

Integrated Waste Management Strategy In Kintamani (Case Study in Sekaan village, Kintamani, Bangli)

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Abstract: The purpose of this research is to know how integrated waste management system and strategy in the village of Sekaan, Kintamani. This research is quantitative descriptive. It is conducted in the village of Sekaan, Kintamani, Bangli. The number of samples chosen are 83 participants taken with proportionate stratified random sampling technique which is calculated from each strata that is the stratum of administrators of the village office, Village Customary Board, Community Leader, Board of BUMDes and other communities. While, the methods of data collection is conducted by questionnaires which are analyzed univariately with SPSS version 21 and SWOT analysis.

Keywords: Strategy, Waste Management, Sekaan village.

I. INTRODUCTION

Garbage is an endless discuss issue. It has been a global problem recently that cannot be fully handled by several countries in the world, such as Indonesia. In Indonesia, various environmental problems arise due to garbage, such as land pollution, water pollution, air pollution, and the emergence of various diseases.

The increase of population contributes the increase of the amount of waste produced by each country, as well as the amount of waste produced by each region in Indonesia. Analyzing the composition of the garbage, we know that most of the garbage produced in Indonesia is classified into biological waste, or commonly known as organic waste. In big cities, the organic/biological waste can reach 70% of the total waste, and about 28% is non-biodegradable waste that becomes the potential object for the scavengers activities, from waste source (from houses) to TPA, while the rest (about 2%) are classified as hazardous and toxic materials or B3 (Solo Technopark, 2017).

According to data of Aggregate Semester II of 2016 of Population and Civil Registry of Bangli Regency, the number of residents in Bangli Regency is recorded as many as 263.890 inhabitants. If the average of the amount of waste produced per person according to SK SNI S-04-1993-03 about the specification of garbage heap for small town and city every day is 2.75 liter/person/day, the volume of waste produced by Bangli Regency is 725.697,5 m³/day. Considering from the large amount of waste volume, Bangli Regency has only one final processing site (TPA) located in hamlet Bangklet, Kayubihi Village, Bangli District with 4,75 Ha of land. TPA is also at the same time a Regional Landfill that serves Bangli Regional District, some areas of Gianyar District (Payangan District, Tegalalang District and Tampaksiring District), and some areas of Karangasem District (Sidemen District, Rendang District and Selat District). Can be imagined how solid waste processing activities in place. Limited land and only concentrated in one particular shelter and minimal waste management through the implementation of sanitary landfill management system makes garbage accumulate uncontrollably (Bangli Sanitation Working Group, 2013).

Relating to the garbage problem, lately the district government of Bangli recently is intensively launching waste management in each village. One of the villages that has been pioneering village waste management is the village of Sekaan, Kintamani. It already has land/area for waste management with open dumping method of 3 (three) acres of a ravine with a depth of ± 20 m and a volume of ± 6.000 m³. Seeing the number of residents of Sekaan village in 2016 is 1163 people consisting of 553 Head of Family (KK), with garbage volume of 5,66 m³/day (2.065,9 m³/ year 2016) or 4,87 liter/person/day (SKS S-04-1993-03), surely the area of land available as waste processing is still very narrow, especially by applying an open dumping system which would require a lot of land (Sekaan village Profile, 2016).

If we use the average data of garbage production per day in 2016 above, with average growth rate of population in Sekaan Village is 8.1% per year it can be estimated that garbage production in 2017 is 6.121,6 liter/day (6, 12 m³/day) or 2.233,8 m³/year 2017. Based on these estimates, the number of waste piles from 2016-2017 reached 4.299,7 m³ and based on the increase in the average population per year (8.1%) in Sekaan village if calculations over the next 10 years are estimated to reach 25.652,5 m³ of household waste. The amount of waste pile does not include waste from other sources that are also disposed of in the TPS, such as residual waste residual ceremony or the rest of the building. Based on the estimation of the amount of garbage pile, of course the land of TPS will not be able to accommodate the entire waste during the next 10 years if not properly managed waste management. In addition to limited land, the cost of transporting garbage from each household to the TPS also requires substantial expenses so that it becomes a burden for the village budget (Sekaan Village Profile, 2016).

