Organic Waste Management in the Hospitality Area for the Development and Conservation of Ecotourism in the Mandalika Special Economic Zone, Indonesia: Literature Review

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Abstract. The Mandalika Special Economic Zone is included in five super Priority Travel Destinations throughout Indonesia. Mandalika has two main potential tourist attractions: the beauty of white sand and green hills along the coastline that stretches for 7.2 km. The target for Mandalika for Total Hotels & Resorts is 10,000 units, and villas, condominiums, and townhouses are 3800 units which will potentially become a source of waste. The total landfill in Mandalika is 215.7 tonnes/per year. Waste management, including waste reduction and handling in Mandalika, must be of particular concern to area managers, tourism managers, communities, tourists and local governments. Efforts that the Regional Government has made are increasing the number of landfills, garbage collection vehicles and cleaners. In addition, what is no less important is the need to educate the public about cleanliness and training in organic and inorganic waste management. Community involvement around Mandalika will positively impact the local community's economy because the results of waste processing by recycling and composting can be re-sold.

Keywords: Organic Waste; Hotels; Ecotourism.

INTRODUCTION

The word trash is synonymous with things that are not good, such as smell, dirt, pollution, and so on. This is partially correct because waste can hurt living things and their environment. The definition of waste/waste is the residue of the production process whose existence is unwanted in the environment where humans live [1].

Currently, the government's efforts to promote Lombok tourism still have concerns about environmental problems, especially waste management. A discussion on Waste Business and Management System in Kuta Mandalika revealed that Indonesia Tourism Development Corporation still needed a specific strategy for managing waste and tourism waste at the Mandalika SEZ [2, 3, 4].

Administratively, the Mandalika Special Economic Zone is located in Pujut District, Central Lombok Regency, West Nusa Tenggara Province, Indonesia. It is based on the 16 villages in the Pujut District. Six villages are part of the Mandalika SEZ, divided into two areas: the core area and the buffer zone [5, 6, 7].

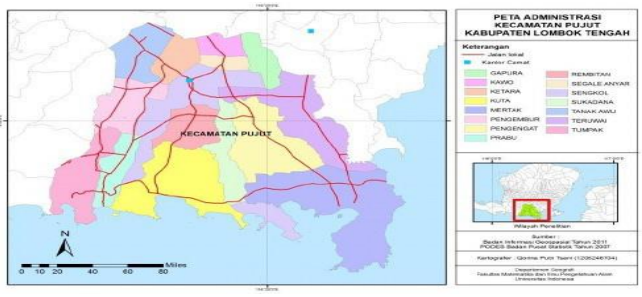

Figure 1 – Map of Pujut District

The economic activity of the population in the core area is dominated by farmers (20.28 %), followed by fishermen (3.83 %) and work carried out by residents with the status of wives, namely as housewives (21.42 %). Opportunities from tourism activities on the beach are residents who work as tour guides (1.13 %), hotel managers and employees. Other activities around the planned Mandalika SEZ are residential areas, Islamic boarding school activities, salt farming activities, aquaculture, illegal livestock activities, mangrove forest development activities, the Novotel Lombok Hotel and other activities [8].

The target for Mandalika SEZ for Total Hotels & Resorts is 10,000 available room units. These rooms will become a source of waste that can disrupt tourism and environmental activities, especially the sea, if they are not appropriately managed. The target for Mandalika SEZ for villas, condominiums, and townhouses is 3,800 units which will have the potential to become a source of waste. Waste management, including reducing and handling waste in the Mandalaika SEZ, especially plastic waste in the sea, needs special attention for area managers, tourism managers, communities, tourists, and local governments [9, 10].

Tourism activity can be seen in the graph above. The construction of the Mandalika SEZ indicates the surge in tourists coming to Central Lombok Regency. In 2009 as many as 37,897 tourists came, and in 2019 as many as 618,120 tourists took a vacation. Suppose we project using the arithmetic or geometric method without anything hitting the pandemic. In that case, it is projected that in 2025 the number of tourists vacationing in the Mandalika SEZ will be 2,572,463 tourists. The results of research conducted at the Mandalika SEZ during the pandemic, waste from land amounted to 215.7 tons/per year.

