

# Challenges and Solutions for Food Waste Management in the Hospitality Industry: Its Impact on Sustainable Tourism

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**Abstract** Food waste is a global problem today and is closely related to tourism , especially in the hospitality sector . Every day there are 70 million tons of food waste wasted and there are about 1.2 billion people living on empty stomach , this inequality needs to be looked at more deeply so that sustainability can be realized , at the research location there are 18 thousand kilograms of waste generated per day and will be different in number if the high season or holiday season . There are more than 700 sectors in the form of hotels , restaurants and cafe that are economic drivers and emissions contributors . The purpose of this research is to find a solution to the problem gap, namely one side has excess food

and one side needs food . The method used in this research is qualitative . The data obtained are primary and secondary data, through observation , interviews , and documentation . The results of this study indicates that the field is considered supportive to conduct a food rescue program following the novelty of the research that researchers offer .

**Keywords** : Food Waste , Food Rescue, Sustainable Tourism, Environment .

## INTRODUCTION

Waste is a global problem that cannot be considered simple. Organic waste, especially food waste, is the highest contributor to environmental, economic and social problems. Food waste includes food that is not consumed or thrown away during the storage and processing process, which according to Food and Agriculture Organization FAO, ( 2011), count around 1/3 of the total food Which produced in a way global. Impact from waste food very big, good from aspect environment, in where waste food in place disposal produces dangerous methane gas Garrone et al. , (2014). Food waste also has the potential to reduce food security, because valuable resources such as water and land are used. in a way No efficient in produce food Which on Finally discarded ( Gustavson) et al. , 2011).

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Figure 1. 10 Producing Countries Rubbish Homemade Food Most in the World 2023  
Source: United Nations Environment Programme (UNEP) 2023

The impact of food waste from an economic perspective causes losses of Rp 213-551 trillion per year or equivalent to 4-5% of GDP (Emy, 2025). The environmental impact in the form of loss of resources such as deforestation and climate change is currently dominated by the impact of food waste. waste , from a health perspective, nutritional potential is wasted because it is not utilized properly and evenly (Tirto, 2024).

Composition rubbish more from 50% Which There is in Indonesia is rubbish leftovers generally originate from House ladder And sector HORECA (Hotel, Restaurant and Cafes). According to *United Nations data Environment Program* (UNEP) there are 10 countries that are the largest producers of household food waste in the world and Indonesia is in the top position. to 8 with total 14.73 million tons/year or around 2.33% in the year of 2023. Lubis, ( 2024). And become contributor rubbish the biggest in ASEAN with total 20.93 million kilograms per year ( Mufrida , 2024).



Picture 2. Composition Rubbish Based on Source Rubbish Province NTB 2023

Difference Which No significant percentage between national with Which There is in Nusa Province Southeast West rubbish remainder food almost touch number 60%.

In the Regency Lombok North recorded 18,590 m3 on year 2023 difference 306 m3 from previous year. Volume rubbish seen stable every the month average produce 9 million m3 BPS Data (2023). There are destinations that contribute the highest PAD in the tourism sector, namely Gili Indah Village, which has three small islands including Gili Trawangan , Gili Meno And Gili Water. From island small This capable give impact positive in the economy area. In side other impact social And environment Which become a threat from the existence of growth. Improvement volume rubbish consequence increasing number of tourists in season certain add burden management rubbish solid that There is ( Saputra, 2019 ).

Table 1. Number of Foreign Tourists And domestic tourists in the Regency Lombok North 2019-2023

No	Year	Overseas a	Domestic	Amount
1	2019	588,074	48.36 2	636,436
2	2020	113,218	23.88 2	137,100
3	2021	17.60 4	14.15 1	31.75 5
4	2022	232,357	46.16 2	278,519
5	2023	581,978	74.47 0	656,448

Source: BPS Data for North Lombok Regency 2024

Amount visit traveler domestic And total foreign 656,448 person per year or an average of 1,798 visits per day. In 2023, these visits will increase rapidly after COVID-19 Data BPS (2023). Amount average resident local in accumulation with tourist visits of around 3,799 people who are on the small island. Counting amount rubbish Which produced as big as 0.6-0.7 kg/person/day Jussac , (2021). It can be accumulated if the number of residents and tourists is multiplied by the amount of waste. Which produced, matter this can donate rubbish as big as 2.5 tons per day. On the other hand, the explanation of previous studies on the issue of organic waste is not considered *urgent*. especially in tourist locations.

