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FOOD COMPOSTING FOR THE SUSTAINABLE HOTEL INDUSTRY

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Abstract

The hospitality industry is making its comeback after the COVID-19 pandemic. This return has brought new trends to the sector. Nowadays, tourists demand that hotels be more eco-friendly or "greener", along with Indonesia's own commitments to meeting Sustainable Development Goals (SDG 12), and putting Indonesia's own circular economy concept into practice. With this demand for eco-friendliness, the sector must keep sustainability and environmental responsibilities in mind. The purpose of this research is to introduce the Balinese concept of teba, a place traditionally reserved behind a home to process food waste into fertilizer or compost. Whether this can be a suitable method of food waste disposal for the hospitality industry. The data analysis technique used a mock up derived from a literature study. The result of this study is that the hospitality industry can meet Sustainable Development Goals (SDG 12) by applying this circular economy concept to its operations.

Keywords: *food composting, sustainability, hospitality, circular economy*

Introduction

The hospitality industry is currently on the rise after the tourism sector slumped due to the COVID-19 pandemic and the lockdown policy to suppress the growth rate of the spread of the virus. We can see this in the latest trends in the hospitality world, namely staycations and holding offline and hybrid meeting events (ThinkAOR.com, 2023). The shift in trend in the world of hospitality from hotel rooms and suites to apartments and homestays is provided by accommodation rental companies in the form of rooms, without a lobby or a building to offer hospitality, and no one can imagine that they can make more money renting in a month than a year (Santikos, 2020). By charging a service fee for hotels and accommodation providers in the range of 3%–5%, whereas online travel agents can charge up to 30%, this trend can disrupt the world of hospitality (hospitality-on.com, 2022).

All contemporary industries, including the hotel sector, must prioritize sustainability (Roy, 2023). According to the most recent information from the IPCC AR6 Synthesis Report, the earth's surface temperature is currently 1,09°C, which is higher than it was during the first two decades of the twenty-first century and has been rising more rapidly since 1970 than during any other 50-year period since the last two thousand years (IPCC, 2023). The "safe" limit for the earth's temperature is 1.5 degrees. According to a study, hotels contribute about 1% of the world's carbon emissions (Sustainable Hospitality Alliance, n.d.). Additionally, players in

the tourism industry are beginning to concur that the industry's ability to reduce its carbon emissions by 50% by 2030 will be crucial to its survival (UNWTO, n.d.). Tourists also call for “greener” policies; according to survey respondents, 52% are concerned with environmental sustainability (Growth from Knowledge, n.d.), and 78% are open to staying in “green” or eco-friendly hotels at least once (Statista Research Department, 2022). The idea of green hotels and policies being those that minimzes the impact on the natural environment. The status of a green hotel is a point of pride for hotels, especially for those purpose built with sustainability a a core concept of their architecture and operations.

Responsible consumption (SDG 12) is one area where the hotel sector and climate change intersect. Food waste, a byproduct of production in the hospitality sector, can contribute to climate change. According to estimates, more than 30% of food produced worldwide is wasted for many reasons (von Weizsacker, E.U., et.al., 2009). This is ironic because there are nations that lack food in other parts of the world. Food waste in the hotel sector is another issue that might arise.

This article seeks to address the issue of waste sorting in the hotel sector, the catering industry, and food vendors. Because it has contributed to a greener earth, a new workforce, and innovations in the hospitality industry, specifically sustainable hospitality, through encouraging sustainability efforts to be adopted by the industry as a whole. By utilizing the circular economy concept, the author further hopes that this paper can help to establish a new culture of creating a "green hero" climate in society.

Literature Review

With the concern for climate stability, Indonesia has committed to meeting the Paris Agreement commitments of limiting global warming to below 2 °C and preferably to 1.5 °C compared to pre-industrial levels. This means that Indonesia’s Nationally Determined Contribution (NDC) between 2016 and 2030 entails a 21% reduction in GHG (greenhouse gas) emissions compared to a 2030 business-as-usual scenario, along with a 41% reduction in GHG emissions with international assistance for finance, technology transfer, and capacity-building (PwC, n.d.). In order to meet these goals, Indonesia as a whole, including the hospitality industry, needs to make improvements to its infrastructure to tackle emissions and waste. One key aspect leading to this change is the concept of The Circular Economy.

