

## **Environmental Management Accounting: Efficient Use of Paper, Electricity and Water on Local Environmental Department, Bondowoso Regency, Indonesia**

Andriana\* and Widiarto\*\*

*The purpose of this study was to investigate the application of Environmental Management Accounting, activities undertaken related to the efficiency and constraints of Environmental Management Accounting (EMA) at the Local Environment Department of Bondowoso Regency, Indonesia. This study use qualitative research with descriptive analysis. The object of research is the Local Environmental Department of Bondowoso Regency, Indonesia. In this research, there are two sources of data, are: Primary data is data obtained by observation for 6 months, focused discussions, and interviews. And secondary data that serves as a complement to primary data which relates to the subject of research. In this study, the test of the credibility of data using Triangulation techniques. The results showed that the Local Environmental Department has made efficient use of paper, electricity, and water with the approach of reuse, recycle and reduce. The Local Environmental Department can apply the concept of EMA. In addition to the efficiency of the work, the installation of pamphlets and government regulations also support the implementation of EMA. The obstacles faced by the Local Environment Department in implementing EMA have SOP yet, on the use of resources and energy, lack of staff understanding of government regulations on the environment, inadequate number of pamphlets and lack of staff awareness about environmental. Concepts of EMA can be applied to the maximum when the Local Environmental Department improve their efficiency, compiling reports on the environment and make the SOP on the use of resources and energy.*

**Keyword:** Environment Management Accounting

**JEL Codes:** 103

### **1. Introduction**

In the era the current globalization, many developments taking place in the industrial world. This development is certainly an impact on Indonesia over the last 20 years (Novia, 2014). In addition to economic growth, the impact of the development of this industry is the increase in environmental pollution resulting from the rest of the production.

On the other hand, the causes of environmental pollution not only from industrial commercial and service industry. IFAC (2005) explained that agriculture, animal husbandry, transport and the public sector also contributed to environmental

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\*Andriana, SE., M.Sc, Ak, CA, Public Sector Accounting, Accounting Department, University of Jember, Indonesia, Email: andrianamsc@gmail.com

\*\*widiarto, SE, jember University, Indonesia, Email: wydhist12@yahoo.com

pollution resulting from the activities of daily operations. Public sector organizations or government agency in daily operations can't be separated from the use of paper, water and electricity which can cause environmental pollution. While the Indonesian government has a variety of government agencies spread across the central, provincial and district authorities / municipalities to serve the needs of people with more than 237 million (BPS, 2010).

Basically, public sector organizations have a responsibility to serve the community in terms the provision of goods and services. In addition to serving the community, public sector organizations are also required to manage resources that are used well because most of the resources used come from the government budget. Increased regulations on environmental awareness such as the Law of the Republic of Indonesia Number 32 of 2009, the signing of a Memorandum of Understanding (MOU) with the US Environmental Protection Agency US in Jakarta in June 2011 and Presidential Decree No. 13 Year 2012 on Energy Saving and Water is the underlying reason for the organization and accountants should be concerned with environmental issues. With the increased regulations on environmental awareness, each agency is required to make innovation and efficiency in the use of some water, minerals or energy in running operations.

In doing efficiency, every organization needs information whether monetary or non-monetary to determine the environmental costs arising from activities operations. Application of accounting in environmental management is as an innovation accounting aims to provide relevant information for the organizations related to environmental performance, application of accounting in environmental management turned out to be the driving force of the innovation of the company (Ikhsan, 2009: 27).

One study on EMA implementation in public sector organizations are Novia (2014), which examines the application of environmental awareness with a budget saving electricity, paper, water at the local environment department on Probolinggo regency. The study aims to build environmental awareness in the office of the local environment department in Probolinggo. The Results shows their budget saving that occur in the use of electricity and water in 2012-2013.

The different this study from previous research, which in this study focuses on the efficient use of electricity, paper and water on local Environment department, bondowoso regency which have not implemented the Environmental Management Accounting. This study did not look at scaling back budgeted each year, but based on the efficient use of which does not exceed the budget ceiling, which is based on performance approach. This research is not limited to the application of environmental awareness in the public sector organization but also to provide recommendations on the management and efficiency of the use of paper, electricity, and water.