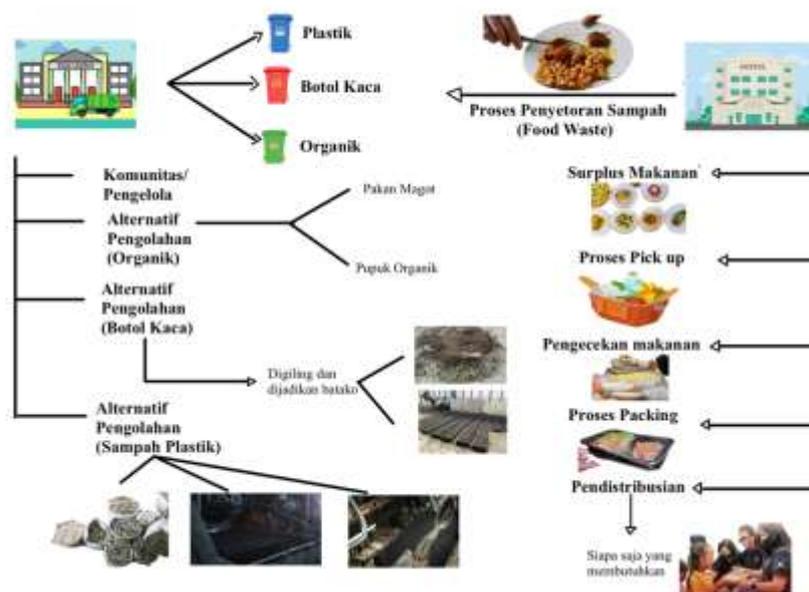


Figure 3. Hotel waste disposal flow

Source: Researcher

From each industry, waste is sorted into several categories such as organic, inorganic and B3 (hazardous, smelly, and toxic), then disposed of according to their respective categories ( Papargypoulou , 2024). Starting from the organic category that is still suitable will be distributed to those in need, otherwise it will be used as maggot feed . The next category, namely inorganic in the form of plastic and the like, can be used as a basic material for making asphalt at the research location.

Every year There is 1/3 from food Which produced wasted vain, More from it can harm economy global as big as USD 936 billion . Jamaluddin , (2023). Despite the many innovations made, the policies set each year still show significant increases. Vietnam is currently around 25.5 million tons/year, and is expected to increase by an average of 10-15% per year due to population growth. Which fast, combined with process industrialization And urbanization Thanh , Gia, *et.al* , (2024). If this problem is not

addressed immediately, in the future we will lose half of the food supply chain by 2030 (Boiteau , 2023).

Research previous about change climate Which to describe impact bad that happened If No take action Which put forward environment. Change climate worsens challenge, so that the more important for Europe for adapt with environmental disturbances getting worse Miron *et.al.* , (2023). In previous studies, there was a lot of discussion about problem Which There is in school, but For context outside school like in restaurants is not specifically explained. Existing studies on climate change are caused by waste food among student nature quantitative with focusing on the curriculum Sara, *et.al.* , (2024).

On the other hand, this qualitative research has a different perspective by explaining specifically and directly involving managers from related sectors as the focus of data collection so as to improve data validation. Efforts to understand the complexity of previous research such as waste management that still uses the old method are still considered ineffective in reducing existing problems so that *food rescue* present as an antithesis . So that it can formulated problem in this research is how actions that can be taken to manage food waste in order to support sustainability tourism especially in environmental aspects in Gili Indah Village? Formulation This issue focuses on on seeking solutions to reduce food waste that can be applied to the hospitality sector at the research location.

## LITERATURE REVIEW

The hotel, restaurant and cafe sector has a strong relationship with the tourism industry as evidenced by tourists who visit for a long period of time, requiring accommodation in the form of lodging, transportation and food. In addition, it also absorbs a lot of labor from the local community and has an impact on the regional economy. ( Irlado , et.al 2017)

On the other hand, the hospitality sector has quite complex elements such as *hospitality* , *service*, and more *urgently*... is about waste or waste that is produced and has not been managed properly, so it is necessary to know what waste is and where it comes from. ( Stankov et.al 2019)

### *Food Waste* (Food Waste)

*Food waste* or referred to as food waste. According to the United States Department of Agriculture (USDA), at the consumption level food waste is generated by the catering and hospitality sectors (especially in hotels, restaurants, hospitals, schools, and airplanes). Food waste can occur at the preparation stage or at the consumption stage. The preparation phase includes large portions, poor storage, excessive preparation, while at the consumption stage is the remaining food on the consumer's plate.

In international studies, terminology related to food waste was also found, namely as follows:

#### 1.Excess Food (*Food Surplus*)

The term "*food surplus*" when translated into Indonesian means excess food. In the context of research on food waste, this term refers to a situation where there is an excess of food due to excessive production processes, resulting in accumulation and potentially causing food losses ( food loss ) and food waste (*food waste*) ( Huang *et.al.*, 2020).

