



## ORIGINAL RESEARCH

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## Adaptation of breakfast serving mechanism during Covid-19, and management of food surplus in two-star hotel (Case study on Amaris Hotel, Bandung)

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**KEYWORDS**

Buffet  
Food bank  
Food waste  
Overaged food

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**ABSTRACT**

Covid-19 conditions force hotels to change the mechanism of breakfast serving system, which was previously done in a buffet. This is because buffet breakfast is the time for hotel guests to gather with each other, but this is not in accordance with the Covid-19 health protocol. Besides, the buffet method also caused food surplus because the hotel had to prepare more food than the number of guests. The food surplus has the potential to become food waste if not utilised. The purpose of this research was to provide an overview of the amount of food loss from the producer side, both in terms of resources and the economy from buffet breakfast activities at hotel, and provide options for breakfast serving at hotels during the Covid-19 pandemic. This research was conducted at a two-star hotel in Bandung using survey, observation, and interview methods. The results of this research indicated that the breakfast serving method during a pandemic could be done by room service mechanism. The potential for food waste from food surplus comes mostly from the main course menu, especially carbohydrate (rice) group with 48%. If food surplus is not managed, it could become a large loss potential in both resources and economic. What is significant from this research is that this research was carried out from the producer's side, by managing the food surplus from the serving container and not from the hotel guest plate. Thus, the research results can be used as a reference for environmentally friendly hotel management.

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**Introduction**

The Covid-19 pandemic results in a significant impact on the economic sector in Indonesia, including in the hospitality tourism sector Sihaloho (2020), due to directives for self-quarantine and reducing outside activities which leads to a decrease in room bookings (Taufik and Ayuningtyas, 2020). Hotels must adapt by implementing health protocols (i.e. physical distancing) so that the guests feel safer in order for hotels to continue operating (Diayudha, 2020). The condition of breakfast serving system in hotels is different before the pandemic. Previously breakfast was done in a buffet because it was the time when hotel guests gathered together.

Technically, the buffet method requires hotels to cook by exaggerating the portion of food from the number of hotel guests (overaged food) to ensure food availability for hotel guests

(Prasanna, 2013). The excess food produced by the hotel from the overage food system has the potential for a lot of food that is ultimately not consumed, which will lead to food inefficiency (Juvan et al., 2018). The concept of eating in a buffet gives guests the freedom to take their own menu and the amount of food they want to consume (Tekin, 2017). Guests are free to take their own food, there will be a food menu that is little or no consumption by hotel guests, even until breakfast time is over (Beretta and Hellweg, 2019). Overaged food causes food cannot be consumed by hotel guests, which is known as food surplus. The buffet activity can cause the food surplus, which potentially become food waste if is not utilised (Papargyropoulou et al., 2014). It is necessary to study and to rearrange the proper mechanism in breakfast serving during the pandemic period. This is because the current

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serving breakfast in a buffet is deemed unsuitable for the Covid-19 health protocol.

Therefore, the purpose of this study was to formulate a breakfast serving mechanism during the Covid-19 pandemic, which can also minimise the food surplus by hotels. Since the food surplus has the potential to become waste if it is not managed properly, thus this study also aimed to evaluate the magnitude and potential loss of food surplus produced by hotels. The research was conducted at one of the two-star hotels in Bandung, West Java. This research was expected to provide a formulation of the food serving mechanism during the Covid-19, and what efforts can be made by hotels in the management and utilisation of food surplus.

### Research Methods

Data were collected by survey, observation and in-depth interview methods. The time of this research was coincided with the beginning of the Covid-19 pandemic in Indonesia, therefore several methods had to be done online, such as survey and in-depth interview. The survey method was carried out to identify the preferences of prospective hotel guests in breakfast serving mechanism during the Covid-19 pandemic, which was carried out online with Google Form. Questionnaires were distributed using the snowball sampling method to groups of workers and students. There were 100 respondents in this survey. Furthermore, this research also used the observation method, namely by measuring the weight of the food surplus in the hotel for 8 days (SNI 19-3965-1884). Food samples came from consumable food in the serving container and counted at the end of hotel breakfast time. Foods were grouped based on two major groups, namely main course and side dish. These food, then be categorised based on nutrition: carbohydrates (rice), carbohydrates (non-rice), fiber (vegetables), fiber (fruits), animal protein, and vegetable protein. Another method used in this research was an in-depth interview with human resource department (HRD) and Head Chef of the hotel, Food Bank of Indonesia, and the Department of Tourism and Culture of West Java Province. These interviews were conducted online using WhatsApp and Zoom Meeting.

