

## EVALUATION OF ENVIRONMENTAL INVESTMENT (EEI) FOR COST EFFICIENCY: CASE IN INDONESIA

**Sarah Yuliarini**  
TISSA-Universiti Utara  
MALAYSIA

**Ku Nor Izah Bte Ku Ismail**  
TISSA-Universiti Utara  
MALAYSIA

**Zaleha Othman**  
TISSA-Universiti Utara  
MALAYSIA

### ABSTRACT

Usually, environmental investment financing within business scope becomes a managerial problem for businesses. In general, the issues related to the measurement, allocation, monitoring and reporting are encountered by environmental accounting practices. In order to measure and assess the cost of investment to production cost efficiency, the concept of evaluation of environmental investment (EEI) is suggested in present study. It is expected that this approach can be utilized to determine the impact of investment on the organizational bottom line and serves as a basis for empirical analysis

**Keywords:** Behavioral of environmental investment, bottom line, environmental accounting.

### INTRODUCTION

The companies that does not have environmental accounting standards are least interested in environmental investments. A number of CEOs of local companies in Indonesia argued that corporate social responsibility (CSR) activities are sufficient for external concerns due to the fact that the environmental aspect has become one of the important points in the implementation of good corporate governance (Siregar, S.V. & Bachtiar, Y., 2010). The difficulty in measuring and recognizing the economic impact of investments on environmental activities is the second major reason that make companies reluctant in allocating funds for the environment (Hank C. Alewine Dan N. Stone, 2013). In addition, Villiers and Staden (2011) argued that disclosure of environmental performance is considered as bad performance because companies are reluctant in disclosing information about investments for bad performance.

Meanwhile, in a case study of US companies, Berger (2010) asserted that the environmental accounting standards in a country have three strategies for enhancing the growth of green products by substituting with more environment friendly technologies, doing recycling and enhancing efficiency. But, the mindset of businesses are changed and the environmental issues and problems are addressed in business activities which is known as ‘environmentally positivism’. This definition is used under the umbrella of “organizational standards”.

Barry Field and MK Field (2006, pp. 180-181) have given the description of efficiency in case of pollution which infers a balance between damages and reduction in cost or to reach a point where marginal damages equates marginal costs. If the impacts of damages are not provided, the application of this approach would be difficult.

In Indonesia, a study revealed that 53.75% of companies reported about environment but only 10% of those companies had shown that in monetary terms (Siregar & Bachtiar, 2010). In

addition, the data from Ministry of Environment of Republic of Indonesia revealed that 2224 firms are the member of PROPER (Program Performance Rating) while only 34 firms provided the Sustainability Report (National Center for Sustainability Reporting, 2013-2014). This highlights the need of developing an appropriate tool to assess the environmental investments which is repeatedly given in the Sustainability Report without a clear description of the allocation of funds.

## **LITERATURE REVIEW**

### **Environmental-Investment in Cost Structure**

Environmental changes are always adapted by the successful organizations and such organizations are always proactive to changes in the environment. In the study of organizational design, contingent environmental uncertainty is a protuberant factor that has extensively received the attention of research community (Chia, 1990). In accounting supervision system, such uncertainty can be determined by looking at the environmental impact of the use and characteristics of information. Qian, Burritt and Monroe (2011) highlighted that the activities having a potential environmental impact can be identified and materialized by using the procedures of environmental management accounting. These procedures include the monetary procedures for accounting revenues, costs and savings, and physical procedures for accounting material and energy consumption, and flows and final disposal.

Environmental investments are needed for the internal management of environmental costs. As in a case study of US companies, Berger (2010) emphasized that the environmental accounting standards in a country have three strategies for enhancing the growth of green products by substituting with more environment friendly technologies, doing recycling and enhancing efficiency. As the definition of “organizational standard” used by companies states that the prime focus of business activities is to be environmentally positive and the issues problems related to the environment must be addressed.

The organizational internal and external resources can be the source of investments for funding activities of environmental preservation which is highly dependent on policies of the organizational management. Lee N, Nuwan Gunarathne, and Lee K (2015) examined the investment behavior of the firms in Japan. They divided the investment behavior of firms into three phases as the first stage is to comply with the environmental regulations of the government, the second stage involves the development of a system of managing environment friendly technological innovations, and the third stage comprises the maturity yield production cost efficiency and the sales rate acceleration. However, the Ministry of Environment in Japan has already implemented the environmental accounting standards. This implementation of environmental accounting standards made the control and evaluation of investment allocation easier to track. Martinez (2012) contended that the quantitative evaluation of this environmental investments has increased scrutiny and transparency of the system by ensuring the measurability of the collected data.

