentally friendly negatively impacted their competitive advantage and provided little if any cost benefits. However, companies have realized that such investments help create brand awareness, and social and environmental stewardship within the companies itself and their customers. This is why 41% of the largest global companies now use sustainability to guide their corporate strategy and thereby, have also changed their corporate culture and values.

Appendix

Descriptive Statistics: Initial Independent Variables

Variable	N	N*	Mean	SE Mean	StDev	Minimum	Q1
IGP Energy Productivity	80	20	0.5699	0.0301	0.2689	0.0200	0.3135
IGP Carbon Productivity	86	14	0.5153	0.0312	0.2895	0.0000	0.2908
IGP Water Productivity	70	30	0.5975	0.0345	0.2886	0.0000	0.3458
IGP Waste Productivity	61	39	0.5660	0.0378	0.2954	0.0000	0.3130
Leadership Diversity	100	0	0.12587	0.00929	0.09292	0.00000	0.05882
Percent Tax Paid	90	10	0.8131	0.0289	0.2738	0.0000	0.6984
Sustainability Ldrship	100	0	0.4600	0.0419	0.4185	0.0000	0.2500
Transparency	100	0	0.5069	0.0251	0.2507	0.0238	0.3006

Variable	Median	Q3	Maximum
IGP Energy Productivity	0.5825	0.7953	1.0000
IGP Carbon Productivity	0.4805	0.7745	0.9670
IGP Water Productivity	0.6315	0.8610	1.0000
IGP Waste Productivity	0.6000	0.8475	1.0000
Leadership Diversity	0.12917	0.18182	0.47059
Percent Tax Paid	0.9709	1.0000	1.0000
Sustainability Ldrship	0.2500	1.0000	1.0000
Transparency	0.4821	0.7262	0.9643

Tally for Discrete Variables: SRDV

SRDV	Count	Percent
0	60	60.00
1	40	40.00
N=	100	

Stepwise Regression: Rank versus Independent Variables

Backward elimination. Alpha-to-Remove: 0.1

Response is Rank on 9 predictors, with N = 47
N(cases with missing observations) = 53 N(all cases) = 100

Step	1	2	3	4
Constant	136.9	137.2	137.3	125.7
Industry Group Percentile EP	32	33	33	37
T-Value	1.55	1.87	1.88	2.15
P-Value	0.130	0.069	0.068	0.038
Industry Group Percentile CP	2			
T-Value	0.12			
P-Value	0.908			
Industry Group Percentile WP	-50	-50	-50	-51
T-Value	-3.25	-3.30	-3.30	-3.33
P-Value	0.002	0.002	0.002	0.002
Industry Group Percentile WasP	-39	-39	-40	-40
T-Value	-3.16	-3.30	-3.50	-3.49
P-Value	0.003	0.002	0.001	0.001
Leadership Diversity	-92	-92	-93	-108
T-Value	-2.25	-2.29	-2.34	-2.81
P-Value	0.030	0.028	0.025	0.008
Percent Tax Paid	-27	-27	-27	-29
T-Value	-1.58	-1.61	-1.62	-1.74
P-Value	0.124	0.116	0.114	0.089
Sustainability Leadership	-22.0	-21.9	-23.1	-21.2
T-Value	-2.62	-2.65	-2.91	-2.69
P-Value	0.013	0.012	0.006	0.010
Transparency	-19	-19	-20	
T-Value	-1.21	-1.22	-1.32	
P-Value	0.234	0.230	0.196	
SRDV	-3.6	-3.7		
T-Value	-0.55	-0.58		
P-Value	0.585	0.564		
S	20.9	20.6	20.5	20.6
R-Sq	52.16	52.14	51.71	49.57
R-Sq(adj)	40.52	42.06	43.05	42.01
Mallows Cp	10.0	8.0	6.3	6.0

References

Badaracco, J. (2002). Leading Quietly. Boston: Harvard Business School Press.

Bradley, J,, Fulmore-Hardwick-, M., Greiner, M., Moseley, L., Nordquist, J., Phulgence, Y. (2010), Analysis of Sustainability and Diverse Leadership within an Organization (student paper), Jacksonville University, Jacksonville, Florida.

Collins, J. (2001). Good to Great. New York: HarperCollins.

Fullan, M. (2001). Leading in a Culture of Change. San Francisco: Jossey-Bass.

Fullan, M. (in press). Change Forces with a Vengeance. London: Routledge-Falmer.

"Global 100 Most Sustainable Corporations in the World." Global 100. 2010. Web. 14 April 2010.

Goleman, D., Boyatzis, R., & McKee, A. (2002). Primal leadership. Boston: Harvard Business School Press.

Nidumolu, Prahalad, Rangaswami (2009) *Why Sustainability Is Now the Key Driver of Innovation.* Harvard Business Review.

"Prioritizing GRI indictors by Mainstream Investors for Mainstream Investors", Corporate Knights Research Group, 2010.

Senxian, Jutras (May 2009) *The ROI of Sustainability: Making the Business Case.* Aberdeen Group, from www.aberdeen.com

Wilson, Baker, Sako, Lee (2005) *Corporate Strategy for Eco-Efficiency.* Kenan-Flagler Business School, from www.cse.unc.edu