To obtain an estimated loss value, two calculations were used, namely based on raw materials, and based on final product price and production costs. Calculations based on raw materials were aimed to obtain estimated losses using the market price approach. The weight of

food surplus was converted to raw weight using *Faktor Dalam Masak Mentah* (FDMM) from the Kemenkes RI (2014) and calculated by using formula (1).

$$NK_m = M_b \times f \times P \times d \dots\dots\dots (1)$$

Where:

- $NK_m$  : Potential loss using raw material price (IDR/year)  
 $M_b$  : Food surplus weight (kg/day)  
 $f$  : Conversion factor (FDMM Indonesian Ministry of Health)  
 $P$  : Raw food price (IDR/kg)  
 $d$  : Number of hotel operating days in a year

Another calculation used was the estimated loss based on the final product price. This calculation was carried out to complete the shortcomings in the calculation of raw materials, because of the production and components used to get food. The price approach used in this calculation was to use ala carte price for food at the hotel. The calculation of loss based on the final product price was calculated by using formula (2) and based on production costs was calculated by using formula (3).

$$NK_a = \left( \frac{M_m}{M_o} \right) \times P \times d \dots\dots\dots (2)$$

Where:

- $NK_a$  : Potential loss using final product price (IDR/year)  
 $M_m$  : Food surplus weight (kg/day)  
 $M_o$  : Weight per serving (kg/portion)  
 $P$  : Food price (IDR/kg)  
 $d$  : Number of hotel operating days in a year

$$NK_p = NK_a - (NK_a \times 20\%) \dots\dots\dots (3)$$

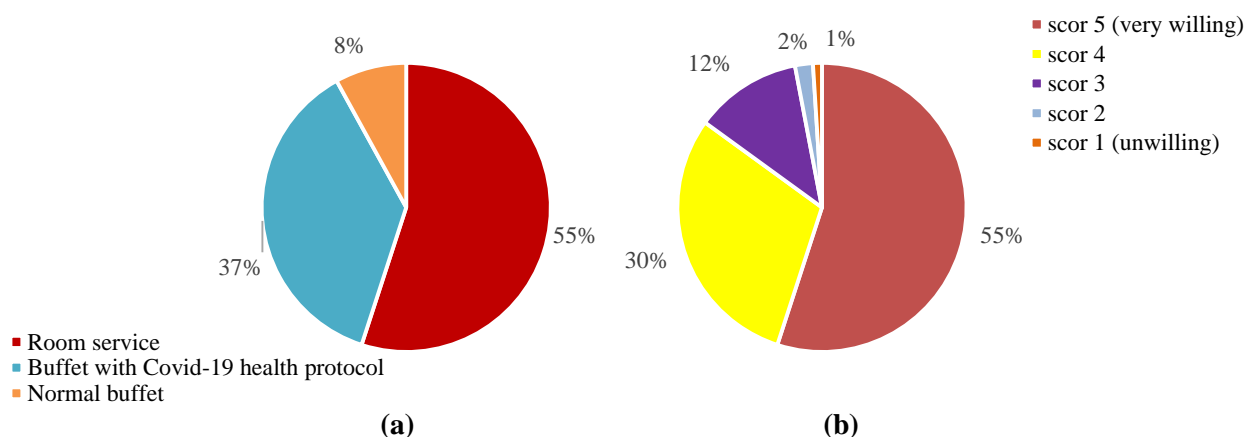
Where:

- $NK_p$  : Potential Loss using production cost (IDR/year)  
 $NK_a$  : Potential loss using final product price (IDR/year)

### Results and Discussion

The limitations of this research were as follows:

1. The study was only conducted in one hotel as a case study, which is Amaris Hotel, a two-star hotel in Bandung;



**Figure 1.** Adaptation of the food service system result of (a) breakfast serving mechanism; and (b) willingness to return back to stay at hotel

2. The study only observed food surplus from buffet breakfast activities that have not become waste. These foods are either still in the serving container or have been cooked;
3. It did not count the food on the hotel guest's plate;
4. It did not count the menus in the form of liquids (i.e. drinks and gravy) and additional compartments (i.e. green onions, fried onions, sauces, jams, etc.).

