

# Environmental and financial performance: The virtuous cycles of Japanese manufacturing companies

**Jingran Cai**

Ritsumeikan Asia Pacific University  
Beppu, Oita, Japan

**Nam Le**

Ritsumeikan Asia Pacific University  
Beppu, Oita, Japan

**Felix Edbert Oktavius**

Ritsumeikan Asia Pacific University  
Beppu, Oita, Japan

**Thu Thai Nguyen**

Ritsumeikan Asia Pacific University  
Beppu, Oita, Japan  
[nguyen.thai.thu.jazzmine@gmail.com](mailto:nguyen.thai.thu.jazzmine@gmail.com)

**Sidney C. Roxas**

Ritsumeikan Asia Pacific University  
Beppu, Oita, Japan  
[nenito.roxas@gmail.com](mailto:nenito.roxas@gmail.com)

## ABSTRACT

*Following the environmental accounting guidelines provided by the Ministry of Environment of Japan or over a decade, Japanese automotive and electronics manufacturing industries are significantly recognized for the issue of sustainability because of the great amount of carbon emission and waste disposal from production chains and products consumption. In this study, while examining conventional resource-based view perspective and the slack availability of resources theories, we aim to: (1) explore the directional relationships between environmental performance and financial performance; (2) determine if virtuous cycles exist; (3) and finally, provide insights into future opportunities and challenges-facing environmental performance of automotive and electronics industries. We performed fixed and random panel data regression analysis of comparable data regarding financial performance and environmental performance. The findings of this study reveal significant statistical correlations as well as virtuous cycles existing between environmental and financial performance of automotive and electronics companies selected, although dominant directional behaviors are different between the two industries.*

**JEL Classifications:** Q00, Q56

**Keywords:** environmental accounting, financial performance

## INTRODUCTION

Besides the annual financial report, Corporate Social Responsibility (CSR) report has been taken into consideration to evaluate companies' comprehensive performance. Triple Bottom Line, which refers to economics, ecological and social aspects, expands the conventional accounting report to a larger spectrum including social and environmental report. In the case of Japan, the Japanese Ministry of Environment established environmental accounting guidelines to help stakeholders accurately identify the investments and costs related to environmental

conservation activities. By having a better insight into the potential benefit of these investments and costs, the company can not only improve the efficiency of its activities, but environmental accounting also plays a very important role in supporting rational decision-making.

In our study, we aim to:

- Explore the relationship between the company's financial performance and environmental performance in Japanese electronics and automotive industries
- Determine if virtuous cycles exist
- Provide insights into future opportunities and challenges-facing environmental performance of automotive and electronics industries.

## LITERATURE REVIEW

### **Resource-based view perspective and slack availability of resources theory**

Waddock & Graves (1997) were among the first to introduce the correlation between CSR and firms' financial performance, which applied the slack of availability of resources perspective. In this point of view, the companies need to be profitable initially before engaging in any future environmental innovations. On the other hand, the resource-based view perspective involves firms in strategic resources as a mean to generate competitive advantages.

Adopting this theory, Cortez & Cudia (2012) utilized the resource-based view perspective to explain the positive impacts of environmental innovations on financial performances by firms, which are realized through both tangible and intangible benefits inflow.

### **Sustainability reports and environmental accounting in Japan**

Emerging from the initiatives of Kyoto Protocol in 1997, the Ministry of the Environment of Japan (MOE) introduced a guideline for environmental accounting record and report in 1998. In 2002, MOE revised its guidelines, making three major points: "environmental accounting system, environmental conservation cost, and environmental conservation effects and economic effects" (Kokubu & Nashiola, 2001). On the other hand, under published environmental reports, Japanese companies also emphasize on CO<sub>2</sub> and other greenhouse gases emission, waste generated and final waste disposal, which are recorded and reported in production, transportation and consumption activities.

## RESEARCH DESIGN AND METHODOLOGY

### **Data Gathering**

In this study we conduct a cross-comparative Japanese industry case study over a 10 years period (2001 – 2010) of 10 consumer electronics companies and 8 automotive companies listed in the Tokyo Stock Exchange and Nikkei 225, including:

- Electronics: Canon Inc., Casio Computer Co. LTD, Fujitsu LTD, Hitachi LTD, JVC, OKI Electric Industry Co. LTD, Panasonic Corp., Sharp Corp., Toshiba Corp., Mitsubishi Electric.
- Automotive: Daihatsu, Fuji, Honda, Isuzu, Mazda, Mitsubishi, Toyota.
- 2001 – 2010 data of company financial performance was attained from Research Insight COMPUSTAT.
- 2001 – 2010 data of company environmental performance was attained from published environmental accounting reports and CSR reports in the compliance of MOE guidelines.

## Methodology

We utilize multiple panel data regressions to explore the directional relationship between financial performance and environmental performance. In examining the impacts of environmental performance on financial performance, environmental innovation costs, CO2 emissions and amount of waste disposal are inserted as independent controlling variables over dependent variables of financial measuring factors (income, revenue, 1-year high price, costs of sales, current assets, total assets, current liabilities, long-term debt, total liabilities, and stockholders' equity). In the second stage, the relationships between environmental and financial variables are reversed.

