

Waste Bank Revitalization in Palabuhanratu West Java

Budi Prasetyo Samadikun¹, Dwi Siwi Handayani¹, and Muhamad Permana Laksana^{1*}

¹ Department of Environmental Engineering, Faculty of Engineering, Diponegoro University, Semarang - Indonesia

Abstract. Palabuhanratu Village has three waste banks, one of them was established since 2010, the others built in 2016. However, waste processing from the source is still not optimal, it's only reduced waste about 5% of the total waste generated to the final waste disposal site. The performance of waste banks is still minimal, because one waste bank can not serve the entire area of the village. Furthermore, organic waste processed by some communities of Palabuhanratu Village to be compost can not be a mass movement, due to the lack of public knowledge. The purpose of this research is to know the existing condition of waste management in Palabuhanratu Village and to formulate the revitalization of existing waste bank. The research used survey research method by using questionnaire, in depth interview, and observation. Analytical technique using quantitative and qualitative analysis. The findings of the research indicate that the residents of Palabuhanratu Village who often do waste sorting from the source only from the residents of RT 01 / RW 33. The number of existing temporary waste disposal site in Palabuhanratu Village is still lacking, so it requires addition up to 5 units that integrated with waste bank in this village.

1 Introduction

Waste management that are not going well, would cause the decreasing quality of the environment. In SNI (Indonesia national Standard) 19-2454-2002 it was stated that solid waste consist of an organic and inorganic substance, regarded as useless and must be managed so that could not harm the environment and protect development investment [1].

According to interviews with Environmental Agency (BLH) Sukabumi Regency [2] said that there are three waste bank which is in Palabuhanratu Village, one of them have been constructed since 2010 and two others began to stand up since the beginning of 2016. Waste volume in 2015 is 134,89 m³/day that includes 89 % Palabuhanratu Villages area. Waste produced is from domestic activities, activities in fish auction venue, public facilities, with the varying quantity and composition. However, waste management from the source is not optimal because waste reduced still about 5 percent of the total waste that sent into final disposal site (FDS) Cimenteng which is 70 km away from Palabuhanratu Village.

Far mileage between Palabuhanratu Village and final disposal site (FDS) Cimenteng cause high operational cost and a little ritation, so the service that conducted by the government of Sukabumi Regency not going optimally. Besides, the lack performance of the existing waste bank in Palabuhanratu Village, one waste bank only able to serve one Rukun Warga (RW). Apparently, three temporary disposal site is not able to serve all areas of Palabuhanratu Village.

In Indonesia, the *Rukun Warga* (RW) is the lowest hierarchy of community organizational system which

can implement creative and innovative arrangements to support solid waste management activities with less financial requirement [3]. But, a review of the institutional aspects shows that the existing waste bank Palabuhanratu Village still do not have a clear structure. In daily operation, there has been no party responsible for the sustainability. In addition, organic waste processed by some communities of Palabuhanratu Village to be used as compost, cannot be applied by all people in society, because of limited knowledge of the community to process organic waste become compost.

Seeing the phenomenon that occurred in Palabuhanratu Village, it is necessary to revitalize the waste bank in order to better function in waste management in Palabuhanratu Village. Attention and public awareness has become an important factor in supporting the success of waste management, so the environment quality in this village is maintained. Indrianti stated that high participation from the community supported by harmonious relationship among community members enables the waste bank to run effectively [4].

This paper purposes to know the existing condition of waste management in Palabuhanratu Village Sukabumi Regency and also to formulate existing waste bank revitalization efforts as a support party for waste management in final disposal site (FDS) Sukabumi Regency.

2 Research method

The research used survey research method by using questionnaire, in depth interview, and observation.

* Corresponding author: budisamadikun@gmail.com

Analytical technique using quantitative and qualitative analysis.

Research site located in Palabuhanratu Village Sukabumi Regency. The existing temporary disposal site located in three RW, namely RW 24, RW 30, RW 32 Palabuhanratu Village.