This research aimed to determine the application of EMA in the efficient use of paper, electricity and water on public sector organizations, namely local Environment department. Selection on local Environment department as the research object because the object is a public sector organizations which implement the arrangement of law with the development of an environmental management system, the implementation of the AMDAL and the development of environmental

technologies, so that the organization is expected to become an example for the organization of other public sector especially in the Bondowoso regency that have not applied Environmental Management Accounting (EMA).

Based on this background, then the problem in this research is: Does the local Environment department on bondowoso has made efficient use of paper, electricity, and water, what activities are carried the local Environment department on bondowoso to make efficiency the use of paper, electricity and water, obstacles faced local environment department, Is the concept of Environmental Management Accounting may be applied by both the local Environment department, what recommendations given in order to achieve the implementation of Environmental Management Accounting. Thus this study aims to determine whether the local Environment department has conducted efficiency, the constraints faced by the local Environment department in implementing EMA, recommendations to achieve implementation of EMA optimally and to determine whether the concept of EMA can be applied properly or not at local Environment department.

## **2. Literature Review**

Environmental accounting is prevention, reduction or avoidance of impacts on the environment, moving from a couple of occasions, starting from the restoration of the events that lead to disaster on such activities (Ikhsan, 2008). Accounting environmental management (environmental management accounting) is a sub-system of environmental accounting. Accounting for environmental management to explain a number of issues regarding impact the company's business into a number of monetary units (Ikhsan, 2009).

Accounting for the environment to identify, assess and measure important aspects of social and economic activities of companies in order to maintain the quality of the environment in accordance with its intended purpose (Sulistyo 2008 in Nungky, 2014). Understanding the nature and relevance of environmental accounting vary greatly depending upon the perspective of professionals and practitioners functional orientation. Some aspects of the field work on environmental accounting are: Identifying the effect of daily activity organization on the environment in the practice of conventional accounting; Identify, search, and examined the problem as opposed to environmental criteria as well as providing an alternative solution; Implementing proactive measures in developing initiatives to improve the environment on the accounting practices of the conventional and The development of new formats accounting systems of financial and non-financial, control systems management decision support environment.

The United Nations Divisions for Sustainable Development (UNSD) (2001) in Ikhsan (2009) suggests another definition of management accounting environment. Some stressing that the management accounting system environment to produce information for internal decision making, where information can be also focused physically or monetarily.

According Bayangkara (2013: 13), efficiency relates to how the organization conducts its operations, so as to achieve the optimal use of resources owned. Efficiency is the ratio between output and input. How big is the output generated by using a certain amount of input-owned companies. Thus, efficiency is a

measurement process that connects between the input and output in the company's operations.

Optimizing the use of resources if an organization formed to produce the desired output with minimum input. The minimum input can be formed if its use can be maximized so that the non-operational operating (waste) generated can be reduced. Efforts to prevent and or reduce the generation of waste starts from selecting the materials used, process technology, energy use and utilization of by products. Azizah (2013) describes the approach taken by the organization to minimize the generation of waste generated as a result of daily activities so that efficiency can be achieved, namely by means of: Reduce that efforts to reduce consumption / use of energy efficient as possible in a production process. Activities reduce also pay attention to production activities within an organization so that the liquid waste discharged into fewer; Reuse is an attempt of using waste for reuse without processing or change shape; Recycle that efforts to use waste by means of recycling process through the processing of physical or chemical.

Performance measurement according Nordiawan governmental organizations (2007: 24) using several approaches. Like the traditional approach and performance approach. The traditional approach to measure the efficiency of organizational performance based on budgets and the realization that in the analysis of any specific expenditure items. While the approach of measuring the performance efficiency of organizational performance based on budgets and the realization based on the total realization of the overall when compared with the total overall budget of activities have been established.