II. BODY OF ARTICLE

In addition to limited land and facilities and financing, there are also other issues related to community participation, the role of institutions and the environmental impacts caused by the waste. Based on the description, a study was conducted to investigate the Integrated Waste Management Strategy in Kintamani with Case Study in Sekaan village, Kintamani, Bangli. So from the results of this study later can be obtained a description of integrated waste management system in Sekaan village and strategies that can be applied to optimize waste management in the village of Sekaan.

This research is a kind of quantitative descriptive research with case study design in the village of Sekaan, Kintamani Sub-district of Bangli Regency. Sampling technique used is probability sampling with proportionate stratified random sampling technique. In this study, the sample is the stratum of administrators of the village office, Village Customary Board, Community Leader, Board of BUMDes and other communities who are not included in the above mentioned strata belonging to the 553 HHs that are the population. Sampling of each strata used the formula of Frank Linch et al (1987). The total sample is 83 people.

The design of research instruments are observation, documentary and questionnaire consisting of 20 (twenty) questions. The form of data in this study is quantitative data is questionnaire data analysis with SPSS version 21 to know the frequency distribution in the form of percentage (%) of each variable so that obtained the data of internal factors and external factors that will be used in SWOT and TOWS analysis.

The village of Sekaan is one of the villages in Kintamani sub-district, which has northern boundaries: Bayung Gede Village, east: Pukuh Village, south: Apuh Village (Gianyar) and west: Bukian Village. The village of Sekaan is located 7 km from the district government center, 23 Km to the capital of Bangli Regency, while the distance to the capital city of the province about 48 Km. The position of Sekaan Village can be said to be very strategic because it is located in the tourism route, which is on the Kintamani-Tegalalang/Ubud (Gianyar) line. The village of Sekaan has a large area of 253 hectares. Based on the village data of 2016, Sekaan village has a population of 1.163 inhabitants consisting of 553 people of Head of Households (HHs).

The characteristics of samples taken include name, age and strata of society. Name and age are used to obtain authentic data, meaning not the result of data manipulation, while the strata system is used to know the village people's assessment from various layers, so that the data is obtained that represent the whole society. Based on the result of sample statistic test, obtained mean value for type of strata 4,82 and age 47,14 whereas standard deviation for strata type 0,735 and for age 13,804. Visible mean value is greater than standard deviation value, it indicates that the result of data distribution is good enough and does not cause bias, so that data can be used. Based on data of sample age distribution, the highest percentage was obtained in 45 years old sample (7.2%) and the second largest at 67 years old was 5 people (6.0%).

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Based on table R with the number of respondents as many as 83 people obtained R value of 0.2520 with a significance value of 0.01 where the level of confidence to obtain the truth in this study is 99% and error rate of 1%. From the test of questionnaire validity, it is obtained Corrected item value - The total correlation of each variable is greater than the value of R (0.2520) which means that the value is valid or really appropriate to be used to measure what is to be measured, while the value of alpha cronbach's is obtained more large from 0.6 which means the questionnaire has a reliable level of reliability in the category.

From the result of research on land and facilities aspect, there were 60 people of HHs (72,3%) stated that the land which is now available for waste management is very inadequate for the next 10 years and as many as 23 people of HHs (27,7%) stated inadequate. Therefore, the need for alternative land belonging to the village that can be used as land disposal of village garbage; as many as 46 people of HHs (55,4%) stated that garbage bin is available but not separated between organic and non organic waste. A total of 37 people of HHs (44,6%) stated that there are garbage bin and separated between organic and non organic waste. Based on the Village Fund program in Sekaan village, the garbage provided only amounted to 1 (one) barrel in each house, but some people (37 people of HHs) have initiated to add the waste bin at their own cost to separate the organic and non-organic waste organic; 61 people of HHs (73,5%) stated that there is no available garbage truck owned by Sekaan village, available only vehicles rented by the village belonging to one of the residents and their transport personnel totaling three people, where each year the village spends the rent and transport of Rp.63.000.000, - (sixty three million rupiah); as many as 58 people of HHs (69,9%) stated that garbage management has not been done yet and 25 people of HHs (25%) stated that waste management has not been done optimally.

