INTEGRATED SOLID WASTE MANAGEMENT STRATEGY BASED ON COMMUNITY
(Case Study : Pandawa Beach Tourist Area, Kutuh - Badung)

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ABSTRACT

Garbage is a problem faced by coastal resort manager Pandawa Kutuh Bali. Waste management method with the old system without any processing before it is time to be replaced with integrated waste management system based on community. Integrated waste management is systematic, comprehensive, and sustainable that includes waste reduction and handling by involving various systems from regulatory, organizational, operational, financing and community participation aspects. This research emphasizes on technical planning and waste management covering service system from collection, transportation and processing. The Average waste generation in Pandawa Beach Resort Area was 3, 42 liters / person / day, with a predominance of organic waste coconut shells. Integrated waste management system had not been optimally implemented. The amount of waste produced must be well managed and correct so that the Pandawa beach area is free of waste and worth to be visited by tourists and expected to reduce the pile of garbage in the Final Processing Place.

Keywords: Strategy, Garbage, Tourism, Community

1. Introduction

The development of the Nusa Dua region as a famous tourist destination, encourages the surrounding villages such as Jimbaran, Pecatu, Ungasan, and Kutuh to develop the tourism potential which is owned in order to increase village income and improve the welfare of the community. Kutuh Village, South Kuta Subdistrict, Badung Regency is located adjacent to the Nusa Dua tourist area, also experiencing rapid tourism development. The inhabitants of Kutuh Village who were originally dry land farmers, farmers, and fishermen are currently part of the population who depend their lives on the tourism sector. Kutuh village's natural potential is

very charming both in cliffs, ocean waves, white sand beaches and hilly terrain, there is also the Gunung Payung Temple area which provides a special attraction. Besides the availability of art and cultural attractions and paragliding flying attractions are a source of community income and the largest contributor to the village's original income.

Data on tourist visits to the village of Kutuh in the last two years has experienced a very sharp increase of 273% and is still dominated by domestic tourists (Pandawa Beach Manager, 2016). The rapid development of tourism in this area raises a variety of problems that are very diverse both from the Balinese community, as well as external challenges originating from outside the island of Bali. Tourism development tends to cause Balinese to become increasingly individualistic, and materialistic, as a result of the process of globalization. They tend not to pay attention to the preservation of nature, because they are busy pursuing profit, efficiency and productivity. While external problems are reflected in the presence of migrants and tourists who flood the island of Bali, and this will disturb local customs and culture if they are difficult to adapt. Although the tourism sector is recognized to provide employment, and the addition of local revenue, but on the contrary, it can also impact the pollution of the natural environment.

On the other hand, the existence of demands for clean and healthy settlements and efforts to fulfill the MDGs (Millennium Development Goals) target has resulted in the need for solid waste services to be considered. Improving solid waste services starting from processing, transporting and collecting (Prihandaini, 2004; Sunarwan 2005) is often done without a policy and planning as a clear reference so that it is difficult for the implementers in the field to carry out their duties. The phenomenon that arises is the target of waste management services, namely: a) doing the right collection, b) doing proper processing and c) serving the transportation of waste from the source to the place of processing (Paramiati, 2007; Tchobanoglous G. 1993). This in the end is only transporting waste from the source to the FPS (Final Processing Site) so that it requires very high costs, without waste being reduced at the source (Damnhuri, 2010; Hasbulah, 1988). The ability to move waste from the source to the landfill is very dependent on the ability of financing by an area, so the smaller the cost of waste management, the more waste is scattered in the area. The problem faced in waste management at this time is the waste management strategy. It is not appropriate due to the

unavailability of adequate facilities and infrastructure, financing, regulation of community participation in managing waste.

2. Method

Broad research implementation was carried out in the form of information gathering (secondary and primary data collection), field surveys, problem analysis, with research locations in the Kutuh village area, South Kuta District. The variables in this study consisted of five sub-variables, namely: land and waste processing facilities, financing, community participation, the role of institutions and environmental impacts. Data were analyzed by SPSS version 21 and to find out internal factors and external factors in the preparation of waste management strategies with SWOT analysis.