### **Breakfast Serving Mechanism**

After the Covid-19 pandemic, almost all sectors needed to adapt, including the hotel industry. Hotels must make adjustments to the breakfast serving that was previously done in a buffet. This mechanism cannot be implemented because it is not following the Covid-19 health protocol. Thus, a survey is needed to see the preferences of potential hotel guests for the form of serving breakfast during the pandemic, which is presented in Figure 1.

Based on Figure 1, there are several serving options. First, the serving of food in restaurants is still carried out but with some requirements such as the presence of food protection, the food being taken by hotel employees, and the application of health protocols. The second and preferred serving option is room service. The hotel will contact each room to confirm the guest's choice of the menu for breakfast, then the food will be delivered directly to the room. This option is considered better and was chosen by 55% of respondents (Figure 1a). Furthermore, this option is chosen on the grounds that it is more sterile and hotel guests also feel safer because they do not gather with other guests. If the room service mechanism is carried out continuously, it can

minimise the potential for food waste generated from food surplus. This is because the hotel only cooks food according to the portion of guests who book a room, and does not need to overage food.

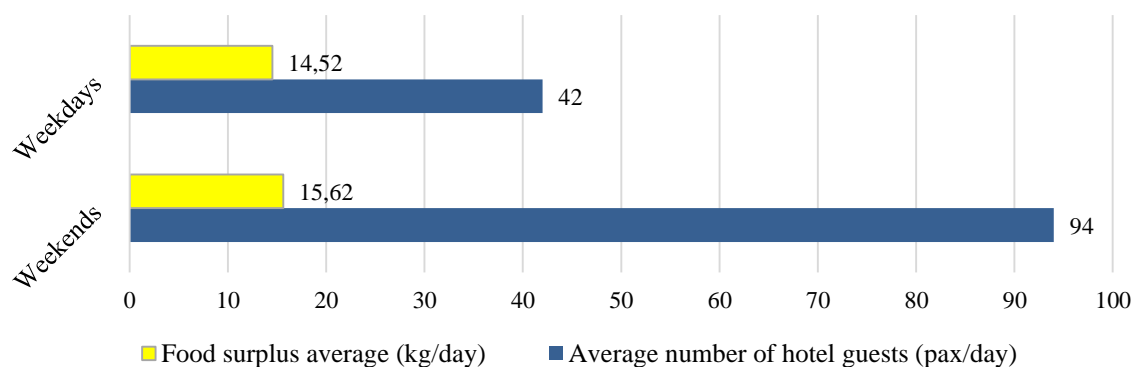
Changing the mechanism for serving breakfast to room service is one way to implement the Covid-19 health protocol. One of the health protocols implemented in Indonesia is physical distancing and avoiding crowds. Buffet breakfast at the hotel restaurant is a time where hotel guests can gather together. To prevent the spread of the virus, there needs to be an adaptation regarding the serving of breakfast in hotels. Thus, the hotel guests do not have to crowd to get food. Based on the survey results shown in Figure 1b, 55% of respondents were willing to return to stay at the hotel, if the hotel had implemented good health protocols. This is supported by the CHSE (Clean, Healthy, Safety, and Environmental friendly) program initiated by the West Java Provincial Culture and Tourism Office. The hotel industry that implements the CHSE could receive operational cost assistance in increasing innovation in environmentally friendly hotel management. Also, the hotel could obtain certificates and labels, indicating the appropriate implementation of the CHSE protocol. Thus, the hotel can restore public confidence to return to stay at the hotel.

