SUSTAINABILITY INNOVATIONS AND THE IMPACT ON FINANCIAL PERFORMANCE OF JAPANESE AUTOMOTIVE AND ELECTRONICS COMPANIES

Michael Angelo A. Cortez¹, Cynthia P. Cudia²

¹College of International Management, Ritsumeikan Asia Pacific University, 1-1 Jumonjibaru, Beppu, Oita 8740919 JAPAN, cortezm@apu.ac.jp
²College of Business, De La Salle University, 2401 Taft Ave., Malate, Manila 1004 PHILIPPINES, cynthia.cudia@dlsu.edu.ph

ABSTRACT
Sustainability is an important non-financial report on environmental accounting practices in Japan as guided by the Ministry of Environment. Automotive and electronics manufacturers are significant industries on the issue of sustainability because of the carbon emission in the production and ultimate use of the products. For over a decade now, Japanese companies publish costs of environmental innovations in products and process improvements alongside with its perceived economic benefits. However, the impact on financial performance over a comparable period for the two manufacturing industries has to be established empirically to support the resource-based view that sustainability innovation translate to measurable benefits of competitiveness. The general findings of this study point to positive impact on sales, income and assets of Japanese automotive and electronics companies. However, the impact on profitability of electronics companies could not be established in the regression models in this study.

KEY WORDS:
sustainability, environmental accounting, financial performance
BACKGROUND OF THE STUDY

Multinational enterprises are confounded with issues of sustainability in this era of globalization. They have been blamed for environmental neglect and natural resources depletion in countries where they operate. Their environmental actions, therefore, are in response to the changing values of their stakeholders and a governance mechanism for themselves.

Sustainability’s triple bottom-line of environment, society and economy could be seen alternatively from a Japanese perspective. Alongside with annual financial report made publicly available is the sustainability or environmental report that communicates the corporate philosophy of environmental conservation. As Senge (2008) suggests, there is an overwhelming concern for the environment considering that without the environment, there will be no society, and hence no economy.

Environmental innovations started early in Japan in response to pollution problems in the 1970s due to rapid industrialization and economic growth. The environmental reports of Japanese automotive and electronics companies clearly state their commitment and institutionalization of such philosophy in their modes of governance. This is evident in their product and process innovations that provide for the reduction of wastes and CO2 emissions; life cycle analysis (end of life product recall), materials renewal and recycling; and responsible disposal.

Corporate social responsibility (CSR) literature has evolved into corporate social performance and more specifically could be operationalized into environmental performance. Links have been established to firm performance as scholars theorized the positive impact.

Deloitte Touche Tohmatsu, a leading global accounting firm, published The Sustainable Auto Report in 2001 highlighting the strengths and weaknesses of sustainability reporting practices. While there is genuine environmental concerns in the corporate philosophy of automotive manufacturers with detailed discussions on product life cycles, innovation, technological options and eco-efficiency, there seems to have been limited discussions on matters that have or could have a bearing both on risks and opportunities; and on short-term and long-term financial performance.

This study aims to present a theoretical review of corporate social performance and environmental innovations; and determine its impact on sales, profitability and firm size of all ten Japanese automotive manufacturers and ten electronic manufacturers listed in the Tokyo Stock Exchange in order to substantiate the conceptual theorization and empirical investigations earlier espoused on the link between corporate social performance and financial performance.

Japanese automotive companies covered in this study are all ten companies listed in the Tokyo Stock Exchange - Toyota, Nissan, Honda, Mazda, Mitsubishi, Daihatsu, Subaru, Hino, Suzuki and Isuzu. As for the electronics companies, the leading manufacturers of household and office electronics were considered, namely - Toshiba, Fujitsu, Hitachi, Panasonic, Sanyo, JVC, Canon, Oki, Casio, and Sharp.

Following the resource-based view, companies engage in strategic resources such as investments in technology, competencies and skills as a basis for competitive advantage (Barney 2001). In a more specific perspective, Hart’s (1995) natural resource -based view details the strategies these firms employ with its relationship to the natural environment.

