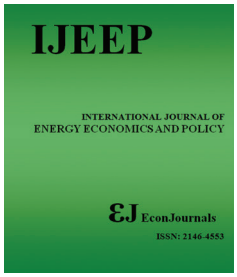

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The Trade-off Strategy between Financial and Environmental Performance: Assessment of Sustainable Value Added

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ABSTRACT

Corporate sustainability issue has considered the most important aspects as it reflects the corporate consideration to environmental, social, and economic dimension. However, using trade-off strategy to assess the relationship between financial performance and environmental performance has not been implemented. The aim of this study was to apply an integrated analysis of trade-off strategy to assess the relationship between financial performance and environmental performance. The method was used Autoregressive to analyze the relationship between return on asset (ROA) as financial performance and eco-efficiency (EE) as environmental performance. The samples were business sectors non-financial listed in Nikkei225 in the period of 2005–2014. The result showed that EE significantly relates to ROA as shown by Granger Causality Test, and their relationship appeared to three sectors of business: Consumer discretionary, industrials, and materials. EE significantly related to current financial performance, and the previous year financial performance. The impact of EE on the current financial performnace appeared only to sector of business consumer discretionary. the investigation applied opportunity cost to assess sustainable value added and to describe the causality between financial performance and environmental performance as well as the trade-off strategy. It is expected that this finding might be considered an environmental management accounting tool to weigh the environmental impacts at different points to life cycle of company.

Keywords: Trade off Strategy, Financial Performance, Environmental Performance, Sustainable Value Added, Opportunity Cost, Eco-efficiency, Autoregressive
JEL Classifications: M45, N50, N55

1. INTRODUCTION

In the privat company, sustainability is becoming an important issue as it integrates financial and non-financial aspects in making a decision. Sustainability is defined as a concept covering environmental, social and economic dimensions (Kuosmanen and Kuosmanen, 2013), and this concept consist of conceptual and normative framework that can be applied to select variables in the expanded value added statement as it provides a considerable advance in social accounting conducted by integrating economic, social and environmental factors in a format that is applicable to various organization types, time dimensions, and contexts (Mook, 2007).

Meanwhile, sustainability development reflects the performance of an economic entity. The sustainable development according to Kuosmanen and Kuosmanen (2013), can be measured using sustainable value (SV), from which the value is created whenever benefits exceed costs (Figge and Hahn, 2004). In addition, strong sustainability can also be determined using SV Added that assesses whether a company creates an extra value while ensuring that every environmental and social impact is in total constant, therefore, SV added should take into account both, corporate eco and social efficiency as well as the absolute level of environmental and social resource consumption (eco and social effectiveness), so SV added considers simultaneously economic, environmental and social aspects, and the overall result can be expressed in any of the three dimensions of sustainability (Figge and Hahn, 2004).

To achieve the sustainability state, a corporate sets a sustainability strategy known as trade-off as it can identify the relationship

between environmental and financial outcomes. The aim of this strategy is to create environmental value to develop economic value rather than to create economic value through environmental management known as the green business case as the goal of the green business case is to use economic capital efficiently by ignoring trade-off, therefore, the green business case is not suitable to resolve and manage trade-off situations (Figge and Hahn, 2012), and in fact, the green business case strives to identify and develop corporate environmental strategy to help enhance the risk-adjusted return on capital of a company, i.e. creating shareholder value, on the other hand, the environmental value can be appraised by using opportunity costs based approach since this approach can identify strategies of a firm in creating both economic and environmental value separately and the way a corporate contribute to sustainability.

According to Figge and Hahn (2013), the opportunity costs in management accounting reflect the return that an alternative use of capital would have created, therefore they extend opportunity cost thinking to the use of resources besides economic capital, and in addition, similar to economic capital-oriented approach such as Alfred Rappaport's shareholder value approach (Bierman, 1990), whether the use of the resource is more efficient than that of the value creating market can be approched by SV that determines the specific resource of opportunity cost. The SV approach is built based on the premise that companies require economic and environmental resources to create an economic return, and the SV extends the value based perspective of financial market by applying opportunity cost thinking not only economic capital but also to the use of environmental resources in companies Figge and Hahn (2013).