### **Food Surplus Management and Utilization Plan**

Besides changing the breakfast serving mechanism, the potential for food waste generated from food surplus in hotels can be reduced by making management and utilisation efforts. The management plan and utilisation of food surplus can be seen in Table 1.

**Table 1.** Food surplus management plan

Management Alternative	Mechanism	Potential Thread	Solution
<b>A. Prevention</b>			
1. Raw materials efficiency	Using raw materials efficiently, thus not much materials was wasted	Hotel cannot buy groceries in small quantities	Make a shopping plan in a specific time, and have a good storage
2. Raw materials selection in processing	Part of the food that is less consumed, cooked in small portion or not used	Unused materials have the potential to become waste	The unused materials can be processed into a different menu
3. Menu mapping	Analyse the menu that is less consumed by hotel guests	Changing the hotel's budget plan	Cook less for the menu that is often eaten, or level up the food taste
<b>B. Utilization</b>			
1. Employee consumption	Food surplus is processed as lunch for hotel employee	Complain from the employees who think they are given leftover food	The food is cooked again and processed into different menu
2. Food donation	A good condition food surplus is donated through a food bank	Miscommunication and technical errors related to food distribution	Standard operating procedure is needed to prevent mistakes
		The food is in bad condition while received by the donation recipient	Food storage management that can maintain food quality
3. Used as feed	Food that is no longer suitable for consumption and has turned into waste, used as animal feed	The food collection mechanism takes longer to distribute the feed	Hotel directly handed over the leftover food to nearest farmers

**Figure 2.** Food surplus and hotel guests comparison on weekdays and weekends***Food Waste Potential from Food Surplus***

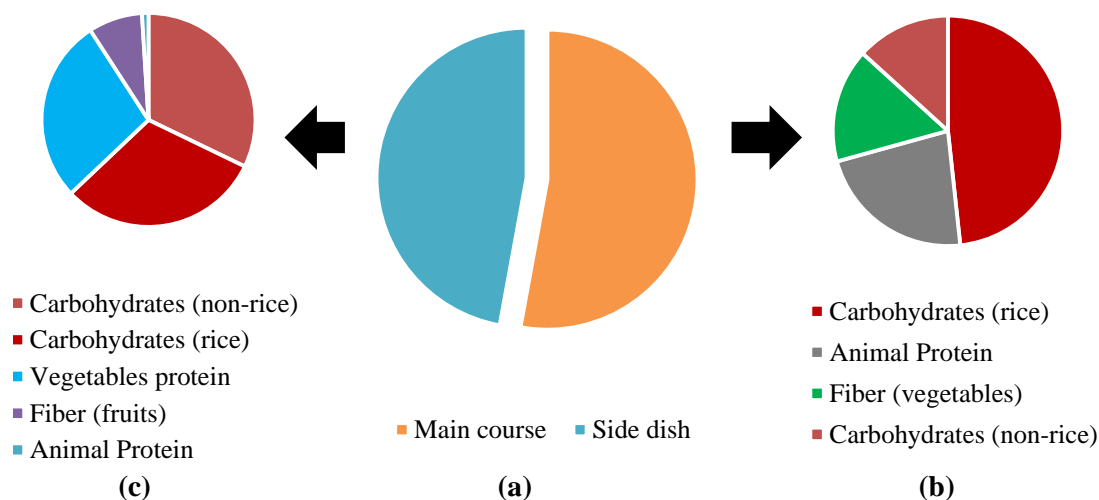
Food surplus was divided into two categories, on weekdays and weekends. The food surplus would be compared with the number of hotel guests to investigate the different guests characteristics on weekdays and weekends. A comparison of the food surplus and hotel guests is shown in Figure 2.