3. Findings and Discussion

Waste generation identification

Identification Garbage is divided into two, namely waste that comes from households and garbage from tourist areas. Observations show that total waste per household per day reaches 8.22 kg/family with an organic composition of 2.18 kg and 6.3 kg organic waste (Figure 1)

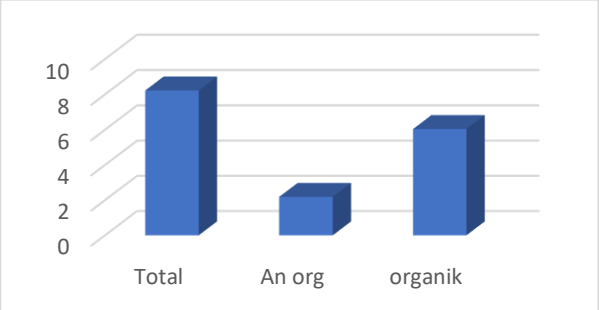


Figure 1. Waste generation of household

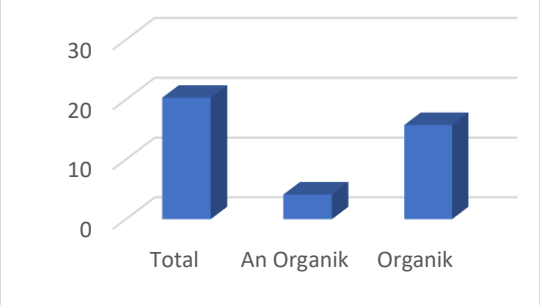


Figure 2. Waste generation of tourist areas

While waste generation in the Pandawa coastal area was between 10-20 m^3 per day depending on the number of visits (Figure 2). In general, the amount of garbage in the holiday

season was very high with the transportation time reaching 5 times per day, while on weekdays the collection reaches 2 times a day.

Garbage coming from households and tourist areas were served by a unit of 5 m^3 truck, and 18 staffs served. The garbage that had been collected was immediately disposed of in the dumping place on the land owned by the traditional Kutuh village with an area of 500 m^2. Waste that has been disposed of in this place had not been sorted and processed.

Land and Facilities

The most important thing that needs to be considered in planning the waste management system is adequate land and facilities. The land in question has at least an area that is able to accommodate garbage well within a certain period of time, for example at least within the next 10 years. Based on the results of field observations and information from the management of the landfill that is available on the land owned by the traditional village located at the Cungking FPS, Jabe Pure banjar with an area of 5 acres. Seeing the population of Kutuh Village in 2017 amounted to 922 households, with a total population of 4,197 people consisting of male gender amounting to 2,055 people and women totaling 2,142 people with a volume of 4.87 liters / person / day (exceeding the standard SK SNI S-04 -1993-03, which is 2.75 liters / person / day), of course the land available as a waste processing facility is still very narrow, especially by implementing an open dumping system which will certainly require a lot of land. In Kutuh village, there is one dump truck available for garbage transport equipment, with 8 personnel, in the tourist area there are 250 trash cans. Based on observations at the landfill in Kutuh Village, the garbage that is transported directly disposed to the available landfill is only carried out in an open dumping on the land in the form of a basin.

Community Participation

The community as implementers of activities in waste management is an important factor in the success of waste management in Kutuh Village. Because without active community participation, certainly a well-planned waste management system will not be implemented in accordance with expectations. Community involvement in waste

management starts from the reduction of waste products, garbage collection, recycling of waste, garbage disposal even to the marketing of recycled waste.

The results of the study showed that 90% of the people were aware of the need to dispose of garbage in its place and maintain environmental cleanliness. This shows that all respondents support the awareness of throwing garbage in its place and maintaining environmental cleanliness. Regarding the selection of waste, the results of the study showed that as many as 41.0% expressed doubts, 15.7% said they had not sorted waste, and as many as 43.3% said they had sorted organic and non-organic waste. The number of respondents who answered doubtfully was due to a lack of public knowledge about garbage.