Some scholars have been conducting research to investigate the relationship between financial performance and environmental performance. Al-tuwaijri et al., (2004) examines the relationship between environmental disclosure, environmental performance, and economic performance with a simultaneous equation approach. They suggest that "good" environmental performance is significantly associated with "good" economic performance, and also with more extensive quantifiable environmental disclosures of specific pollution measures and occurrences. Meanwhile, Kimbara (2009, p. 211) characterized environmental management into environmental regulations, organizational factors, and relationship between environmental performance and economic performance. On the other side, Figge and Hahn (2012) suggested that proponents of the green business case argue only environmental management which is economically viable and contributes to financial performance will be sustainable and robust when economic slump or crisis takes place. Therefore, when the sustainable development fails to meet its objective in the economic crisis situation, the impact could be further eroding social and environmental concerns and values (Correa-ruiz and Moneva-abadía, 2011).

In addition, the approaches applied by scholars investigate the relationship between environmental performance and economic performance were different one to others. Kimbara (2009) stated that method of measurements and indicators to quantify environmental performance represented by chemical, CO2 emissions, or rank of the environment, have not been established yet. However he also claimed that return on assets (ROA), Return on Equity (ROE) or tobins q can be applied as indicator of economic performance. And then he explained that the efforts to improve environmental performance are accompanied by increase of economic performance, and at certain point, the relationship might turn into trade-off. In conducting his research, he examined only the data of 2006, and the results showed that there was no relationship between sustainable development concept and environmental impact of corporate life cycle. Meanwhile, Figge and Hahn (2012) used panel data and matrix method in an efficient market.

Understanding the complexity of the investigation, this study applied an integrated analyzes to examine the relationship between financial performance and environmental performance. The underlying argument was that the integrated analysis considered ROA as indicator of financial performance, and CO2 emissions or eco-efficiency (EE) as indicator of environmental performance. The subject of investigation was industrial sectors non-financial in Japan listed on Nikkei225 and have been classified by Global Classification Industries Standard (GCIS) and the data examined was within the period of 2005–2014. In addition, opportunity cost was applied to assess SV Added and to describe the causality between financial performance and environmental performance as well as the trade-off strategy. Moreover, Autoregressive was also applied to analyze the relationship between ROA and EE.

The purpose of this study was to analyze the trade-off strategy to determine factors that influence the sustainability concept. To achieve this purpose, two objectives were formulated: (1) To assess SV added by applying opportunity cost; (2) to investigate causality between environmental performance and financial performance; (3) to investigate impact of the trade-off strategy between financial performance and environmental performance.

2. LITERATURE REVIEW

2.1. Theory

Since the last 19th century, the concept of sustainable development mainly discussed macroeconomic level with two emphases (Figge and Hahn, 2004, p. 174). The first emphasis was to increase or at least stabilise the per capita well-being or utility over time without leaving present or future generations worse off. The second one was the use of capital theory approach to sustainability comprising of man-made capital (such as produced goods), human capital (such as knowledge and skills), natural capital (such as natural resources), and social capital (relationships between individuals and institutions). This concept, according to the constant capital rule, could be called sustainable development if it ensures constant capital stocks or at least constant capital services over time. Figge and Hahn (2004) further explained that the concepts of weak and strong sustainability could be used to substitute different kinds of capital one to another; so that, the weak sustainability could be identified if all forms of capital are substitutable. As a result, any loss in one kind of capital, theoretically, might be substituted by a surplus in other forms of capital.

The concept of sustainable development has been increasingly applied by companies. The stakeholder theory suggest that the sustainable development need added value in the future, and this value is the company stakeholder responsibility (Freeman et al., 2010). So that, the corporate also has to consider the level of substitutability of man-made, natural, human, and social capital (Figge and Hahn, 2004).

According to Hahn et al. (2010, p. 1998), the corporate contributions could be measured to sustainability by two kinds of measurements: (a) Absolute measure was one way of assessing corporate contributions to sustainability with subtract the costs from the benefits created by a company, meanwhile a company contributes to sustainability, if the benefits more than the sum of internal and external costs, so in these concepts economic performance of a company in terms of value added (VA) was adjusted for the external environmental cost caused by the company's economic activity. Therefore, benefits and costs could only be deducted if they were measured in the same unit, so the environmental (and social) damage were monetarised by these concepts, but monetary valuation of environmental and social damage, however, was difficult and still controversially discussed. The approaches usually compare the value created by a company with the environmental and social damage caused. The absolute approaches presented above were based on the assumption of full substitutability, i.e. they were mainly inspired by weak sustainability (b) relative measures expressed corporate contributions to sustainability as benefits per unit of environmental or social impact, i.e. EE, and the definition of corporate operational EE was the ratio between value added and environmental impact added of a company's operational processes.