Food surplus on weekends (15.62 kg/day) was only 8% higher than on weekdays (14.52 kg/day). However, the number of guests on weekends (94 people/day) was 124% higher than on weekdays (42 people/day). This shows that the

number of visitors does not affect the food surplus. But, the difference in the guest's number affects the amount of food waste in the hotel (Pirani and Arafat, 2015). Based on information from the hotel, the food surplus on weekends and weekdays was not significantly different due to the hotel guest's characteristics. The majority of hotel guests on weekdays come from office workers with the reason of staying was to attend meetings, training, and any other formal events. Thus, they did not have much time for breakfast because the formal event usually started at 8 in the morning. In contrast to hotel guests on weekends,

the majority of the guests were family with the

reason of staying was for vacation.



**Figure 3.** Food surplus composition based on (a) food classification; (b) main course; (c) side dish

Therefore, they had more time to try various kinds of foods at the hotel. Food surplus in weekdays still shows high result because the hotel cooks the same amount of the guest's hotel, to serve the guests who want breakfast. The food composition was divided into the main course and side dish food, which were then classified based on nutrition. This is to identify which group and classification is the largest un-consumed food, and the results can be seen in Figure 3.

The food surplus from the main course group was 6% higher than side dish group (Figure 3a). This is possibly because in the morning not all guests want to eat the main course which considered as heavy meals. Hotel guests generally will try various types of food available, thus the main course is often not consumed, especially for guests on weekends (i.e. family guests). This is due to the guest's behaviour, which prefers to take a lot of foods for tasting new or rarely consumed foods (Quan and Wang 2004). Merli et al. (2019), which states that there is a change in the habits of visitors when they are at a place to eat with a buffet concept, guests tend to try small meals first. Hotel guests tend to overestimate the food they take because of the many choices of food they can try without having to pay more (Kuo and Shih, 2016).

The highest food surplus from the main course group was carbohydrates (rice) at value of 48%. The results show that despite white rice was served in large quantities, hotel guests tend to prefer fried rice. This is because fried is tastier than white rice. This result is not in line with Fachrunnisa et al. (2020) who stated that the most

food component leftover from the producer side is vegetables. The highest food surplus from the side dish group was carbohydrates (non-rice) accounted for 32%. This food surplus was consisted of several food components, mostly boiled sweet potatoes and cassava. This menu does not attract the attention of guests because the food is no longer hot, and guests also prefer the fried menu to the stew.

### *Estimated of Loss Value*

The loss value potential based on the raw material was calculated by using market price. The calculation results can be seen in Table 2.

Besides using a raw material method, the loss value was also calculated by using the final product price and production cost. This calculation is different from the raw material calculation because there is an added input to obtain food. Therefore, it is necessary to calculate the product price and production cost. The calculation results are shown in Table 3.

The calculation of the loss value based on raw material (Table 1) shows the estimated loss in one year is IDR 54,590,543/year. Meanwhile, the calculation of the loss value based on the final product price (Table 2) shows that the value was five times higher, which was IDR 334,169,848/year. This high number is caused by the method of serving food with a buffet system. The buffet method requires hotels to overage food to ensure that the food served is always in sufficient quantity and to meet hotel guest's expectations (Prasanna, 2013).

**Table 2.** Potential loss based on raw material price per year

Menu	Food Surplus <sup>1</sup>		CF <sup>2</sup>	Raw Weight (kg/year)	Price (IDR/Kg)	Potential Loss based on Raw Material (IDR/year)
	(kg/day)	(kg/year)				
White rice	2.86	1,043.44	0.4	417.38	10,700 <sup>3</sup>	4,465,939
Fried rice	0.92	335.34	0.4	134.14	10,700 <sup>3</sup>	1,435,271
Fried vermicelli	0.33	120.45	0.4	48.18	17,600 <sup>4</sup>	847,968
Fried noodle	0.19	70.49	0.3	21.15	6,700 <sup>3</sup>	141,686
Fried sohun	0.51	187.75	0.4	75.10	75,000 <sup>4</sup>	5,632,406
Sauteed pumpkin	0.33	119.04	1	119.04	9,000 <sup>5</sup>	1,071,321
Sauteed long beans	0.43	156.72	1	156.72	21,000 <sup>5</sup>	3,291,159
Sauteed cabbage	0.11	39.24	1	39.24	12,000 <sup>5</sup>	470,850
Pakcoy	0.12	42.66	1	42.66	14,000 <sup>5</sup>	597,231
Balado eggplant	0.18	64.33	1	64.33	15,000 <sup>5</sup>	964,969
Eggplant with cabbage	0.10	35.59	1	35.59	12,000 <sup>5</sup>	427,050
Soy sauce chicken	0.37	134.59	1.6	215.35	34,400 <sup>3</sup>	7,408,040
Butter fried chicken	0.57	206.91	1.6	331.06	34,400 <sup>3</sup>	11,388,292
Chicken curry	0.43	158.55	1.6	253.68	34,400 <sup>3</sup>	8,726,420
Indonesian chicken curry	0.38	140.30	1.6	224.48	34,400 <sup>3</sup>	7,721,940
Total	7.82	2,855.40				54,590,543