THEORETICAL REVIEW

CSR as evolving construct with firm performance

Earlier CSR literature initially saw no significant relationship with profitability (Aupperle, Carroll & Hatfield 1985). McGuire, Sundgren & Schneeweiss (1988), on the other hand, were among the first to link CSR with firm prior financial performance. As the CSR construct evolved not into a common definition but rather in various operationalizations, corporate social performance (CSP) came into fore.

Wood (1991) defines CSP as “a business organization’s configuration of principles of social responsibility, processes of social responsiveness, and policies, programs, and observable outcomes as they relate to the firm’s societal relationships”. The principle is that companies engage in CSP because they are bound by the legitimacy and power society has given them. Local companies lose their power they have to act in a manner society considers responsible (Davis 1973 in Wood 1991). Social legitimacy, public responsibility and managerial discretion were the predominant CSR principles at that time.

Amongs the first to relate corporate social performance to financial performance were Waddock & Graves (1997). They found that CSP is positive associated with prior financial performance supporting the theory of slack resource availability. A company has to perform financially first before it engages in CSP. Furthermore, CSP is also associated with future financial performance (Waddock & Graves 1997). But then again, a company has to be initially profitable. Morhardt (2009) espouses, however, that once a company reaches a certain size, sustainability reporting becomes independent of it.


Legitimacy and slack view availability as early predominant theories

Legitimacy appears to be the common theme why companies go green. Bansal & Roth’s (2000) analytic induction revealed three motivations: competitiveness, legitimation, and ecological responsibility. This ‘social license’ pressures and corporate environmental management appear to be the most powerful factors that lead firms to more than just comply with regulation (Kagan, Thornton & Gunningham 2003). Spence (2009) refers to this as ‘corporate ego’ and uses social and environmental reporting to manage how a company wants to be perceived. Environmental reputation management at this point may have implications in market value as explored by Konar & Cohen (2001). Cortazar, Schwartz & Salinas (1998) argues that firms...
require high output price levels to be induced to invest in environmental technologies, thereby reaffirming the slack resource availability view.

**Pressures from stakeholders and regulation**

From legitimacy to slack resource view, stakeholder pressure was also seen as a driving force for CSP. In this age of climate change and global warming, environmental concerns now top the issues for social performance. The construct evolved further in actions taken by companies to address the depletion of finite resources, pollution, waste management, recycling and reduction of CO2 emissions. These initiatives transcend legitimacy and slack resource view as stakeholder perspective gained widespread currency as a theory for CSP. Sakai & Akaoka (2001) cites that sustainable growth of Japanese firms and the Japanese economy considers the economic welfare of stakeholders and the society. Buyssse & Verbeke (2003) coins protractive environmental strategies in stakeholder management. They argue that environmental leadership is not associated with the rising importance of environmental regulations but rather with a deeper and broader coverage of stakeholders (Buyssse & Verbeke 2003).

At the turn of the century, environmental reports issued by companies that supplement annual financial reports were more predominant among companies from the United Kingdom, Japan and Germany. Notable are the industries of chemicals & pharmaceutical manufacturing; automotive and electronics topping the list of companies doing environmental reporting. This could be attributed to the growing stakeholder expectations and the increased level of regulation in these countries (Kolk 2003). However, there was a need for standardized data and comparability can only be facilitated by regulation (Kolk 2004; Porter 2008).

**Network theory and institutional isomorphisms**

Organizations are basically part of society and sustainability could not be attained without the collective participation of all players (Jennings & Zandbergen 1995). They espoused the incorporation of values into organizational sustainability.

Network analysis, on the other hand, focuses on the relationship between firms, describing the observed phenomena as ‘inter-firm cooperation’ (Richardson 1972) or as Blois (1971) puts it, vertical ‘quasi-integration’. Hence networks are defined as situations where some firms are gaining the advantages of vertical integration without assuming the risk or rigidity of ownership (Blois 1971). In network analysis, the approach has tended to focus on the dynamic aspects of the organization of production, with adaptation and innovation issues occupying a central role.

