

THE ENVIRONMENTAL MANAGEMENT ACCOUNTING (EMA) PERSPECTIVE CALCULATION OF ENVIRONMENTAL MANAGEMENT ENVIRONMENT IN RIAU

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Abstract: This study aimed to see the results of Environmental Management Accounting (EMA) analysis in application to the environmental costs of oil mining companies in Riau and their influence on the company. This analysis starts with the quantitative and descriptive analysis of primary data in the form of data on the profits of the company's petroleum production. Data form of the amount of the company's petroleum production per day and the amount of sales profit per day. The analysis by including aspects of costs that must be met by the company in Environmental Management Accounting (EMA). The results of the analysis show that there was a decline in company profits by 15% between entering environmental costs by not including environmental costs. However, the company still benefits from the economic side. In addition, the company's responsibility for the environment and society could be fulfilled.

Keywords: Environmental Management Accounting (EMA), environmental costs.



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Environmental aspects are important instruments that cannot be separated from the production activities of a company, because of a causal relationship between the production process, goods produced and the environment. A production activity produces goods that will be consumed and enjoyed by consumers, but in the production process, it creates an unavoidable impact of pollution caused by the materials used and the impact of the use of the tools. This phenomenon is something that is faced by every company op-

erating in the field of the environment today. Apart from having an impact on the economy, it is unavoidable that the development of industrialization has the consequence of an increase in pollution resulting from the remainder of the results of industrial production processes. The production process is in the form of exploration, exploitation, and production of natural materials used by humans, ranging from mining materials, food, clothing, energy and other daily necessities. This has increased the environmental damage that occurs both on a local and global scale. Therefore, the efficiency of production and environmental attention by the company becomes a very important aspect owned by each company.

The problem of environmental management had long been a conversation that is quite crowded because lack of management will result in problems. At present, the industry is required to improve its production system by applying the principles of sus-

tainable development, namely economic benefits, ecological balance, and business responsibility to the social environment (Purnomo, 2014). Sustainable development is a development process in which it can meet the needs of the current generation without reducing the ability of future generations. Therefore, the goal of economic and social development must be pursued sustainability. However, the biggest challenge of development is how to organize clean and equitable economic growth. In addition, there are environmental challenges in the form of pollution that requires the industry to make efficiency to reduce the use of energy and natural resources that will reduce the level of environmental pollution (Renjaan, 2011).

The era of globalization had demanded the industry to improve its production system by not abandoning the three main pillars of sustainable development, namely economic benefits, ecological balance and business responsibility for the social environment. Limitations concerning technology are the quality of raw materials. The availability of tools and skills of workers causes the occurrence of waste in a certain amount can often not be overcome so that the need for an environmentally friendly production approach (Nisa, et al., 2015). Industry had a lot of inefficiency in the process, and this was also one of the causes of waste. Waste can come from the use of raw materials, energy or water or other materials that were needed in the process so that there were many indirect losses caused. In addition, inefficiencies also cause waste, both liquid, solid and emissions. These wastes cause pollution both soil, water, and air pollution. These pollutions cause social impacts, such as health, aesthetics, and discomfort in social life. This can lead to losses that indirectly had economic value and also cause losses to industry or the surrounding community. There were various approaches to environmental management that were environmentally friendly through an environmentally friendly production approach or with minimal waste. One approach to overcome these problems by applying the eco concept - product efficiency so that less waste was produced (Renjaan, 2011).

The concept of Eco-efficiency contains three important things. First, improvements in ecological and economic performance can and should complement each other. Secondly, improvements in environmental performance should no longer be seen as charity and charity, but also as competitiveness. Third, efficiency was a compliment and supporters of sustainable development. Sustainable development was defined as development that meets current needs, without reducing the ability of future generations to meet their own needs.

