Riwayat

Original Article

Innovation in Waste Management Methods for Sustainable Tourism (A Case Study at Pullman Hotel Lombok)

Veronica[1]✉, Andari Tirtadidjaja[2], Janice Aveline Michaela[3]
[1,2,3]Hospitality and Tourism Program Study, Faculty of Social Sciences and Humanities. Bunda Mulia University, Indonesia.
Correspondence Author: veronica@bundamulia.ac.id✉

Abstract:

Sustainable tourism has become a key focus in the development of the global tourism industry, with Lombok as a major destination facing challenges in waste management. Ineffective waste management threatens environmental sustainability, the quality of tourist destinations, and has negative impacts on the surrounding communities. Therefore, innovation in waste management within the hospitality sector is crucial to support the principles of sustainable tourism. Pullman Hotel Lombok has adopted the Green Hotel initiative to minimize environmental impacts through eco-friendly waste management. This research aims to explore waste management innovations at this hotel, focusing on waste segregation, the processing of food waste into organic liquid fertilizer, and their impact on environmental sustainability and hotel operations. The research methodology includes in-depth interviews with management and relevant staff to identify the waste management practices implemented. The findings reveal that waste management innovations at Pullman Hotel Lombok successfully reduce waste volume, improve soil quality, and decrease greenhouse gas emissions, supporting the achievement of Sustainable Development Goals (SDGs). This study recommends developing more efficient waste management technologies and enhancing local community awareness through continuous training programs to promote sustainable practices in the hospitality and tourism sectors.

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Introduction

Sustainable tourism has now become a primary priority in the development of the global tourism industry (Iskandar, 2021). The main focus of this concept is to reduce the

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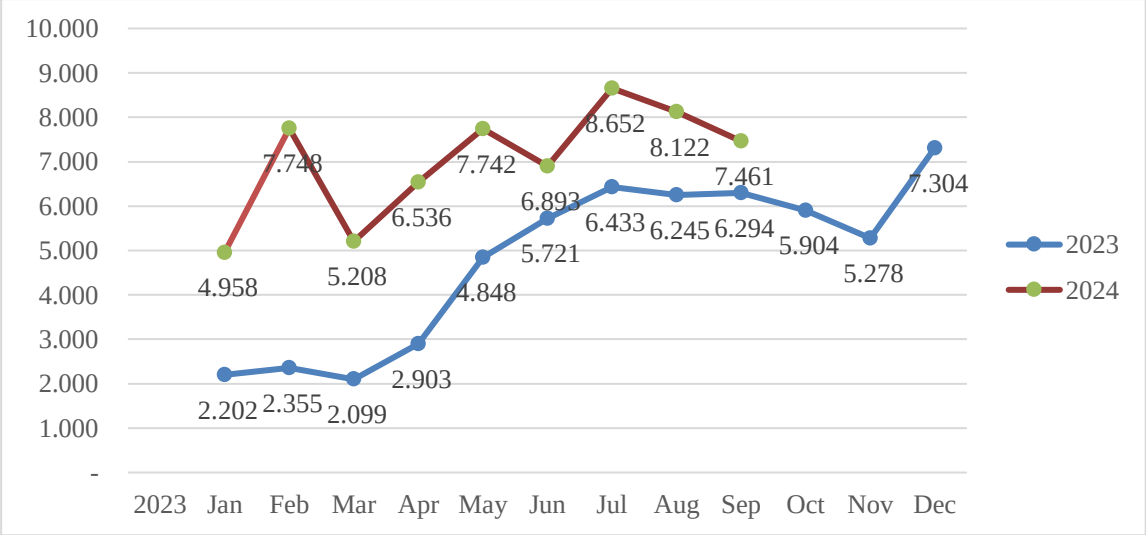
negative impacts on the environment, society, and economy, while ensuring that tourism activities can meet the needs of the present generation without compromising the ability of future generations to meet their own needs (Veronica & Rivabelle, 2024). In Indonesia, particularly in popular tourist destinations like Lombok, the tourism sector plays a significant role in the local and national economy, contributing substantially to regional income and creating job opportunities (Rosanto & Carennia, 2022). This can be proven by the increase in international tourist arrivals through Zainuddin Abdul Madjid International Airport. Visit data from February 2023 to September 2024 can be seen in Figure 1.



