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# Food Wastage, a Threat to Indonesian Tourism

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## ABSTRACT
Food waste is a pressing global issue, particularly in the tourism sector, where sustainability has become a key focus. Defined as edible food discarded unnecessarily, food waste significantly impacts environmental health. Indonesia is one of the largest producers of food waste in Southeast Asia, generating 20.93 million tons annually, according to the UNEP 2021 report. The tourism industry's food and beverage sector is a major contributor, exacerbated by consumer behavior, overproduction, and inadequate waste management. This study explores the attitudes and behaviors of domestic tourists toward food waste in Labuan Bajo, one of Indonesia's super-priority destinations. Using a quantitative approach, the research examines the influence of tourists' attitudes and knowledge on food waste reduction, mediated by sustainable awareness. Findings reveal that while visitors recognize the importance of reducing waste, behavioral gaps persist due to cultural habits, lack of awareness, and ineffective practices. The study emphasizes the economic and environmental consequences of food waste, including greenhouse gas emissions and lost economic potential. Recommendations include fostering sustainable food practices, enhancing infrastructure, and raising awareness to align tourism development with Sustainable Development Goals (SDGs). This research offers valuable insights to policymakers and stakeholders aiming to make Indonesian tourism more sustainable and responsible.

**Keywords**: *Food waste, food loose, environmental health, sustainable environment*.

## INTRODUCTION
The body of the paper begins with the Introduction. Food waste, sometimes referred to as food loss and waste, is the large quantity of food that is thrown away or not eaten. Food waste Contrarily, food waste is defined as food that is appropriate for consumption but is purposefully thrown out by customers. This can occur for several reasons, including overindulgence, and food that has past its best-before date but is still edible. In Indonesia, food waste is a serious issue with wide-ranging effects on the economy, ecology, and society. After China, Indonesia has the second-highest rank of food waste worldwide. In 2021, a report by the United Nations Environment Program (UNEP) stated that Indonesia's annual food waste amounted to 20.93 million tons, and established Indonesia as the nation producing the most food waste in Southeast Asia.

Economic losses resulting from food loss and waste (FLW) in Indonesia range from IDR 213 trillion to IDR 551 trillion annually, or 4% to 5% of the country's GDP, this potential economic loss figure could be substantially higher. As a result, the actual number can be higher than the computation. Food waste represents a substantial economic loss to Indonesia's GDP. This squandered resource could feed between thirty and forty percent of Indonesia's population if it were managed properly (Nisaputra, 2023). Indonesia has a high number of food waste due to a confluence of factors including infrastructure, education, economic effects, management, culture, and education. Over the previous 20 years, food waste in Indonesia has resulted in greenhouse gas emissions of 1,702.9 Megatons of CO2 equivalent or 7.29% of average annual GHG emissions. 8% of greenhouse gas emissions worldwide come from food waste, which is equal to emissions from both China and the US. Burning food waste releases methane gas, which

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has the potential to increase global warming 25 times more than carbon dioxide (Universitas Negeri Semarang, 2023). A multi-strategy is needed to reduce food waste, one that includes enhancing infrastructure, raising public understanding of the significance of sustainable food management, and altering community behavior (Maulana, 2023). Despite being a country that generates a lot of food waste, Indonesia also faces problems of hunger and malnutrition. Food shortages still affect 8.34% of Indonesians, according to data, even though, with good management, food waste may feed millions of people (Nisaputra, 2023). In addition, Indonesia relies on imports to meet food demands, especially rice and wheat. The government is frequently forced to import a lot of food to ensure supply stability due to inadequate local production. Indonesia imported roughly $919 million worth of wheat from Ukraine in 2021, illustrating its dependence on the global market (Rozaki, 2021).

Food waste in Indonesia can be attributed to several factors, such as the practice of individuals leaving food behind, logistical challenges during transit, and inadequate industrial processing (Natalia, 2024). In addition, other issues contributing to Indonesia's high rates of food waste such as :

- Inefficiency of food handling after harvest, Food is not processed and stored efficiently when proper post-harvest handling is not followed, which raises the possibility of damage and waste.
- People are unaware of the detrimental effects of throwing away food because of uninformed or uneducated on the significance of decreasing food waste.
- Market Quality Standards & Consumer Preferences: High market quality standards and consumer preferences can lead to food waste. For example, products rejected by supermarkets for not meeting quality standards (Klinik Agromina Bahari, 2021)