The circular economy itself is a concept meant to help achieve Sustainable Development Goals and net-zero emissions. It is a closed-loop economy system approach in which raw materials, components, and products are maintained as useful and valuable as possible so as to reduce the amount of waste material that is not reused and disposed of in landfills (Indonesia Circular Economy Forum, 2022). The concept revolves around “The 9R Framework," where the basic 3Rs of Reduce, Reuse, and Recycle have been further updated with 5 additional Rs. This is meant to change the way that materials and products are viewed in regard to their end-life and end-use. Sustainable Development Goal 12 (SDG 12) of the United Nations Department of Economic and Social Affairs on Sustainable Development is to “Ensure sustainable consumption and production patterns," one of the 17 Sustainable Development Goals established by the United Nations.

The implementation of Indonesia's circular economy is paramount to meeting the goals of SDG 12. The Ministry of National Development Planning (Bappenas) 2030 aims to substantially reduce waste production through prevention, reduction, recycling, and reuse (Bappenas, n.d.). The G20 Bali Leaders Declaration emphasized additional initiatives to fulfill the SDGs with the mission to "promote nutritious food for all, strengthen global, regional, and local food value chains, and accelerate efforts to reduce food loss and waste." (Kominfo, 2022). Bali, along with other cities and provinces in Indonesia, has drafted its own Regional Action Plan for Further Development (RAD TPB) (Badan Perencanaan Pembangunan Daerah, Penelitian dan Pengembangan Provinsi Bali, 2019). These regional action plans also keep SDG 12 in focus. TPB plans highlight the various policies and strategies put in place to meet SDG 12 targets. One particular highlight is that an integrated farming system (SIPADU) is able to produce its own organic fertilizer (LOCALISE SDGs in Indonesia, n.d.). This leads into the main issue food waste that is running rampant in Indonesia, and is a major contributor to waste.

Food waste is defined as food that was not used for its intended purpose and is managed in a variety of ways, such as a donation to feed people, the creation of animal feed, composting, anaerobic digestion, or disposal in landfills or combustion facilities (USEPA, n.d.). Food waste is common in all aspects related to the food sector, including food processing, supply, production, and consumption (Keraf, 2022). White this system applies for the agricultural sector and its waste problem. There are no system put in place in order to tack food waste in the hospitality sector. This is especially worrying considering the amount of food waste the hospitality industry generates.

Food waste accounts for one-third of all human-caused greenhouse gas emissions and generates 8% of greenhouse gases annually (Lewis, J., 2022). With this in mind, the impact of food waste on climate change and the environment cannot be understated. With food waste in mind, the International Hotel Environmental Initiative (2002) estimated that, on average, per guest generates a daily amount of 0.8–1.2 kg of waste, which can be doubled on checkout days (Pirani and Arafat, 2014; Abdulredha et al., 2018). From this waste, more than a third is represented by food waste, roughly 75% of which is still edible (Williams et al., 2011).

The hospitality industry is seeing a major boom, with the number of hotels in Indonesia increasing significantly from 16,685 to 27,607 (Foreign Agricultural Service U.S. Department of Agriculture, 2022). This is can lead to large repercussions down the line if the food waste issue is left unchecked. This leads to the idea of bringing back the old Balinese practice of "Tebas". Which is the the disposal of food and organic waste in a specific made bin in a home's backyard where the food slowly turns into compost through decomoposition. Although this concept has been adapted for modern use in a small villages and hamlets and has seen success in reducing the amount of waste and costs of garbage disposal services. The use of tebas can applied to the hospitality industry in order to reduce its food waste and help it further implement the concept of the circular economy.

