Waste management model at Bugel Village – Kulonprogo District, Yogyakarta Special Province

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Abstract. Village community have not been fully aware of the economic value of waste management. The knowledge limitation of waste management and the availability of waste management facilities to be the reason for not dealing with waste management, instead of throwing and piling up the waste. Waste economic potential, and at the same time the abundance of existing coconut waste is not manage well. The objective of the research to develop a model for economic reason for the household. The method applied qualitative research. The results found an economic model for household through a commercial (a home industry) through digital waste management and community-based participation through waste bank management. Recommendation from the model: There are three factors can be adapting to support the success of waste management through local wisdom responsibility, activities supervision, and the attractive activity. To the local manager development also need to socialize and internalize the important aspect on waste and waste utilization.

1. Introduction

Globally, waste is a population problem. In Indonesia, every day around 190,000 million tons of waste is collected. What is very worrying is that of the 11 million tons of plastic waste in Indonesia, only 2 tons are recycled every day. The problem of waste is not only an urban problem but also a problem in rural areas. [1],[2],[3] Although laws, presidential regulations, and regulations have been issued in Law of the Republic of Indonesia Number 18 of 2008 concerning Waste Management, public awareness is still low in managing waste, especially household waste. As the population increases and consumption patterns change in rural communities, solid waste problems arise. Also, the exploration of rural areas as tourist objects has led to more and more tourist destinations that take advantage of rural beauty. This causes a large number of local tourists to go on vacation and leave trash in rural tourism objects.3 The existence of organic and non-organic household waste is increasing every day. Rural communities have started to complain about the existence of garbage, especially caused by visitor activities at tourist attractions. Plastic waste is often found in tourist sites, especially on beaches and riverbanks.

Research on waste management in rural areas is very interesting and important to do considering that rural areas are experiencing rapid changes in urbanization and consumption patterns [1] while waste collection services are less developed in some rural areas.5 So far, the village community has used their yards to pile up garbage and burn it.[5] One of the challenges in waste management is the cost and expensive transportation equipment.[2] Besides, few people know and make efforts in collecting and
sorting household waste for sale as recycled material. For this reason, it is necessary to research how to manage waste in rural areas so that waste is not only burned and dumped. In regards to waste management, it is important to find its economic value for income for the family. The purpose of this study is to determine the waste management of rural communities and to formulate a waste management model that is economically valuable and sustainable by utilizing the development of smartphone technology.

2. Methodology
This research uses a qualitative approach. Field data information was collected through a group discussion forum (FGD). The interviewed respondents came from village officials and community representatives in 10 hamlets. The information collected is related to the source and volume of waste, waste management, and understanding of village officials regarding the issue of waste. The stages of operational research (OR) include problem identification, model formulation, intervention, and evaluation. The activity focus involved 3 hamlets in Bugel village. The selection of the research location was purposive. Implementation of natural research activities June-November 2020.

3. Studied Area
This research was conducted in Bugel Village, Kulon Progo Regency, Yogyakarta Province with an area of approximately 642.32 ha. Bugel Village is a coastal village area that has one tourist beach. Bugel Village is a lowland and fertile land that has great potential as a food storage area, even though the area is prone to floods or tsunamis. Administratively, Bugel Village consists of 10 hamlets, 20 Rukun Warga, and 41 Rukun Tetangga- community associations. In 2020, the total population of Bugel Village was 4,521 people consisting of 2,208 men (48.8%) and 2,313 (51.2%) women, and the number of head of the family as many as 1,583 (Potensi Desa, 2020).

The population density of Bugel Village is 703 per Km.2 Bugel Village is one of the less developed and slightly underdeveloped villages so that the national population and family planning agency has made it a foster partner with the family planning village Quality (Kampung KB). Bugel Beach is one of the tourist destinations and is visited by local tourists. Besides, most of the population in Bugel Village are farmers. The economy of Bugel Village is mostly supported by the agricultural sector. Even though it is a rural area, the agricultural management of Bugel Village has implemented Good Agricultural Practices (GAP) which maintains the quality of its agricultural products.

4. Result and Discussion
4.1 Current condition of waste management in the studied area
Waste management activities in the village of Bugel Village are located in 3 locations, namely hamlets 4, 9, and 10. Hamlet – or in Bahasa it is called Dukuh- number 4 is managed by youth organizations, Hamlet 9 and 10 are managed by the mothers. Waste management in the three places has just been initiated recently. The existence of waste management is based on the initiative and concern of residents who are concerned about the waste which has recently been increasing and has not been managed collectively. Institutionally, the waste management group has not been integrated with the institutional structure at the village level. The existence of waste management groups is still voluntary and non-profit. There is a group of garbage managers from hamlet 9 whose condition is suspended due to lack of support from the local community members.