Source: Statistics Indonesia of West Nusa Tenggara Province (2024)

Figure 1. Development of International Tourist Arrivals through Lombok International Airport January 2023 - September 2024

International tourists (foreign tourists) enter Indonesia through air, sea, and land routes. One of the entry points via air is Zainuddin Abdul Madjid International Airport (BIZAM). The development of the number of foreign tourist arrivals through BIZAM from January 2023 to September 2024 is shown in Figure 1. In September 2024, the number of foreign tourists arriving through BIZAM was recorded at 7,461 people, showing an 8.14 percent decrease compared to August 2024, where the number of foreign tourists reached 8,122 people. However, when compared to September 2023, which recorded 6,294 foreign tourists, there was an increase of 18.54 percent in September 2024.

Compared to August 2024, the number of guests staying at Star Hotels in September 2024 decreased by 5,982 people, or a 4.97 percent drop. Domestic guests increased by 3,584 people, while international guests decreased by 9,566 people. More detailed information can be found in Table 1.

Table 1. Number of Guests Staying at Bintang Hotel in September 2024 (People)

Hotel Star Classification	Overseas		Domestic		Total	
	Number	Percent	Number	Percent	Number	Percent
1 Star	1.744	4,48	589	0,78	2.333	2,04
2 Star	1.974	5,08	9.609	12,71	11.583	10,12

3 Star	11.484	29,53	32.037	42,39	43.521	38,02
4 Star	17.069	43,89	28.663	37,92	45.732	39,95
5 Star	6.621	17,02	4.685	6,20	11.306	9,88
Total Arrivals	38.892	100,00	75.583	100,00	114.475	100,00

Source: Statistics Indonesia of West Nusa Tenggara Province (2024)

The main challenge faced by the tourism sector in Lombok is waste management, which has become a major issue in the industry. The waste management system in Lombok is still not optimal to handle the increasing waste volume due to tourism activities. Research by Masjhoer et al. (2021) shows that the existing waste management capacity is limited, covering only the collection and transportation of waste to landfills, while the recycling potential remains low. The number of tourists exceeding the waste management capacity causes the system to be overwhelmed, highlighting the significant contribution of the tourism sector to the waste problem in Lombok (Ardiansyah et al., 2024).

As part of the tourism sector, hotels also contribute to generating waste, including food waste. Dewilda et al. (2022) in their research on food waste management in hotels in Padang City, using the Food Recovery Hierarchy principle, found that most of the waste generated is organic, which can be managed through composting or biodigester. This study emphasizes the importance of sustainable waste management, such as reducing waste at the source, donating edible food, and composting the remaining waste, to reduce negative environmental impacts.

However, conventional waste management applied in many tourist destinations often overlooks sustainability principles, such as reduction, reuse, and recycling. Sustainable approaches are crucial to effectively address waste challenges. W et al. (2020) stated that sustainable waste management in developed countries includes waste reduction at the source, recycling, reuse, waste-to-energy processing, and reducing landfill disposal. To achieve this system, the involvement of all parties, including government, community, and the private sector, is essential. In the context of tourism, hotels as large waste producers need to implement these measures to achieve more sustainable waste management. One solution that can be implemented is the Waste to Energy program, which has been successfully applied in several countries, such as the European Union, and could be an effective solution in tourist destinations like Lombok.

Tourism in Lombok is rapidly developing, but waste management remains a major challenge that causes environmental pollution, lowers the quality of life for local communities, and diminishes tourist satisfaction. The current waste management system still relies on conventional methods that do not support sustainability principles, such as waste reduction at the source, reuse, and recycling. Therefore, it is crucial to innovate more effective and environmentally friendly waste management, including implementing efficient recycling technologies, organized waste segregation, and strict waste reduction measures, to support sustainable tourism and address the increasingly urgent negative impacts (Kurniawati, 2020).