The number of respondents as many as 100 people spread over 35 RW, determined by purposive sampling technique. Criteria of respondents are the Head of Family (KK) who live in Kelurahan Palabuhanratu with the highest population density and found waste scattered in the environment.

3 Waste bank revitalization

3.1 Waste bank

Based on the Regulation of the Ministry of Environment Number 13 of 2012 [5], Waste Bank is a place for sorting and collecting of waste that can be recycled and / or reused which has economic value. Waste Bank can serve as implementing reduce, reuse, and recycle. The scope of Waste Bank includes:

1. Waste bank requirements

Based on the Regulation of the Ministry of Environment Number 13 of 2012 [5], the requirement to establish a waste bank should have a building and management system. The management system required in the waste bank is the name of the waste bank, the address of waste bank, the waste bank depositor, the waste bank administrator, the waste collector / buyer / recycling industry, waste management in the waste bank, and the role of the waste bank administrator.

2. Waste bank working mechanism

Waste bank working mechanism includes waste sorting, waste delivery to waste bank, weighing of waste, recording, waste result of sale submitted into saving book, and sharing of waste sale between depositor and executor.

3. Implementation of waste bank

Implementation of the waste bank includes the determination of working hours, withdrawal of savings accounts, borrowing money, savings books, waste collection services, savings types, waste type, pricing, waste conditions, minimum weight, and waste containers.

4. Waste bank administrator

Waste Bank administrator have a role as facilitator in construction and implementation of waste bank, providing waste collector / buyer data for Waste Bank, providing recycling industry data, providing reward for Waste Bank

3.2 Revitalization

Gouillart and Elly in Santoso [6] argue that the essence of revitalization is to revive or reenact a place or organization that has potential assets. Organizational revitalization as a planned change takes place through a long-term process that is divided into systematic and

detailed planning phases. It is not only limited to physical revivals such as completion of infrastructure, utility support or other development, but also the planning of new creative and innovative activities that have been prepared along with its management mechanisms. Organizational revitalization can be achieved through 3 approaches, ie :

- a. Achieve Market Focus
- b. Invent New Business
- c. Changing The Rules through Information Technology.

3.3 Lesson learned from application of waste bank

3.3.1 Waste bank in Depok and Surabaya Indonesia

Despite the lack of success of government in solving waste problem, some communities in Depok established what so called '*Bank Sampah*' (waste bank). Waste bank is a bank that uses inorganic waste as deposit. It emerges as a community-based program driven by waste bank administrators who work on voluntary basis with little incentive in terms of money. Established in 2011, now there are more than 500 waste banks in Depok Municipality. During June 2013 – December 2013 alone, the number of waste bank increased from 60 to almost 400 locations (7).

Waste bank program as community initiative supports government program by changing people's behavior to sort their waste. Both inorganic and organic waste creates economic value after the sorting: the inorganic waste will be recycled and the organic waste will be composted. The organic waste is composted either in UPS (waste treatment facility for organic waste) or through homemade compost. Depok Municipality targeted that in 2014 Depok will have 2,000 locations to reduce 40 percent of the waste generated in Depok.

Waste bank as a business is owned by people who consider waste as a valuable economic commodity and savings, has instruments that involving community in waste management. In Surabaya, waste bank grows rapidly and has supported community's livelihood and encourage people's self-reliance in environmental management [8].

3.3.2 Waste bank in Malaka Sari Village Jakarta and Kepanjen District Malang Regency Indonesia

Waste Bank Malaka Sari, is one of the waste bank in Jakarta. Currently, the waste bank located at *Jalan Delima III* Number. 190 Malaka Sari Village, Duren Sawit Sub-district, East Jakarta, has been a pilot in waste management both from within and from abroad [9].

Since 2009, residents of Malaka Sari Village in East Jakarta do community-based waste management by applying the principles of 3R (Reduce, Reuse, and Recycle) as a social engineering. As a social movement, the waste bank is built upon public awareness of the importance of waste. The main goal of waste bank is

reducing solid waste at community level & increasing effectiveness of integrated waste.