### **3. The Methodology**

This research use qualitative research method of research is descriptive analysis. Descriptive analysis is used because researchers want to know the description of the use of Environmental Management Accounting (EMA) on the Local environment Department in terms of the use of electricity, paper and water. Data collected in the study descriptive form of words and images. Thus, the research report will contain excerpts of data to illustrate the presentation of the report (Moleong, 2011).

The object of this research is the public sector organizations, namely the Local Environment Department on Bondowoso Regency. The focus of this research is the daily activities of the organization in the use of paper, electricity, and water. In this research, there are two sources of data, namely: Primary data is data obtained by researchers directly by observation, focus group discussions and interviews. Secondary data is data obtained or collected from all existing sources. This data serves as a complement to the primary data which relates to the subject of research,

Data collection methods will be pursued researchers in data collection efforts by several stages namely: Interview on this research is a form directed interviews. Investigators will conduct interviews with several sources including: staff areas of environmental pollution control, waste management and environmental law enforcement, staff areas of environmental impact assessment and environmental management, field staff of damage control, environmental restoration, and community empowerment, secretary of the body and head of sub-section and reporting program. Informants were selected because they know about the daily

operational activities of the organization and understand the rules of the use of paper, electricity, and water. Observation is done is observe the activities of the use of paper, electricity and water usage in the Entity. In addition, researchers also match the data generated from interviews with everyday activities undertaken related to the use of paper, electricity, and water.

Data analysis method used in this research is the method according to Miles and Huberman. The first stage in this method is collecting the necessary data. The second stage is the data reduction that is choosing the key points that correspond to the focus of research. The third stage in the form of a matrix presentation of data, network, or graphics so that data can be controlled. The last stage is the decision or verification. In this study, the test of the credibility of the data is done using two techniques, namely: triangulation. Triangulation in testing the credibility of the data is interpreted as checking data from different sources in a way, and a variety of different times (Sugiyono , 2010). According Sugiyono (2010) member check is the process of checking the data obtained by researchers to data providers. Objectives member check is to see how far the data obtained in accordance with what is provided by the data providers.

#### **4. The Findings**

The Local Environment Department on Bondowoso have supporting elements of local government in the environmental field. Corresponding local government decree No. 32 of 2010 concerning description Main Tasks and Functions Bondowoso Local Environment Department, the Local Environment Department has the task of carrying out the preparation and implementation of regional policies in the field of environmental management and environmental impact control.

##### **4.1 Efficiency Guide Environment Agency**

**Table 1: Efficiency Has Done the Local Environment Department on Bondowoso**

type usage	Reduce	Reuse	Recycle	Efficient
paper	-	Using waste paper into a draft, print documents that have not been approved, and draft letter	Change the used paper into envelopes.	Yes
Electricity	Reducing the use of lights, fans, and computers.	-	-	Yes
water	Reducing water usage taps using well water.	-	-	Yes

Source: processed Researcher

Measured from reuse resources that have been used, the activity that has been carried local Environment department on Bondowoso related to the use of paper, electricity, and water can said to be efficient.

**Table 2: Use of paper in 2013**

Paper	2013				
	Budget		Actual		Difference
	PEMA	MEMA	PEMA	MEMA	
HVS	125rim	Rp5.000.000	120 rim	Rp4.800.000	Rp200,000
A4	20 rim	Rp800,000	18 rim	Rp720.000	Rp80.000
<i>Continuous Form</i>	2 box	Rp935.800	2 box	Rp935.800	Rp. 0
CD's Paper	3 rim	Rp81.000	3 rim	Rp81.000	Rp. 0
Double Folio	2 rim	Rp164.800	1 rim	Rp82.400	Rp.82.400
<b>Total</b>	Rp.6.980.600		Rp6.619.200		Rp.361.400

Source: local Environment department on Bondowoso, processed

**Table 3: Use of paper in 2014**

Paper	2014				
	Budget		Actual		Difference
	PEMA	MEMA	PEMA	MEMA	
HVS	125 rim	Rp. 5.000.000	100 rim	Rp4,000,000	1,000,000
A4	20 rim	Rp.800,000	20 rim	Rp800,000	Rp. 0
continuous Form	4 rim	Rp.2.000.000	3 box	Rp1,500,000	Rp.500,000
CDPaper	6 rim	Rp.162.000	6 rim	Rp162.000	Rp. 0
Double Folio	4 rim	Rp. 340.000	4 rim	Rp340.000	Rp. 0
<b>Total</b>	Rp8.302.000		Rp.6.802.000		Rp1. 500,000