The benefits of composting has been shown in the case of the Torridon Hotel in the United Kingdom. With its savings in garbage disposal costs and tonnes

of waste disposed of. We can apply this concept as well to a hotel in Bali, using The Sheraton Bali Kuta Resort as an example. If The Sheraton Bali Kuta Resort utilized tebas as a method of food waste disposal, the hotel would be capable composting of 48.7 tonnes of food waste each month. This means that 95.53 tonnes of CO2 emissions would cut in half to 47.76 tonnes. A considerable amount of GHG reductions. If the use of tebas were further applied to more hotels and results across Bali, and even further throughout Indonesia. We could see a major decrease in food waste, greenhouse gas emissions and better prospects of meeting SDG 12 targets. This can also lead to the further implementation of sustainability and more green hotels in Indonesia.

Research Methodology

This research method utilizes a literature study, in combination with a hypothetical mock-up made from the gathered research data. This method involves researcher gathering theories from previous studies that are used as references and data points for the mock-up. The literature used as material for this research is in the form of books, previous research, and websites that provide information related to food waste, the hospitality industry, and sustainability (Insert number for articles and such here).

Our research is a compilations of 14 pieces of literature, including papers, studies and relevant articles. The starting point was to find the issue of food waste in Indonesia, and the severity of the issue. We also delved into composting and the methods of composting that exist. This leads into research on tebas, and how they are utilized in small villages and hamlets in Bali. Our research then led to how composting is utilized in the hospitality industry, specifically how composting can benefit a hotel through its implementation and operation.

The information is then applied to create a hypothetical example of a hotel applying the use of tebas, the requirements for such a system to be put into place, and the theoretical results of the system based on statistics found through research and calculations. One currently operational hotel in Bali is used for a hypothetical application of tebas. This hypothetical use, involves a calculating the number of guests and their waste output, to the number of tebas needed to properly compost the amount of food and organic waste produced by the hotel. This would give us the idea of the suitability of tebas in use the hospitality industry.

Results and Discussion

In 2017, Indonesia is the second largest contributor to food waste in the world, following Saudi Arabia. Indonesia holds the title of the second-largest waste contributor in the world. When averaged, each individual contributes 300 kg of waste. According to waste processing data for 2017/2018, the National Waste Management Information System (SIPSN) for food waste accounts for 46.75% of the total waste in Indonesia (Amicarelli, V., Aluculesei, A.-C., Lagioia, G., Pamfilie, R., Bux, C., 2021). Although most of this food waste comes from a lack of proper storage infrastructure in the agricultural sector. The least efficient type of processed food is vegetables, which account for 62.8% of total domestic losses in Indonesia (Putri, R. A., 2022).

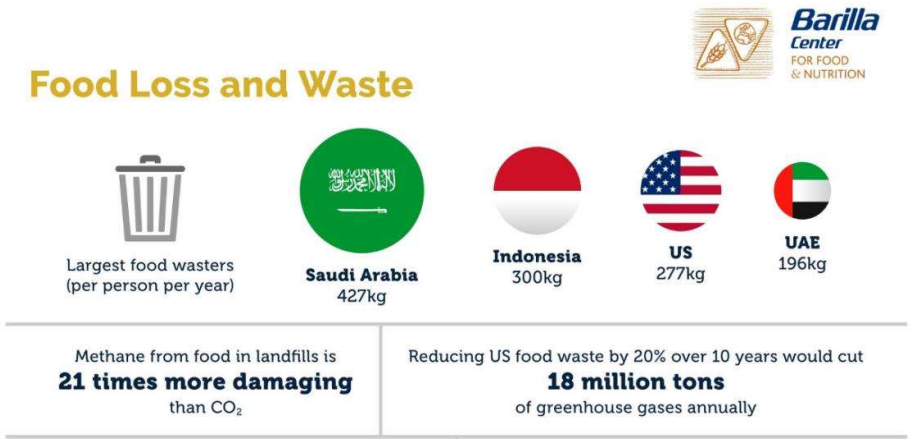

Figure 1: Food Loss and Waste Infographic
[Source : https://impact.economist.com/sustainability/ecosystems-resources/food-loss-and-waste]

A study done on the awareness of food waste in Indonesia pointed to the lack of awareness of food disposal by the population. The authors found most of the respondents (62%) were never aware of their food waste, about 20% of respondents were aware of the impact of food waste but chose to ignore it, leaving 18% of respondents who were aware of the problem and took action (Susilo, D., de Leon, M. V., Dwi Putranto, T., Kurnia Hartati, F., 2021). This greatly shows the lack of information regarding food waste, its impact on the environment, and the action being taken to manage it.