Citizen gets money from the sale of waste. The price of the waste varies; for instance, cardboard sold for USD 0.10-0.15 per box, soft drink cans sold for USD 0.44 per can, and so on. Then, this waste is processed by the caretakers. The organic waste is processed into fertilizer, while other waste is recycled into craft items such as handbags, wallets, tissue boxes, umbrellas, and more. All processed products are sold back. In 2012, business profits reached \$ 698.21. Through this method, all parties gain mutual benefits. Customers are increasingly eager to collect as much waste. The more waste collected, the more money earned.

Waste reduction through waste bank has been initiated in Kepanjen District Malang Regency [10] because of the landfill in this area is approaching its maximum capacity. Kepanjen District has three kind of participation rate which are low, medium, and high participation. Consequently, the scenarios proposed are pessimist scenario, fair scenario, and optimist scenario for low, medium, and high participation respectively. Pessimist scenario focuses on avoiding the community to do open burning causing air pollution and health injury. Meanwhile, the fair scenario starts to introduce the institution to the community to conduct the capacity building of the community in waste separation. The optimist scenario proposes the implementation of waste bank involving the community.

3.3.3 Waste bank in Ban Nong Fab School, Map Ta Phut, Rayong province, Thailand

The success of the first Waste Recycle Bank project in Ban Nong Fab School, Map Ta Phut, Rayong province has encouraged Indorama, the world's leading manufacturer of integrated polyester chain, to expand the project to cover two more schools in Rayong ne [11]. Indorama started the project in November, 2010, in Ban Nong Fab School. Following the success of the maiden project, the company now plans to run waste recycle banks in two more schools in Rayong province next year.

Richard Jones, head of investor relations and corporate communications, recently said that as a manufacturer of polyethylene terephthalate (PET), a raw material for manufacturing plastic drinking bottles, Indorama can support the recycling to reduce waste. Indorama has supported the school by inviting experts in waste recycling to educate the students and teachers on how to select and screen garbage. Meanwhile, teachers in the project have coordinated with recycling companies in the province to buy waste from the bank.

The garbage accepted by the bank includes paper, plastic drinking bottles, and drinking cans. The purchasing price for each waste is different. Pieces of paper, for instance, get Bt2 per kilogram, general plastic garbage can be sold for Bt7 per kilogram, while PET drinking bottles fetch as high as Bt14 per kilogram.

The school is confident that this problem can be managed with the well-planned project. It foresaw that

most of workers who move to work here are poor. Thus, if they can generate revenue from litter, they can increase their income while saving the environment. The project was born out of this idea [11].

4 Result and discussion

4.1 Existing condition of waste management in Palabuhanratu Village Sukabumi Regency

Based on the results of the questionnaire, the general condition of waste management in Palabuhanratu Village is 42% good and 58% enough. Public perceptions on the condition of waste management vary depending on the standards of hygiene and public awareness in waste management



Fig. 1. Waste management condition percentage

The implementation of waste management is influenced by several factors, one of which comes from the aspect of community participation that is influenced by the community's knowledge of 3R concept (Reduce, Reuse, and Recycle) as well as the willingness and capability in the implementation of the 3R. The community's experience in waste sorting is 20% of respondents always do waste sorting, 79% of respondents do not do waste sorting and 1% of respondents sometimes do waste sorting, as seen in Figure 2. From these results can be stated that most people are still less experienced in sorting waste. One thing that is needed in waste management is the willingness of people to go directly in the waste management. This can be done like throwing waste in place, sorting from source, utilizing waste that can still be used to reduce waste generation, etc.

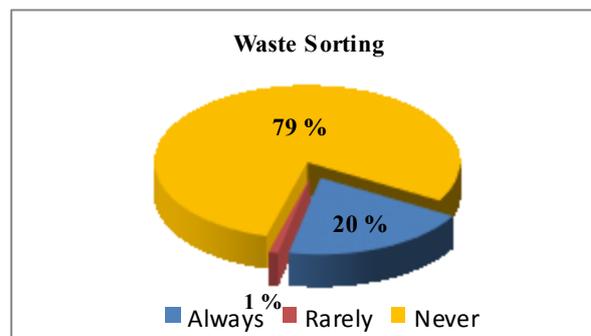


Fig. 2. Waste sorting condition percentage

Most of the residents of Palabuhanratu Village have understood in the procedure of composting, that is as

much as 69% of respondents. There are 31% of respondents who do not understand the composting process is supported by field findings that are still found by residents who throw organic waste directly into the trash, as shown in Figure 3.