4.2 Community behavior towards waste
The community in general in the three hamlets also manages garbage by burning it and dumping it in a special garbage pool in the yard called jugangan. The organic type of waste is usually used for compost (fertilizer). Each household was given a sack to separate salable trash and every month the youth picked it up and exchanged it for empty sacks. The garbage from residents is collected and sold to the garbage collectors who come. According to the informant, the trash that does not sell well is piled up in the yard and the rest is burned. Besides, there is waste from the garden in the form of fibers and coconut shells.
Almost every house in Bugel village has a relatively large yard with coconut trees. They only use the coconuts to make coconut milk for cooking. Meanwhile, the fibers and shells are left to pile up in the yard.

Therefore, in the initial identification of the study, it was found that there are many coconut shells and fibers that have not been used by the community. Through this research, an intervention model of coconut fiber and coconut shell management was carried out. Activities carried out in the form of socialization to the community regarding the economic value of waste from coconut fibers and shells. In collaboration with the Yogyakarta arts high school, a meeting was held with village officials and representatives of residents in 10 hamlets. As a follow-up, it was agreed to conduct training in processing coconut fibers and shells. The coconut fibers are processed by using the help of a machine that breaks the coconut fibers into thread. Meanwhile, there is some training to process coconut shell waste into handicrafts.

4.3. Access to buying and selling waste online

Almost all residents have cellphones, so communication and coordination between residents are also now easier. When identifying the problem, residents and groups of garbage collectors have not had access to online application providers that manage waste such as "Rakyat Peduli Lingkungan" (RAPEL)—or in English, People Care for The Environment- which can be downloaded on the mobile phone play store. Therefore, a waste management model was created in Bugel Village by inviting RAPEL application manager. In the initial stage, the research team held a meeting between RAPEL and Bugel village officials and waste managers in 3 hamlets. As a result, the village apparatus together with the hamlet 9 and 10 waste management groups planned to make an MOU with Rapel.

Waste management to generate economic value through the sale of recycled goods is recommended to provide a sustainable perspective for households. [7],[8] There are constraints on 4 aspects, namely capital, facilities and access, creativity in recycling waste, and marketing. Three aspects of waste management that support increasing family income include stakeholder involvement in waste management, interest in the program model being developed, and mentoring activities. The existence of online waste management application providers such as Rakyat Peduli Lingkungan (RAPEL) whose scope of business is still limited in Yogyakarta is very helpful for people who care about waste management. The community is interested in the presence of RAPEL because with this application the Bugel Village waste management group can easily sell and receive sales results well and smoothly. Waste capacity in rural areas such as Bugel Village is still limited, however, online-based waste management can provide additional efforts to improve family welfare. Meanwhile, when the training was conducted regarding coconut shell waste processing, it was found that there were difficulties in making motorcycles and handicraft models that were salable in the market. Crafts require skills and skills so it is difficult to develop them, especially for residents in rural areas who are not familiar with innovation and creativity.

4.4. The problem of selling the household waste and storage areas

The management problem does not work because every month the collectors who collect waste do not pay the proceeds directly to the manager. The waste collectors promise to provide sales results before Eid. However, in reality, the sales proceeds are not given by the collectors, and finally the manager who bailed out the payment of waste savings to residents.

5. Discussion

The findings show that there are 3 hamlets from 10 hamlets that have waste management groups. one of the three rice groups suspended animation. Efforts to persuade rural communities to sort and collect to be deposited to the waste manager have not received maximum support from the local government. Collection of recyclable waste at the household and village level should be widely promoted. [8] This finding shows that community participation in becoming members of waste management groups is still low, according to other research. [9] At the village level, waste management is rarely in rural areas, most
waste banks are in urban areas. Rural communities are still not used to collective waste management activities. This may be due to the habit of throwing garbage in the yard, even though there is a desire to change behavior to sort and increase the economic value of waste. [3]

One of the waste management applications in Indonesia is Rapel, which uses smart phones for access to people who want to sell recyclable waste (Kompas, 2017). The results of this study indicate that rural communities have not been able to adapt to this application. Waste management groups in 3 hamlets are still selling conventional waste collection agency waste. When given the socialization and practice of the Rafel application, the community was actually interested and interested. Village officials who participated in the socialization wanted to make an MOU, perhaps their residents wanted to become partners for Rapel's waste. Citizens still have not fully utilized internet access in rural areas, teenagers are more dominant than older people. [14] The attention and utilization of waste management using smart phones in rural areas still needs optimal socialization so that it can be in harmony with urban areas. [15],[16]

6. Conclusion
Waste management programs through applications on smartphones are relatively new. The use of cellphones to download the RAPEL application has become an alternative solution for rural communities in Bugel Village. The enthusiasm of the community and village officials is the basic capital for sustainable waste management and has economic value for the family. The socialization of waste management by sorting and cleaning waste before it is deposited through the waste group has not yet been done optimally by the village government and community activists.