***Food Waste in Tourism Industry***

In Indonesia, food waste is a serious problem that has multiple connections to the travel and tourism industry. In Indonesia, the food waste problem is mostly caused by the tourism industry, the high levels of food waste within this sector can lead to a reduction in tourism revenue as visitors may perceive the lack of efficient waste management as a negative aspect of the travel experience. Food waste is mostly caused by hotels, restaurants, and catering services; in Jakarta, 35% of restaurants regularly discard extra food that isn't sold (Haryanti, 2023). Several interrelated issues contribute to food waste in the Indonesian tourism sector:

- Overproduction and Excessive Presentation: To accommodate different guest preferences, many hotels and restaurants overproduce and serve a lot of leftover food. This is especially noticeable at busy times and special occasions when demand spikes, which frequently leads to 35% of Jakarta restaurants throwing out extra food every day.
- Consumer Behavior: Due to cultural customs that promote plenty, both tourists and residents frequently show a propensity to leave food uneaten. This practice adds to the high rates of food waste that are seen during holiday times, like Ramadan, when demand for food rises but waste also rises, with waste rising by 20% on average.
- Ineffective Waste Management Practices: Ineffective waste management techniques are frequently absent from the tourism industry. A large number of establishments lack procedures for composting organic waste or dispersing excess food, which makes the issue of food waste ending up in landfills worse.
- Lack of Education and Awareness: When it comes to sustainable food consumption and waste management methods, both visitors and local businesses generally lack awareness. We're only getting started with our efforts to inform stakeholders about how food waste affects the environment.
- Cultural Factors: Large quantities of food are frequently prepared due to cultural conventions surrounding hospitality, which feeds into a loop where excess is expected and subsequently wasted. This cultural factor makes it more difficult to adopt more environmentally friendly procedures in the travel and tourist industry.
- Economic constraints: Although the tourism industry has a strong demand for food, firms may find it difficult to effectively manage supplies due to these limits, which may result in over-purchasing and waste.

Food waste has a negative financial impact on Indonesia's tourism sector due to significant direct losses, inefficient use of resources, and lost potential for both economic and nutritional growth. For the tourism industry to be sustainable over the long run, these problems must be addressed through effective waste management

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techniques and sustainable practices.

According to the findings of a pre-survey completed by 195 respondents, 180 respondents, or 92.3% of the sample, reported having seen, heard of, or experienced food waste in the surrounding area, whereas 15 respondents, or 7.7% of the sample, reported never having seen, heard of, or experienced food waste. Additionally, 96.4% of respondents, or 188 people, said that food waste behavior should be avoided or decreased, and 99.5% of respondents, or 194 people, agreed that teaching children how to prevent food waste at a young age is essential.

Furthermore, according to respondents, several factors contribute to food waste behavior. For example, 76.9% of respondents, or 150 respondents, said that eating too much or lacking self-control is a factor in food waste behavior; 113 respondents, or 57.9%, said that disrespecting food is a factor in food waste behavior; and 52.3%, or 102 respondents, said that no one taught or instilled good behavior toward food from an early age. There were 99 respondents, or 50.8%, who reported feeling full or bored, 98 respondents, or 50.3%, who reported not caring about eating, and 68 respondents, or 34.9%, who reported not having someone nearby to remind them.

Regarding the second set of pre-survey results, which deal with actions that can be taken to foster an awareness of food as a source of life, up to 79% of respondents, or 154 people, said that they felt it was essential to develop "self-control" over food. Furthermore, up to 150 respondents, or 76.9%, believe that it's critical to inculcate virtues like compassion and a love of eating at a young age. Furthermore, 122 respondents, or 62.6% of the sample, stated that in an attempt to inculcate positive ideals around food, it is critical to show empathy to those in positions of authority.

The behavior of domestic tourists toward food waste will be investigated in this study, with a focus on the Labuan Bajo region, one of Indonesia's top tourist destinations. This study aims to ascertain the relationship between the phenomenon of food waste in the tourism industry and domestic tourists, To help the local government develop strategies to prevent food waste by raising tourist awareness, attitudes, and behavior, as well as to enable the realization of the Sustainable Development Goals (SDGs). This study also aims to identify the primary reasons behind domestic visitors' conduct of wasting food when visiting Labuan Bajo.