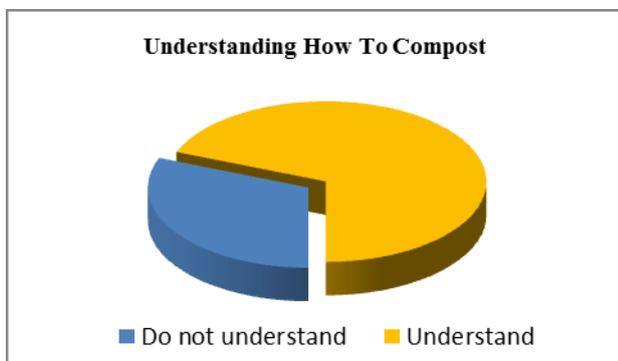


Fig. 3. Societys understanding of composting percentage

Palabuhanratu residents have a good understanding of the waste bank. This is evidenced from the results of the questionnaire, that 77% of Palabuhanratu Village residents know about waste banks, and only 23% of respondents do not know. Departure from this condition, it is expected that in the future for inorganic waste sold to waste bank can be separated from its source to reduce waste generation.



Fig. 4. Societies understanding of waste bank percentage

4.2 Ratu Indah Waste Bank

There are 3 units of waste bank in Palabuhanratu Village. Two garbage bank units are no longer operational due to lack of capital and human resources, while those that operate today are Ratu Indah waste bank.

Waste Bank Ratu Indah is located in RT 01 / RW 33 residing in the Housing of Bank Tabungan Negara (BTN) Pantai Ratu Indah. The waste bank manager has three members with a member structure, namely chairman, treasurer, and secretary. Ratu Indah's waste bank service area is still only one RT with service level of 67% that is 60 Head of Family from total 90 Head of Family. Residents in BTN housing that is not a customer of Ratu Indah garbage bank is a very busy activity so

they do not have time to sort out waste. Waste Bank Ratu Indah per month can produce 200 Kg of garbage consisting of iron, plastic, cardboard, and aluminum cans. The results of the purchase of waste from residents of BTN housing serve as raw materials for making handicrafts and sold to collectors. The profit earned per month is 500 thousand. Some of the work of Bank Sampah Ratu Indah is shown in the following figure:



Fig. 5. Product of Ratu Indah waste bank

Based on interviews with Mrs. Maryatun as the Chairman of Waste Bank Ratu Indah stated that the purpose of the waste bank was formed is to introduce the meaning of waste and its impact to the community and also to socialize indirectly about the sorting of waste. Since the establishment of the waste bank, 60-70% of the people around the waste bank have become aware of the functions and benefits of the waste bank. The obstacles faced in establishing the waste bank is the lack of human resources to manage the waste bank so that management has not been able to work optimally.

4.3 Waste bank revitalization in Palabuhanratu

4.3.1 Establishment of NGO for Waste Management Regency

In order to support waste management in Palabuhanratu Village, an institutional structure at the village level is arranged by the community through community meetings and consists of various components of society, in the form of Non Governmental Organization (NGO). This NGO which will carry out and oversee the way of waste management accompanied by relevant agencies. The organizational structure of NGO in PalabuhanRatu Village is as follows:

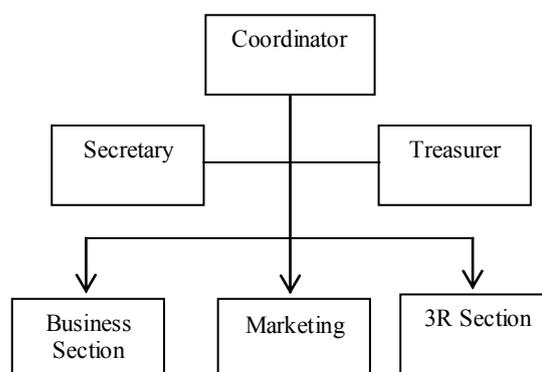


Fig. 6. Structure of non-governmnetal organization in Kelurahan Palabuhanratu

In line with that stated by Gouillart and Elly in Santoso [6] related to the three approaches in organizational revitalization, the organizational structure that plays an important role in the development or activation of Waste Bank is the Business Section, Marketing Sector, and 3 R (Reduce, Recycle, Reuse) Sector. The business field is responsible for finding

customers for the garbage bank in temporary disposal site (TDS) 3R and also in charge of technical gathering. The marketing field coordinates with garbage buyers (industry, collectors) to conduct trading and also coordinate with local government and other KSM. Field 3R is tasked and responsible for doing 3R in TDS 3R, as has been done in Malaka Sari Village.

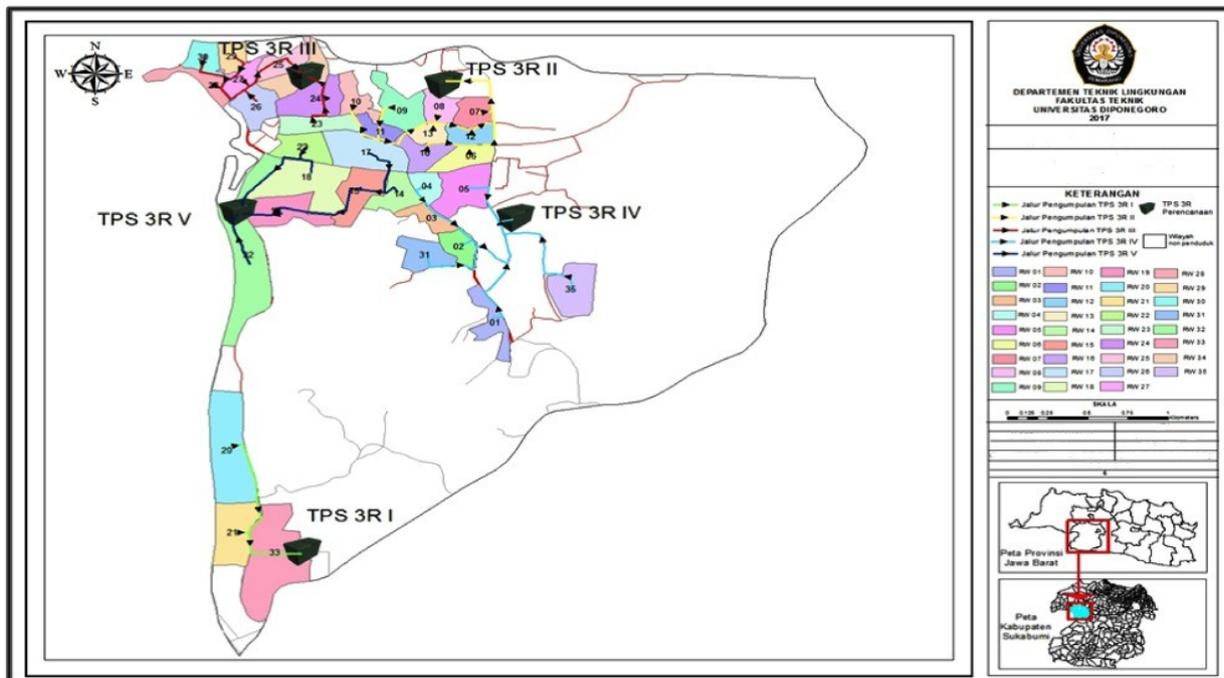


Fig. 7. Service area temporary disposal site (TDS) reduce-recycle-reuse (3R)/waste bank

4.3.2 Increasing the number of waste bank in temporary waste disposal

Existing temporary disposal site (TDS) in Palabuhanratu Village have 3 RW, namely RW 24, RW 30, and RW 32, all of which have not functioned 3R (Reduce, Recycle, Reuse) and have less strategic location to serve waste transportation in Palabuhanratu Village.