Dubois (1998) provides the characteristics of inter-firm relationships to include: continuity, complexity, a low degree of formalization, a symmetry of resources and initiative, adaptations and connectedness. This typically captures how Japanese multinational enterprises are structured across the globe. As for technological innovations, Teece (1991) points that interfirm cooperation brings together existing capabilities on which new products can be based. An innovating firm or consortium that has developed a new product or process with good commercialization prospects has taken only the first step. It must secure access to complementary technologies and complementary assets on favorable terms in order to successfully commercialize the product or process (Teece 1991).

Amongst most literature on Japanese MNCs and their practices, DiMaggio and Powell ‘s (1983) institutional theory with three isomorphic processes is the most relevant. They hypothesize on the impact of resource centralization and dependency, goal ambiguity and technical uncertainty, and professionalism and structuration on isomorphic change which is evident in Japanese MNCs as discussed above.

Institutional similarity, called isomorphism, is the emergence of a common structure and approach among organizations in the same field. It is the process that causes one units in a population to resemble other units that face the same set of environmental conditions (Daft 2003).

Mimetic isomorphisms could explain the institutionalized practice of sustainability reporting across all Japanese manufacturing companies and its subsidiaries as confounded by the guidelines from the Ministry of Environment.

Jennings and Zandbergen (1995) emphasize that natural constraints on sense making and paradigm construction, the study of regional networks, and recognition of the role of individual players in attaining ecological sustainability. This leads to the next theory on natural resource-based view of the firm (Barney 2001).

**Strategic management perspective and the natural resource based view of the firm**

The conceptual benefits of environmental management practices and technologies include cost reduction, revenue enhancement, supplier ties, reduction of liabilities, competitive edge and quality improvement. These were the findings of Shrivastava (1995); Porter (2008) and Senge (2008). Orlitzky (2008) adds efficiency, attracting more productive workforce, and reducing business risk as causal mechanisms that link corporate citizenship and financial performance.

Senge’s (2008) *The Necessary Revolution* book emphasized the benefits of sustainability as: avoiding significant costs, earning significant other income, gaining competitive advantage over competition, establishing points of differentiation, shaping the future of an industry, becoming a preferred supplier, and changing image and brand preference.

The principles of the natural resource-based view of the firm (Hart 1995; 2008) was discussed by Crane, Matten & Spence (2008) within the context of sustainability and CSR. They espoused the use of natural resources efficiently and minimize wastes, pollution prevention, establishing product stewardship, innovation in products, processes and services; managing climate change; ensuring resource security and resource justice (Crane, Matten & Spence 2008; Porter 2008).

Lastly on the resource based view, Russo & Fouts (1997) posit that high levels of environmental performance are associated with enhanced profitability and that the level of industry growth moderates the relationship between the environmental performance and profitability of firms in an industry.
Financial analysis studies and environmental accounting

Among the first and limited literature that aims to integrate sustainability reporting and financial analysis are the studies by Castro & Chousa (2006) and Yongvanich & Guthrie (2006). By building on the Dupont Pyramid, the balanced scorecard and shareholder value concepts, Castro & Chousa (2006) proposed measures on relating sustainability variables (such as environmental fines, emissions costs, pollution levels, waste, etc.) with traditional performance indicators like sales, costs, and capital. Yongvanich & Guthrie (2006), on the other hand, proposed a framework to integrate social and environmental reporting with traditional financial analysis.

The findings would have significantly changed the manner of environmental reporting except that companies found their own metrics as they deemed important to their stakeholders. Furthermore, the proposed integrated frameworks could most likely be executed from within the reporting company considering the extent of internal information needed. An external analysis may not necessarily have the access to such information to operationalize the proposed integrated framework. What is critical is the role of regulation in promoting consistently comparable information on social and environmental reports. This is discussed in the next section.