As sustainable waste management becomes more important, Pullman Hotel Lombok has implemented various measures to adopt environmentally friendly waste management practices, including plastic waste reduction and recycling programs. However, the effectiveness of these methods has not been thoroughly evaluated. Therefore, this study aims to explore the waste management innovations applied at

Pullman Hotel Lombok and assess the impacts of these practices on environmental sustainability and hotel operations. Additionally, this study will provide recommendations for broader implementation of waste management measures in the hospitality sector. It is expected that the results of this research will make a significant contribution to the development of more effective and sustainable waste management systems in other tourist destinations, thus supporting the creation of more environmentally friendly tourism.

Methods

This research adopts a qualitative approach to explore the innovative waste management methods implemented at Pullman Hotel Lombok in support of sustainable tourism. The qualitative approach is chosen to deeply investigate the phenomenon of waste management, including the challenges faced, strategies used, and their impact on environmental sustainability and hotel operations. This approach allows for an in-depth analysis of complex events while providing space for perspectives that are often underexplored (Eakin & Gladstone, 2020). Data collection in this study is carried out through primary data obtained from in-depth interviews with relevant informants. The in-depth interview technique aims to explore in detail the roles, challenges, and waste management strategies implemented at Pullman Hotel Lombok (Locke et al., 2022). The collected data provides an overview of the connection between waste management and the Sustainable Development Goals (SDGs), as well as its contribution to the development of sustainable tourism.

This study applies a non-probability sampling method using purposive sampling to select samples relevant to the research objectives (Mezmir, 2020). Respondents are selected based on specific criteria involving management, as well as housekeeping and food and beverage staff who play a direct role in the waste management process at Pullman Hotel Lombok. The data analysis process uses the Miles and Huberman model, which involves three main stages: data reduction, data presentation, and conclusion drawing. The data reduction stage involves filtering irrelevant information, organizing significant data, and identifying emerging patterns or themes. Data presentation aims to systematically display information to facilitate interpretation, while conclusion drawing is done to formulate findings based on the analyzed data (Asipi et al., 2022).

To enhance the validity of the research results, a triangulation method is used with two approaches: source triangulation and technique triangulation. Source triangulation is conducted by comparing data from various informants to obtain a more comprehensive perspective. Meanwhile, technique triangulation is used to test the credibility of the data by applying different analysis techniques to the same data. With this approach, the research is expected to produce valid, comprehensive findings that contribute significantly to waste management in support of sustainable tourism at Pullman Hotel Lombok (Dierckx de Casterlé et al., 2021).

Results

Pullman Hotel Lombok is a five-star hotel located in the Mandalika tourism area, Lombok, Indonesia. Offering luxurious accommodation with beautiful beach views, the hotel is equipped with various facilities such as restaurants, swimming pools, spas, and meeting rooms. With modern and comfortable design, this hotel is crafted to meet the needs of tourists looking for a premium stay in a rapidly developing tourist destination.

As part of its commitment to sustainability, Pullman Hotel Lombok has adopted the Green Hotel initiative to reduce its environmental impact. This initiative includes the use of energy-efficient methods and a waste management program that prioritizes the 3Rs (Reduce, Reuse, Recycle). The hotel also supports the use of eco-friendly materials and strives to educate both guests and staff to become more aware of the importance of sustainability in the hospitality industry.

The waste management innovation at Pullman Hotel Lombok began from the need to support environmental sustainability and meet the increasingly stringent global standards in the hospitality industry. One of the main motivations was to reduce the amount of waste sent to landfills and minimize the hotel's ecological footprint. Additionally, the hotel aims to be a pioneer in eco-friendly waste management that can be emulated by other hotels in Lombok and Indonesia.

The implementation of this innovation is driven by global trends towards "green tourism" and "sustainable tourism," which are increasingly being applied in the tourism sector. Pullman Hotel Lombok strives to actively contribute to promoting the principles of sustainable tourism and reducing the environmental impact of tourism activities. One of the steps taken is the processing of food waste using eco-friendly chemicals, which produces organic liquid fertilizer for the care of the hotel's gardens and landscapes. With this approach, the hotel not only reduces waste sent to landfills but also creates added value in the form of organic fertilizer beneficial to the hotel's environment.