## Propositions

Under resource-based view perspective, we hypothesize:

H1a. Environmental performance positively impacts financial performance of automotive companies.

H1b. Environmental performance positively impacts financial performance of electronics companies.

Under the slack availability of resources perspective, we hypothesize:

H2a. Financial performance positively impacts environmental performance of automotive companies.

H2b. Financial performance positively impacts environmental performance of electronics companies.

In order to detect virtuous cycles' existence, we hypothesize:

H3a. Virtuous cycles exist between environmental and financial performance of automotive companies.

H3b. Virtuous cycles exist between environmental and financial performance of electronics companies.

## RESULTS AND DISCUSSION

Directional relationship between environmental performance and financial performance:

**Automotive manufacturing.** Basing on the resource-based view perspective, most of the financial performance variables researched upon are significantly affected by environmental innovation cost.

Assets increase along with rising costs for environmental innovation, which suggests that the cost be capitalized within the companies and that will lead to future benefits. Also, the positive correlation between these costs and total liabilities reveals that companies' finance environmental innovation is primarily from debt, which is argued to be the main source of

capital in Japan. Furthermore, an increase in 1-year high stock price, shareholders' equity as well as revenue suggests that investment in environmental innovation contributes to the improvement in consumer trust in the companies' products which are now more environment-friendly, thus stimulates consumers to drive their preferences towards these products and raises sales. Not only consumers, shareholders also find these companies bear less risky for stock holding, as a matter of enhanced legitimacy, which helps boost shareholders' equity and reduce financial leverage.

On the reverse side, we examined the effect of financial performance on environmental innovation based on the slack availability of resource view perspective. While total assets obtain positive correlation in the main side, the reverse side concludes in a negative correlation. In order for companies to develop their firm sizes; they need to focus on investing in environmental innovations. The smaller the firm size is, the more intensive the company concentrates on boosting such cost expenditure for its own development. Other variables show positive coefficients, such as total long-term debts and total liabilities. The amount of long term debts and liabilities are proxies of risk confronting the company. Higher risk prompts the company to focus more on environmental innovations as a matter of legitimacy.

Compared to environmental innovation cost, amount of CO<sub>2</sub> emission results in more significant impacts on financial performance. The positive coefficients suggest that higher amount CO<sub>2</sub> emission leads to increasing firm size, revenue, income, total shareholders' equity and common stock earnings per share, which are all attributed to corporate development. Moreover, increasing liabilities, both current and non-current, as a result of rising CO<sub>2</sub> emission reveals that companies are subjected to higher contingent liabilities as a matter of legitimacy as well as higher long-term risk due to higher investment in manufacturing. Cost of sales increase is attributed to more intensive investment in reducing CO<sub>2</sub> emission per vehicle.

The reverse side shows much fewer significant impacts from financial performance on CO<sub>2</sub> emission. The positive impact from revenue indicates that higher manufacturing and sales lead to more CO<sub>2</sub> present in the environment. Besides, the negative coefficient of the correlation between costs of sales and CO<sub>2</sub> emission indicates that lower cost of sales is caused partly by the reduction in the expenditure for lowering CO<sub>2</sub> emission per vehicle, leading to higher CO<sub>2</sub> emission per vehicle, which raises the total amount of CO<sub>2</sub> emission.

Finally, the positive coefficients of the correlations between waste disposal and total current liabilities, total liabilities, total assets and revenue suggest that higher waste disposal is attributed to the usual development of the companies. Increasing current liabilities suggest that the cost of waste disposal is financed via debt, which is analogous to the environmental innovation cost. Higher contingent liabilities are also exhibited by the rising waste disposal. Additionally, waste disposal prompts higher cost of sales, which is attributed to the investment in the effort of reducing waste disposal. On the other hand, the reverse does not tell much about the impact of financial performance on waste disposal. However, as common stock earnings per share increases, companies are motivated to increase manufacturing, causing more waste disposal.

**Electronics manufacturing.** In terms of electronics manufacturing companies, while there are some correlations exist in the relationship of CO<sub>2</sub> and waste valuation towards financial performance, we could not find any significant relationship exist between environmental innovations and financial performance.

In the first direction of the impact from CO<sub>2</sub> emission towards companies' financial performance, CO<sub>2</sub> is positively affecting the companies' long-term liabilities while it is also has a negative correlation with the earnings-per-share. The positive correlation of the amount of CO<sub>2</sub> emission and the long term liabilities can be defined as the more CO<sub>2</sub> emission the company

produces, the greater it is under the obligation towards the society. For this reason, companies face a need to invest more in long-term projects of future CO<sub>2</sub> reduction, which are financed via long-term debts. Moreover, the amount of CO<sub>2</sub> negatively affects the companies' earnings-per-share proved in our hypothesis suggests that poor environmental performance due to huge amount of CO<sub>2</sub> emission leads to poor financial performance. As the companies emit more CO<sub>2</sub>, the companies face a decline in sales due to the reduced consumer trust towards them; hence, result in lower income and also lower share values.