In a societal concept, sustainable development is useful to optimise the use of resources from a societal perspective rather than from the perspective of individual firms, therefore this corresponds to the view taken by financial economics where capital is allocated according to market efficiency and not single firm efficiency, so obviously, the SV approach establishes a micro–macro link as it assesses the use of economic, environmental and social resources in companies from an overarching societal perspective, meanwhile optimisation of the use of resources in companies with regard to some overarching market efficiency defined by the benchmark (Figge and Hahn, 2009). But according to the efficient market theory, the market is said to be efficient if security prices reflect all available information, and in general terms, the ideal is a market in which prices provide accurate signals for resource allocation: That is, a market in which firms can make production-investment decisions, and investors can choose among the securities that represent ownership of firm's activities under the a assumption that security prices at any time "fully reflect" all available information (Fama, 1970).

2.2. The Trade-off Strategy Between Financial and Environmental Performance

Fundamental idea of applying opportunity cost thinking to the assessment of environmental resources has been proposed in the late 19th century only until the proposition of the sustainability value (SV) approach that this idea was taken up conceptually, pricing environmental and social resources with opportunity costs, and SV as proposed initially deals with risk by assuming that the use of environmental and social resources is subject to the same risk in all firms as a restrictive assumption (Figge and Hahn, 2004).

Fundamental principle of conventional accounting is using money as a unit of account. Measurement of sustainability issues in the sustainability metrics relies on tools such as life cycle assessment and environmental which go beyond the conventional set of accounting methods and have little focus on monetary information, meanwhile, at the forefront are globalisation of international trade and international business, and associated with this increasing trend is trade between developed, emerging and developing countries and accounting for related environmental and social performance aspects of business which need to be taken into account by managers (Burritt and Schaltegger, 2014). Management orientated path to sustainability accounting, gives recognition to the importance of management decision making and views corporate sustainability accounting as a set of tools that provide help for managers dealing with different decisions, therefor, Management and Accounting theorists argue that there are a number of corporate sustainability decision settings for which accounting information provides necessary support as the basis for assessing deliberative actions to be taken (Burritt and Schaltegger, 2010, p. 829). Understanding interrelations between management's overall strategy, environmental disclosure, environmental performance, and economic performance are of increasing interest to both internal and external stakeholders in an era in which corporate environmental costs have become a significant business expense (Al-Tuwaijri et al., 2004).

2.3. Hypotheses

Opportunity costs reflect the return that an alternative use of capital would have created. SV extends the value-based perspective of financial markets by applying opportunity cost thinking not only to economic capital but also to the use of environmental resources in companies. Environmental value is created when this return on the environmental resource lies above its opportunity cost (Figge and Hahn, 2004). The creation of EE similar to environmental value is created whenever a company uses its environmental resources more efficiently than the market on average, so the hypothesis is derived as follows:

Hypotheses 1: EE as environmental performance caused ROA as financial performance.

Analysis to the relationship between environmental and financial performance indicate an inverted-U type, not only see linear but also a quadric association, the relationship shows beyond a certain point, turns into one of trade-off, (Kimbara, 2009; Figge and Hahn, 2012). Meanwhile, the corporate sustainability strategy aimed at value creation environment alongside economic value. Therefore, implying that efforts to improve environmental performance are accompanied by increasing economic benefits. So to carry out examination of the inter-relationship of deep-economic environment based on these condition, the hypothesis is derived as follows:

Hypotheses 2: There are impact between EE as environmental performance and ROA as financial performance that imply trade-off strategy.