Eco-efficiency implies an increase in efficiency derived from improvements in environmental performance. There are some sources of incentives and causes of efficiency improvements. First, customers want a cleaner product, which is a product that is produced without damaging the environment and its use and disposal were environmentally friendly. Second, employees prefer to work in companies that are responsible for the environment and will produce greater productivity. Third, companies that are responsible for the environment tend to gain external benefits, such as lower capital costs and lower insurance rates. Fourth, better environmental performance can produce significant social benefits, such as benefits for human health. Fifth, focusing on improving environmental performance arouses the desire of managers to innovate and seek new opportunities. Sixth, reducing environmental costs can maintain or create competitive advantage.

Industry needs to measure the environmental impact of production activities both physical environmental impacts and also the financial impact of the company. The Environmental Management Accounting (EMA) approach is appropriate for use in this problem because through EMA information is obtained about material flow or energy, and the impact to the environment based on environmental costs incurred (Shapiro, et al., 2000). Environmental costs are costs incurred due to low environmental quality, as a result of the company's production process. Environmental costs were also interpreted as impacts, whether monetary or non-monetary which occur by the results of company activities that affect the quality of the environment (Hansen and Mowen, 2007).

Ja'far and Dista (2016:3), stated that "environmental conservation efforts by the company will bring some benefits, including the interest of shareholders and stakeholders towards the company's benefits due to responsible environmental management in the eyes of the community". Other results indicate that good environmental management can avoid community and government claims and improve product quality which will ultimately increase economic benefits. The purpose of this study is to describe Environmental Management Accounting (EMA) at PT. Chevron Pacific Indonesia Petapahan operation area, Riau

THEORETICAL REVIEW

Environmental costs are also interpreted as impacts, whether monetary or non-monetary, which occur as a result of the activities of a company that affects the quality of the environment. Environmental costs are also a sacrifice to preserve the company. The definition of company environment is an object outside the company which consists of the Natural environment: Air and water pollution, natural damage, natural damage costs, economic Environment: Agriculture subsistence, commercial, trade and industry agrarian, economic crisis costs (strike workers, etc.), social Environment: Social institutions, social institutions, social crisis costs (community protests), political environment: Taxes and other levies, fiscal and monetary policies, ideology, political policy costs (BBM, Tax, etc.), cultural environment: Customs, beliefs, costs of cultural damage (moral decadence) and five environments must be managed by the company so that the impact does not cause harm.

The environmental damage had an impact on company costs and ultimately will result in company losses. For example, a damaged natural environment (air, water pollution, soil damage), resulting in rising costs, a damaged economic environment (increase in foreign exchange) will increase costs, a damaged social environment (riots) resulting in increased production costs, a political environment damaged due to illegal levies, resulting in increased corporate overhead costs, and a cultural environment damaged by drug influences, resulting in low

work productivity. All of these have an impact on rising costs and decreasing corporate income, which results in losses.

In the total environmental quality model, the ideal condition is that there is no environmental damage. Damage is defined as direct degradation of the environment, such as emissions of solid, liquid or gas residues into the environment (for example water pollution and air pollution), or indirect degradation such as unnecessary use of raw materials and energy. Environmental costs can be classified into four categories: environmental prevention costs, environmental detection costs, internal failure costs and external failure costs (Shapiro, et al., 2000).

Environmental Prevention Costs (environmental prevention costs) were costs for activities carried out to prevent the production of waste and waste that can damage the environment. Example: Evaluation and selection of suppliers, evaluation and selection of tools to control pollution, process and product design to reduce and remove waste, train employees, study environmental impacts, environmental risk audits, product recycling, obtain ISO 14001 certification.

Environmental Detection Costs (environmental detection costs) were costs for activities carried out to determine the products, processes, and other activities in the company meet applicable environmental standards or not. Examples: Audit of environmental activities, inspection of products and processes, development of environmental performance measures, implementation of pollution testing, verification of environmental performance of suppliers, and measurement of pollution levels.

Internal Environmental Failure Costs (environmental internal failure costs) were costs for activities carried out because of the production of waste and waste, but not disposed of in the external environment. Example: Operation of equipment to reduce or eliminate pollution, treatment and disposal of toxic waste, maintenance of pollution equipment, licensing of facilities to produce waste, and recycling of residual materials.