A key practice in waste management at this hotel is food waste management, which begins with detailed waste sorting. Organic waste is separated from inorganic waste at every operational area of the hotel, including the kitchen, restaurant, and guest service areas. After sorting, organic waste is collected and placed in special containers to begin the processing process. This waste is then processed using natural decomposition methods in closed containers, where microorganisms break down the organic material without the need for air.

This decomposition process produces nutrient-rich organic liquid fertilizer, which can be used to nourish the hotel's gardens and landscapes. The liquid fertilizer is collected in special containers and diluted as needed before being applied to the plants. To ensure sustainability, the hotel also conducts routine monitoring of the quality of the liquid fertilizer produced, including testing its nutrient content and cleanliness.

However, not all food waste can be managed through this process. Food waste containing non-organic materials, such as plastic wrappers, or organic materials that have been contaminated with hazardous substances, will be separated for further handling. This waste is typically sent to external waste processing facilities that have the capacity to handle these types of waste safely. In this way, the hotel ensures that each type of waste is managed in the most appropriate way to reduce its negative environmental impact.

Before the implementation of this innovation, food waste was directly disposed of in landfills without further processing, causing environmental pollution and waste of potential resources. With the new method, the hotel not only reduces waste but also optimizes waste potential to produce useful fertilizer. Additionally, the use of organic liquid fertilizer also improves soil quality and enhances the hotel's gardens, which in turn increases guest satisfaction.

The success of this innovation can be seen in the significant reduction of waste, which helps the hotel meet global sustainability standards, improves the quality of the environment, and provides positive economic impacts by reducing waste transportation

costs and enhancing the aesthetic value of the gardens. This practice is also aligned with the principles of sustainable tourism, which emphasizes the importance of maintaining a balance between economic, social, and environmental needs. By adopting innovative waste management methods, the hotel not only contributes to the preservation of the local environment but also strengthens the appeal of the tourist destination. This innovation also sets an example for other hotels and contributes to the broader effort to achieve more sustainable tourism. Despite the challenges in initial implementation and staff training, the hotel is optimistic that this approach will have long-term positive impacts, while serving as a real-world example of how the hospitality sector can support responsible tourism and ensure benefits are felt by future generations.

Pullman Hotel Lombok also faces challenges in using safe and eco-friendly chemicals and maintaining the quality of the waste processing process. Therefore, the hotel continuously evaluates and makes regular improvements to ensure that the applied methods remain effective and sustainable. The hotel is also committed to raising employee and guest awareness of the importance of eco-friendly practices.

This innovation involves various parties, both internal and external to the hotel. Internal parties involved include the housekeeping and food and beverage departments. External parties include suppliers of eco-friendly chemicals that support the waste processing process. Pullman Hotel Lombok also implements a training program aimed at enhancing employee skills in waste sorting, using eco-friendly chemicals, and managing waste sustainably.

To ensure the effectiveness of the method's implementation, the hotel carries out a series of structured evaluation steps. Daily supervision by supervisors in various operational areas ensures proper waste sorting and the use of eco-friendly chemicals, while data collection and waste analysis are used to monitor the volume of waste processed and the reduction of waste sent to landfills. The hotel also evaluates the quality of the organic liquid fertilizer produced and conducts employee satisfaction surveys to ensure the smooth operation of the waste management process.

Success indicators for waste management at Pullman Hotel Lombok include a reduction in the volume of waste sent to landfills, the quality of the organic liquid fertilizer produced, the efficiency of the waste processing process, reduced operational costs, and environmental impacts, such as a decrease in greenhouse gas emissions. Additional relevant indicators include guest satisfaction with the hotel's cleanliness and environmental sustainability, as well as staff participation in training programs and waste management implementation.

The use of organic liquid fertilizer produced from waste processing has a tangible positive impact on the fertility of the soil in the hotel's garden areas. The hotel reports having compared gardens that received liquid fertilizer from waste processing with those that did not receive the fertilizer. The results showed a clear difference, with the gardens receiving liquid fertilizer being more fertile and greener than those without. This demonstrates that processing waste into organic liquid fertilizer not only serves as a waste management solution but also provides added benefits for enhancing the quality of the hotel's environment.

The use of organic liquid fertilizer also contributes to creating a greener and more eco-friendly environment, supporting sustainable tourism efforts by reducing dependence on synthetic chemicals and lowering the hotel's carbon footprint. The positive impact of this innovation is also felt by the surrounding environment.