## METHODOLOGY

This Study uses quantitative research based on factual data by numerical values that can be calculated using statistics as a tool to do calculations relevant to the issue under study and draw conclusions (Sekaran & Bougie, 2016). The subject of this research is the visitor of Labuan Bajo which is one of the 5 Indonesia Super Priority Destinations, the sampling techniques use Hair theory formulas (F.Hair et al., 2010), with the number of respondents 140. Research instruments are required to gather data. The research instrument is a measurement and observation equipment that generates numerical data.

Research tools quantify the variables' values. This study used one dependent variable, Reduce Food Waste Behavior, and two independent variables, visitors' attitude, and knowledge, mediating by Sustainable Awareness as intervening variable. A questionnaire using a Likert scale of six was employed as the study tool. The Likert scale statements on the questionnaire were given to a subset of Labuan Bajo tourists. To reflect their attitudes against food waste, respondents were asked to score each statement according to how much they agreed or disagreed with it. A variety of reasons can be represented by the Likert scale, which can be modified to incorporate more or fewer claims as necessary. The Likert scale gauges the attitudes, beliefs, and perceptions of an individual or a group about social phenomena. The table below displays the shape of the assessment score using the Likert 6 scale (Chang, 1994).

**Table 1.** Likert 6 Scale

| 1.....6 | |
|---|---|
| Strongly Disagree | Strongly Agree |

Primary and secondary data sources were used in this research. Field observations, survey data from domestic tourist questionnaires, and interviews with study stakeholders serve as the Primary data sources, and secondary data is a literature study that can support the primary data source so that both data can be connected and be proven valid. The descriptive analysis approach, which is a technique for describing or analyzing research data with the conclusion of the outcome of hypothesis measurement, was employed by the researcher in this study. The process of data analysis involves providing a description or illustration of the gathered data to conclude the hypothesis test that can be applied to a broader population (Sekaran & Bougie, 2016). Using SmartPLS

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4.0 software, the researcher employed validity and reliability tests as well as descriptive hypothesis testing to examine the data for this study. With the use of the Smart PLS 4.0 program, this work employs a structural equation modeling (SEM) methodology (Hair et al., 2019). Two modeling stages will be used in the SEM-PLS analysis, the measurement model will be tested in the first stage to guarantee a sufficient degree of model suitability as well as the validity and reliability of the construct, the structural model, which is the study's primary hypothesis, is next put to the test in the second step.

Hypothesis Development

In this study develop 7 hypotheses, as outlined in the formula below :

- H1 there is an effect between Visitors Attitudes (X1) on Reduce Food Waste Behavior (Y).
- H2 there is an effect between Visitors Knowledge (X2) on Reduce Food Waste Behavior (Y).
- H3 there is an effect between Visitors Attitudes (X1) on Sustainable Awareness (Z).
- H4 there is an effect between Visitors Knowledge (X2) on Sustainable Awareness (Z).
- H5 there is an effect between Sustainable Awareness (Z) on Reduce Food Waste Behavior (Y).
- H6 there is an effect between Visitors' Attitudes (X1) on Reduce Food Waste Behavior (Y), mediating by Sustainable Awareness (Z).
- H7 there is an effect between Visitors Knowledge (X2) on Reduce Food Waste Behavior (Y), mediating by Sustainable Awareness (Z).

In order to determine the role of the mediator variable, two lines of path influence, which is direct and indirect, will be compared, namely in hypotheses 1 and 2 to hypotheses 6 and 7.