External Environmental Failure Costs (external environmental failure), were costs for activities carried out and release waste or garbage into the

environment. This was divided into two, namely realized external failure costs were costs experienced and paid by the company. The costs of unrealized external failure costs or social costs were caused by the company but were experienced and paid for by parties outside the company. Examples of realized external failure costs include cleaning of polluted lakes, cleaning of spilled oil, cleaning of polluted soil, inefficient use of raw materials and energy, completion of personal accident claims from environmentally unfriendly work practices, etc. Examples of social costs were: include medical care due to polluted air (individual welfare), loss of use of the lake as a place of recreation due to pollution (degradation), loss of employment due to pollution (individual welfare), and damage to ecosystems due to solid waste disposal (degradation).

Environmental Cost Classification, Hilton (2008), divides the types of environmental costs as follows:

1. Private vs. Social environmental costs.

An important difference between private and social costs (or public costs). Private environmental costs are borne by companies or individuals. Examples of costs incurred by companies to comply with EPA regulations or to clean polluted lakes. The cost of the social environment borne by the wider community. These examples include the costs borne by taxpayers to EPA staff, the costs borne by taxpayers to clean a polluted lake or river, the costs borne by individuals, insurance companies and Medicare due to health problems caused by pollutants, and unquantifiable quality of life, and we bear all the costs of a damaged environment. While the costs of the social environment are important to all of us, we will focus on environmental cost management, which is a systematic effort to measure and control or reduce private environmental costs borne by other companies or organizations.

2. Cost of Visible vs. Hidden (Hidden) Environment.

Social and private environmental costs can be seen or hidden. Visible social environment costs (Visible) are known and identified concerning environmental issues, such as the taxpayer's

fees from EPA staff or cleaning the polluted lake. The costs of the social environment are hidden including those caused by environmental issues but have not yet been identified, such as costs borne by individuals, insurance companies, or Medicare due to cancer caused by pollution, but not identified as such. For example, is melanoma (a type of serious skin cancer) caused by hereditary tendencies, failure to use sunblock, or depletion of the ozone layer resulting from emissions of the chlorofluorocarbons industry.

To overcome the problem of environmental management, Environmental Management Accounting (EMA) had now been developed as a tool to assist managers' efforts to improve financial performance and environmental performance. Systematically, EMA integrates environmental aspects of the company into management accounting and decision-making processes. Furthermore, EMA helps business people/managers to collect, analyze and connect environmental aspects with monetary and physical information.

The definition of Environmental Management Accounting (EMA) according to The International Federation of Accountants was the management of the environment and economic performance through the development and implementation of an accounting system related to the environment and its practice appropriately. This can include reporting and auditing for several companies, in general, EMA includes LCC, full cost accounting, benefit assessment, and strategic planning for environmental management.

Environmental Management Accounting's focus for a company is different, depending on its purpose, what information was to be achieved in the implementation of EMA, for example for a department manager will focus on information about EMA that is applied only to his department, or for example the company wants to get information about EMA implementation in one life cycle of a product (Life Cycle Analysis).

EMA is a comprehensive framework for discussing environmental accounting. Concerning environmental accounting, there is a major consensus,

Environmental impact on corporate finance (MEMA) and environmental impact on environmental systems (PEMA).

The environmental impact on an economic system is expressed in the form of monetary, environmental information, namely all the effects of the past, present and future of money flows, for example, expenditure and income due to clean production, fines for violating environmental regulations. Environmental impacts on environmental systems are expressed in physical environmental information. At the corporate level, the physical environmental information includes all material and energy released in the past, present and future that affect the ecological system. Physical environmental information is always expressed in physical units, for example, kilograms or joules.