Food composting is a process that involves turning food scraps and waste into a humus-rich soil adamant known as compost. Generally, all types of organic matter can be composted, such as red meat, bones, and small amounts of paper, but they take longer to decompose (Risse, M., Faucette, B., 2017). This process happens through decomposition. Where microorganisms feed on the materials added (food waste), as they feed off the carbon and nitrogen present, while water is needed for digestion and oxygen to breathe (Environmental Protection Agency, n.d.).

Composting relies on a variety of factors, including a proper ratio of carbon to nitrogen, The optimum ratio to begin composting is 30:1 (Risse, M., Faucette, B., 2017). Temperature, pH levels, aeration, particle size, and moisture content all must be managed to ensure the process keeps going and the microorganism can thrive. Composting can be done in a variety of ways. Piles can be made by just placing the food waste to decompose naturally. More common ways involve utilizing bins and closed containers to control conditions and avoid the spread of foul odors. Windrows are another method which involve burying and turning large piles of composting waste. Windrows are typically used for large volumes which can require a lot of space (Risse, M., Faucette, B., 2017).

The resulting compost will appear similar to hummus. It will be able to keep its own ambient temperature and there won't be any weed seeds or pathogens present. Its pH levels will be neutral, it will be moist with organic matter content between 40-65 percent (Risse, M., Faucette, B., 2017). The resulting compost can be used in various ways, improving soil structure, as fertilizer, tree mulch, and improving pasture quality. Compost is reaching higher levels of demand with the market value of compost ranging from $3 to $40 a ton (Risse, M., Faucette, B., 2017), depending on the materials used in the composting. Composting itself is not just beneficial to the growth of plants and trees. Composting is a viable alternative to chemical fertilizers, remediates soils contaminated by hazardous waste, aids habitat revitalization, and reduce methane production compared to waste disposal in landfills (Environmental Protection Agency, n.d.).

In Bali, there are 434-star hotels out of a total of 3,528 accommodation business units in 2022, which have a total of 47,751 rooms (Annur, C. M., 2022). Where 3-star hotels have the highest number, namely 153 hotels. As for restaurants and restaurants, in 2021 there will be 3,868 restaurant and dining units spread throughout the region, of which there are 1,053 restaurant and dining units in Gianyar with the highest number (Badan Pusat Statistik, 2022). From this range of numbers, we have the privilege to interview a guesthouse owner in Canggu and the general manager of a villa in Sanur. From them, we learn that guesthouse residents usually eat at a restaurant, so there is not much food waste being produced in the guesthouse. If there are any, the process is linear, which means the waste will be taken by the cleaning staff to the waste management site. And from the villa's general manager, they are dividing the waste into 3 parts; plastic, food waste, and leaf litter. The plastic and the leaf litter will be taken by cleaning staff to a waste bank or a landfill, meanwhile the food waste is taken by the waste bank manager to be used as pig fodder and organic fertilizer.

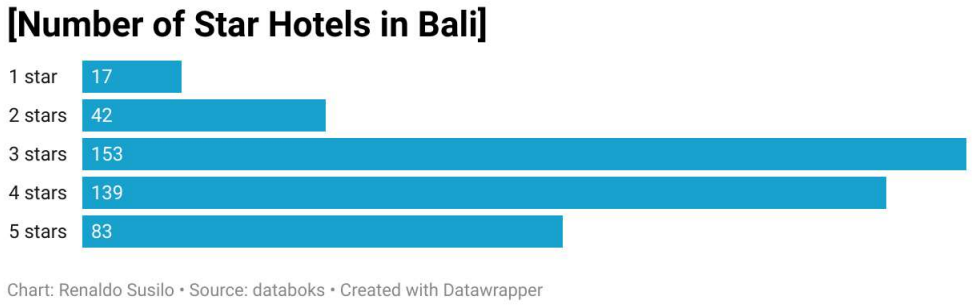

Figure 2: Number of Star Hotels in Bali
[Source : https://databoks.katadata.co.id/datapublish/2022/12/29/ini-jumlah-hotel-bintang-di-bali-pada-2022]