Sustainability reporting and environmental accounting in Japan

Sustainability of the natural environment is essentially about the long-term maintenance of the earth’s ability to sustain itself (Crane 2008). Japan for Sustainability (JFS), a nonprofit organization providing information on developments and activities in Japan that lead toward sustainability defines the concept as:

“Acts by humankind that respect the diversity of all creatures, and result in the passing on of life, nature, livelihoods and culture to future generations within the carrying capacity of the natural environment, and the establishment of mutual connections with the purpose of building better societies and seeking the greatest happiness of the greatest number across both time and space.”

Consistent with the initiatives of the 1997 Kyoto Protocol, the Ministry of Environment of Japan in coordination with various stakeholders, has promulgated a guideline for environmental accounting system in 1998 to enable the public to correctly understand, evaluate, and support the manner of environmental conservation of companies (MOE 2000).

The revised guidelines as of 2002 can be summarized in the following three points: environmental accounting system, environmental conservation cost, and environmental conservation effects and economical effects (Kokubu & Nashioka 2001).

The Ministry of Environment (2002) describes environmental accounting in the following quote:

Environmental accounting aims at achieving sustainable development, maintaining a favorable relationship with the community, and pursuing effective and efficient environmental conservation activities. These accounting procedures allow a company to identify the cost of environmental conservation during the normal course of business, identify the benefits gained from such activities, provide the best possible means of quantitative measurement (in monetary value or physical units) and support the communication of its results.

The guideline describes environmental accounting as a system that integrates financial performance and environmental performance through correlating the environmental conservation effects and economical effects associated with environmental measures (MOE 2000).

Environmental innovations on investments in assets refer to cash outlays on environmental concerns that benefit future periods. These may include the current acquisition value of plant and equipment that benefit the environment, research and development that quality for capitalization, social costs, and environmental conservation.

Environmental innovations on expenses are classified into six categories: (1) business area costs; (2) upstream/downstream costs; (3) management activity costs; (4) research and development costs; (5) social activity costs; and (6) environmental damage costs.

Kokubu & Nashioka (2001) performed a panel data analysis of listed companies in the Tokyo Stock Exchange and concluded that there is a positive correlation with companies’ sales, total assets and operating profits. However, they noted that comparability of information was weak due to management discretion in recognizing and measuring costs and benefits in environmental accounting. Therefore, they used only the business area costs, upstream and downstream costs and management activity cost as total environmental costs. They argued that other costs such as research and development, social activity cost and environmental damage costs were ambiguous and hence, difficult to measure and compare.

Hypotheses and methodology

Following a theoretical review, this study uses a descriptive and exploratory case study design in comparing ten automotive and ten electronics manufacturing companies’ environmental innovations measured through environmental costs and the related impact on sales, net income and assets.

Following the meta-analysis and integration work on corporate citizenship and financial performance of Orlitzky et. al (2006), sales and profitability benefits by Senge (2008), cost savings and other income by Porter (2008), and empirical observation covering 1998 to 2001 by Kokubu & Nashioka (2002), the authors of this study determined environments costs (environmental investments and environmental maintenance costs) as independent variables and sales, income, and assets as dependent variables.

Total environmental costs were considered to reconcile the varying treatments of research & development and other discretionary recognition of assets and expenses. Sales figure is used to represent business activity while net income as a measure
of profit. Assets are used to denote firm size which could include increases in equity over time.

H1a: Environmental innovations positively impact sales of Japanese automotive companies.
H1b: Environmental innovations positively impact sales of Japanese electronics companies.

It may be theorized further that environmental innovations create perceived value of automotive and electronics products that customers appreciate and patronize. Hence, with environmental investments in research and development, and environmental expenses (like maintenance, cleanup, pollution prevention), the preference of customers or end users of the products could be translated into sales. These are currently observable in the sales growth of hybrid cars, the need for more energy efficient products, and the introduction of a new range of electronics products that have high eco-efficiency rating and with provisions for responsible end of life disposal.

