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## Review on EnvironmentalManagement System of Domestic Waste Management Unit in Bogor

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# PREFACE

*Pusat Penelitian* Lingkungan *Hidup* - Institut Pertanian *Bogor* (PPLH-IPB) [Center for Environmental Research - Institut Pertanian Bogor (CER-IPB)] was established in 1976. One of the Center's goal is to develop policies and concepts for natural resources and environmental management based on ecosystem characteristics, community participation, local community tradition, economic justice, and global environmental change.

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Finally, we hope this publication will be valuable and beneficial for those who have interest in Indonesia's natural resource and environmental management.

September 2009,

Kukuh Murtilaksono

Director

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**ABSTRACT**

The implementation of an EMS is intended to result in improved environmental performance. In case of Domestic Waste Management Unit (DWMU) in Bogor, the organization could periodically review and evaluate its EMS to identify opportunities for improvement and their implementation. The objective of this study was to review the existing environmental management system operating under Bogor Environmental and Sanitation Agency (DLHK) in compliance with international standard requirements of ISO 14001 Environmental Management System [EMS). The expected result of this research is an evaluation of its EMS to identify opportunities for improvement and their implementation. The management review was conducted based upon the requirements established in ISO 14001 EMS and focusing only on several relevant elements of Domestic Waste Management Unit (DWMU) in Bogor. The EMS elements that were ready to be built in accordance with standard international (EMS ISO 14001), are environmental policy, environmental aspects, legal and other requirements, objectives, targets and programmes, resources, roles, responsibility and authority, competence, training and awareness, operational control, monitoring and measurement. The effectiveness of the EMS could not be evaluated because no document was found showing the trend of environment performance, especially on the significant environmental aspects as well as the achievement of the objective and the target. It is needed to improve the performance of EMS of DWMU that was related to the element of the management: resources, nonconformity, corrective action, preventive action, and management review.

## 1. INTRODUCTION

### 1.1. Background

Environmental Management System (EMS) is a part of the whole management system that includes structure, plan of activity, program, responsibility, procedure, accomplishment/application, achievement, review and protection to environmental policy of organization. The advantage of EMS application is management system structure that focused in continual improvement, attention to environmental issues and plan development, work plan in long term, and to improve understanding and responsibility interpersonal about impact that produced from environment.

The implementation of an EMS is intended to result in improved environmental performance. In case of Domestic Waste Management Unit (DWMU) in Bogor, the organization could periodically review and evaluate its EMS to identify opportunities for improvement and their implementation. However, if the organization doesn't have any existing EMS, they could initially, establish its current position with regard to the environment by means of a review. The aim of the review is to consider all environmental aspects of the organization as a basis for establishing the EMS. The organization could identify significant environmental impacts and aspects, setup and reachment of objectives and targets, and consistency in regulation compliance. To know the effectiveness of the implementation of EMS of DWMU in Bogor in increasing environmental performance, it need a holistic management review.

An environmental management system is a well-documented and structured approach to coping with regulations and customer requirements related to environmental issues. Since the 1960s, there has been a growing interest in environmental issues. This, combined with several high-profile lawsuits, has sensitized both workers and industry. As of 1995, the governments of the United Kingdom, Germany, Norway, and the Netherlands will do business only with suppliers that have environmental management systems. The U.S. Department of Energy is also beginning to require an environmental management system for its suppliers (Clements, 1996).

In establishing EMS, the International Standard ISO 14001 requires an organization to:

a. Establish an appropriate environmental policy
b. Identify the environmental aspects arising from the organization's past, existing or planned activities, products and services, in order to determine the environmental impacts of significance
c. Identify applicable legal requirements and other requirements to which the organization subscribes
d. Identify priorities and set appropriate environmental objectives and targets
e. Establish a structure and a program(s) to implement the policy and achieve objectives and meet targets
f. Facilitate planning, control, monitoring, preventive and corrective actions, auditing and review activities to ensure both that the policy is complied with and that the EMS remains appropriate
g. Be capable of adapting to changing circumstances

The review on an organization with no existing EMS should cover four key areas:

a. Identification of environmental aspects, including those associated with normal operating conditions, abnormal conditions including start-up and shut-down, and emergency situations and accidents
b. Identification of applicable legal requirements and other requirements to which the organization subscribes
c. Examination of existing environmental management practices and procedures, including those associated with procurement and contracting activities

Evaluation of previous emergency situations and accidents.