Over the last twenty years, Indonesia's economic development has led to industrialization. At least 30,000 industries are operating in Indonesia from year to year showing an increase. This increase in number is of course directly proportional to the increase in pollution generated from industrial production processes (Azizah, 2016). One such industry is in Riau Province in the form of mining and petroleum processing companies. In its activities, the Company does not only take into account economic benefits but also important in managing the surrounding environment both physical and social environment. For good financial management is needed so that from the economic side the company still benefits without harming the other side.

One of the efforts to create environmentally friendly production is to consider the impact caused by production activities on the environment and human health in the vicinity. The international business world has known the concept of sustainable development with the issue of environmental management issues through various regulations concerning environmental management including Law No. 23 of 1997, concerning Environmental Protection and Management, and an international scale is ISO 14001 which establishes a comprehensive environmental management system. Even Law No.40 of 2007 regarding Limited Liability Companies, through article 74, specifically regulates the company's ob-

ligations to carry out these social and environmental responsibilities.

Therefore, a management accounting system is needed that can consider environmental problems and costs associated with environmental management. Therefore the Environmental Management Accounting (EMA) method as previously described is needed in the production process of petroleum companies in Riau. With this environmental management accounting method, information on material flow or energy and its impact on the environment is based on environmental costs incurred. The Environmental Management Accounting (EMA) principle can help companies identify environmental costs. "The application of Environmental Management Accounting aims to build a culture that can reduce pollution and minimize waste in an industry (Purnomo, 2014). In the study that will be conducted this time, the researchers aim to find out the EMA as a form of eco-efficiency implementation in mining companies located in Riau Province.

METHOD

This type of research is applied research, namely research conducted to solve problems and evaluate the use of EMA by PT. Chevron Pacific Indonesia Petapahan operation area, Riau. This study uses a case study method, with the type of primary data taken from PT. Chevron Pacific Indonesia is in the form of financial reports and records on types of waste and regarding calculations, cost assessments, and allocation of waste processing to financial statements. Data analysis techniques in this study using descriptive, comparative analysis to describe the findings and then analyzed the accounting treatment of the cost of processing waste, then included as a component of production costs with the consideration that waste arises as a result of the production process. Companies in measuring and assessing environmental costs (concerning operational costs of processing waste) as much as the cost of the cost (Historical Cost). PT. Chevron Pacific Indonesia was chosen in this regard because the company is one of the largest petroleum producer companies operating in Riau Province and has been operating for approximately 68 years. The

financial report data used is a company report in 2017 because the data was taken in line at the time of the study of isolation of hydrocarbonoclastic bacteria taken from the exploration area of PT. Chevron Pacific Indonesia, Petapahan, Riau.

RESULTS AND DISCUSSION

PT. Cevron Petapahan Riau produces 12,000 barrels of oil per day with a lifting cost of USD 11,

so there is a total cost of USD 132,000 per day. If it is assumed that in 1 year this production never ceases to operate (365 days), then the total production cost per year is 12,000 barrels x USD 11 x 365 days = USD 48.18 million for the production of 4.38 million barrels per year. Table 1-3 is an estimate of the difference in operating profit (loss) incurred if the company involves environmental costs and the efficiency.

Table 1 Environmental Cost Report

Cost Type	Activity	Cost \$USD/ year	% total production costs
Prevention costs	Training	150.000	
	Product design	450.000	1,3
	Equipment selection	40.000	
	Subtotal	640.000	
Inspection fees	Process checking	600.000	
	Material inspection	200.000	1,66
	Sub Total	800.000	
Internal failure costs	Damaged or defective product costs	900.000	
	Equipment maintenance costs	500.000	2,91
	Sub Total	1.400.000	
External failure costs	Natural environment costs	500.000	
	Economic environmental costs	500.000	
	Social environment costs	500.000	
	Political environment costs	500.000	9,34
	Cost of cultural environment	500.000	
	Cleaning costs	500.000	
	Land management costs	500.000	
	Damage claim fees	1.000.000	
	Sub Total	4.500.000	
Total		7.340.000	15,23

In Table 1 the costs incurred by companies in the fuel oil production process. Training costs are the total costs incurred to provide training to employees/employees regarding standard procedures to prevent environmental damage caused by the production process. The amount of this fee is USD 150,000. Product design costs are the costs incurred for designing products that are environmentally friendly, at the cost of as much as USD 450,000. Whereas equipment selection costs are costs in-

currred to buy production equipment that does not damage the environment, with a cost, in this case, it is USD 40,000. Furthermore, the process inspection costs are the costs incurred for the production inspection process, for example paying the experts, along with the tools and materials. The amount of fees needed is USD 600,000. The cost of inspecting materials is the costs incurred for inspecting raw materials for production, for example, experts received a fee of USD 200,000.