Based on observations at landfills in Sekaan village, garbage transported directly to the exhaust is available, only open dumping is done on land in the form of ravine without any other treatment to process the garbage. There is even an indication that officers hired by the village to transport and dispose of garbage do not do their job properly that is not waste land disposal on the ravin but dumped on the highway near the ravine so it is very disturbing road users in terms of smells, sights and sources of disease. Therefore, the village needs to review the rental cooperation with the provider of the waste transport service.

Waste management system that has been running for this in Sekaan village, the budget obtained through the allocation of village funds of Rp. 63.000.000,-/year which is entirely for lease of garbage transportation vehicle and garbage duty service from every home of the residents to the village garbage dump. The budget is certainly not sufficient if it is also used for the cost of purchasing waste processing equipment and training costs or socialization related to waste management. Therefore, it is necessary for community participation and community cadres to help find new sources of budget so as to increase the budget allocated for waste management, for example through the payment of waste money and the formation and utilization of garbage bank.

Based on the results of research on financing aspect, there are 50 people of HHs (60,2%) stated that there is allocation of village fund for waste management but the fund is not sufficient to finance the procurement of facilities and infrastructure for waste management in Sekaan village. While 32 people of HHs (38,6%) stated that the funds allocated sufficient for waste management. This is due to their lack of knowledge about waste management, so that the open dumping system which has been running with the fund of Rp.63.000.000, - is considered sufficient, but there are still many facilities and infrastructures that must be fulfilled to be able to run the waste management system well, and certainly with a budget of that size is not sufficient for the fulfillment of facilities and infrastructure needed; 43 people of HHs (51,8%) stated that it is necessary to apply the payment of garbage levy to support the waste management facility in Sekaan village, while 36 people of HHs (43,4%) stated necessary. This means that most of the samples support the imposition of garbage collection in Sekaan village; as many as 60 people of HHs (72,3%) stated that it is necessary to establish Waste Bank in Sekaan village while 23 people of HHs (27,7%) stated necessary. This means that most of the samples support the establishment of Waste Banks in Sekaan village to accommodate and distribute recyclable waste; as many as 60 people of HHs (72,3%) stated that there is a need for fund allocation for the implementation of training and socialization of waste management, while 23 people of HHs (27,7%) stated necessary. This means that most of the sample supports the allocation of funds for the implementation of education and socialization of waste management in the village of Sekaan. Because through the training they will know and understand about the waste and how to manage it.

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Community involvement in waste management starts from the reduction of waste products, garbage collection, waste recycling, garbage disposal and even recycling of waste marketing. From the result of the research about the aspect of community participation, it is found that 61 people of HHs (73,5%) stated that there is a need to consciously dispose of garbage in their place and to keep the environment clean, and 22 people of HHs (26,5%) stated necessary. This indicates that all respondents supported the awareness of disposing of garbage in their place and maintaining environmental cleanliness in Sekaan Village; as many as 34 people of HHs (41,0%) expressed doubt, as many as 13 people of HHs (15,7%) said some people have sorted organic and non organic waste, and as many as 36 people of HHs (43,3%) stated all the community have sorted organic and non organic waste. The number of respondents who answered hesitantly due to lack of knowledge about the garbage community, so they are not sure whether the waste they mean organic and non organic is correct; as many as 61 people of HHs (73,5%) stated it is necessary to do the processing of organic waste into compost and 22 people of HHs (26,5%) stated necessary. From these data can be seen the existence of community support to process organic waste into compost; as many as 61 people of HHs (73,5%) stated very need to be managed with 3R system (Reduce/Reuse/Recycle) and 22 people of HHs (26,5%) stated necessary. From these data can be seen the existence of community support to process waste with 3R system.

Waste management in Sekaan village is carried out under the supervision of Village Head and Customary Village Management (Bendesa Adat), there is no clear organizing system and no specific human resources (employees) are responsible for the waste management process in the village. Based on the result of research on the aspects of institutional role, there are 51 people of HHs (61,4%) said that there is a need of policy about waste management and 32 people of HHs (38,6%) stated necessary. It appears that 100% of respondents supported the policy; 54 people of HHs (65,1%) stated that the budget allocation in the Village Revenue and Expenditure Budget for the waste management program and 29 people of HHs (34,9%) stated necessary so that 100% of respondents supported the allocation of the budget; 57 people of HHs (68,7%) stated that the cadre of garbage caretaker and 26 people of HHs (31,3%) stated necessary so that 100% of respondents support the formation of cadre of villagers about garbage; as many as 57 people of HHs (6,7%) said BUMDes is very helpful in marketing of waste products and 26 people of HHs (31,3%) said to assist in marketing waste products.