Role of Institutions

Waste management in Kutuh Village is carried out under the supervision of the Village Head and Customary Village Management (Bendesa Adat), there is no clear organizing system in the waste management process in the village. A system that can run well requires a policy as a legal product that will be used as a guide in implementing village waste management activities, or a policy that underlies the use of the village budget allocated for waste management costs. This is where the role of institutions is needed is the Village Administrators both Village Service and Traditional Villages. In addition to this, to support the smooth management of village waste, it is also necessary to form cadres who care about waste which will help in terms of socialization, education and even to use waste into items that can be reused or items that can have value economical. After the waste is ready for sale, it also requires the role of other village institutions, namely village owned bussiness entity (*BUMDes*).

Integrated Waste Management Strategy in Kutuh Village

Table 1. Matrix of Internal Factors Analysis Summary (Strengths and Weaknesses)

Number	Strengths	Factor Weight	Rating	Total
1	Land is available for village garbage disposal	0.100	4	0.400
2	Trash cans are available in each people's home	0.050	3	0.150
3	Village fund allocation is available for waste management	0.100	4	0.400
4	Community support through willingness to pay garbage fees	0.100	4	0.400
5	Community support to form a Waste Bank	0.050	3	0.150
6	Community support to dispose of garbage in its place	0.100	4	0.400
7	Community support for sorting organic and non-organic waste	0.050	3	0.150
8	Community support in managing organic waste into compost	0.050	3	0.150
9	Community support for managing waste with the 3R system	0.100	4	0.400
10	Commitment and support from the Village Administrators, both Desa Dinas and Desa Adat	0.050	3	0.150
11	There is a policy of the Dinas Desa Management about the allocation of funds for village waste management	0.100	4	0.400
12	The existence of village owned business entity (*BUMDes*)	0.050	3	0.150
13	There is public awareness that plastic waste is a source of environmental pollution	0.050	3	0.150
14	There is community awareness to preserve the environment by using compost fertilizer	0.050	3	0.150
	TOTAL	1.000	48	**3.600**
Number	**Weaknesses**	**Factor weight**	**Rating**	**Total**
1	The available landfill was not sufficient for the next 10 years	0.100	1	0.100

2	Trash cans were only available in each house, not separate organic and non-organic	0.100	2	0.200
3	Did not have waste management technology	0.125	1	0.125
4	Garbage transport vehicles were still leasing systems	0.085	2	0.150
5	Village funds were not sufficient to purchase waste processing equipment / technology	0.125	1	0.125
6	Collection of waste retribution fees had not been carried out	0.100	1	0.100
7	There needs to be training or socialization about waste management	0.100	1	0.100
8	There was no village cadre to care about garbage	0.080	3	0.240
9	The absence of a system for organizing village waste management	0.100	2	0.200
10	The absence of processing organic waste into compost	0.085	2	0.170
	TOTAL	1.000	16	**1.510**

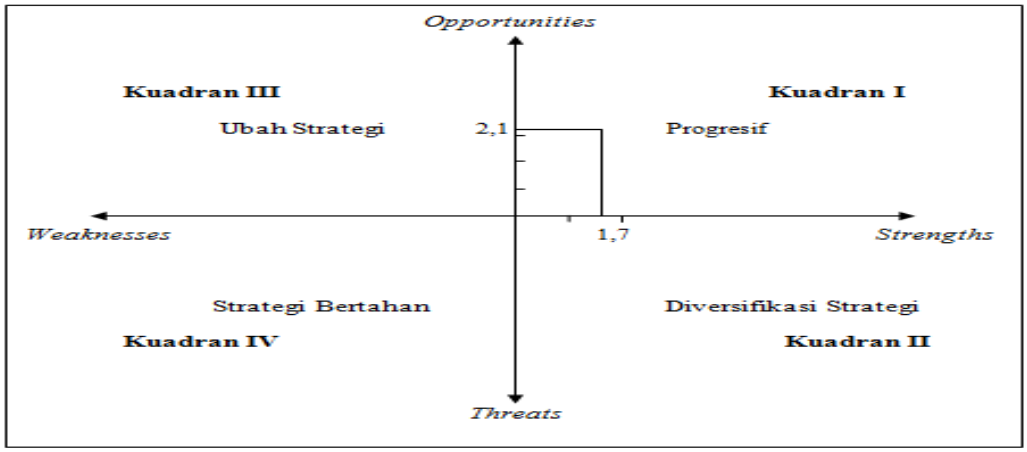
Table 1 shows the strength factor value greater (3.60) than the weakness factor (1.51)