In contrast, for plastic waste found, 80% was added to waste originating from land (land base), namely 107.8 tons/year. Suppose it is assumed that the increase in tourists is directly proportional to the rise in plastic waste. In that case, it is also believed that the surge in plastic waste will be four times as the number of tourist's increases in 2025.

The population growth rate in Central Lombok Regency is 1.15%, so in 2025 the projected population in Central Lombok Regency will increase to 1,021,461 people. The generation and weight of waste will always increase along with the increase in population. Based on a scale analysis of Central Lombok Regency for the next four years (2021–2025), an average waste generation of 4259 m^3/day is obtained [11].

The generation and weight of waste will always increase along with an increase in population. Based on the analysis results, the population growth rate from 2017 to 2030 in Mandalika SEZ is 1%. In 2020, the area had 46,432 people with a waste of 200 m^3/day. Compared to the amount of waste in the 2017 base year, it has increased by 4%. Based on the analysis results, in the next ten years, in 2030, the amount of waste is predicted to increase by 4.7% [12].

METHOD

This paper is a literature review, conducting an in-depth study of various scientific articles published in national and international journals related to the keywords "hotel waste, Mandalika SEZ, and ecotourism". Then filter the search for authors again by limiting the year of publication between 2012 and 2022. This is done by the author so that the articles being reviewed are still relevant. The writer finds several similar articles from several of these articles, then reads the abstracts of each piece and selects the theme, which is empirical research. The purpose of this study is to look for efforts made to manage organic waste in the Mandalika SEZ ecotourism area so that it can help maintain and preserve the environment in the tourism area.

RESULTS AND DISCUSSION

Community Awareness and Knowledge Level. Most people who know about a good waste management process are people from the non-domestic sector, such as managers of tourism services, hotels, cafes, restaurants and the like. Most of them are people who come from somewhere other than villages around the Mandalika SEZ. Meanwhile, most indigenous people and those who live in villages in the Mandalika SEZ area need to fully understand the mechanism for excellent and correct waste management. People from the non-domestic sector have more knowledge of waste management procedures compared to the domestic industry. The highest level of knowledge is owned by the community group aged 15–30 years, followed by those aged 50–60 in the non-domestic sector. Almost all people have a basic understanding of the types of waste. The basic knowledge in question is the type of waste based on organic and inorganic categories. Meanwhile, a small portion of the community understands more in-depth types of waste such as paper, plastic, glass, metal, cloth and B3. People with a high school education level in the age range of 15–30 have the best level of understanding about the types of waste among people with other age ranges and levels of education [10].

Facilities and infrastructure in the Mandalika SEZ, from the supporting villages to the core and tourist areas, are still relatively simple. The buffer villages themselves are still implementing a waste management system. In addition, some people burn and throw their plastic waste into

the river. Mandalika SEZ has 26 trash bins scattered in the office and Kuta Beach area, which have been managed. Then the cleaning manager cleans up the SEZ 3 times, namely in the morning, afternoon and evening. This is still with the exhaust system. The SEZ TPA around the Mandalika area is located in Teruwai Village, Pujut District, about 15 kilometres from the core area of the Mandalika SEZ.

Projection of Waste Generation at Mandalika SEZ. Of the total generation of plastic waste in the sea, 69.57% of PP was found mainly in food containers, yoghurt drinking bottles, straws, bottle caps, sauce bottles, ice cream containers and also found several baby bottles and others. PET / PETE type plastic waste is 4.46%, often found in mineral water drinking bottles and glasses. PE plastic waste is mostly found in the form of nylon from fishing waste [9, 6, 13].

Projection of Waste Generation Plastic waste generation is getting higher because it is influenced by the number of people who use plastic products for daily consumption. Based on the results of an analysis of actual plastic waste generation in 2021 in Mandalika SEZ, 91 m^3/day. The age of plastic waste has increased by 5.5% since 2017. Within the next ten years in 2030, the amount of plastic waste is predicted to increase by 4.3% [14, 15, 16]. Based on the measurement results, it was found that the average plastic waste generation at Aan Beach was 29 gr/m^2 per day. The middle plastic waste generation at Seger Beach is 4.25 gr/m^2 per day. Observation of secondary plastic composition at the Tanjung Aan Beach and Seger Beach locations on average generated plastic waste between 3.22–249.11 gr/day [17, 18, 19].