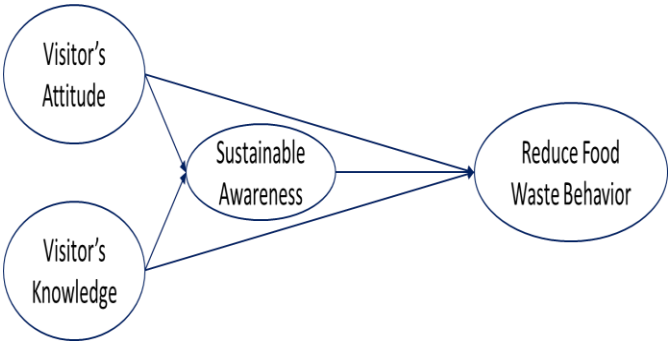


Figure 1. Model Construct
Source : Own 2024

## RESULT AND DISCUSSION

A survey questionnaire targeted at visitors to Labuan Bajo was used to collect data. 140 respondents completed the questionnaire, which was distributed via WhatsApp using a Google form. According to the data collection period, which was March 2024, the questionnaire was only collected once, or what is known as cross-sectional studies (Sekaran & Bougie, 2016). The demographics of respondents described as women make up the majority of respondents 90 individuals (64.3%), while males 50 individuals (35.7%). According to the occupations of the respondents, 56 persons, or 40% of the total respondents, were private employees. At 34.3%, students made a considerable contribution as well, demonstrating the group's strong representation in the dataset. Individuals working for themselves contributed 8.6%, whereas employees of the public sector, such as ASN and TNI/Polri, contributed 2.9% and 5.7%, respectively. 6.4% of respondents were housewives, while 2.1% came from the "Other" category. According to data on educational backgrounds, 76 individuals (54.3%) out of 140 respondents had a D4/S1 education level. A noteworthy percentage of 30.7% belongs to the high school/vocational high school education level, and 10% is contributed by respondents with an S2/S3 education level.

The primary constructs of the conceptual model are measured in this study using a six-point Likert scale. To verify a high degree of construct reliability, the Cronbach Alpha coefficient was also examined; all constructs had acceptable values of more than 0.70 (Ghozali, 2021). Every item's loading factor value is more than 0.7, according to the findings of convergent validity assessments. It may be inferred, that all of the variable construction indicators Visitor Attitude (VA), Visitor Knowledge (VK), Sustainable Awareness (SA), and Reduce Food Waste Behavior (RFWB) applied. Every latent variable has an AVE value greater than 0.5, indicating that at least 50% of the variation can be explained by each variable. This indicates that every variable, as in Table 2, is deemed valid and satisfies the requirements for convergent validity (outer loading values are greater than 0.7). Based on the idea that each indicator ought to have a significant correlation with its corresponding concept, reflective indicator testing performs well when measuring constructions. This is accomplished by applying the cross-loading and Fornell-Larcker criterion to test the validity value results (Ghozali, 2021).

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**Table 2.** Convergent Validity – Outer Loading

| Variable | Indicator | Outer Loading |
|---|---|---|
| Visitors Attitudes | X1.1 | 0.781 |
| | X1.2 | 0.818 |
| | X1.3 | 0.885 |
| | X1.4 | 0.853 |
| | X1.5 | 0.824 |
| Visitors Knowledge | X2.1 | 0.842 |
| | X2.2 | 0.846 |
| | X2.3 | 0.893 |
| | X2.4 | 0.883 |
| Reduce Food Waste Behavior | Y1.1 | 0.896 |
| | Y1.2 | 0.909 |
| | Y1.3 | 0.883 |
| Sustainable Awareness | Z1.1 | 0.855 |
| | Z1.2 | 0.879 |
| | Z1.3 | 0.802 |

Source: Data Analysis 2024

Tests for Reliability evaluate the questionnaire's consistency. Cronbach's Alpha and composite reliability, which gauges the internal consistency of the elements inside each indicator, can be used in SmartPLS to evaluate dependability. For strong internal consistency, make sure the composite reliability and Cronbach's Alpha are both above 0.7, shown as in Table 3.

Testing of hypotheses involves examining test results on the Original Sample (beta coefficient), T statistics, and P Values (as shown in Table 4) to determine the influence between variables. The T statistics value is 1.96, which means that for each variable to be considered significant, the T statistics value must be greater than 1.96. T statistics is a statement of the significance value of the relationship between one and another variables (the level of significance is taken at a 5% error rate). Table 4 presents a summary of the path coefficient data.

**Table 3.** Reliability Test

| | Cronbach's Alpha | rhoA | Composite Reliability | (AVE) |
|---|---|---|---|---|
| *Visitors Attitudes* | 0.89 | 0.897 | 0.919 | 0.694 |
| *Visitors Knowledge* | 0.801 | 0.808 | 0.883 | 0.716 |
| *Sustainable Awareness* | 0.877 | 0.877 | 0.924 | 0.803 |
| *Reduce Food Waste Behavior* | 0.89 | 0.902 | 0.923 | 0.751 |