### **Economic Impact**

In late 90s, social investments became popular because it is not related to the economic benefits. Mostly, the business payments are meant to produce economic or monetary benefits, therefore,

the charitable funding is not related to the business monetary gains rather it produces social gains. Meanwhile, the social externalities are the environmental degradation effects of such investments.

In the beginning of environment friendly stock selection and portfolio construction, investors have a great choice of stocks, many of which are not environmental friendly. Due to the fact that religious perspective is still dominant, investors are not well aware of the environmental (Wilson, R. (1997) and political aspects (Schlegelmilch, B. B. 1997) of the investments. The environmental aspect constitutes very little proportion of total assets in a typical sustainable and ethical portfolio selection. As Luther, Matatko and Corner (1992) asserted that in this stage, social performance (not related to the environment) was highly shown by Kyoto Protocol firm.

As the markets are globalized and barriers of tariff and quota are eliminated, the biggest closure to be disclosed by the firms is environmental issue. The term quality evaluation or quality assessment includes all the terms such as pollution reduction, waste management, emissions etc. thus becoming part of green license that is included by the management of the firms to incorporate the environmental cost. In addition, Johansson and Winroth (2010) avowed regarding the concept of environmental profit for firms. They asserted that the benefits and costs must be taken into account for enhancing the competitiveness of the firms by developing, manufacturing, selling and delivering affordable and environment friendly products to the consumers.

### **Control on Environmental Investment**

The assessment of environmental investments varies among firms depending of the policy of each firm (Wood & Ross, 2006). Environmental investments are managed by organizational resources and regulations imposed by the government of respective country. In general, a theoretical model of efficiency is used by the firms as a tool to assess the environmental investments (Radermacher, 1999), however, this approach ruminates internal functions only. As Johansson and Winroth (2010) argued that if the decisions of the management of firms are based on sound business rationales, then the benefits and costs of environmental investments must be clear

## **METHODOLOGY**

### **Research Questions**

As far as the development of assessment of environmental investment for such a country is concerned that does not have her own institutions and accounting standards regarding environmental accounting, the questions of evaluations of environmental investments and its economic impacts on firms arises.

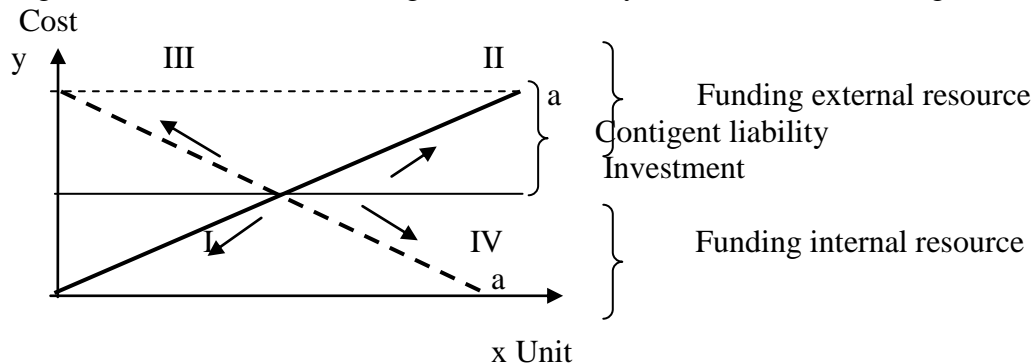
### **Summation Approach**

The evaluation and assessment of investment performance can be done using an economic approach known as the Evaluation of Environmental Investment (EEI). In order to set the position of the gradient, it translates into variables (y) and variable (x) as depicted in Figure 1. McGuigan (2008) introduced the efficiency cost from Varian price as input and this study has

adopted this approach. In this study, Varian investment resources are taken as input for examining the effect of allocation on real efficiency cost. Funding resources are taken from both internal and external sources. Internal funding includes allocation from incremental capital while external funding comes from grants and carbon credit mechanisms.

Nominal data is collected from the annual reports using Cartesian coordinates (x, y). The financial non-financial data for all the companies in Indonesia was taken from annual reports which contain financial statements and sustainability reports. Burrit et.al (2012) stated that annual reports should contain the data for mature investments under sustainable environment activities. Information management shown by separate reporting strengthens the image of the company (Raska & Shaw, 2012), but the content in separate formats must support each other (Siregar & Bachtiar, 2010).