Source: Pullman Hotel Lombok Documentation

Figure 2. Drums for food waste management processes.

Source: Pullman Hotel Lombok Documentation

Figure 3: Waste Management Process.

One of the main impacts of waste management at Pullman Hotel Lombok is the reduction of environmental pollution, particularly the decrease in harmful gas emissions from organic waste disposed of in landfills. The reduction of harmful gas emissions contributes to mitigating climate change and supports SDG 13 (Climate Action), which focuses on reducing the impacts of climate change through more eco-friendly and sustainable actions.

In addition, the quality of the soil around the hotel has improved thanks to the use of organic liquid fertilizer, which supports the sustainability of the local ecosystem. This aligns with SDG 15 (Life on Land), which encourages the sustainable management of natural resources and the protection of terrestrial life.

The increased environmental awareness initially focused on the hotel's internal staff has had a significant positive impact. Employees who are more aware of the importance of eco-friendly waste management actively contribute to implementing sustainable practices in their work environment. This supports SDG 12 (Responsible Consumption and Production), which emphasizes efficient resource management, reducing waste, and transitioning to more eco-friendly consumption and production

practices. Once employee awareness and involvement have developed, this positive impact is expected to extend to the local community in the long term.

Another positive impact is the maintenance of cleanliness and the quality of the marine ecosystem near Lombok, as part of the hotel's ongoing efforts to preserve the environment. One important effort is the management of organic food waste from the hotel, which, if not properly managed, could potentially pollute the marine ecosystem and nearby beaches. Organic waste, such as food scraps, when improperly disposed of, can contaminate waterways and harm marine life, disrupt coral reef ecosystems, and threaten the sustainability of marine life. However, by processing food waste into organic liquid fertilizer, Pullman Hotel Lombok has successfully reduced the impact of waste on the surrounding sea and beaches. This liquid fertilizer is not only used to improve the soil fertility in the hotel's garden areas but also helps prevent potential contamination that could flow into the sea. This aligns with SDG 14 (Life Below Water), which focuses on the protection, restoration, and sustainable management of marine ecosystems and marine resources. By maintaining the cleanliness and quality of the marine ecosystem around Lombok, Pullman Hotel Lombok contributes to the preservation of rich marine environments and ensures that the negative impacts of tourism activities on these ecosystems are minimized.

Overall, the implementation of this innovative method has not only successfully reduced negative environmental impacts but also strengthened the reputation of Pullman Hotel Lombok as a tourism industry player supporting sustainability. This achievement demonstrates that effective and eco-friendly waste management can provide long-term benefits for environmental conservation and the hotel's operational sustainability.

Pullman Hotel Lombok has implemented a waste management initiative focused on environmental sustainability while also raising awareness in the local community. Through training programs, the hotel teaches how to sort waste and process organic waste into liquid fertilizer, which is then distributed to local farmers to improve agricultural yields. While the production of organic liquid fertilizer is still limited, with the use of modern technology in the future, it is expected that the hotel's contribution in providing this fertilizer could increase significantly. This initiative not only supports environmental sustainability but also encourages local economic empowerment by transforming waste into a valuable resource.

Pullman Hotel Lombok leverages social media to amplify its positive impact by sharing information about waste management and the importance of sustainability to a wider audience. However, the biggest challenge faced is changing the behavior of the public, who still tend to litter. To address this, the hotel is committed to continuously setting an example and conducting outreach about the importance of waste segregation and reducing the use of single-use plastics. Furthermore, the hotel hopes to expand its collaboration with the Mandalika area in an integrated waste management program, which is expected to have a broader impact on the main tourist area of Lombok.

Support from local stakeholders, including the government and environmental organizations, is expected to optimize waste management efforts, including the provision of adequate infrastructure, raising public awareness, and collaborating on training and waste management programs. A solid partnership between the private and public sectors could also enhance the effectiveness of waste management and create synergies beneficial to the sustainability of tourism in Lombok. By involving local stakeholders, the

hotel can strengthen its commitment to sustainability and set a positive example for other tourist destinations in Indonesia.