The problem of waste that until now can not be overcome is environmental pollution by the existence of plastic waste. In order to minimize the production of plastic waste, there needs to be real action in the form of reduced use of products made of plastic or the use of plastic packaging that is difficult to decompose in nature. Efforts to minimize the production of plastic waste that can cause environmental pollution must start from the introduction of waste and its impact on the environment through training and socialization by related institutions to the village community. If people already understand and know about the impact of waste for the environment it will be easier to invite the community to play an active role in managing waste in order to preserve the environment. One manifestation is the use of compost fertilizer recycled organic waste that is environmentally friendly.

Based on the result of research on environmental impact aspect, there are 57 people of HHs (68,7%) stated that the household waste is one source of environmental pollution and 26 people of HHs (31,3%) agree; as many as 59 people of HHs (71,1%) stated strongly agree to the extension of the related agencies about the impact of waste on the environment and 24 people of HHs (28,9%) agreed. This means that 100% of respondents stated that they wanted the extension of the relevant agencies; as many as 58 people of HHs (68,9%) stated strongly agree that environmental conservation with the use of compost fertilizer and 25 people of HHs (30,1%) agreed. This means that 100% of respondents stated that one way to preserve the environment is the utilization of compost fertilizer; as many as 60 people of HHs (72,3%) stated that they agree to reduce the use of plastic as a tool of wrapping and as many as 23 people of HHs (27,7%) agreed. This means that 100% of respondents stated that the use of plastic should be reduced.

Internal factors such as strength owned by Sekaan village include: available land for disposal of village garbage; available trash cans in each resident's house; available village fund allocation for waste management; community support through willingness to pay waste levies; community support to establish Waste Bank; community support to dispose of waste in its place; community support for sorting organic and non organic waste; community support in managing organic waste into compost; community support to manage waste with 3R system; commitment and support from administrators of the village office and Village Customary Board; the existence of the policy from administrators of the village office regarding the allocation of funds for the management of village waste; existence of BUMDes; public awareness that plastic waste is

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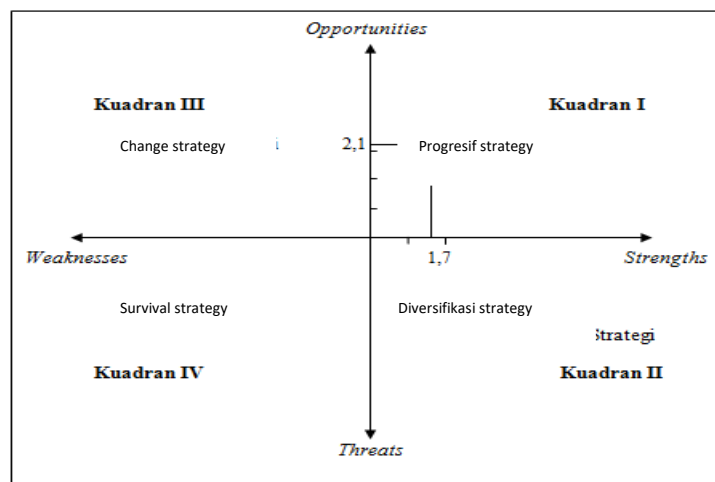
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a source of environmental pollution; the awareness of the community to preserve the environment with the use of compost fertilizer.

Internal factors of weaknesses consist of: the available land is insufficient for the next 10 years; trash cans are only available one in each house not organic and non organic separated; does not yet have a waste processing technology; garbage transport vehicles still lease system; village funds are insufficient for the purchase of waste processing equipment/technology; collection of garbage charges has not been made; communities never received training or socialization on waste management; the absence of village cadres care about garbage; the absence of organizing system of village waste management; the absence of organic waste processing into compost.