Figure 1 Interconnection amongst cost efficiency, eco-investment, contingent liability in EA



Source: Author

Nominal data is collected from the annual reports using Cartesian coordinates (x, y). The financial non-financial data for all the companies in Indonesia was taken from annual reports which contain financial statements and sustainability reports. Burrit et.al (2012) stated that annual reports should contain the data for mature investments under sustainable environment activities. Information management shown by separate reporting strengthens the image of the company (Raska & Shaw, 2012), but the content in separate formats must support each other (Siregar & Bachtiar, 2010).

Thus, the expression  $y = f(x) + ?$  shows that (y) is the expected output in the form of cost efficient production, accelerated on sales after efficiency, and other comprehensive income after the efficiency of a number of factors (x) is the efficiency of cost, investment on the environment, financing activities in the environment, contingent asset, contingent liability, as in equation of (1);

$$Y=f(x)+E; (x,y)=I \tag{1}$$

$$y= f [(IE, SP,TV,SE,AS,CR,PF,GS,t)x] \text{ where}$$

y = monetary benefits (e.g., cost efficiency, increased revenue)

(total cost of goods sold - total abatement costs)

x= quantity of the products at the efficiency level

IE = environmental investment

SP = price of unused substitute inputs (e.g., charcoal)

TV = technological improvements (e.g., heat inverter)

SE = entry or exit of other product sellers

AS = accidental supply interruptions from fires, floods, etc.

CR = costs of regulatory compliance

PF = expected (future) changes in price

GS = taxes, subsidies or cut allowance, grant, loan for emission reduction

t = time period adjustment

Total reduction in costs can be noted from EPA (1995,p.9) as;

The costs of pollution reduction (e.g. costs of scrubbers, labor needed to maintain them, etc.).

The opportunity costs of lowering consumption or production.

The expression should be converted into LENT (Ln) in order to simplify the result from monetary value to Cartesian coordinates as given in equation (2):

$$\ln Y = \ln(Ix+E) \quad (2)$$

$$Y = e \ln(Ix+E)$$

In order to find out the level of achievement of company investment in environment conservation activities, the expression  $y = f(x) + ?$  is used. It is assumed that firms are already in the latest phase of investment behavior in accordance with the conditions of entrance to the stage of sustainability investment (Lee N et al., 2015).

The movement of variables at the position in epistemology is shown in Figure 1 which demonstrates the position of the Gradient revealing the existence of environmental impact of environmental conservation activities.

### **Gradient Greenwash**

Gradient Greenwash observed the short term trend of environmental cost investment, with the direction of arrow, the x value changes from the expected to unexpected or no change along with the short-term investment (3 months or trimester). Likewise, the cost of production and the constant will not be affected from the environmental impact of the cost of investment rather it is a burden on other administrative costs. Lyon and Maxwell (2011) used equation which is based on the financial disclosure literature and revealed that an increase is observed in green washing practices because of the absence of any industrial standards controlling the communication of environmental messages. There exists a strong likelihood of clamping up of some organizations instead of becoming more transparent and open because of the threat of public backlash for greenwash.

### **Gradient Growth**

The year to year consistency in the use of investment growth is explained by Gradient growth. The significance of the impact of investment on cost efficiency of production is yet to prove. The variable investment cost tend to be a burden variable. As Tate, Ellram, and Dooley (2014) asserted that the contract in which companies enter are based on different cost structures such as variable cost and fixed cost structures and technological innovations such as organizational, activity and regulatory innovations have to be considered by the companies in this regard. Typically, companies entering this gradient are considered in first stage of environmental

conservation cost behavior. Position  $y$  in this gradient is inversely proportional to  $x$ , where  $y$  moves from the expected direction toward unexpected, whereas,  $x$  moves from not targeted to targeted. There is possibility that firm may shrink the environmental impact, but they cannot determine its economic advantages.

### **Gradient Corrective**

Gradient Corrective demonstrates the undesirable changes in terms of environmental impact generated on environmental cost, production quantity and the tendency of the absence of cost efficiency. This behavior can be observed in firms implementing such environmental investment cost system in the long run. Johansson and Winroth (2010) revealed that a number of costs such as contingent cost, agency cost or imaging cost etc. are related with poor environmental compliance. Better organizational structure and reduced possible conflicts have to be collaborated with environmental issue in order to strengthen the manufacturing strategy. The companies that are in transition phase from gradient growth to gradient sustainable are considered to be in second stage of environmental conservation cost behavior.

### **Gradient Sustainable**

Gradient sustainable refers to the condition with which arrows points to the desired targets in case when the production cost at the level of most efficiency will reach the quantity of the product. Johansson and Winroth (2010) refers environmental perspective to the effort to eliminate redundant activities and to attain high resource efficiency and they suggested to lessen the manufacturing approach.