#### 2.Food Loss

"*Food loss*" in Indonesian means food loss. In research, this term is defined as food that has experienced a decrease in quality, which can occur at any stage in the food supply chain. There is a possibility that the food that has experienced this loss is still suitable for consumption or is no longer suitable (Dou *et.al.*, 2016).

#### 3.Food Waste

*Food waste* , can be interpreted as leftover or discarded food. The term food Waste includes all materials that should be fit for human consumption at every stage of the supply chain but are instead discarded, lost, or experience a decline in quality due to pest attacks ( Papargyropoulou *et.al.*, 2014).

#### 4.Food Wastage

*Food wastage* is a combination of *food loss* And *food waste* . This food waste is usually the result of excessive shopping behavior, lack of control in food storage, excessive food portions, and lack of creativity in reprocessing food (Jungowska *et.al.*, 2021).

Various types of food waste (*food waste* ) can arise from various sources. Research shows that food waste can occur at all levels of the food supply chain, from pre- harvest to post-harvest, with the following details :



Figure 4. Stages of Food Loss and Food Waste

Source: Researchers (various sources)

## Food Rescue (Food Rescue)

Poppendieck (1998) stated that in 1967 food banks were established as a source of food for those in difficulty and food needs. ( Riches , 2003 in Susan 2019). Food banks are a mechanism for utilizing excess food that is wasted. Food banks became an international phenomenon. By the mid-1990s, most OECD countries had food banks ( McPherson , 2006).

*Food Rescue* emerged after food banks lacked strong data and literature. City Harvest in New York which started in 1982 is considered the first rescue organization in the world (City Harvest: Poppendieck , 1998). After the founding of City Harvest, food rescue organizations began to emerge in other countries such as Canada in 1985, England in 1994 ( Poppendieck , 1998 in Susan 2019), Australia in 2001 ( Fareshare , ) and in Indonesia in 2015.

1. According to Jen England (2024) there are several stages in starting *Food Rescue*
    - a. Looking for information on whether there are similar communities in the surrounding area.
    - b. Start looking for donors and explain the benefits of donating food.
    - c. Opening volunteer services ( *open volunteer* ) to help with food distribution.
    - d. Create SOPs starting from food pickup to distribution stage.
  2. Cooperation with donors
    - a. Identifying donors who want to contribute.
    - b. Determine the target donors , for example (hotels, restaurants, markets, supermarkets).
    - c. a cooperation MoU .
  3. Identification of donor recipients ( *Food Heroes* )
    - a. lists , for example (schools, vulnerable groups, or those in need).
    - b. Make an agreement ( *appointment* ) for the time and process of acceptance.
  4. Distributor network
    - a. Having a wide and numerous distribution partners means being able to save more food.
    - b. Have responsible volunteers from each cooperation partner .
    - c. Have a website that can be accessed for the communication process between donors and the community.
  5. Data tracking
    - a. Starting from data on the amount of food that has been donated, volunteers who have joined, and donors who have received the benefits.
    - b. Make a classification of what types of food have been saved, for example bread, fruit and vegetables.
  6. *Food flow rescue*
    - a. hospitality sector prepares excess food that is still suitable for consumption.
    - b. *Food Team Rescue* will come to collect and pack excess food that is still suitable for consumption.
    - c. Food will be checked according to SOP for suitability.
    - d. Food that is deemed fit for consumption will be donated to those in need.
- Gili Indah Village is divided into three small islands that are not yet equipped with good waste management and disposal, so it is necessary to develop ideas to reduce existing waste or food waste, one of which is the concept of *food waste. rescue* .

## Sustainability of Environmental Aspects

Sustainable tourism can be understood as a type of tourism that seeks to meet the needs of tourists and the priorities of the destination when faced with current challenges, without compromising the ability of future generations to meet their own needs (WTO & UNEP, 2005). This concept emphasizes the importance of wise resource management, to ensure that the environment, local culture, and economic aspects can be maintained in the long term.

There are environmental aspect indicators related to the problem of *Food Waste* .

- a. Greenhouse Gas Emissions
 

Food waste contributes about 8-10% to total greenhouse gas emissions worldwide (FAO, 2013). When food is thrown away, all the resources used to produce it, such as land, water, and energy, are also wasted. Food that degrades in landfills produces methane, a greenhouse gas with a higher global warming potential than carbon dioxide.
- b. Water Usage

Food waste is also closely related to water use in agricultural systems. FAO (2013) states that every kilogram of food is wasted, including the water needed to produce it. Around 25% of the total freshwater used for agriculture is spent on producing food that is never consumed.

c. Waste of Resources

According to Bouley (2018), data shows that more than 1.3 billion tons of food is wasted every year, which means that around 4% of total global energy consumption is used just to produce this food.