## 1.2. Objectives of the Research

The objective of this study was to review the existing environmental management system operating under Bogor Environmental and Sanitation Agency (DLHK) in compliance with international standard requirements of ISO 14001 Environmental Management System (EMS). The expected result of this research is an evaluation of its EMS to identify opportunities for improvement and their implementation

# 2. RESEARCH METHODOLOGY

Tools and methods for undertaking the review include checklists, conducting interviews, direct inspection, results of previous audits or other reviews, depending on the nature of the activities. The management review was conducted based upon the requirements established in ISO 14001 EMS and focusing only on several relevant elements of Domestic Waste Management Unit (DWMU) in Bogor, as showed in Figure 1.

# 3. RESULTS AND DISCUSSION

## 3.1. Environmental Policy

Management of an organization has the responsibility to proof the capability of the organization in complying with the legislation through environmental policy and field implementation. Commitment of top management in the practice of environmental watch is stated in an environmental policy signed by the top executive of the organization and covers the vision of the organization about environment and continuous commitment on improvement (Oliveira, 1996 in Wulandari *et al*, 2002). The environmental policy has to be specific to form real action basis, not only a slogan. It has to be implemented, maintained and communicated to all parts of the organization and available for public.

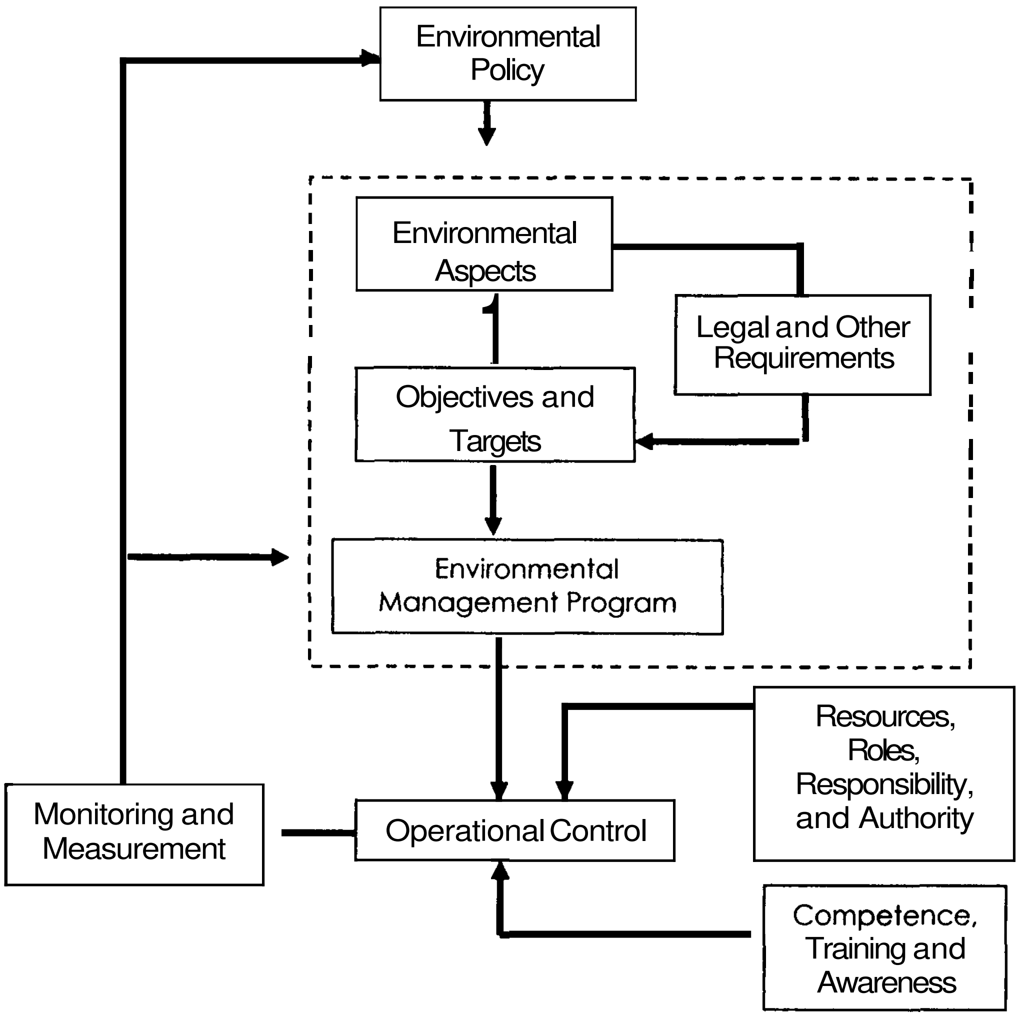


Figure 1. A framework of the research

EMS ISO 14001 (Technical Committee ISO/TC 207/SC1, 2004) stated that top management shall define the organization's environmental policy and ensure that, within the defined scope of its environmental management system, it:

1. is appropriate to the nature, scale and environmental impacts of its activities, products and services,
2. includes a commitment to continual improvement and prevention of pollution,
3. includes a commitment to comply with applicable legal requirements and with other requirements to which the organization subscribes which relate to its environmental aspects,
4. provides the framework for setting and reviewing environmental objectives and targets,

5. is documented, implemented and maintained,
6. is communicated to all persons working for or on behalf of the organization, and
7. is available to the public.

The procedures to establish the environmental policy of domestic waste management in Bogor City is referred to Law No. 412007, article 18 to 24. The environmental policy is stated in the Government Institution's Performance Accountability Report (LAKIP) of Bogor Environmental and Sanitation Agency (DLHK) year 2007, which is:

> "Always make an effort to improve service and the amount of transported waste in accordance with *Bogor* Strategic Plan especially the sanitation improvement program, by means of increasing the mechanism or transport system, the provisions of sanitation infrastructure, the motivation of service personnel and public participation."

This policy is in accordance with the Vision of Bogor City, that is:

> "*Bogor* city as a comfortable service city with prosperous people and trustworthy government"

and in accordance with the second Mission of Bogor City, that is:

> "Ensuring *Bogor* as a clean, beautiful, orderly and secure city with adequate and environmentally friendly infrastructure."

In order to achieve the vision set above, DLHK has its visions to ensure a clean and green Bogor, with missions as follows:

1. Enhancing the professionalism of the people and the business sectors towards environmental and sanitation management
2. Improving apparatus professionalism in the management of environment and sanitation
3. Minimizing municipal waste towards a clean Bogor City in order to increase the quality of the city environment and sanitation and its infrastructure.

## 3.2. Environmental Aspects

The definition of environmental aspect is the element of an organization's activities or products or services that can interact with the environment. While environmental impact is any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization's environmental aspects.

From the EMS ISO 14001, it might be quoted that the organization shall establish, implement and maintain a procedure(s) to identify the environmental aspects of its activities, products and services, and a procedure (s) to determine those aspects that have or can have significant impact(s) on the environment (significant environmental aspects). The organization shall ensure that the significant environmental aspects are taken into account in establishing, implementing and maintaining its environmental management system.

The procedure to establish the significant environmental aspects in the handling of municipal waste is referred to Bogor City Strategic Plan that prioritizes two main problems that is the final disposal site (TPA) and the cleansing service improvement. The determination of TPA sites and the provisions of disposal facility in the location have been the main issues. In relation to this matter, waste management partnership was developed with Bogor District Government based on SK Bupati Bogor No 658.1/246/KPTS/HUK/2005 on July 25, 2005 for the extension of TPA Galuga management permission, and also considering the possibility to undertake waste management partnership with private sector.

In providing further cleansing service improvement, the city was dealt with waste collection service problems such as waste transport system, the insignificance number of transport fleet and cleansing personnel, public behavior of illegal littering, as well as the dependence of TPA location permission by neighboring city.

## 3.3. Resources, Roles, Responsibility an Authority

Based on EMS ISO 14001, the standard stated that management shall ensure the availability of resources essential to establish, implement, maintain and improve the environmental management system. Resources include human resources and specialized skills, organizational infrastructure, technology and financial resources. Roles, responsibilities and authorities shall be defined, documented and communicated in order to facilitate effective environmental management

The procedure to establish the organization structure for Bogor municipal waste management unit is referred to Regional Regulations of Bogor City No. 1312004. Resources, the role and responsibility of the structure are stated in 2007 LAKIP DLHK Bogor City, where DLHK as the environment and sanitation authority that executes environment and waste management of the City. In the implementation of the task of administration and operational, DLHK was assisted by:

1. Administration Unit
2. Environmental Impact Prevention Unit
3. Conservation and Environmental Pollution Monitoring Unit
4. Sanitation Unil
5. Technical Unit of Waste Water Management
6. Technical Unit of The Final Disposal Site (TPA)

Based on 2007 LAKIP DLHK, the tasks of each Unit and Technical Unit are as follows:

1. Administration Unit

The main task of the Administration Unit is to facilitate and give administrative services to all units as well as coordinate the activities in the organization. In carrying out the main task of the subject, Administration Unit has to make coordination and compiling plan and work programs, make personnel administration, equipment, finance, correspondence and household, report evaluation, as well as supervise general affair sub-unit and financial sub-unit.