### **Data**

Two companies, Company A and B are taken as two cases for examining the impact of investment benefits of efficiency activities on the production cost. Yearly data of nine years is used for analysis following the basic company regulation of 2007 which states that Indonesian companies must reveal their social responsibilities including environmental activities in their annual reports. Both companies A and B declared their initial investments for environmental conservation and confirmed their efficiency performance in electrical and water supply in their sustainability reports.

## **RESULTS AND DISCUSSION**

### **Results**

#### **The Company A's case**

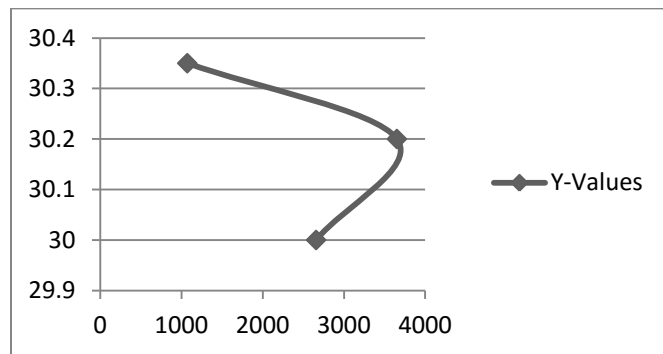
Figure 1 depicts the relationship between the allocated cost investment (as variable  $x$ ) and the cost-efficiency production (as variable  $y$ ) which is the value addition by the company. The calculations are showing that Company A has moved to the position of gradient corrective from gradient growth due to the fact that the source of funding comes from the volume of contingent liability for enhancing green technology. The allocation of investment sources comes from the grants or debts from third party. An increased impact of contingent cost on cost structure is the probable outcome



Table 1 Average value

term	1	2	3
Y	30	30.2	30.35
X	2,656.3	3,651	1,070

Graphic 1 The shifted of x and y company A



In order to make the analysis of investment behavior easier, the calculation of data from annual reports is divided into three terms. Company A needs international green license for the expansion of its operations overseas as it is a multinational firm. The environmental cost allocation during the first term is for regulatory charges. Compared to other variables, its amount is eccentric which is 26.56%. This amount is proportional to the production quantity as much as the average for the environmental cost allocation. This is obvious from the movement of line in the graph with the production cost. Likewise, a continuation in management policies regarding allocation of environmental cost for green license is seen in second term of three years that reached to 36.51%. The company attained greater growth in the third term of three years as compared to the first stage of three years.

The third term of the three-years period actually changes the line direction in the graph. The data taken from the annual reports revealed that companies got carbon credits from Joint Credit Mechanism program and the Clean Development Mechanism in first and second year respectively. The investment allocation was used for the purpose of improvement of technology. As a result, the variable x which is denominator, increased up to four times as compared to previous term. On the other hand, total production goes up by 12.71% reaching to 37.41% of total as compared to previous term. The acceleration in production process will not take place. The environmental cost is taken as a contingent liability which cannot be presented in balance sheet as it is not in monetary terms. As a result, production cost per unit increases up to 3.96%. And this is the stage where organization arrives at correction phase. In order to reach the sustainable phase, the organizations must practice tedious strategies and policies.

### The company B's case

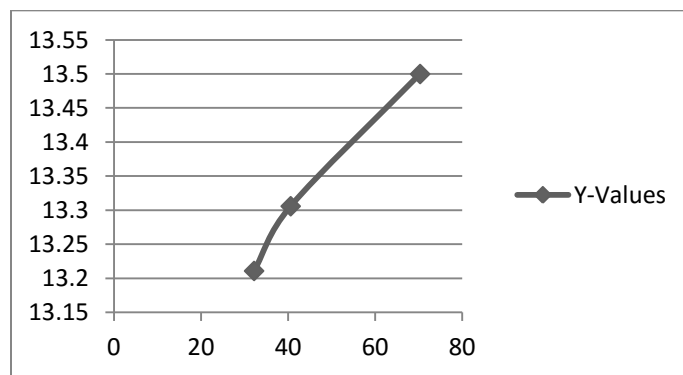
The position of the gradient growth for Company B is depicted in Figure 2. The location of Company B is at growth gradient. The probability of allocation for environmental investment allowance is determined from each year proportion P/L. In addition, per unit variable cost or the

proportion of increase in revenue affect the amount of environment investment allocation. The environment investment allocation in the short term account matters despite it is not related to the environmental investment. If the net income declines for Company B, its position will be shifted to green wash gradient.