3R has its own service area, TDS 3R I serves RW 20, RW 21, and RW 33, because the location of RW is very far apart from other RW so that waste management is made separately. While for TDS 3R II-V serving more than 3 RW because of its adjacent RW location. The service area of each waste bank can be seen in the following table:

Table 1. Service Area TPS 3R

TDS 3R	Total Service Area (RW)	Service Area (RW)	Waste Volume (m ³ /day)
I	3	20,21,33	11,116
II	9	6,7,8,9,10,11,12,13,16	21,364
III	9	23,24,25,26,27,28,29,30,34	24,390
IV	7	1,2,3,4,5,31,35	22,366
V	7	14,15,17,18,19,22,32	20,34
Total	35		99,576

The condition and number of existing TDS inadequate must be added in number and function, that is 5 TDS which function to do 3R. Based on Figure 7 there are 5 TDS 3R integrated with Waste Bank. Each TDS

5 Conclusions

Waste landfill in temporary disposal site (TDS)and final disposal site (FDS) is not a wise solution because every day waste volume always be increased. The shelter continues to decrease, and the adverse impacts around the shelter locations are growing. Waste Bank is one of concrete efforts to minimize the amount of waste in society that has not been well managed.

Through this paper, the authors present a real example of the implementation of waste banks that have not been optimal in Kelurahan Palabuhanratu. There are two things that can be done in revitalizing a garbage bank, including:

1. to create a solid waste management structure in village coordinated by Non Governmental Organization (NGO). NGO will serve as a driver and waste bank activist in the Palabuhanratu Village

2. to add number of temporary disposal site (TDS) and functioning as TDS 3R in which integrated with waste bank

The success of waste bank revitalization will require government support to make special regulation related to waste bank, so that the managers and customers of the garbage bank have more certainty and also the spirit to continue to play an active role in this realm.

References

1. Badan Standar Nasional SK SNI 19-2454-2002 *Tentang Tata Cara Teknik Operasional Pengolahan Sampah Perkotaan*. Jakarta: Balitbang DPU. (2002).
2. Badan Lingkungan Hidup Kabupaten Sukabumi (2017).
3. Towolioel, S., Permana, A.S., Aziz, N.A., Ho, C.S., Pampanga, D.G. (2016). The Rukun Warga-Based 3Rs and Waste Bank as Sustainable Solid Waste Management Strategy. *PLANNING MALAYSIA: Journal of the Malaysian Institute of Planners SPECIAL ISSUE IV (2016)*, 181 – 196
4. N Indrianti,. *Procedia - Social and Behavioral Sciences* 224, 158 – 166(2016)
5. Ministry of Environment. *Peraturan Menteri Lingkungan Hidup No. 13 Tahun 2012 tentang Pedoman Pelaksanaan Reduce, Reuse, dan Recycle Melalui Bank Sampah*. Jakarta. (2012).
6. W.Santoso, *Revitalisasi Dewan Pendidikan dalam Peningkatan Mutu Pendidikan di DKI Jakarta*, Tesis Program Pascasarjana Ilmu Administrasi FISIP UI. (2009).
7. Halimatussadiyah <http://www.lpem.org/the-economic-and-environmental-benefit-from-thewaste-bank-bank-sampah-in-depok-municipalitywest-java/> Accessed on July, 12th 2017 (2014).
8. D.R., Wijayanti, S Suryani,. *Procedia - Social and Behavioral Sciences* 184, 171 – 179 (2015),
9. <http://www.republika.co.id/berita/inpicture/jabotabek-inpicture/16/08/10/obp6wj314-bank-sampahmalakarsari>. Accessed on July, 12th 2017
10. D.H Purba, C.Meidiana, D.W Adrianto, *International Journal of Environmental Science and Development*, Vol. 5(2), (2014)
11. Viboonchart,Nalin.<http://www.nationmultimedia.com/business/Waste-banks-in-schools-30172942.html>, (2012). Accessed on July, 13th 2017