3. RESEARCH DESIGN

3.1. Samples and Data

The analysis focussed on non-financial industries that are listed in Nikkei225 and classified based on sector of business by GCIS, period 2005–2014, based on company reports from Bloomberg terminal data. That are ten sectors of business, but this study focus on eight business sectors (two business sectors that else are telecommunication service and financial), namely consumer discretionary (22 members, n = 186), industrials (53 members, n = 404), information technology (19 members, n = 149), health care (10 members, n = 82), materials (25 members, n = 201), Consumer Staples (12 members, n = 98), energy (3 members, n = 17), and utilities (4 members, n = 38), were selected for comparative analysis. Business features differ between eight industry types, which may confer industry-specific characteristics to a company's environmental approach. Generally, materials industries have high environmental impact, while in other industries, direct environmental impact is relatively low, although indirect impact is rather high. In this case, direct environmental impact refers to resources and energy directly consumed by companies, as well as CO2 and chemicals discharged during consumption. Indirect impact refers to resources and energy consumption and CO2 and chemical discharges derived from procured materials and parts.

3.2. Performance Indicators

The creation of EE similar to environmental value can be calculated following and in analogy to an investment logic. Like a measure the return on investment (ROI) in financial management, i.e. return on economic capital, is used to describe the efficiency of the use of economic capital. An investment creates value when its ROI lies above its opportunity cost (Figge and Hahn, 2012, p. 94). In practical terms, EE as an environmental performance indicator is expressed by the equation of added value/environmental impact. More formally, it can be expressed as follows: EE = added value/environmental impact. In practice, CO2 emissions, water, input resources, waste disposal or chemicals are factors normally used to measure EE as environmental impact. For measuring environmental performance, in Japan it is acceptable to use data on CO2 emissions or discharged hazardous chemicals regulated by the pollutant release and transfer register system (Kimbara, 2009), so in this research, EE = revenue (million)/CO2 emissions (t).

In this study, ROA is used as a financial performance indicator. Return on equity (ROE), return on sales (ROS), tobin's q or ROA is often used for measurement Economic performance indicators, and allowing evaluation of a company's economical accomplishment. ROE is ratio of profit to equity capital, so it is a very important indicator for shareholders and investors. An emphasis on ROE reflects a view that company value equals shareholder value. ROS is ratio of profit to sales. Sales tend to fluctuate, and variations can be large, so using this indicator to evaluate a company's performance has the weakness of being susceptible to short-term factors. Tobin's q shows company value in the stock market against reacquisition price of assets, so it is not a financial but an economic indicator of a company's market value. ROA, ratio of profit to total assets, is an indicator most commonly used to evaluate profitability of the business (Kimbara, 2009).

The Table 1 is descriptive and correlation between ROA as financial performance and EE as environmental performance.

3.3. Analysis Models

To determine the relationship between the ROA and EE by business sector, Two equations model were developed, the first model to test whether previous year EE and previour year financial performance influence current year financial performance. The second model to test whether previous year EE and previour year financial performance influence current year EE. Granger Casualitty was used to test simultanity between EE and Financial performnace.

Model 1: $ROA_t=\Sigma_a EE_{t-1}+\Sigma_b ROA_{t-1}+\mu$

Model 2: $EE_t=\Sigma_c EE_{t-1}+\Sigma_d ROA_{t-1}+\mu$

Those models describe that:

a. ROA_t has a relationship with ROA_{t-1} and EE_{t-1}
b. EE_t has a relationship with ROA_{t-1} and EE_{t-1}
c. In this context, both ROA and EE is treated as an endogenous variable, This model actually be the basis of the VAR model.

Interpretation of the second equation is:

a. If statistically, $\Sigma_a \neq 0$, and $\Sigma_a = 0$, it is concluded EE cause ROA
b. If statistically, $\Sigma_c = 0$ and $\Sigma_d \neq 0$, it is concluded ROA cause EE

Table 1: Descriptive statistics and correlation based on classification of industry

Variable	Mean±SD	ROA	EE
Consumer discretionary			
ROA	1.722±4.569	1.000	0.171
EE	362148.3±237588.7	0.171	1.000
Industrials			
ROA	2.325±2.651	1.000	0.024
EE	471392.6±972355.0	0.024	1.000
Information technology			
ROA	1.184±5.458	1.000	0.099
EE	388935.8±369243.8	0.099	1.000
Health care			
ROA	5.356±4.418	1.000	−0.304
EE	380105.7±229709.0	−0.304	1.000
Materials			
ROA	2.904±3.858	1.000	0.191
EE	33377.73±42644.4	0.191	1.000
Consumer staples			
ROA	2.439±1.521	1.000	0.480
EE	317315.3±349803.6	0.480	1.000
Energy			
ROA	3.232±3.548	1.000	0.675
EE	125054.2±108125.1	0.675	1.000
Utility			
ROA	0.745±2.891	1.000	0.530
EE	13418.8±16021.3	0.530	1.000

SD: Standard deviation, ROA: Return on asset, EE: Eco-efficiency

c. If statistically, $\Sigma_a \neq 0$ and $\Sigma_d \neq 0$, it is concluded ROA and EE mutual cause
d. If statistically, $\Sigma_a = 0$ and $\Sigma_d = 0$, it is concluded there are no dependency between the ROA and EE.