## METHODS

In this section, the researcher divides the research steps into 3, namely exploration, description and explanation as a more specific explanation of the data being studied, as follows:

1. In the context of sustainable tourism, this exploration can affect the image of the tourist destination and the welfare of the local community. The hospitality sector is known to be the largest contributor to food waste production. Showing that up to 60% of food produced in hotels and restaurants ends up as waste.

2. Description of *food management waste* in Gili Indah Village involves various methods. Good management can include reducing food production, recycling food waste into compost, and distributing food to those in need. These initiatives not only reduce waste, but also educate visitors about the importance of sustainability.

3. Explanatory of *food management Effective waste management when the* hospitality sector manages waste well, this can attract more tourists who care about sustainability issues. Investment in infrastructure that supports waste management

This study uses two sources, namely primary and secondary. Primary sources are the results of interviews obtained from research sources and direct observations of various objects that are believed to be able to be supporting data for research. Secondary sources are data sources obtained from various documents, such as reports on the number of tourists, conditions in the field. It is realized that case studies are not an easy approach (Yin, 1996:69)

After collecting data from various sources informant And location, researcher need do analysis data using a qualitative research approach. According to Ihalauw *et.al.* (2023), the qualitative data analysis process involves several systematic steps or methods to ensure clarity and depth in processing, including :

1. Observation works as window for researcher to understand the dynamics in the field. In this case, the researcher will conduct observations without intervention, allowing For get description more authentic about food waste management activities by related sectors. Observations will be supplemented with field notes, which can be structural and off, so that researchers can with flexible adapting records according to evolving situations (Kumar, 2019).

In research this, the interview was conducted in the form of semi- structured, Which make room for researchers to gain a richer perspective on the subject under study. Interviews aim not only to obtain facts, but also to understand context, and view individual related *food problem waste* in Village Gili Indah. According to Flick (2018), semi-structured interviews use a series of prepared questions but still provide freedom for Respondent For share information from corner view they.

## RESULTS

No	Sub-chapter	Brief Explanation
1.	Description Objects Study	More than 5,000 people live in an area of 678 Ha. There are 700 sector units not including residents' houses and other public facilities. There are 24 sectors according to the criteria as informants.
2.	Knowledge about <i>food waste</i>	A small portion of the sector knows and implements sustainable systems, while others still use the old way of managing waste. The obstacles faced are due to lack of knowledge from managers or minimal regulations from the government.
3.	Knowing how to manage and the causes of <i>food</i>	The majority of sectors are of the opinion that <i>food Waste</i> arises from the production stage to consumption. From the process of purchasing raw materials to the cooking process

	<i>poisoning waste</i> in the hospitality sector	and at the consumption stage, which is where the majority of <i>food waste occurs. waste</i> .
4	Providing information to increase environmental awareness	Mitigation is carried out by evaluating every month and some provide information on social media about the importance of reducing <i>food waste. waste</i> .
5	Knowledge about <i>food rescue</i>	Most sectors have just heard the term, but some have also implemented it without realizing it. One of them is by reducing the purchase of raw materials periodically and simplifying the menu so that it does not require many raw materials that would otherwise be wasted.
6	Background of related communities	This community was formed based on the initiative of entrepreneurs who saw the increasing development of Gili Indah Village and how to make it sustainable, a community was formed as a bridge between companies and waste management.
7	What steps have been taken to address <i>food issues? waste</i> This	Starting from putting 50 trash bins in public places, adding cleaners to clean public places, collecting trash every day. Processing glass bottle waste into <i>reusable</i> and other ideas that are <i>in process</i> .

## CONCLUSION

Based on the results of the analysis and discussion related to *food management waste* in the hospitality sector , the role of sustainable tourism in Gili Indah Village can be concluded as follows:

1. The majority of the hospitality sector still uses the old system for waste disposal, especially organic waste, especially food waste which has *a high treatment*. different from waste in general. *Food waste* If managed properly, it has many benefits, such as maintaining natural resources or ecosystems, reducing methane gas emissions, as maggot feed and others.
2. To overcome the above problems, the concept of *food rescue* is the first step in dealing with *food waste* , but the application stage requires several supporting aspects such as communities or organizations as distributors of *food surplus* or excess food from each sector.
3. But without realizing it, some sectors have done it, for example by implementing the *a'la carte* system. *carte* and buy raw materials from local markets, only the concept of *food rescue* still sounds strange.
4. However, this is considered not yet capable of answering increasingly complex problems with the increasing population and the number of tourists visiting, of course the role of *stakeholders is important*. become the main thing in making regulations or decisions that can be implemented.

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