Source: Data Analysis 2024

**Table 4.** Path Coefficient

| | Hypotesis | *(O)* | *Sample Mean (M)* | *STDEV* | *T Stat* | *P Values* | *Result* |
|---|---|---|---|---|---|---|---|
| H1 | X1→ Y | 0.339 | 0.325 | 0.098 | 3.449 | 0.001 | Accepted |
| H2 | X2 → Y | 0.031 | 0.058 | 0.118 | 1.430 | 0.808 | Not Accepted |
| H3 | X1→ Z | 0.531 | 0.518 | 0.083 | 6.406 | 0.000 | Accepted |
| H4 | X2 → Z | 0.167 | 0.364 | 0.100 | 1.987 | 0.037 | Accepted |
| H5 | Z → Y | 0.300 | 0.024 | 0.106 | 2.286 | 0.015 | Accepted |
| H6 | X1 → Z →Y | 0.126 | 0.141 | 0.129 | 1.987 | 0.002 | Accepted |
| H7 | X2→Z →Y | 0.101 | 0.581 | 0.120 | 1.970 | 0.00 | Accepted |

Source: Data Analysis 2024

Hypothesis 1 was Accepted, it shown by the values of Visitors' Attitude (X1) have a positive impact of 0.339 with a significant 3.449 to Reduce Food Waste Behavior (Y), but in another result, Hypothesis 2 was not accepted because of the values of path coefficient of Visitors Knowledge (X2) was 0.031 with significance of 1.430 (less than 1.96) it is determined that, there is positive impact (0.031) but not significant (1.430). Meanwhile, in Hypothesis 3 to Hypothesis 5 (direct impact) the values of the original sample were positive and significant impact on all independent variables to the dependent variable, it is determined as Accepted. A more thorough justification of indirect impact (Hypothesis 6 and 7), shows that there is a Positive (0.126) and significant (1.987) between Visitors' Attitudes (X1) on Reduce Food Waste Behavior (Y), mediated by Sustainable Awareness (Z), and there is positive (0.101) and significant (1.970) effect between

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Visitors Knowledge (X2) on Reduce Food Waste Behavior (Y), mediating by Sustainable Awareness (Z). It was determined that the mediation variable offered Full Mediation on the path between these variables because the mediator's role Sustainable Awareness, was able to alter the significance of the path between Visitors Knowledge and Reduce Food Waste Behavior, became positive and significant. The findings of this research, clearly show that visitor's attitudes have a significant, positive, and considerable impact on their efforts to reduce food waste behavior, and they also indirectly have a positive and significant impact through raising awareness of sustainability. Although visitor knowledge has no discernible impact on attempts to Reduce food waste behavior directly, it has been shown to have a favorable and considerable impact indirectly through raising awareness of sustainability. The limitations of this study include the lack of a wide variety of respondents which should include foreign tourists and residents, besides this it is also required to examine other factors such as perceived control and subjective norms. To get a more complete view, it can also be enhanced by deepening it into qualitative research.

## CONCLUSION

This study examines the phenomena of reduced food waste behavior and pinpoints several primary factors. One of the primary reasons why some people fail to see the significance of preserving the value of food is because of attitudes that devalue it. Food waste behavior is also significantly influenced by a lack of self-awareness regarding the worth of food, suggesting that a lack of knowledge about the negative social and environmental effects of food waste might serve as a primary catalyst for this activity. Another significant element is the lack of external reminders, as neglect or insufficient supervision can raise the risk of food waste.

The study's recommended preventive measures encompass a variety of initiatives that both people and communities can do. Individuals can take direct action by reducing meal quantities, employing conspicuous reminder signs, and raising public awareness of the significance of reducing food waste behavior. Conversely, cooperative efforts between producers, food providers, and other stakeholders are necessary for methods involving prudent food production planning, needs-based food procurement, and efficient raw material storage management. Strategies that involve community participation in anti-food waste campaigns and the use of food waste as fertilizer or animal feed are pertinent to creating sustainable solutions. Therefore, the key to tackling food waste issues and advancing sustainability is to alter mindsets, increase awareness, and put complete preventive measures into place.

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## DECLARATIONS

Conflict of Interest, We declare no conflict of interest, financial or otherwise.

## ETHICAL APPROVAL

The corresponding author, on behalf of all authors, affirms that the study complies with ethical standards. No human subjects or animals were involved in the research, and all procedures were conducted according to applicable ethical guidelines and regulations.

## INFORMED CONSENT

On behalf of all authors, the corresponding author confirms that all informants have given their informed consent and agreed to the inclusion of their information in the study.

## DATA AVAILABILITY

The data supporting the findings of this study can be obtained from the corresponding author upon request

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