Once the form that relationship simultaneously or in one direction is known, it will try to form Autoregressive for investigate Hypotheses 2. An analysis Autoregressive is used to show the impact between ROA and EE, and Autoregressive model is a simple model used for forecasting which all variables as endogenous variables, with enter one or more lagged dependent variables into independent variables, and the form Autoregressive model with Koyck approach below (Gujarati and Porter, 2008):

Model 3: $ROA_t=\alpha_0+\alpha_1 EE_t+\alpha_2 ROA_{t-1}+V_t$, Where $V_t=(U_t-U_{t-1})$

3.4. Analysis of Results

According to Gujarati and Porter (2008) that granger causality test need attention the stationary for both the two variables. In this study, used Unit Root Test (Dickey–Fuller test) to test the data of ROA as dependent variable and EE as independent variable whether stationer or not. The following are results from Unit Root Test the data of ROA for eight classification of industries on level of significant *5%, **10% (Table 2).

Based on output of eviews, the Table 2 shows that t-statistics ADF value more greater (absolute) than critical value and significant on p-value more smaller than alpha = 5%, so the result of unit root test (ADF) of ROA data are stationer, but only classification of business sector energy is stationer on d = 1 which mean ROA data can use in estimate on level 1 (first difference), so the first difference form: $Dt = \Delta EE = EE_t\text{-}EE_{t-1}$. In addition, the result of unit root test (ADF) of EE data are stationer, but in classification of business sectors Health Care and Energy are stationer on d = 1, so ROA and EE data in both classification of these business sectors can use in estimate on level 1 (first difference).

To test whether EE which caused ROA or whether ROA which caused EE, there are the results of analysis granger causality test also indicate differences between eight classification of industries. The following are findings from the analysis of Model 1 and Model 2 with lag = 2 on level of significant *5%, **10%.

Based on output of eviews, the null hypothesis in the Table 3 that EE does not granger cause ROA mean to show whether EE does not cause ROA, and the result of equation using the lag 2 reject the hypothesis for classification of industry consumer discretionary, industrials, and Materials on level of significant *5%, so EE affect the ROA but ROA did not affect EE, or there are unidirectional causality from EE to the ROA. When lag enlarged to 3, the result gives the same decision with the equation that uses lag 2 on sector of business Industrials, however we provide enough evidence to reject the hypothesis for classification of industry consumer discretionary and materials on level of significant **10%. But when the lag increased to 4, the results showed that 'probability' first equation on industry consumer discretionary and materials are not significant, so it does not have sufficient evidence to reject the hypothesis.

Table 2: Unit root test (ADF) based on classification of industry

Null hypothesis	Max lags	t-statistic	Prob.*
Consumer discretionary			
ROA has a unit root	14	−7.6695	0.0000
EE has a unit root		−4.8319	0.0001
Industrials			
ROA has a unit root	17	−12.5304	0.0000
EE has a unit root		−7.7073	0.0000
Information technology			
ROA has a unit root	13	−9.0942	0.0000
EE has a unit root		−3.9694	0.0021
Health care			
ROA has a unit root	11	−3.7668	0.0047
D (EE (−1)) has a unit root		−9.1128	0.0000
Materials			
ROA has a unit root	14	−9.0068	0.0000
EE has a unit root		−3.3080	0.0158
Consumer staples			
ROA has a unit root	12	−5.9337	0.0000
EE has a unit root		−305578	0.0085
Energy			
D (ROA (−1)) has a unit root	3	−6.0155	0.0002
D (EE (−1)) has a unit root		−3.6465	0.0160
Utility			
ROA has a unit root	9	−3.6056	0.0101
EE has a unit root		−3.4559	0.0153
0.37882			
0.75349			