Source: local Environment department on Bondowoso, processed

Based on performance approach, the use of paper by the local Environment department on Bondowoso already said to be efficient. The total realization of the use of paper in 2013 and 2014 did not exceed the budget has been set. However, there are several exceed realization of the paper from 2013 to 2014.

**Table 4: Total Electricity Consumption in 2013 and 2014**

Year	Electrical			
	Budget		Actual	
	PEMA	MEMA	PEMA	MEMA
2013	79,900 kWh	Rp13.200.000	59 990kwh	Rp9.899.550
2014	87.262 kWh	Rp14.400.000	63,600 kWh	Rp11.058.132
Difference	7,362 kWh	Rp1.to 200,000	3,610 kWh	Rp1.158.582
Percentage	9.1%	9.1%	6.02%	11.7%

Source: local Environment department on Bondowoso, processed

Based on performance approach, the use of electricity by the local Environment department on Bondowoso has also been said to be efficient. The total realization of the use of electricity in 2013 and 2014 did not exceed the budget has been set. However, the use of electricity from 2013 to 2014 has increased. This was due to an increase in electricity tariffs in the year 2014 in the amount of 5.36% to government customers (P2) with power above 200 kWh. In addition, the increase in electricity use of it due to the renovation of the office.

**Table 5: Total Water Usage in 2013 and 2014**

Year	Water			
	Budget		Actual	
	PEMA	MEMA	PEMA	MEMA
2013	685 m3	Rp3.600.000	574m3	Rp3.055.170
2014	900 m3	RP4.800.000	735 m3	Rp3.921.000
Difference	Increase 215 m3	Increase Rp. 1 200,000	Increase 161 kWh	Increase Rp865.830
Percentage	33%	33%	28.3%	28.3%

Source: local Environment department on Bondowoso, processed

Based on performance approach, the use of water by the local Environment department on Bondowoso has also been said to be efficient. The total realization of the water use in 2013 and 2014 did not exceed the budget has been set. However, the use of water from 2013 to 2014 has a significant increase in water usage this case due to the renovation of the office that cause increased water usage. Renovations are using most of the water coming from the PDAM due to the volume of water that comes from wells has been reduced and can't be used.

#### **4.2 Activities local Environment department on Bondowoso Related Efficiency**

The activities undertaken by local Environment department regarding the use of paper, electricity and water are as follows:

#### **4.2.1 Paper**

Local Environment Department using paper for various activities such as preparation of reports, proposals, letters, payroll and others. In routine activities, the Environment Agency using several types of paper, such as paper HVS, A4 paper, Continuous Form, Double Folio and CD paper. Researchers have analysed that indirectly local Environment department EMA has implemented concepts such as: identifying the needs of paper per month each field, and recording paper usage per month on each activity. Each field in local Environment department will conduct the analysis and identification of the needs of paper each month, whether the paper on each field needs to be reduced or maximizing the use of paper.

Maximize or reduce the use of paper, can be done when each unit to perform efficient use of paper. In Table 2 and Tabel.3, researchers found budget savings in paper use local Environment department. The use of paper each year at the local Environment department does not exceed a set budget despite the increase in the ceiling in 2014. This is because the activities carried out each year is different so that the preparation of reports and proposals also change. There are two types of information for Local Environment Department according to the EMA concept that physical information called PEMA and monetary information called MEMA. Based on this information, researchers will conduct an analysis of the efficiency that has been carried out by local Environment department.

Local Environment Department has conducted efficiency in the use of paper. Each side of the paper can still be used, utilized by the staff to draft, print a file that has not been approved, conceptualizing and manufacturing of pay envelope.