2. Environmental Impact Prevention Unit

The main task of the Environmental Impact Prevention Unit is to carry out, prepare and evaluate technical programs in the prevention of environmental impacts. To support the implementation of the task, this unit also has to formulate technical policy, carry out coordination, implement the activity and do monitoring, carry out evaluation and make report of the Environment Impact Analysis (EIA). This unit supervises Management and Environment Partnership sub-unit that will support each implementation of the main task.

3. Conservation and Environmental Pollution Monitoring Unit

The main task of the Conservation and Environmental Pollution Monitoring Unit is to carry out the provision and evaluation of technical policy as its role as the activity coordinator, carry out monitoring, evaluation and reporting in the field of Conservation and Environmental Pollution Monitoring. In the implementation of the task, this unit is assisted by two sun-units that are Environmental Pollution Management sub-unit and Natural Resources Restoration sub-unit.

4. Sanitation Unit

Sanitation Unit has the main task of carrying out the formulation of the technical policy and evaluating cleansing service. Whereas the main function of the Sanitation Unit is to carry out coordination, monitoring, evaluation and reporting sanitation of the city. In carrying out its main task and function, Sanitation Unit is assisted by two sub-units that are the Cleansing sub-unit and Waste collection and Transport System sub-unit.

5. Technical Unit of Waste Water Management

The main task of the Technical Unit of Waste Water Management is to manage waste water, whereas the function of this unit is as follows: carry out the compilation of the program, administrative management, coordination, managing and supervising, as well as carry out the evaluation and reporting the activity of waste water management.

6. Technical Unit of the Final Disposal Site (TPA)

The main task of the Final Disposal Site (TPA) is to handle the TPA management included to carry out its function that is making compilation of such program, administration, coordination, control and supervision as well as carry out the evaluation and reporting of TPA management.

## 3.4. Competence, Training and Awareness

The standard stated that the organization shall ensure that any person(s) performing tasks for it or on its behalf that have the potential to cause a significant environmental impact(s) identified by the organization is (are) competent on the basis of appropiate education, training or experience, and shall retain associated records. The organization shall identify training needs associated with its environmental aspects and its environmental management system. It shall provide training or take other action to meet these needs, and shall retain associated records.

Factors that influence the level of the cleanliness of Bogor City were seen from the weakness point of view in the development of human resources in the DLHK, which are:

1. The challenge in the development of the environmental management institution includes inadequate human resources capacity compared with the problem that must be handled by DLHK.
2. Lack of coordination and commitment of the stakeholders in the environmental management
3. High turn over of the manpower especially operational/field worker influences to the performance of the fieldwork of sanitation services (streetcleansing and waste collection)
4. It is difficult to get personnel who are willing to work in sanitation services especially for the sweeper and the waste collector, due to the scope of work and welfare.

However apart from the weakness factors, DLHK has high commitment to the city environmental management and it is showed by the heads of DLHK units and supported with 642 officials. With the high commitment of all DLHK officials to do their best in the sanitation management then the impact of the existence of the limitations can be minimized.

The problem of the human resources limitations, whether from the aspect of the quantity and the competence, has drawn DLHK Bogor City to develop a program in improving the apparatus professionalism in sanitation and environmental management. This program is aimed at increasing the apparatus capacity and the service of environmental management and sanitation of the city, through increasing the competence and discipline of the official staff. Therefore, efforts that will be carried out are to give the opportunity to apparatus to receive good quality education and training as well as ensuring best service to the community by using optimal and responsible resources.

## 3.5. Legal and Other Requirements

Referred to EMS ISO 14001, the standard stated that the organization shall establish, implement and maintain a procedure(s) to identify **and** have access to the applicable legal requirements and other requirements to which the organization subscribes related to its environmental aspects.