ROA: Return on asset, EE: Eco-efficiency

Table 3: Granger causality test based on classification of Industry

Null hypothesis	Obs	F-statistic	Prob.
Consumer discretionary			
EE does not granger cause ROA	186	3.53698	0.0311*
ROA does not granger cause EE		1.01941	0.3629
Industrials			
EE does not granger cause ROA	404	4.17904	0.0160*
ROA does not granger cause EE		0.38158	0.6830
Information technology			
EE does not granger cause ROA	149	0.12170	0.8855
ROA does not granger cause EE		1.53915	0.2181
Health care			
EE does not granger cause ROA	82	1.27704	0.2847
ROA does not granger cause EE		0.83515	0.4377
Materials			
EE does not granger cause ROA	201	3.76057	0.0250*
ROA does not granger cause EE		0.54115	0.5829
Consumer staples			
EE does not granger cause ROA	98	0.98137	0.3786
ROA does not granger cause EE		0.02223	0.9780
Energy			
EE does not granger cause ROA	17	0.75349	0.4917
ROA does not granger cause EE		0.37882	0.6926
Utility			
EE does not granger cause ROA	38	0.72275	0.1942
ROA does not granger cause EE		0.42453	0.6576

ROA: Return on asset, EE: Eco-efficiency

The granger was very sensitive in used the lag on models, so Akaike (AIC) or Schwartz criteria can be used to determine the lag. To estimate the relationship between dependen variable ROA as financial performance and independent variable EE as

environmental performance, will be analyzed with lag regression with Autoregressive model (Model 3). And for the next stage of the analysis will be focused on three sectors of business.

The first difference ROA and EE data or ΔROA and ΔEE of three business sectors also be analyzed to confirm the trade-off between financial performance and environmental performance that occur as in Figure 1 quadrant I and III. The output of Eviews graph show that business sector consumer discretionary has relation between both variables in quadrant I and III, while Industrials in quadrant II, as well as materials in quadrant II and IV. So there is the trade-off in consumer discretionary. And if those three business sectors were examined with Autoregressive model will be showed in the Table 4 as result.

The output of eviews obtained from the Table 4 data processing, each column represents the equation every business sector and the column name is the name of dependent variable. Each independent variable has values, consist value of the coefficient, the standard error coefficient, and t-test with the probability. The result shows the value of adjusted R^2 each industry are not high, namely 24.72% for consumer discretionary, 18.82% for Industrials, and 18.99% for Materials. F-statistic show the three sectors of business significant on $P < 0.0000$, that mean all of independent variables affect to ROA at current simultaneously. The result of t-test show that EE and ROA (−1) or ROA_{t-1} are significant affect to ROA at current only for business sector of Consumer Discretionary. The result of t-test show that marginal propensity to consume is 0.251, which mean the increase of 1% current environmental performance (measured by EE real) will improve the average of financial performance with 0.251%. As well as the increase financial performance lag 1 or ROA_{t-1} is 1% will improve the current of financial performance or ROA_t at 0.486%.

Table 4: Output autoregressive model based on three sectors of business consists of coefficient, in parentheses standard error and t-statistic, probability

Variable	Consumer discretionary	Industrials	Materials
	ROA	ROA	ROA
EE	0.2510	0.4430	0.1140
	(0.1230)	(0.1220)	(0.5800)
	[2.0477]	[0.3633]	[1.9605]
	0.0420*	0.7166	0.0513
ROA (−1)	0.4860	0.4381	0.4055
	(0.0652)	(0.0449)	(0.0641)
	[7.4590]	[9.7624]	[6.3226]
	0.0000*	0.0000*	0.0000*
C	−0.0790	1.2719	1.3223
	(0.5357)	(0.1677)	(0.3467)
	[−0.1475]	[7.5860]	[3.8134]
	0.8829	0.0000	0.0002
Adj. R^2	0.2472	0.1881	0.1899
F-statistic	31.5458	47.8110	24.5644
Prob (F-statistic)	0.0000	0.0000	0.0000
Akaike info criterion	5.6106	4.5845	5.3405
Schwarz criterion	5.6625	4.6142	5.3896
Observations	187	405	202

ROA: Return on asset, EE: Eco-efficiency

The estimate of function short-run show the elasticity of environmental performance short term gives positive sign and significant for business sector of consumer discretionary. Adjustment coefficient at ð = 1–0,486 = 0.514 which means the difference between the performance expected and reality 0.514% that was eliminated in 1 year.