External Factors in the form of opportunities owned by Sekaan village consist of: assistance from local and central government for the procurement of waste management facilities; utilization of regional landfill land for waste disposal that can not be processed solely in Sekaan village; waste marketing opportunity into goods that have economic value through Waste Bank; purchase of facilities and infrastructure through waste levies; reduced waste volume at regional and village landfills with community participation; expanding the market share of waste processing through BUMDes; village revenues arising from the sale of processed waste products by expanding marketing out of Sekaan village; making compost is a business opportunity for the village; the cleanest village award with a clean and sustainable environment; become a pilot village for another village in terms of village waste management.

External factors in the form of threats consist of: the high price of waste processing facilities, the presence of garbage from other villages that are disposed of in the landfill of Sekaan village; not optimal support from local government institutions or central government; the presence of traders from outside the village who still use plastic as a wrapper wares. Based on the SWOT analysis obtained graphs as below:



From the graph shows that the condition of integrated waste management in Sekaan village is in quadrant I. This position indicates a strong organization and opportunity. The strategy recommendation is Progressive, meaning that the organization is in good condition and steady so it is possible to continue to expand, increase growth and achieve maximum progress. Progressive strategies can be executed appropriately through the utilization of existing strengths and opportunities and minimizing weaknesses and threats. It is therefore necessary to analyze TOWS that can provide an overview of real actions in accordance with the conditions in the research sites that can be taken into consideration in developing strategies for the development of village waste management in the village of Sekaan.

The results of TOWS analysis are as follows:

1. Utilizing regional landfill land for waste disposal that can not be processed alone in the village of Sekaan so that it can reduce the pile of garbage in landfills (land elements).
2. Procure facilities and infrastructure through the allocation of village funds, assistance from the government, the payment of waste retribution by the community and the sale of processed garbage out of the village of Sekaan by BUMDes (elements of facilities and financing).

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3. Shape of Garbage Bank so that the community participate actively in processing waste into economic value goods and can take the opportunity of marketing waste processing, so that the volume of waste in regional and village landfill can be reduced (element of institutional role and community participation).
4. Invite the community to jointly maintain cleanliness and environmental sustainability by disposing of waste in place, reducing the use of materials made of plastic, and utilizing compost fertilizer for crop fertilization (elements of community participation and environmental impact).
5. Provide training on garbage from related institutions e.g through training, the formation of cadres of garbage to invite people to use compost from organic waste and maintain cleanliness and environmental sustainability, recycling waste into economic value goods so that the volume waste in regional and rural landfills can be reduced (the role of institutional elements).
6. Creating an organizational structure that manages the garbage bank which is subsequently shelter under the management of BUMDes (element of institutional role).
7. Establish Waste Bank, manage waste with 3R system and apply reward and punishment system in waste management by community (element of community role and institutional role).
8. Empowering BUMDes as the lending business entity for the purchase of waste management facilities and also as a business entity that helps the marketing of processed products from garbage, in which the loan can be repaid in installments through the proceeds from the Garbage Bank (element of institutional and financing role).
9. Implement rules on the use of plastic wrapping (elements of institutional role and environmental impact).
10. Making policy on village waste management (element of institutional role)
11. Establish village cadre of garbage that will invite people to be able to help provide waste management facilities such as making garbage bins for organic and non organic waste (element of institutional role and community participation).
12. Opening opportunities for cooperation with private parties for the provision of waste processing equipment/technology (elements of the role of institutions and financing)

Based on the results of SWOT and TOWS analysis on the five aspects used in this study, obtained results in accordance with the results of research from Riswan (2011), Marleni (2012) and Jumar (2013). However, there are also some differences with the results of previous research i.e the consideration of the environmental impact element and the utilization of BUMDes as a fund lending organization and marketing agent in the village waste management system.

III. CONCLUSION

The waste management system in Sekaan village can be said to be good enough, with great support from administrators of the village office, Village Customary Board, Community Leader, Board of BUMDes and other communities in Sekaan village. Nevertheless, it is still necessary to add facilities and technology of waste management, establishment of waste management organization structure and provision of training and socialization about garbage.

The Waste Processing Strategy that must be applied in Sekaan village is a progressive strategy, meaning that the organization is in good condition and steady so it is possible to continue to expand, increase growth and achieve maximum progress. By optimally exploiting existing strengths and opportunities in terms of land and facilities, financing, community participation, institutional roles and environmental impacts.

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