#### **4.2.2 Electricity**

Electricity on the local Environment department are used for various activities, such as: office lights, fans / air conditioning, televisions, computers, printers, refrigerators, and water pumps. The efficiency of electricity use by the local Environment department has done. The use of a window with lots of ventilation is an effort made to keep the room in order to remain stable. This is done to reduce the intensity of use of the fan. In addition, the use of glass windows with clear film, also helps the room to keep in bright conditions so that the use of lights at the local Environment department can be reduced. Efficiency undertaken by the local Environment department on Bondowoso can be seen in Tabel.4 about electricity usage that do not exceed the budget has been set, although the budget in the following year have increased.

#### **4.2.3 Water**

Local Environment Department is a public sector organizations that use large volumes of water. The water that comes out of the office used the local Environment department for cleaning garbage trucks operating daily in the Bondowoso regency. Besides the water used by the office for routine daily activities such as: a kitchen, a bathroom, watering the garden and cleaning the official car. The source of water in the office environment comes from two sources, namely wells and PDAM. The well is an alternative used by local Environment department on Bondowoso to reduce the usage of water from the PDAM. It is proven to reduce water usage of this debit.



Efficiency source of water usage can be seen from Tabel.5 water use for one year carried out by the local Environment department.

### **4.3 Obstacles Faced local Environment department to Implement Efficient**

Researchers analysed several obstacles implementation of efficiency faced by the local Environment department on Bondowoso. The constraints include:

#### **4.3.1 Standard Operating Procedure (SOP)**

SOP (Standard Operating Procedure) is a standardized set of written instructions on the various processes the implementation of various activities of the organization, how and when it should be done, where and by whom done. With the SOP, the staff in an organization has a guideline in carrying out their work activities so that the organization can improve effectiveness and efficiency. For SOP on employment services, local Environment department of the regency has had the SOP. But for SOP related to the use of paper, electricity and water local Environment department of the regency have not already.

#### **4.3.2 Understanding Government Regulations**

Researchers discovered several speakers at the local Environment department on Bondowoso do not know and understand the Government Regulation. The staff only carry out the instructions for use of resources and energy that comes from the organization. If staff know and understand about government regulations, the awareness for the use of energy and resources will increase.

#### **4.3.3 Pamphlet**

Installation pamphlet is the efficiency measures undertaken by the local Environment department to reduce the use of energy and resources that exist. But the obstacle is the number of pamphlets installed in only a few organizations. Researchers found only one pamphlet with the words "Save energy, use the lights as needed", while the staff explained that the pamphlet was the only written instructions in the local Environment department

#### **4.3.4 Building Awareness of staff**

Thought the staff about available resources come from the government budget the constraints faced by the local Environment department on Bondowoso. Obstacles not come from the mindset of the staff but on the action taken on the results of that mindset. Some of the staff thought that the resources coming from the state budget should be maximized its use without thinking about the regulations and the impact on the environment.

#### **4.4 Application of Concept of Environmental Management Accounting On local Environment department, Bondowoso**

Concept of Environmental Management Accounting can be implemented either on Local Environment Department at Bondowoso views of the efficiency do. The approach has been made to reduce the generation of waste is indicated by Tabel.1. There are some things that have been done of a local Environment department at Bondowoso so researchers assumed that EMA can be applied either at the office. In addition to the efficiency of the work done, the installation of pamphlets and government regulations also support the application of EMA. But the EMA application will be run in accordance with wishes if supported by human resources that is in the office.

#### **4.5 Recommendations Implementation of Concepts Environmental Management Accounting**

For maximum efficiency can be implemented, efficiency measures that have been carried out by the local Environment department needs to be increased. Resources and energy used must be properly managed so that the environmental impact of the operations can be well controlled. Research recommendations that the concept of Environmental Management Accounting can be applied to the maximum are as follows:

##### **4.5.1 Management of Water**

Wellis the means used by the local Environment department to reduce the use of water from the PDAM, but the wells in the local Environment department can't be used continuously throughout the year. At a certain period, the volume of water in the well will be reduced. There should be good governance so that the Local Environment Department could do efficient water use. Local Environment department on Bondowoso do not waste water management the results of the use of toilets and water for ablution. Waste water produced, distributed directly on the gutter that leads to the river. Though the waste water could be managed and used again for everyday activities office.