The internal failure costs included are the costs of damaged or defective products is the cost of replacing a damaged or defective product because if it is removed from the place of production, it is feared that it will have a negative impact on the environment. For this type of cost, it takes as much as USD 900,000. The second is the cost of equipment maintenance, namely the costs intended to repair or

maintain deer production equipment due to production activity. In this case, it takes as much as USD 500,000.

Based on Table 2 the amount of environmental costs required reaches 15.23% of the total production costs. Estimated costs needed in a year reach USD 7.34 million.

Table 2 Imposing Environmental Costs

Cost Type	Calculation	Cost (\$ USD)
Production / barrel costs	48.180.000 / 4.380.000	11,000
Prevention / barrel costs	640.000 / 4.380.000	0,146
Check / barrel costs	800,000 / 4.380.000	0,183
Internal failure costs / barrel	1.400.000 / 4.380.000	0,320
Costs fail external / barrel	4.500.000 / 4.380.000	1,027
Total cost / barrel		12,676

If calculated by adding environmental costs, the total cost per barrel is USD 12,676. With the assumption that the selling price per barrel is USD 25 and the marketing cost is 10% of the total sales revenue, the comparison of the profits resulting from the additional environmental costs without any environmental costs explained in Table 15 below. Total annual production of 4.38 million barrels with a selling price of USD 25 will be obtained sales revenue of USD 109.5 million and marketing expenses of \$ 10.95 million USD.

Table 3 explains that there is a difference in the profit loss of USD 7.34 million if there are envi-

ronmental costs. The petroleum production process will still include elements of environmental costs because of long-term considerations if these costs are not included, it will harm the company. Furthermore, by taking into account the possibility of reducing environmental costs if using oil-based bacteria is still open. In other words, if the production process with bacterial isolates can be carried out at a cost below the profit difference, it will result in higher efficiency. For example, if the environmental cost of using bacterial isolates reaches \$ 5 million per year, then the efficiency is $(7.34-5)/7.34$ or 32%. If a company does not incur efficiency costs

Table 3 Profit and Loss Calculation Based on Environmental Costs

Cost	Environmental costs (USD)	No Environmental Costs (USD)
Sales revenue	109.500.000	109.500.000
Production cost	48.180.000	48.180.000
Prevention costs	640.000	0
Inspection fees	800.000	0
Internal failure costs	1.400.000	0
External failure costs	4.500.000	0
Gross profit	53.980.000	61.320.000
Marketing costs	10.950.000	10.950.000
Operating Profit and Loss	43.030.000	50.370.000

for the environment, it will cause substantial losses. As an example of a case for handling petroleum waste in Balikpapan (the case of a petroleum spill, March 31, 2018) turned out to require a huge cost if it did not include environmental costs, it was known that the costs incurred in the case for environmental improvements were USD 27 million.

CONCLUSION

The use of Environmental Management Accounting (EMA) in petroleum industry companies in Riau does not cause economic losses. Losses that occur only decrease the company's profit by 15% compared to if it does not include environmental costs and processed by the EMA method. However, the company has the advantage of maintaining the company's image concerning environmental safeguards and social relations with the community

This research also has implications for science regarding the importance of implementing environmental management accounting. The application is especially for mining companies that have the potential to conduct environmental pollution because the impact of production activities can be managed in a recorded manner with the report of environmental costs. Environmental Management Accounting is one way that can be used to contain the effects of monetary activity.

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