Types of Organic Waste from Hotels. Organic waste can be regarded as environmentally friendly waste; even waste can be reprocessed into valuable something if appropriately managed. However, if not handled properly, waste will cause disease and an unpleasant odour resulting from the rapid decomposition of organic waste. Based on type of organic waste can be classified into 2, namely wet and dry organic waste. Wet Organic Waste, namely Wet organic waste, is organic waste that contains a lot of water. Examples of wet organic waste are leftover vegetables, banana skins, rotting fruit, onion skins and the like. Second, dry organic waste is dry organic waste, which is organic waste that contains little water. Examples of organic waste include wood, tree branches, wood and dry leaves. Most organic waste is difficult to reprocess, so it is more often burned to destroy it. Examples: are rice, fruit peels, rotten fruit and vegetables, tea/coffee waste, animal carcasses, and animal/human waste [20, 21, 22].

Selection of Hotel Waste Treatment Methods. Community Awareness and Knowledge Level:

1) Reducing. Reducing the use of consumable items that can generate waste, because the more goods are wasted, the more destruction.

2) Reuse. Try to find items that can be reused, and avoid using disposable things to maximise an object's life.

3) Recycle. In addition to looking for items that can be reused, you can also look for things that can be recycled so that the goods can be used instead of being trash.

4) Replace. This method can be done by making observations around. Replace disposable items with more durable items, and use environmentally friendly items.

Waste processing is closely related to the community because disease-causing microorganisms (bacteria, pathogens) live from this waste, so waste must be appropriately processed, so it doesn't cause problems [23]. There are various ways to reduce the adverse effects of waste, including

a) Stacking. This method piles up waste until it decomposes to become compost.

b) Incineration. Incineration is a method that is often carried out, even in various landfills. The government often uses this method. The weakness of this method is that not all waste can be burned entirely.

c) Sanitary Landfill. This method is also often used by the government. The way to implement it is by making new holes to bury waste.

d) Composting. This method is highly recommended because it has a positive impact and produces valuable goods from waste that are useful for the environment.

Hotel waste processing with Integrated Waste Management System. The Integrated Waste Management System is a waste management system involving more community participation, is more environmentally friendly, operationally more energy and cost-efficient, and can productively increase community economic empowerment. The

method referred to here is one of the alternatives to various other waste management systems, which leads to solving the weaknesses that exist in the handling of urban waste and agricultural waste in rural areas so far [24, 25].

The Integrated Waste Management System is directed so that waste can be appropriately managed to answer the current waste problems that still need to be entirely resolved. It is also directed at empowering local communities so that they can be independent, especially regarding: Structuring and utilising community-based waste in an integrated manner, increasing the active participation of the community in waste management, exploring the economic potential of debris so that it is expected to expand employment [26, 27, 28].

Advantages of Integrated Waste Management System. Some of the benefits that can be obtained from this integrated waste management system include the following:

1) With the IPSK/IPSO system (Core-Plasma or Decentralisation pattern), there is an increase in environmental quality as well as the ecosystem can be well maintained because the system uses waste management without residue (zero waste);

2) The waste transportation chain becomes very small so that the transportation costs can be reduced;

3) Does not require land for large landfills or centralised landfills with incinerators or other equipment with high operational costs, enough land for smaller IPSK/IPSO locations that are closer to service areas;

4) Can generate added value from the utilisation of waste into goods that have economic value and do not burden the local government excessively;

5) Can increase employment opportunities as well as improve the welfare of the managing community by establishing a business entity managed by the community that contains waste into valuable materials;

6) The burden on the District/City Regional Government Budget will be reduced or even nonexistent (which is related to waste handling) [23, 13].

CONCLUSIONS

This literature review aims to look for efforts made in managing organic waste in the Mandalika SEZ so that it can help maintain and preserve the environment in tourism areas. Types of organic waste originating from hotels include food scraps, raw vegetables, and leaves that fall around the hotel. The waste management system originating from hotels in tourism areas uses an integrated management system. The integrated waste management system is directed so that waste can be appropriately managed to answer waste problems that have yet to be entirely resolved. It is also directed at empowering local communities to be independent, especially regarding: the structuring and utilisation of community-based waste in an integrated manner.

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