Future plans to expand waste management at this hotel not only include implementing a more integrated system and collaborating with the Mandalika area and local stakeholders, but also utilizing more modern and advanced technology in waste management. The hotel is also committed to enhancing employee capacity through ongoing training to support sustainable tourism goals and environmentally friendly waste management. With these steps, Pullman Hotel Lombok hopes to continue leading the implementation of waste management in the hospitality sector and make a significant contribution to the sustainability of tourism in Lombok and Indonesia as a whole.

To support these findings, several recent studies emphasize the importance of food waste management in the hospitality industry, as well as the challenges faced in reducing its impact on the environment and economy. In the study by Scholz et al. (2020), one of the main issues identified is food waste management in the hospitality industry. The study shows that several hotels in Czechia have implemented efficient measures in managing food waste, such as turning leftover bread into croutons, giving plant-based food scraps to farmers, and using leftover grains as animal feed. These measures have successfully reduced food waste while supporting the local economy.

However, despite efforts in food waste management, the study also reveals issues related to the use of single-use packaging. Products such as sugar, butter, jam, and cheese are often packaged in single-use packaging that is difficult to recycle. Furthermore, the use of plastic straws and single-use bottles contributes to a significant volume of waste. The issue of non-environmentally friendly single-use packaging management becomes a major challenge in the pursuit of sustainability in the hospitality sector.

In line with these findings, the research by Okumus (2020) also highlights food waste as a significant issue in the hospitality industry. This study shows that food waste mostly occurs during the preparation and consumption stages. The main factors contributing to food waste include over-ordering by guests, inventory management errors, staff mistakes in food preparation, and suboptimal food safety practices. To reduce food waste, this study suggests several strategies, such as employee training, the use of proper equipment, better menu planning, and more accurate demand forecasting. In addition, educating customers with appealing and informative portion guides can reduce waste caused by over-ordering and consumption.

Similar challenges were found in the study by Aditya & Kurniawati (2023). This study identifies unexpected sales fluctuations as one of the causes of food waste, as well as a lack of customer awareness about the importance of food waste reduction. Despite efficient food processing, there is a significant difference in the amount of food waste generated per customer. The study shows that better inventory management, employee training, customer education, and collaboration with food rescue organizations such as Foodbank are effective strategies for reducing food waste. The study also highlights the significant impact of food waste management on the economy, society, and environment, and its connection to Sustainable Development Goals (SDGs), such as ending hunger, responsible consumption, and climate action.

From these various studies, it is clear that food waste management in the hospitality industry faces similar challenges, although there have been several efforts to reduce its negative impacts. The suggested managerial implications include

implementing more effective monitoring and reporting systems, as well as encouraging active participation from customers to reduce food waste and support sustainability.

Conclusion

Pullman Hotel Lombok has successfully implemented significant waste management innovations, with a focus on environmental sustainability principles. The hotel adopts an eco-friendly approach in managing organic waste, such as processing food scraps into organic liquid fertilizer that improves the soil quality around the hotel's garden. The reduction of waste sent to landfills and the positive impact on the local ecosystem, including the reduction of marine pollution, demonstrate the success of this initiative in supporting sustainable tourism goals and the Sustainable Development Goals (SDGs).

However, despite the positive results, challenges remain in maintaining the quality of the waste processing system and ensuring the safe use of environmentally friendly chemicals. Therefore, it is recommended that Pullman Hotel Lombok continue to improve the evaluation and monitoring of its waste management processes and expand training for employees and local communities. Investment in modern technology could increase the production of organic liquid fertilizer, providing greater benefits to the environment and supporting long-term sustainability. Additionally, collaboration with other hotels and relevant stakeholders to share best practices could amplify the positive impact of this innovation and support the broader development of sustainable tourism.

This research has several limitations, including the use of a case study approach focused on a single hotel, which limits the ability to generalize the findings. The qualitative method that relies on interviews also carries the potential for subjective bias. The time constraints hinder the analysis of long-term impacts and the evaluation of changes in employee and visitor behavior. Furthermore, external factors such as local government policies or social and cultural aspects were not considered. Therefore, the findings of this research are contextual and require further studies to address these limitations.

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