Municipal waste management system of Bogor City is referred to several legislation, regulations and other provisions that are

1. Regional Regulation No. 411999 on the Levy of Waste and Sanitation Services
2. Regional Regulation No. 4/2007 on Environmental Management
3. Government Institution's Performance Accountability Report of Bogor Environmental and Sanitation Agency (LAKIP DLHK) year 2007
4. Mayor Decree No. 3312004 on the Main Task, Function, Procedure and the Responsibility of the Structural Position in DLHK organization,
5. Additional Regional Regulation No.21/2005 on the Main Task, Function, Procedure and the Responsibility of the Structural Position in DLHK organization

The provisions in Regional Regulation No. 411999 include the kind of sanitation service, the type of waste and the location of refuse as well as the levy for the service. The sanitation service covers waste collection, transport system as well as the provisions of the location of the disposal from household, industry and trade, not including the street cleansing service of the public's road, garden and public conveniences. Referred to these Regional Regulations, waste is defined as things or second-hand object that could not be used again or decreased its function, and in accordance with these characteristics it must be thrown away, processed and destroyed; it includes waste from household, shop, office, industry, hospital, street seller, solid waste, and the waste from trade.

The provisions in the Mayor Decree No. 2112005 contain specific definition, main tasks and the functions of each subordinate (division, unit and sub-unit) of DLHK organization.

## 3.6. Objectives, Targets, and Program

The standard stated that the organization shall establish, implement and maintain documented environmental objectives and targets, at relevant functions and levels within the organization. The objectives and targets shall be measurable, where practicable, and consistent with the environmental policy, including the commitments to prevention of pollution, to compliance with applicable legal requirements and with other requirements to which the organization subscribes, and to continual improvement.

In line with the vision of Bogor City with its third mission that is minimizing municipal waste towards a clean Bogor City, the aim and target set out for the year 2005-2009 were:

1. Increasing the quality of the environment and the city sanitation,
2. Increasing the quality of environmental facility and infrastructure,
3. Creating and maintaining the city sanitation
4. Providing adequate facility and infrastructure

The objective and target achievement is supported by efforts of increasing public awareness on the importance of environmental sustainability and increasing the role of business people in minimizing activities that cause negative impact on the environment, as well as the availability of a role model area in which waste handling is done. As for the next step is to carry out an assessment of green actions and sanitation in schools and develop an environmental monitoring system by involving universities, NGOs and the community itself.

To support the implementation of the environmental management optimization in Bogor, in relation to the performance improvement of human resources in waste management, then in 2007, DLHK compiled several programs, they were:

- Monitoring on the implementation of "TPA Galuga Environmental Management and Monitoring (UKL-UPL)",with the availability of the report on the environmental monitoring of TPA Galuga as the output the program
- BOP (the operational and maintenance expenses) on waste management, with output of the program was transported municipal waste through the operation and the maintenance of 62 units of dump truck, 22 units of arm tool, 6 units of picked-up car, 1 unit of mini bus, 1 unit of tanker, 3 units of excrement tanker, 10 units of motorcycle, 5 units of waste motorcycle, 82 containers, 70 waste carts, 1 unit of bulldozer, 1 unit of whell loader, 1 unit of bach hoe and 1 unit of track loader.
- Arrangement of temporary disposal site (TPS) and standardization of communal TPS, with the achievement target of new 22 TPSs.
- Recycling and composting, with output of the program was compost and waste reduction that entered TPA Galuga, with the achievement target of 5 ton compost/month and 7% waste decreased in TPA.

Special efforts are needed to bring about the clean Bogor City as well as the availability of adequate infrastructure for the City by optimizing the use of TPA Galuga and undertaking waste management partnership opportunities, both regionally and locally, with an appropriate and environmentally friendly technology as well as the provisions of facility and the infrastructure of the city waste management.

## 3.7. Operational Control

Referred to EMS ISO 14001, the standard stated that the organization shall identify and plan those operations that are associated with the identified significant environmental aspects consistent with its environmental policy, objectives and targets, in order to ensure that they are carried out under specified conditions.