H2a: Environmental costs positively impact net income of Japanese automotive companies.
H2b: Environmental costs positively impact net income of Japanese electronics companies.

Sustainability is a broader concept that covers life cycle assessment and resource productivity. Life cycle assessment involves product designs that are free of substances of concern, process improvements that reduce emissions, and end of product life activities for recall, disassembly, materials renewal and recycling, and disposal. Relatedly, resource productivity is the process of maximizing the output of a unit resource through improved product designs, efficient production processes and renewal of resources that result in cost savings or opportunities for earning other income. Earlier espoused by Porter (2008), Senge (2008) and Orlitzky et al. (2006), profitability could result from significant cost savings through investment in environmental innovations; and other income from renewable and recyclable materials.

H3a: Environmental costs positively impact assets of Japanese automotive companies.
H3b: Environmental costs positively impact assets of Japanese electronics companies.

Sales growth and profitability accumulated over the years and investments in environmental innovations (facilities and research & development) all sum up to a company’s financial position. It is in the light that the researchers investigate the impact of environmental costs on total assets of a company.

Sustainability reports of the ten automotive and ten electronics companies were reviewed and the total environmental costs were lifted. Annual financial reports and internal revenue reports were examined to gather financial performance highlights of the subject companies. Personal interviews were conducted with subsidiaries in the Philippines of Toyota Motors Corporation and Toshiba Corporation to validate and substantiate the research findings. As such, results of this study cannot be generalized as indicative of environmental accounting and practices of Japanese automotive and electronic companies. However, the findings of this study could serve as initial results and other methods of triangulation may also be employed in the future to verify the findings in this study.

Data Analysis

Environmental innovations in terms of costs include investments and expenses. Environmental investments, regardless of generally accepted accounting principles, include: research and development (otherwise not classifiable as asset); recycling-related investments; other expenses on social contribution; ISO certification; education and training; and investment in plant and equipment (like any tangible asset but pertinent to recycling, prevention of global warming and eco-efficiency). Maintenance costs include expenses related to environmental measures of waste processing, waste water treatment, atmospheric pollution and environmental preservation. In addition to the maintenance costs are: awareness building, professional environmental staff and environmental restoration (vehicle recalls and soil and ground water remediation). The environmental investments and expenses from 2001 to 2008 are related to the performance indicators such as sales, net income, and assets.

RESULTS AND DISCUSSIONS

Regression analysis was employed to determine if the environmental innovations impact the financial performance of the Japanese automotive and electronic companies included in this study. Three sets of regression analysis were performed in this study. The first regression analysis in Model 1a and 1b are geared toward estimating the financial performance in terms of sales; the second analysis in Model 2a and 2b estimate the financial performance in terms of net income; and the last two analysis, Model 3a and 3b are estimates of the financial performance of the companies in terms of assets.

Impact of environmental innovations to sales

Model 1a for automotive shows that, with other things remaining the same, if environment innovation in terms of cost goes up by a billion yen, average sales go up by about JPY 33.83 billion. The slope coefficient is highly significant at α = 0.05 , for the t value of about 6.2286, which is obtained under the assumption that the true population coefficient is zero, is highly significant for the p value is 0.00001. The intercept value suggests that if environmental innovation in terms of cost is zero, sales will amount to approximately JPY 1,692.95 billion. The intercept coefficient is also significant at 0.02358 to obtain a t value of 2.3076.

| Table 1. Model 1a Automotive: OLS, using observations 1-83 |
|-----------------|-----------------|-----------------|-----------------|
| Dependent variable: SALES |
| Coefficient | Std. Error | t-ratio | p-value |
| const | 1692.95 | 733.65 | 2.3076 | 0.02358** |
| COST | 33.8397 | 545.149 | 0.62286 | 0.00001*** |