Note:

<sup>1</sup> : Food weight from observation<sup>2</sup> : Conversion factor with FDMM (Kemenkes RI, 2014)<sup>3</sup> : Source of price from Portal Informasi Harga Pangan (priangan.org)<sup>4</sup> : Source of price from Tokopedia (tokopedia.com)<sup>5</sup> : Source of price from Kementerian Perdagangan (kemendag.go.id)**Tabel 3.** Potential loss based on final product price and production cost

Menu	Food weight (kg/portion)	Food surplus (kg) <sup>1</sup>	Food price (IDR/portion) <sup>2</sup>	Potential Loss based on Final Product (IDR/year)	Potential Loss based on Production Cost (IDR/year)
White rice	0.13	2.86	6,000	50,085,300	40,068,240
Fried rice	0.13	0.92	25,000	67,068,750	53,655,000
Fried vermicelli	0.1	0.33	25,000	30,112,500	24,090,000
Fried noodle	0.1	0.19	25,000	17,622,656	14,098,125
Fried sohun	0.1	0.51	25,000	46,936,719	37,549,375
Sauteed pumkin	0.83	0.33	25,000	3,585,410	2,868,328
Sauteed long beans	0.83	0.43	25,000	4,720,538	3,776,431
Sauteed cabbage	0.83	0.11	25,000	1,181,852	945,482
Pakcoy	0.83	0.12	25,000	1,284,921	1,027,937
Balado eggplant	0.83	0.18	25,000	1,937,688	1,550,151
Eggplant with cabbage	0.83	0.10	25,000	1,071,913	857,530
Soy sauce chicken	0.1	0.37	30,000	40,378,125	32,302,500
Butter fried chicken	0.1	0.57	30,000	62,072,813	49,658,250
Chicken curry	0.1	0.43	30,000	47,564,063	38,051,250
Indonesian chicken curry	0.1	0.38	30,000	42,089,063	33,671,250
Total	7.82			417,712,311	334,169,848

The loss value based on the final product price was five times higher than that of based on the raw material. This is possibly due to the uncounted components of the calculation. A high loss value in the final product price may also be due to the price of food in hotels, which consist of

various additional cost include taxes, operational costs, services, and etc. Another study by Fachrunnisa et al. (2019) and Wulansari (2019), however, found that the estimated loss value based on the raw material is slightly similar to that of based on the final product price.

The findings indicate that if food surplus is not utilised, it may cause an enormous loss from a resource and economic perspective. The resources and economic value are wastage along with the wasted food. because if it is related to the circular economy concept, limited resources cause everyone to use them wisely to maintain resource availability (Ellen MacArthur Foundation, 2012). In addition to the resulting impact on the environment and the economy, food waste also has a social impact (Salhofer et al., 2008). Food surplus and discarded leftover food is also a form of waste of resources, because the raw materials that have been used to make food are wasted and are not utilised.

### Conclusions

Facing the Covid-19 pandemic situations, hotels can adapt the breakfast serving system from a buffet to a room service mechanism. This can be applied not only because guests may feel safer for not gathering with other guests, but also the potential of food surplus from overaged food system in buffet can be reduced. The pandemic period is an entry point for arranging the food serving mechanism in hotels that can minimise food surplus from buffet activities. It is expected that this mechanism can become a new habit that may continue to be applied or as an option of guest breakfast preferences. The potential for food waste can be minimised because the hotel only cooks as much food as the number of guests. Hotels can also optimise the taste and volume of food, thus no food is wasted. Future research is needed to compare the breakfast mechanism before and after the Covid-19 pandemic era.