Table 2 Average value of 3 term of period

Terms	1	2	3
Y	13.2110	13.306	13.50
X	32.50	40.62	70.35

Graphic 2 The shifted of x and y company B



The allocation of environmental cost for Company B is considered very careful on the basis of the calculations of each term. It is obvious that production cost is not much affected by the environmental cost because in third term of three years it increased 1.475% per unit as compared to 0.719% per unit in last term of three years. It is a sign for the external stakeholder that the company is not undergoing much innovation in production process and continuing the same program every year. Therefore, the economic benefits of environmental costs are not considered by the organizational management.

## DISCUSSION

On the basis of horizontal summation of EEI, both Company A and Company B have different results. It demonstrates the economic impacts of environmental investments considering capital structure if;

1. Productivity growth offsets the environmental investment.

The integration of environmental cost with financial and production system is considered by the organizational management in order to measure the benefits of the environmental cost on economic growth. Spencer and Adams (2013) argued that competitive advantage can be realized in a more rigorous way in case of contingent efficient management practices because of a lack of support system for the environmental cost measurement and management. However, Bracci and Maran (2015) recommended to examine the economic impact of environmental investment through financial system by environmental costs capitalization and by associating identified future revenues to the



- environmental costs.
2. The condition of internal fundamentals is needed for the sources of investment funding. Both internal and external sources of investment carry financial structure risk. Important insights regarding internal fundamental related to the area of measurement are offered by Whittington (2007, p.13). Inflation accounting is a consequence of the lack of clarity in the definition and measurement of profit.
  3. Investment evaluation should not be in wide range of time period. MacLean, Ziemba and Blazenko (1992) recommended to use a continuous time approach for measuring the time-frame based investment probability for getting current wealth at any point in time, in the context of a wide range of time period.

## CONCLUSIONS AND RECOMMENDATIONS

The benefits and usefulness of the environmental investments can be evaluated using EEI approach. For measuring the multiple or individual time series data, EEI approach can be used. The objectives or research and characteristics of data determine the evaluation outcomes. The inclusion of environmental perspective to the financial structure varies from firm to firm and majority of firms use qualitative methods to disclose the environmental costs. Therefore, content approach can be used to find the data..

## REFERENCES

- Alewine, H. C. (2010). A model for conducting experimental environmental accounting research. *Sustainability Accounting, Management and Policy Journal*, 1(2), 256–291.
- Berger, R. (2010). *Green Growth, Green Profit*. Basingstoke: Palgrave Macmillan.
- Bracci, E., & Maran, L. (2015). Management of Environmental Quality : An International Journal Article information : *Management of Environmental Quality: An International Journal*, 24(4), 538–554.
- Burritt, R. L., & Schaltegger, S. (2012). Measuring the (un-)sustainability of industrial biomass production and use. *Sustainability Accounting, Management and Policy Journal*, 3(2), 109–133.
- Field B.C., & Field M. K. (2006). *Environmental Economics on introduction*, Singapore: McGraw-Hill
- Firoz, C. M., & Ansari, A. A. (2010). Environmental Accounting and Intemational Financial Reporting Standards ( IFRS ). *International Journal of Business and Management*, 5(10), 105–112.
- Hank C. Alewine Dan N. Stone. (2013). How does environmental accounting information influence attention and investment? *International Journal of Accounting & Information Management*, 21(1), 22–52.
- Johansson, G., & Winroth, M. (2010). Introducing environmental concern in manufacturing strategies: Implications for the decision criteria. *Management Research Review*, 33(9), 877–899.
- Lee, N. G. K.-H., Nuwan Gunarathne, & Lee, K.-H. (2015). Environmental Management Accounting (EMA) for environmental management and organizational change: An eco-control approach. *Journal of Accounting & Organizational Change*, 11(3), 362–383.

- Lyon, T. P., & Maxwell, J. W. (2011). Greenwash : Corporate Environmental Disclosure under Threat of Audit. *Journal of Economics & Management Strategy*, 20(1), 3–41.
- MacLean, L. C., Ziemba, W. T., & Blazenko, G. (1992). Growth Versus Security in Dynamic Investment Analysis. *Management Science*, 38(11), 1562–1585.
- Martinez, F. (2012). The syncretism of environmental and social responsibility with business economic performance. *Management of Environmental Quality: An International Journal*, 23(6), 597–614.
- Spencer, S. Y., & Adams, C. (2013). The mediating effects of the adoption of an environmental information system on top management ' s commitment and environmental performance. *Environmental Information System*, 4(1), 75–102.
- Walker, J. (2009). *Accounting in a Nutshell*. Oxford,UK: CIMA Publishing.
- Whittington, G. (2007). *Profitability, Accounting Theory and Methodology*. (S. A. Zeff, Ed.) (First, Vol. 20072131). London and New York: Routledge.