Waste domestic water that comes out of the office can be processed again using the filter technology and piping systems as was done by the Department of Spatial Planning and Housing, Department of Education, and Department of Revenue of West Java Province. In accordance with the recycling technologies that have been applied, the water from the recycling results could be used by the local Environment department for cleaning the car, watering plants, flushing toilets and to water. In addition to using the water that comes from recycling, the local Environment department can utilize the rainwater that falls on the roof of the building to be accommodated by using gutters and water tanks.

##### **4.5.2 Management Paper**

Theory of efficiency in environmental management accounting (EMA) starts from selecting the materials used, process technology, energy use and utilization of by products (Azizah, 2013). To prevent wasteful spending and reduce the impact on the environment, every organization perform the first step of the theory of efficiency in

environmental management accounting, the choice of the materials to be used. If the material can't be replaced with other materials, these materials can be reduced at least its use.

As the paper, the paper is a material that can't be replaced with other materials, but its use can be reduced. Use of paper on Local Environment Department actually be reduced, namely by changing payroll system employees from manual systems that still use paper continuous forms into the Electronic Payroll System (EPS).

#### **4.5.3 Power usage**

Efficiency electricity use by the local Environment department is supported by the state office building that uses ventilation and glass clear film in the room, so the temperature and light room anyway maintained without the use of fans and lights continuously. But, ventilation and glass windows with clear film can't be relied on. Researchers found that the system used to turn on the fan in one room with only one controller. So if a staff wanted to turn on the fan, then all the fan in the room is lit entirely. This causes the efficiency of electricity use can't be fulfilled. Research suggested that the local Environment department can control the electrical power used, especially on the use of a fan that is the way her upgrading the control system by using the system VAV (Variable Air Volume). VAV systems controlling the volume of air supplied to the room automatically. With the VAV system, the electricity used to cool the room can be reduced automatically.

#### **4.5.4 Making SOP**

As mentioned before, the local Environment department has only Bondowoso SOP on employment services, local Environment department has not yet prepared the SOP on the use of energy and resources. Researchers suggested that the local Environment department on Bondowoso developed standard operating procedures on the use of energy and resources in accordance with the Regulation of the Minister of Administrative Reform and Bureaucratic Reform of the Republic of Indonesia Number 35 year 2012.

### **5. Conclusion**

Based on the analysis and discussion that has researchers explain it can be concluded:

Local Environment department on Bondowoso regency had done the efficient use of paper, electricity, and water. Paper used again by the staff using reuse and recycle approach that is by utilizing waste paper to draft, print a file that has not been approved, conceptualizing and pay envelope. Electrical efficiency is done with reduce approach is to reduce the use of fans and lights by placing a clear window film on windows and adequate ventilation. While the efficiency of use of water, the Local Environment Department uses well water to reduce the use of water from the taps.

Some of the constraints faced by the local Environment department in carrying efficiency, among others: local Environment department do not have a standard

operating procedure (SOP) on the use of resources and energy, lack of staff understanding of government regulations that discuss the environment, inadequate number of pamphlets installed in office staff and low awareness about caring for the environment and the budget savings should be done.

Concept of Environmental Management Accounting can be well applied to the local Environment department. In addition to the efficiency of the work done, the installation of pamphlets and government regulations also support the implementation of EMA on the local Environment department.

Research recommendation about EMA so that the concept can be applied to either: domestic waste water originating from the office processed again using the filter technology and piping systems, as already implemented by the Government of West Java Province. In addition, the local Environment department can collect rain water to use gutters and water tanks, so that the source of water used is not continuous from PDAM. Paper usage can be reduced by replacing the manual payroll system that uses Electronic Payroll System (EPS). Efficient use of electricity could to upgrade the air conditioning system by installing VAV (Variable Air Volume). In addition to improving efficiency, so that the concept of Environmental Management Accounting can be applied optimally Local Environment Department needs to set up a report on the environment and make the SOP on the use of resources and energy.

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