The operational control procedure of the municipal waste management in Bogor City is appointed and stated in:

1. Additional Regional Regulation No.21/2005 on the Main Task, Function, Procedure and the Responsibility of the Structural Position in DLHK organization
2. Mayor Decree No. 3312004 on the Main Task, Function, Procedure and the Responsibility of the Structural Position in DLHK organization
3. Mayor Decree No. 56/ 2004 on the Tasks of the Structural Position in DLHK organization

In the provisions of waste management, waste disposal places include:

1. Temporary disposal site (TPS), that is the place for temporary waste collection/transfer depo/containers both of individual property, belonging to the government and others, before being transported to final disposal site (TPA) and the locations are for temporary used,
2. Final disposal site (TPA), that is the place of the disposal, processing and waste extermination belonging to the government,
3. Transfer depo, that is the facility of moving the waste from the waste cart to truck/dump truck to be transported to TPA that was arranged according to certain schedule

The provision of the levy, the regional tax as payment on the cleansing service, is charged for the transport service and the extermination of the waste by the Regional Government. The levy includes the waste collection and transport service from the source to TPS and/or to TPA, the TPA provisions, as well as the processing and/or the extermination of the waste in TPA, with the exception towards the cleansing service of the public's road, gardens, public conveniences, worship places, orphanages and the old people's house. The levy is subjected to personal person or an organization with tariff referred to the given service, kind and volume of the produced waste and the community's capacity on the cleansing service. The money collected is used for the waste collection cost, the transportation, storage and the processing of the waste and or the extermination of the waste, the administrative cost including TPA location rent.

The provisions that are stated in Regional Regulation No. 4/2007 include the definition, the kind and the problem of waste management, the waste and the environment. The hazardous waste was defined from its characteristics and/or concentration, potential in polluting, damaging the environment or health or the sustainability of humankind and or other creature. That be classed as in the category of the waste includes liquid waste, solid waste, and medical waste.

In the matter of the waste management, the provisions are taken in relation to disposal permission, processing, management, reduction, sorting, transport, as well as the waste producer's obligation and the related ban on the waste problem. The provisions that are stated in these Regional Regulations also include environmental management focusing in the analysis of significant impacts of an effort/the activity towards the environment for decision making.

### 3.8. Monitoring and Measurement

The standard stated that the organization shall establish, implement and maintain a procedure(s) to monitor and measure, on a regular basis, the key characteristics of its operations that can have a significant environmental impact. The procedure(s) shall include the documenting of information to monitor performance, applicable operational controls and conformity with the organization's environmental objectives and targets.

In the matter of resources, the problems of the Bogor City sanitation service that must be solved are:

1. The volume of the waste in the Bogor City in 2007 reached 2210 $m^3$/day, whereas the transport capacity of the waste in general was only 1515 $m^3$/day, with the served territory was around 69% of 11850 Ha Bogor City.
2. With the ratio of 69% transported waste, it means that 31% pile of the waste is left.

The effective fleet needed to transport 1515 $m^3$ of waste daily is 64 units of dump truck, 30 units of arm roll, 6 units of picked up car, 5 units of the motorcycle cart, 138 units of cart and 100 units of container. Therefore, to transport 2210 $m^3$ waste per day, definitely more fleets and an addition of human resources are needed from the available number at the moment.

The performance of domestic waste management unit in Bogor City in 2007 in general was still need for improvement from the aspect of funding and human resources with environmental educational background. With the balance of fund, responsibility, and human resources, it is hoped that DLHK Bogor City can make improvement. To be able to transport 2210 $m^3$ waste per day, apart from the readiness of additional transport fleet, the increase in human resources especially the operational/field personnel (the sweeper, the transport crew and the officials at TPA) was also a very important factor.

The number of officials/personnel of DLHK Bogor City that is 642 people (including the administrative staff and the head of the Unit) is actually not yet fill the minimal requirement for the city service. The standard of the minimal requirement for the sanitation service of the city was 2 people for 1000 of the number of the city inhabitants. If the number of Bogor inhabitants is 850,000 (LPJK Mayor Bogor, 2006), then the ideal number of the officials of the sanitation service should be 1700 people.

## 4. CONCLUSION AND DISCUSSION

The EMS elements of DWMU in Bogor City that were ready to be establish in accordance with international standard (EMS ISO 14001), are as follow:

1. environmental policy
2. environmental aspects
3. legal and other requirements
4. objectives, targets and programme(s)

5. resources, roles, responsibility and authority
6. competence, training and awareness
7. operational control
8. monitoring and measurement

Certain environmental management elements have been implemented to improve the environmental performance and give feedback in order to improve the performance of the management, especially in the matter of resources and the personnel's competence.

The effectiveness of the EMS could not be evaluated because no document was found showing the trend of environmental performance, especially on the significant environmental aspects as well as the achievement of the objective and the target.

It is needed to improve the performance of EMS of DWMU of Bogor City that was related to the element of the management: resources, nonconformity, corrective action, preventive action, and management review..

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