Apart from having a positive impact on the environment, in the management process, the waste management group has a practical and economical online social network and relationship mechanism as well as smooth payments through the RAPEL application. The potential of coconut shells and fibers still needs a further study so that rural communities can be motivated to develop a home industry for craft business.

References
[1] Taghipour H, Amjad Z, Aslani H, Armanfar F, Dehghanzadeh R. Characterizing and quantifying solid waste of rural communities. J Mater Cycles Waste Manag. 2016;18(4):790–7.
[2] Põldnurk J. Optimisation of the economic, environmental and administrative efficiency of the municipal waste management model in rural areas. Resour Conserv Recyc [Internet]. 2015; 97:55–65. Available from: http://dx.doi.org/10.1016/j.resconrec.2015.02.003
[3] Zeng C, Niu D, Li H, Zhou T, Zhao Y. Public perceptions and economic values of source-separated collection of rural solid waste: A pilot study in China. Resour Conserv Recyc [Internet]. 2016; 107:166–73. Available from: http://dx.doi.org/10.1016/j.resconrec.2015.12.010
[4] Vitasurya VR. SAWITRI (Sampah Wisata Pentingsari): Model Pengelolaan Sampah Aktivitas Wisata Desa Pentingsari, Yogyakarta. J Arsit Komposisi. 2017;10(5):315.
[5] MIHAI FC. Rural Waste Management: Challenges and Issues in Romania. 2016;6(2).
[6] Nxumalo SM, Mabaso SD, Mamba SF, Singwane SS. Plastic waste management practices in the rural areas of Eswatini. Soc Sci Humanit Open [Internet]. 2020;2(1):100066. Available from: https://doi.org/10.1016/j.ssaho.2020.100066
[7] de Morais Lima P, Paulo PL. Solid-waste management in the rural area of BRAZIL: a case study in Quilombola communities. J Mater Cycles Waste Manag [Internet]. 2018;20(3):1583–93. Available from: http://dx.doi.org/10.1007/s10163-018-0722-9
[8] Han Z, Liu D, Lei Y, Wu J, Li S. Characteristics and management of domestic waste in the rural area of Southwest China. Waste Manag Res. 2015;33(1):39–47.
[9] Selomo M, Birawida AB, Mallongi A. Bank Sampah Sebagai Salah Satu Solusi Penanganan Sampah Di Kota Makassar. J MKMI. 2016;12(4):232–40.
[10] Shentika PA, Pengelolaan Bank Sampah di Kota Probolinggo. J Ekon dan Ekon Stud Pembang. 2016;8(1):92–100.
[11] Hasnam LF, Syarief R, Yusuf AM. Strategi Pengembangan Bank Sampah di Wilayah Depok. J Apl Bisnis dan Manaj. 2017;3(3):407–16.
[12] Bintarsih Sekarningrum DY dan SS. Pengembangan Bank Sampah Pada Masyarakat Di Bantaran Sungai Cikapundung. Univ Padjadjaran [Internet]. 2017;1(5):292–8. Available from: http://jurnal.unpad.ac.id/pkm/article/download/16414/8010
[13] Subiakto H. Internet untuk pedesaan dan pemanfaatannya bagi masyarakat The usage of internet for the village and villagers.
[14] Ekasari P, Hadi Dharmawan A. Dampak Sosial-Ekonomi Masuknya Pengaruh Internet Dalam Kehidupan Remaja Di Pedesaan. Sodality J Sosiol Pedesaan. 2012;6(1).
[15] Shyam GK, Manvi SS, Bharti P. Smart waste management using Internet-of-Things (IoT). Proc 2017 2nd Int Conf Comput Commun Technol ICCCT 2017. 2017;199–203.
[16] Idwan S, Mahmood I, Zubairi JA, Matar I. Optimal Management of Solid Waste in Smart Cities using Internet of Things. Wirel Pers Commun [Internet]. 2020;110(1):485–501. Available from: https://doi.org/10.1007/s11277-019-06738-8