4. CONCLUSSION AND RECOMENDATION

The result of Granger Causality Test show that three sectors of business, consist Consumer Discretionary, Industrials, and Materials have relationship between environmental performance and financial performance, so in this study accept hypotheses 1 and Model 1. Business features differ between that three classification of business sector and others, which may confer specific characteristics of business sector to a company's environmental approach. Generally, that three sectors of business have high environmental impact, while in others direct environmental impact is relatively low, although there are rather high indirect impact. In this case, direct environmental impact refers to resources and energy directly consumed by companies, as well as CO2 and chemicals discharged during consumption. Indirect impact refers to resources and energy consumption as well as CO2 and chemical discharges derived from procured materials and parts.

After the first difference ROA and EE data or ΔROA and ΔEE of three business sectors were examined whether have a trade-off, the graph area support the result of the estimation Autoregressive model, that explain the variable EE as environmental performance will impact to ROA as financial performance at current significantly (equation Model 3). Therefore, on the business sectors have high impact environmental appear the result supported hypotheses 2. Therefore, the result shows that corporate sustainability strategy aimed at value creation environment alongside economic value. This aim not similar to the green business aim that created economic value through environmental management. However, the trade-off that appear as the environmental performance impact to financial performance, further can be assessed along period of the life cycle of companies.

In practice, there are the factors normally to measure EE as environmental impact, such as CO2 emissions, water, input resources, waste disposal or chemicals, so those factors can be applied to opportunity cost and to assess SV added for the future research. In additional, the research can enhance other variable to study influence the trade-off strategyy.

REFERENCES

Al-Tuwaijri, S.A., Christensen, T.E., Ii, K.E.H., (2004), The relations among environmental disclosure, environmental performance, and economic performance : A simultaneous equations approach. Accounting Organization and Society, 29, 447-471.

Bierman, H. (1990), A review of alfred rappaport's creating shareholder value. Journal of Management Accounting Research, 2, 140-154.

Burritt, R., Schaltegger, S. (2014), Accounting for sustainability in production and supply chains. The British Accounting Research, 30, 4-7.

Burritt, R.L., Schaltegger, S. (2010), Sustainability accounting and reporting : Fad or trend ? Accountinmg Auditing and Accountability Journal, 23, 829-846.

Correa-ruiz, C. Moneva-abadía, J.M. (2011), Special issue on social responsibility accounting and reporting in times of sustainability downturn/crisis. Spanish Accounting Review, 14, 187-211.

Fama, E.F. (1970), Efficient market: A review of theory and empirical work. Journal of Finance, 25, 383-417.

Figge, F., Hahn, T. (2004), Sustainable Value Added-measuring corporate contributions to sustainability beyond eco-efficiency. Ecological Economics, 48, 173-187.

Figge, F., Hahn, T. (2009), Not measuring sustainable value at all : A response to kuosmanen and kuosmanen. Ecological Economics, 69(2), 244-249.

Figge, F., Hahn, T. (2012), Is green and profitable sustainable ? Assessing the trade-off between economic and environmental aspects Environmental performance. International Journal of Production, 140(1), 92-102.

Figge, F., Hahn, T. (2013), Value drivers of corporate eco-efficiency : Management accounting information for the efficient use of environmental resources. Managament Accounting Research, 24(4), 387-400.

Freeman, R.E., Jeffrey, S.H., Andrew, C.W., Bidhan, L.P. (2010), Stakeholder Theory: The State of the Art. Cambridge: Cambridge University Press.

Gujarati, D.N., Porter, D.C. (2008), Basic Econometrics. New York, NY: McGraw-Hill.

Hahn, T., Figge, F., Liesen, A., Barkemeyer, R. (2010), Opportunity cost based analysis of corporate eco-ef fi ciency : A methodology and its application to the CO 2 -ef fi ciency of German companies. Journal of Environment Managament, 91(10), 1997-2007.

Kimbara, T. (2009), An analysis of the eco-efficiency and economic performance of Japanese companies. Asian Business Managament, 9(2), 209-222.

Kuosmanen, N., Kuosmanen, T. (2013), Consistent aggregation of generalized sustainable values from the firm level to sectoral, regional or industry levels. Sustainability, 5, 1568-1576.

Mook, L.I. (2007), Social and Environmental Accounting: The Expanded Value Added Statement, University of Toronto.