Mean dependent var = 4851.100, S.D. dependent var = 5838.797
Sum squared resid = 1,896.090, S.E. of regression = 4830.699
R-squared = 0.323848, Adjusted R-squared = 0.315501
F(1, 81) = 38.79535, P-value(F) = 1.98E-08
Log-likelihood = -820.8276, Akaike criterion = 1645.655
Schwarz criterion = 1650.493, Hannan-Quinn = 1647.599

Notwithstanding the small value of the coefficient of determination, R² of about 38 measures the overall significance of the estimated regression line and this value is expected of bi-variate regression models. Also, the coefficients have signs according to prior expectations. The environmental innovations have a positive impact on sales.
The impact on sales of electronics paints a similar picture, Table 2 (below). With the slope coefficient highly significant at practically zero, it could be inferred that for every one billion increase in environmental costs, sales is expected to increase by JPY 61.59 billion. The intercept coefficient is also highly significant. The r-squared and adjusted r-squared which are relatively high suggest goodness of fit of the model. With the signs of the coefficient according to apriori expectations it could be derived that environmental costs impact sales for Japanese electronics manufacturers.

### Impact of environmental innovations to net income

The coefficient in Model 2a for Japanese automotive manufacturers suggests that, with all other things remaining constant, if environment innovation in terms of cost goes up by a billion yen, net income on the average goes up by about JPY 1.85671 billion. Using 5% level of significance, the coefficient of 1.85671 is highly significant, for the t value of about 4.77, which is obtained under the assumption that the true population coefficient is zero, is highly significant for the p value is 0.00001.

However, the intercept value of  13.4258, in table 3 (above) is not statistically significant. The results show that the model using the 83 sample observations cannot suggest a predictive power as to the amount of net income in the case where the companies included in the study do not have environmental innovations. This could possibly be explained by the recent drop in profitability of automotive companies due to the recent global economic crisis. Net losses or declines in profitability are observable in the companies’ annual financial reports in fiscal year 2008 and 2009. The slope coefficient, however, has a sign according to prior expectation, which means that environmental innovations of Japanese automotive companies involved in this study have a positive impact on net income.

The intercept value of 1.240.46, in Table 4 (below) is also not statistically significant. However, the impact on net income of Japanese electronics companies, Table 4 (below) tells a different story. The slope coefficient has a negative sign according to expectations with no statistical significance suggesting that there is no impact on profit. It appears that the Japanese electronics manufacturers have suffered more losses than automotive companies but they all conform with the guidelines set by the government in environmental accounting and reporting. With profitability not affected by environmental innovations, the results suggest that electronics companies perform environmental reporting for the legitimacy, pollution prevention and product stewardship in pursuit of their business strategies.
Japanese electronics companies, Table 6 (above), show strongly significant slope and intercept coefficients. Even the coefficient of determination could be considered high for a bivariate regression at 0.70 suggesting goodness of fit. The F test that measures the overall significance also has a high value of 204. The model suggests, therefore, that environmental costs impact firm size, measured in assets and that for every investment in environmental innovations, assets of Japanese electronics companies increase by JPY 63.5116 billion.

**Summary of benefits of environmental innovations**

The Japanese environmental reporting guidelines attempt to correlate environmental costs with environmental benefits. The benefits include cost savings from reduced energy consumption, cost savings from reduced waste processing costs, sale of recyclable goods and other income from environmental technologies.

Taking for example Toyota Motors Corporation, environmental benefits were estimated at JPY 3.7 billion in 1998 and it steadily rose to JPY 15.6 billion ten years after. If these environmental benefits were to be accumulated and assumed to have an impact on the financial statements, the cumulative benefits would have reached JPY 91 billion; significant enough to harness any economic shock from the global crisis. With Toyota’s reported JPY 435 billion net loss in 2009, the environmental benefits have shielded the company from greater losses with its environmental impacts and costs investments. Toyota’s economic benefits initially came from the reduction of energy and waste processing costs. However, the sale of recyclable goods started contributing significantly, JPY 5.9 billion, to environmental benefits in 2003 until it became the main source in 2008 at JPY 12.4 billion or 79% of economic benefits for the year.