In Bali, food waste is usually disposed of in an area of the house known as the "Teba". Teba is a noun in the Balinese language meaning "behind the house compound where there are bushes" (BASAbaliWiki, 2019). In the past, people

would grow banana and coconut trees, or flowers for their own needs in these areas. Wasted food would be discarded in the teba to decompose and act as fertilizer. Although this practice has faded away due to the design of modern Balinese homes, and garbage collection services. The reintroduction of tebas has been limited, although a hamlet called Cemenggoan in Gianyar has re-introduced the use of tebas in a modern fashion. The tebas are constructed as wells, with a depth of three meters, and 80cm in diameter, with a hole to dispose of organic waste in. Wayan Bali Mustiana, the Chairman of the Waste Management Agency of Cemenggoan, said this idea of modern teba originated during the Environmental Care Forum of 2011 (Suriyani, L. D., 2022). Throughout his various changes to garbage disposal methods from 2011 - 2017, he found that providing composters made the disposal of organic waste easier. This developed with the construction of more tebas, to the point that each household has its own teba. The results of this development have shown promise. In 2020, the hamlet no longer uses garbage truck services, residents save Rp 30.000 per month on costs and can earn savings from the inorganic waste at the waste bank (Suriyani, L. D., 2022).

Composting isn't a widespread practice in the hospitality industry. Which of those adopting composting are standalone or smaller-scale hotels/homestays. One notable case of composting being used in a hotel is the Torridon Hotel in Wester Ross, in the United Kingdom. The hotel installed a Rocket composting bin, which can process up to 215 liters of food waste per day. This resulted in £12,000 in waste disposal fees being saved, and 50 tons of food being recycled within two years (Smart, R., 2023). Hotels can utilize indoor composting bins dedicated to creating compost or, alternatively, use electrical food composters. Although these are generally regarded as the end product, they are not compost, but rather a fertilizer that can be combined with soil (Healey, C., 2022). The use of tebas may also be a suitable prospect for hotels in Bali. Considering that residents in Banjar Petiga Kangin in Tabanan, have utilized 26 modern tebas for 40 homes. The Head of Petiga Traditional Village, I Made Darmawan, stated “"During the four exchanges, we have collected up to 7 tons of waste,". This was the result of over a year of the tebas being operational. The tebas themselves are 1 meter in diameter and 1 meter deep. Regarding the cost of the tebas themselves, Darmawan said “Approximately, to make this modern cane requires a budget of around Rp. 750,000, including the cost of digging the ground” (Nv, 2022). This makes it a viable cost option for hotels looking to handle their food disposal.

In terms of viability, we can take an example of a hotel in Bali, and use information from Banjar Petiga's tebas to make a hypothetical model for tebas to be implemented. The Sheraton Bali Kuta Resort, is a hotel with 203 guest rooms and 620m^2 of outdoor space (Sheraton Bali Kuta Resort, Cvent, n.d.). Assuming an average occupancy of 3 people per room (Sheraton Bali Kuta Resort Fact Sheet 2021, n.d.), we come to a total of about 609 people. This ends up producing about 730.8 kilograms of waste per day, with 75% assumed edible waste (Amicarelli, V., Aluculesei, A.-C., Lagioia, G., Pamfilie, R., Bux, C., 2021) being 548.1kg.

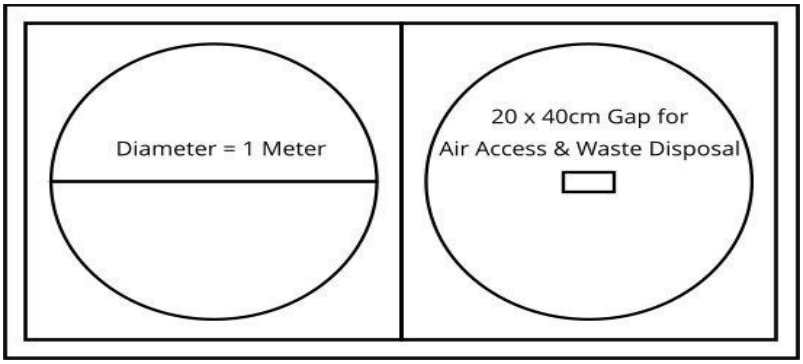

Figure 3: Teba Mockup for Hospitality Industry
[Source : Research Team Study Results]

