Analysis of the application of domestic waste treatment hybrid method – A Case Study at Bidara Cina

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Abstract. The increasing population leads to the increasing waste that will be generated. There have been many researchers who were conducting research on models to proceed domestic waste. However, it was still a small number of analysis carried out to know an advantage from a method and analysis in application in general if a method applied in an area. This research aims to analyze the method of domestic waste treatment hybrid model. This research uses the SWOT – ANP method. The data obtained through field surveys, interviewing residents of a community steeped in opinion, environmental science, analysis of commuters will then be shown in the form of a SWOT chart. The contribution of the researcher is to provide risk analysis on domestic waste processing method with hybrid method applying in the region of Bidara China. The results of this research is that hybrid model (on waste-off waste system) is safe for applying and refers to the number of six (6) of SDG's about clean water and sanitation to ensure domestic waste water management and sanitation sustainable.

Keywords: domestic waste, hybrid method

1. Introduction

The rapid rate of population growth and urbanization in developing countries caused the problem of housing that need to be solved and handled immediately. In African, Latin American, and Asian countries, the population has increased doubled in 10 years period. Uncontrolled urbanization raises a very complex social problem [1] One of the biggest problems that arise, namely water pollution. The largest water pollution caused by settlement activity or the activity of the household, its contribution of 47.62% [1]. Research conducted by Yudo [2] even been noted that the Ciliwung River which crosses the District of Bogor, Bogor City, and Jakarta are contaminated domestic waste amounting to 80% of which comes from household activities [3]. The quality of the Ciliwung river has also been monitored by the Office of Environment and Forestry (KLHK) of DKI Jakarta. The survey of KLHK DKI Jakarta in the research of the Ciliwung river water monitoring segmentation of DKI Jakarta in the year 2015 found that there are several parameters that largely exceed the standard quality, i.e. Escherichia coli (E. coli), and Biochemical Oxygen Demand (BOD). In addition, the dissolved oxygen (DO) obtained low. The value parameter of the e. coli, BOD, and DO can be seen on table 1.

Table 1. The value parameter E. Coli, BOD, and DO

| Parameter | Unit | The Standard* | The Results of The Analysis of The Ciliwung River Segmentation in DKI Jakarta |
|-----------|------|---------------|--------------------------------------------------------------------------------|
| E. coli   | Amount/100 ml | 100           | 300,000                                                                       |
| BOD       | mg/l           | 2             | 14                                                                             |
| DO        | mg/l           | 6             | 5.2                                                                           |

Source: Ministry of environment and Forestry (2015)

(*) Goverment Regulation number 82-year 2001 about water quality management and control of water pollution, the allocation of class I
Suryono and Moersidik research [4], and Poerbandono, Julian, and Ward [5] found that there is a link between the activities on the ground, including the change of land use in the watershed and the phenomena that occur in waters. Furthermore, Vollmer, Prescott, Padawangi, Girot, and Gret-Regamey [6] found that the level of income of the population around the river affect their attitudes and perceptions towards the management of the river. The knowledge and expectations of the population around the river should be a serious consideration in planning the management of the ecosystem of the river, and less available data and contextual information resulted in policy choices become limited. In addition, in managing waste water originated from households, it is necessary to involve the community as the waste water producers, provided an awareness of health and environmental sustainability.

Based on previous research, there are several ways of domestic waste water management, among others are local system (on waste system), centralized system (off waste system), and hybrid system (on waste-off waste system). Among the waste management system, system implementation that has the lowest level of risk is hybrid system (on waste-off waste system). Therefore, this research intended to figure out an advantage from a method and to analyze in general if the method applied in an area. This research was conducted at RT 9 of Bidara Cina, Jakarta, having an area of 1.26 km² with a total population in the year 2016 was 43,995 people in 14,893 household (Jatinegara in numbers, 2017). This research aims to analyze the application of the method of domestic waste treatment hybrid model using SWOT – ANP method.

2. Material and Method

2.1 Method
This research method using SWOT – ANP approach. In the first stage is carried out a SWOT analysis to figure out all the possibilities that occurs when applying the method of domestic treatment hybrid system. Stages of a SWOT analysis to be done with strength, weakness, threats and chances (opportunities). Furthermore after doing a SWOT analysis, then do an assessment using the method of ANP. ANP method is used to find out the "weighting" or judgments of any sub, so on the graph can show the position of the SWOT sub based on weights available [7].