Table 2. EFAS Matrix (External Factors Analysis Summary)

Number	Opportunities	Factor Weight	Rating	Total
1	There was assistances from the regional and central government to procure waste management facilities	0.125	4	0.500
2	Use of other land owned by the village to increase landfill	0.075	3	0.225
3	Through the Waste Bank, it could transform waste into goods that have economic value	0.100	4	0.400
4	Waste retribution could be used to add facilities and infrastructure for processing waste	0.125	4	0.500
5	Waste volume decreases with community participation	0.125	4	0.500
6	The existence of BUMDes as marketing agents	0.075	4	0.300
7	Village income derived from the sale of processed waste through BUMDes	0.100	4	0.400

8	Making compost fertilizer was a business opportunity for the village	0.100	3	0.300
9	Clean and sustainable environment	0.100	4	0.400
10	Became a pilot village for other villages for village waste management	0.075	3	0.300
	TOTAL	1.000	37	**3.825**
Number	**Threats**	**Factor Weight**	**Rating**	**Total**
1	The high price of waste processing facilities	0.275	1	0.275
2	It was difficult to change habits about the rules of properly disposing of trash and the application of 3R	0.275	2	0.550
3	Not yet optimal assistance from local government institutions and central government	0.250	3	0.675
4	There were traders who still used plastic as a wrapper for their wares	0.200	3	0.600
	TOTAL	1.000	37	**2.125**

Based on the results of the analysis of the EFAS and IFAS matrix, the waste management strategy in Kutuh village can be determined as Figure 3.



Graphic 3. SWOT Quadrant

Based on the results of the analysis of internal factors and external factors in waste management in Kutuh Village, it is in quadrant I. The strategy recommendations given are

waste management in the village of Kutuh is very possible to develop to generate profit and achieve comfortable and beautiful environmental conditions. Progressive strategies can be carried out appropriately through the use of existing strengths and opportunities and minimizing weaknesses and threats.

The strategy that could be used as a consideration in the development of waste management systems in Kutuh village include:

1. Adding land area and maximizing waste processing functions with the *TPST* system.
2. Procurement of facilities and infrastructure through the allocation of village funds, assistance from the government, payment of waste retribution by the community and the sale of processed waste by village owned business entity (*BUMDes*).
3. Establishment of a Waste Bank so that the active role of the community in processing waste increases.
4. Inviting the public to jointly maintain the cleanliness and sustainability of the environment by disposing of garbage in its place, reducing the use of materials made of plastic, and utilizing compost for fertilizing plants.
5. Empowering rural communities to sort and manage waste through the 3R system.
6. Conducting community-based integrated waste management and dissemination.
7. Optimizing the role of village owned business entity (*BUMDes*).as marketing agents of waste processed products that will be made, so that the results of the sale can be used to buy waste processing equipment / technology
8. Integrating customary institutions and official institutions in managing waste.
9. Enacting rules on the rights and obligations of the community in waste management.
10. Initiate the formation of a garbage caring cadre who will invite the community to manage waste such as the provisions contained in the rules both written and oral.

4. Conclusion and Recomendations

Conclusion

The waste management strategy that must be implemented in Kutuh Village is a progressive strategy, meaning that waste management needs to be developed so that it was very possible to continue to expand, increase growth and achieve maximum progress, by optimally utilizing

existing strengths and opportunities in terms of land and facilities, financing, community participation, the role of institutions and environmental impacts.

Recomendation

Need to improve the management of waste management by strengthening the customary Laws / *awig-awig* about giving sanctions and rewards for citizens who are compliant in waste management.

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