A 1 meter diameter by 1-meter deep teba has a volume of 785.40 liters, or 785.4 kg. One teba would be able to take all of the food waste produced in a day. Considering the available outdoor space on the hotel, 62m2 or a tenth, can be allocated for tebas. This would allocate about 48.7 tonnes of capacity for composting. With the quickest turnaround time for compost is roughly 30 days (Communications, I. F. A. S., n.d.). The hotel would have the capacity for about 2 months of compostable waste from guests. With proper management, batches of compost can be cycled out each month. To ensure the compost is extracted and the tebas are ready to receive waste again without overflow. This can result in major savings for hotels in terms of waste disposal costs, and the benefits of a greener environmental footprint.

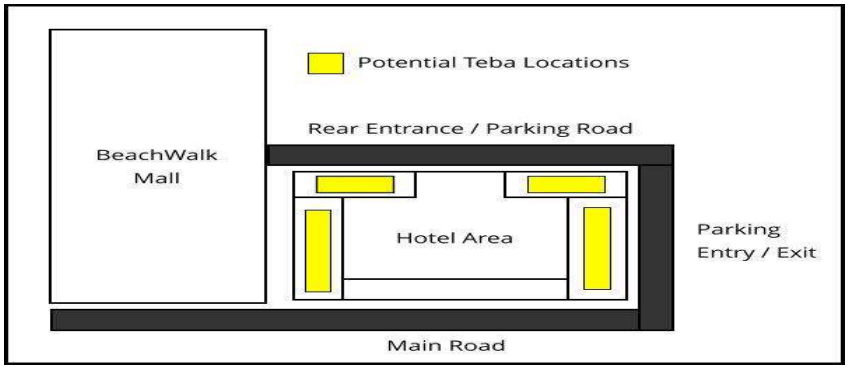

Figure 4: Potential Teba Locations at The Sheraton Bali Kuta Resort
[Source : Research Team Study Results]

While considering that the Sheraton Bali Kuta Resort has limited outdoor space, its underground spaces under the hotel can be utilized for tebas, with spaces closed and allocated for them. Loading trucks connected with the BeachWalk mall can be used to transport compost out without much hindrance to guests.

This composting system does not rule out the possibility of being adopted by the hospitality industry. Owners of guesthouses or villas who have yards and it is possible to make Teba can make Teba process leftover food and food ingredients

that are not suitable for consumption into fertilizer or animal feed ingredients. In fact, even hotels can provide a special location to create Teba, whether on a small or large scale. If processed properly, this Teba can be one of the attractions for tourists who stay in Bali.

Conclusions

From the research we have done, we conclude that the hospitality industry can meet the tourist's demands for "greener" hotels by applying the Balinese concept of teba. By constructing these types of facilities in their buildings, hotels can process their own food waste into fertilizer or compost to be reused for their own needs. The solution is capable of reducing a large amount of food waste, leading to savings in operational cost, and contributing to the circular economy concept. The use of composting by the Torridon Hotel in the United Kingdom shows the benefits of composting, even with a modern method and equipment. Along with the construction of tebas, the issue of food waste needs more public awareness.

The increase in public awareness of the environmental impact of food waste, and the benefits of the use of tebas will lead to further adoption and understanding of the benefits of composting. The use of tebas in Cemenggoan and Banjar Petiga Kangin show the benefits of tebas for households, and homestays. The use of a traditional practice can still find its place in modern hospitality. Thus leading to greener hotels, which can receive proper green hotel certifications such as, LEED (Leadership in Energy and Environmental Design), Green Globe, TripAdvisor Green Leaders, Green Key Global, and EarthCheck. The hospitality industry can find a sense of pride and accomplishment from the new “green” identity.

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