2.2 Sustainability
According to Miller and Spoolman, sustainability is the ability of the Earth's natural and human to be able to survive, develop, and adapt to changes in environmental conditions in the long run [8]. One of the most important questions in environmental science is how we can continue to improve the welfare of human beings with limited natural resources and the existence of a biological system. Development means enhancing people's lives through improved food or education services. While sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs [9]. Sustainable development is also described by Enger and Smith [10], which states that sustainable development is the middle way which aims to tackle poverty while maintaining ecological sustainability. The principle of sustainability is very important to run SDG's as well as the development of number six (6) about, clean water and sanitation to ensure domestic waste water management and sustainable sanitation.

3. Result And Discussion

3.1. SWOT Analysis
The first phase began with SWOT analyses of domestic waste processing method of hybrid system. Stages of a SWOT analysis to be done consists of strength, weakness, threats and chances (opportunities) aspects. The results of the analysis of the SWOT analysis can be seen in the following tables.
Table 2. Strengths

| Code | Description |
|------|-------------|
| S1   | implementation is easier and faster |
| S2   | all kinds of waste can be entered to the communal planning process and implementation are not too hard pollution of the groundwater and the sources can be avoided |
| S4   | financing can be divided between the government and the public |

Table 3. Weaknesses

| Code | Description |
|------|-------------|
| W1   | high operation costs |
| W2   | requires a good operational management |
| W3   | the planned sewage of the transportation system |
| W4   | should be shaped as a business entity |

Table 4. Threats

| Code | Description |
|------|-------------|
| T1   | air pollution due to the transportation |
| T2   | delay in the operation |
| T3   | large number of employees |
| T4   | must have many vehicles that must be maintained |
| T5   | the pollution when the distribution of fecal truck |

Table 5. Opportunities

| Code | Description |
|------|-------------|
| O1   | great opportunities to be implemented |
| O2   | opportunities to opening new business |
| O3   | optimization process of researching opportunities |
| O4   | reduce environmental pollution |

After a discussion with experts, including people who double-majored in environmental science, and surrounding communities, then the process analysis using the method of ANP was conducted. In the early stages, the weighting on each aspect was completed with the method of matrix pairs. The result of the weighting process can be seen in table 6.
### Table 6. The Weighting of ANP method

| Code | S1  | S2  | S3  | S4  | S5  |
|------|-----|-----|-----|-----|-----|
| S1   | 1   | 1   | 2   | 6   | 3   |
| S2   | 2   | 1   | 1   | 4   | 1   |
| S3   | 0.7 | 1   | 1   | 0.3 | 3   |
| S4   | 0.5 | 0.7 | 0.2 | 1   | 0.6 |
| S5   | 0.3 | 0.2 | 0.7 | 0.4 | 1   |
| Total| 4.5 | 3.9 | 4.9 | 11.7| 8.6 |

After weighting to each aspect, then carried out the process of awarding rank criteria. From the results of data analysis, chart of SWOT – ANP was drawn.

![Figure 1. SWOT - ANP](image)

#### 3.2. Discussion

The ever-increasing growth of population was not followed by the availability of land, which resulted in the likely occurrence of environmental pollution. One method that can be used to reduce the environmental pollution resulting from domestic waste is the domestic hybrid system. Based on the analysis, one of the strengths of domestic waste is easy and fast implementation (S1-1.4), in balance with the great opportunity, the possibility of this method can be implemented (O1-1.2). However, there is a serious threat namely delay fecal trucks (T2-0.9) and weakness, i.e. need of a good management in its operational phase (W2-1.0).

A SWOT coordination strategy can be seen from the two factors, which are from internal factors, namely the highest value on strength minus the highest value of weakness, with value of 0.4, and from external factors, namely the highest value of opportunities minus the highest value of threat, with value of 0.3.
4. Conclusion
An increasing number of domestic wastes will be in line with the growth of the community. There have been many researchers who conducted research on how to cultivate a good waste, but still haven't been founded research that discusses whether a waste treatment method safe enough to be applied and according to a certain area. This research resulted in the decision that the domestic sewage treatment method of hybrid model can be implemented in the territory of the RT 09 of Bidara Cina, Jakarta.

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