Toshiba, on the other hand, has different categorization of environmental benefits. These are detailed as to actual benefits, assumed benefits, customer benefits, and risk prevention. The actual benefits are those that can be directly converted into monetary value such as reduced charges for electricity, water, etc. These range from JPY 2.4 billion to JPY 7 billion during the inclusive period. Assumed benefits are reductions in environmental impacts expressed in monetary value. This is the larger share of environmental benefits for Toshiba which ranges from JPY 14 billion in 2001 to JPY 9 billion in 2008. The total environmental benefits of Toshiba fluctuate from JPY 16 billion in 2001 to JPY 42 billion in 2008.

Kokubu & Nashioka (2001) earlier questioned the discretion practiced by companies in estimating environmental costs and the same could be argued as for environmental benefits. The estimation process may distort expected correlation of environmental costs with environmental benefits as intended by the Japanese guidelines on environmental reporting.

Therefore, to alternatively point the discussions on benefits, statistical tests were employed by the authors to falsify or validate the a priori expectation that environmental costs are correlated with environmental benefits. The benefits, however, would have to be operationalized further into impacts on sales, net income and assets of the companies.

**CONCLUSION AND RECOMMENDATIONS**

Statistical tests using regression analysis reveal that environmental innovations in terms of costs show a linear relationship with the financial performance of Japanese automotive and electronics firms included in the study. This might imply that any change in the environmental investments and expenses made by the companies would result to a corresponding level of change in their sales, net income and assets.

Regarding sales, results of the regression analysis reveal the very small p-values. This leads to the conclusion that there is a linear relationship between the environmental innovations and sales. This further indicates that a billion yen increase in environmental investments and expenses of these companies signals an increase in sales. The results of the test therefore suggest a positive impact of environmental innovations on sales. In the current business environment, this may be interpreted as the customers’ preference for the value of eco-efficient products and environmentally compliant processes. Notable are the sales increases of innovative energy efficient vehicles and electronics products that have high eco-rating.

Furthermore, regression results show that environmental innovations in terms of costs positively impact net income of Japanese automotive manufacturers but not electronics companies. Industry growth and the economic environment could be confounding variables that affect the impact of environmental performance on profitability (Russo & Fouts 1997). Although the authors could not predict the amount of average net income if the companies would not have environmental innovations, Model 2 suggests, holding other things constant, that if environment innovation in terms of cost goes up by a billion yen, net income correspondingly increases. Japanese electronic companies’ profitability have experienced recent declines as a result of the global financial crisis and the regression model could not establish the impact of environmental innovations. Nevertheless, they engage in environmental accounting as facilitated by regulation and in their pursuit of legitimacy and corporate strategies.

Lastly, environmental innovations in terms of costs have a positive linear relationship with assets. A billion yen increase in environmental investments and expenses of Japanese companies, for both automotive and electronics, included in this study predicts an exponential increase in firm size (assets). All the cost savings and other income in the inclusive period of study sum up to retained earnings, estimated or actual, directly or indirectly, and ultimately as part of equity.

Sustainability reporting has been in place in Japan as facilitated by the Ministry of Environment’s guidelines on environmental reporting. While these reports involve an estimation and adjustment process from generally accepted accounting...
principles based annual financial reports, readers and stakeholders should exercise discretion in interpreting the environmental costs and benefits.

With a decade of comparable information, further studies that could emerge from the above findings may include the impact of environmental costs on financial markets particularly market value. It would likewise be interesting to replicate this study on other publicly traded companies in the Tokyo Securities Exchange or the New York Stock Exchange.

Comparative studies within the MNE (Williams & Aguilera 2008) would also be a potent ground for research. The samples in this study covered the global headquarters in Japan and their consolidated reports. Studying their subsidiaries using the same variables may be interesting considering that they belong to the same extended value system.

REFERENCES