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### Conflict of Interest

The author declares that there is no conflict of interest in this publication

### References

- Beretta, C., and Hellweg, S. (2019) 'Potential environmental benefits from food waste prevention in the food service sector', *Resources, Conservation, & Recycling*, 147, pp. 169-178
- Diayudha, L. (2020) 'Hotel industry in Indonesia during the Covid-19 pandemic: a descriptive analysis', *Journal FAME: Journal Food and Beverage, Product and Services, Accomodation Industry, Entertainment Services*, 3(1), pp. 1-56 [In Indonesian]
- Ellen MacArthur Foundation (2012) Towards the circular economy: economic and business rationale for an accelerated transition. Ellen MacArthur Foundation. Available at <http://ellenmacarthurfoundation.org/business/reports>
- Fachrunnisa, I., Nuva, and Ekayani, M. (2020) Estimated loss value and efforts to reduce potential food waste from the producers perspective. Thesis. Bogor: Institut Pertanian Bogor. [In Indonesian]
- Juvan, E., Grun, B., and Dolnicar, S. (2018) 'Biting off more than they can chew: food waste at hotel breakfast buffets', *Journal of Travel Research*, 57(2), pp. 232-242
- Ministry of Health of the Republic of Indonesia/KemenkesRI (2014) Guidelines for conversion of cooked-raw weight, edible weight (BDD) and recipes for ready-to-eat food and snacks. Jakarta: Kemenkes RI [In Indonesian]
- Kuo C., and Shih, Y. (2016) 'Gender differences in the effects of education and coercion on reducing buffet plate waste', *Journal of Foodservice Business Research*, 19(3), pp. 23-35
- Merli, R., Preziosi, M., Acampora, A., and Ali, F. (2019) 'Why should hotels go green? insight from guests experience in green hotel', *International Journal of Hospitality Management*, 81, pp. 169-179
- Papargyropoulou, E., Lazano, R., Steinberg, J.K., Wright, N., and Ujang, Z.B. (2014) 'The food waste hierarchy as framework for the management of food surplus and food waste', *Journal of Cleaner Production*, 76(2), pp. 106-115.
- Pirani, S. I., and Arafat, H. A. (2015) 'Reduction of food waste generation in the hospitality industry', *Journal of Cleaner Production*, 132, pp. 129-145
- Prasanna, K. (2013) 'Standard operating procedures for standalone hotels', *Research Journal of Management Sciences*, 2(7), pp. 1-9
- Quan, S., and Wang, N. (2004) 'Towards a structural model of the tourist experience: an illustration from food experiences in tourism', *Tourism Management*, 25(3), pp. 297-305
- Salhofer, S., Gudrun, O., Felicitas, S., and Sandra, L. (2008) 'Potentials for the prevention of municipal solid waste', *Waste Management*, 28(2), pp. 245-259
- Sihaloho, E. D. (2020) The impact of Covid-19 on the Indonesian economy. Papers in: online discussion Pahami, Perangi dan Taklukkan Dampak si Covid-19 at GMKI Komisariat Telkom (Accessed on 11 April 2020). [In Indonesian]
- Taufik, and Ayuningtyas, E.A. (2020) 'Impact of the Covid-19 pandemic on business and the existence of online platforms', *Jurnal Pengembangan Wiraswasta*. 22(1), pp. 21-32 [In Indonesian]
- Tekin, O. A., and Ilyasov, A. (2017) 'The food surplus in five-star hotels: a study on Turkish guests attitudes', *Journal of Tourism and Gastronomy*,

5(3), pp. 13-31

Wulansari, D., Ekayani, M., and Karlinasari. (2019)  
'Study of food waste generation from food stalls',  
*ECOTRHOPIC: Jurnal Ilmu Lingkungan*, 13(2),  
pp. 125-134 [In Indonesian]