On the reverse side, while long-term liabilities have positive effects, earnings-per-share has a negative correlation with CO<sub>2</sub>. The positive correlation between long-term liabilities and CO<sub>2</sub> can be interpreted as the more those companies procure long-term debt the more they expand in the form of capital assets such as machine and factories, which produce more CO<sub>2</sub> emission. As a result, they produce larger amounts of CO<sub>2</sub> emission than it was before due to its intensified operations. On the other hand, the negative correlation between earnings-per-share and CO<sub>2</sub> emission can be interpreted, as the less income the company can generate overall, the less funds they can use to finance their efforts to reduce the amount of CO<sub>2</sub> emission. This interpretation actually backs up the theory of slack availability of resources, as it states that financial performance has to happen first before any company can invest in environmental performance.

Finally, for the first direction, the amount of waste disposal positively affects the companies' current liabilities, which can be attributed to corporate contingent liability. This contingent liability raises the need for them to procure short-term liabilities to reduce waste disposal amount as well as to diminish the damages they could probably bring on the community. Another correlation exists between the waste disposal and earnings-per-share, as the waste disposal negatively affects the companies' earnings-per-share. This proves that the more waste a company produces, the less income and sales they can get from the market due to the customers' decrease in trust and preference.

On the reversed side, there exists a positive correlation between total assets and waste disposal, while there is a negative relationship between earnings-per-share and waste disposal. The positive correlation between total assets and waste disposal can be related with the aspect of firm size. As the companies increase long-term assets, they also increase the intensity of their operations; thus, produce more waste along the way. In the other words, despite the fact that the companies are growing financially, their operation efficiency does not improve in parallel.

## **CONCLUSIONS AND RECOMMENDATIONS**

Upon this research, we revisited the relationships suggested by the constructs of environmental performance and financial performance in two of Japan's largest industries in the manufacturing sector: automotive and electronics. Under the institutional isomorphism and network theoretical perspectives, companies are under constraints to act in a homogenous sociological pattern, from upward pressure from peer competitors to rising awareness of consumers to environmental conservation.

Various financial as well as environmental performance variables are observed under resource-based and slack availability of resources perspectives. The results suggest that bi-directional impacts occur between financial performance and environmental performance, in which different industries represent different dominant directional behaviors. Virtuous cycles do exist between financial performance and environmental performance and appear in both

industries. Expanding the scope of earlier studies, we discovered that not only environmental innovations cost produces virtuous cycles, but CO<sub>2</sub> emissions and waste disposals.

For automotive firms, environmental performance poses more significant impacts on financial performance as a matter of legitimacy, which is also stimulated by firms' size and shareholders' wealth maximization. On the other hand, electronics companies reflect more active influence from financial performance to environmental performance. These firms are highly recommended to stay aware of operation efficiency, indicated by rising waste and CO<sub>2</sub> emissions as firms grow; as well as effectively monitoring debt utilization since financing environmental innovations constitutes large portions of debt.

From these outcomes, we suggest environmental awareness to be further promoted in order to stimulate companies' performance, which ultimately contributes to shareholders' wealth maximization. Besides, further studies on construct relationships and green supply chain in sustainable development would reinforce this research by providing insights into other related industries in Japanese manufacturing sectors.

## REFERENCES

- Cortez, M.A.A. (2012). *Revisiting the Virtuous Cycles Between Environmental Innovations & Financial Performance of Japanese Automotive, Electronics, & Chemical Manufacturing Industries*. Graduate School of Management, Ritsumeikan Asia Pacific University.
- Kokubu, K., & Nashioka, E. (2001). *Environmental Accounting Practices in Listed Companies in Japan*.
- Waddock, S., & Graves, S. (1997). The corporate social performance-financial performance link. *Strategic Management Journal*, 18(4), 303-319.

## APPENDIX

**Appendix A. Panel Regression: Environmental performance impacts financial performance (vice-versa) of electronic companies**

	<i>Environmental Costs</i>		<i>CO<sub>2</sub></i>		<i>Waste disposal</i>	
1 year high price	-	-				
Total current asset			+	-	+	
Total asset					+	+
Total current liability			-		+	+
Total long-term debt			+	+	+	
Total liability					+	+
Stock-holder equity			-	-	+	+
Revenues						+
Costs of sales						
Net income			-		-	-
EPS on common stock						

**Appendix A. Panel Regression: Environmental performance impacts financial performance (vice-versa) of automotive companies**

	<i>Environmental Costs</i>		<i>CO<sub>2</sub></i>		<i>Waste disposal</i>	
<b>1 year high price</b>	+		+	-		
<b>Total current asset</b>	+	-	+			
<b>Total asset</b>	+	-	+		+	
<b>Total current liability</b>	+	-	+		+	+
<b>Total long-term debt</b>	+	+	+			
<b>Total liability</b>	+	+	+		+	
<b>Stock-holder equity</b>	+		+			
<b>Revenues</b>	+	+	+	+		
<b>Costs of sales</b>	+	-	+	-	+	
<b>Net income</b>		-	+	-	+	
<b>EPS on common stock</b>			+			+

 *Environmental performance impacts on Financial performance*

 *Financial performance impacts on Environmental performance*

+ : Positively significant

- : Negatively significant