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Research Article

Determinants of Food Waste Behavior in Culinary Tourism in Batam City: The Role of Intention to Reduce Food Waste, Attitude, and Personal Norm

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ABSTRACT

Culinary tourism not only offers gastronomic experiences but also contributes to the increase of food waste. This food waste arises from tourists' behavior of not finishing their meals. The purpose of this study is to identify the factors that influence tourists' food waste behavior, specifically their tendency not to finish their food, which eventually ends up in the trash at culinary tourism sites in Batam City. This research employs a quantitative approach with 325 respondents who have visited culinary tourism destinations in Batam City. The questionnaire used as the research instrument was first validated by culinary industry experts through a Focus Group Discussion (FGD). Data were analyzed using PLS-SEM, including outer model testing to ensure the validity and reliability of the constructs, and inner model testing to examine the relationships among variables. The findings indicate that personal norm has a significant effect on the intention to reduce food waste, whereas attitude and food taste do not. Furthermore, for the mediation effect through food waste behavior, only personal norm shows a significant indirect effect mediated by the intention to reduce food waste, while food taste and attitude show no significant influence. This study calls for greater awareness and concern toward food consumption, emphasizing the importance of finishing meals during culinary tourism activities.

Keywords: Food Waste; Attitude; Personal Norm; Intention To Reduce Food Waste; Food Waste Behavior

1. INTRODUCTION

Food waste refers to discarded food from dining tables that is left uneaten. Currently, food waste has become a significant issue for both society and the environment (Salem & Wagner, 2025). This is because decomposing food waste in landfills produces large amounts of methane gas, which is a more potent contributor to global warming than CO_2 (Appel et al., 2025). According to a report issued by Bappenas (bappenas, 2024), the urgency of addressing food waste and food loss during the period of 2000–2019 reached 23–48 million tons per year. This amount is equivalent to a loss of 213–551 trillion rupiahs, or about 4%–5% of Indonesia's annual GDP. Furthermore, food loss and food waste occur predominantly at the consumption stage, specifically among consumers (Salem & Wagner, 2025). Based on another report, food waste has increased by 40,000 tons per year, indicating that immediate solutions are urgently needed (Filimonau et al., 2025).

The loss of food also means the loss of life-sustaining nutrients for those in need, as well as the waste of resources such as water, land, and energy used in the distribution, processing, and production of food (Demetriou, 2022). In addition to household dining tables, food waste is also generated by tourists, particularly at culinary tourism destinations. According to research conducted by Çetin (2024), tourists tend to discard more food while traveling compared to their regular daily consumption.

In general, researchers on food waste often use the Theory of Planned Behavior, which was first introduced by Ajzen(Ajzen, 2020). This theory is considered highly suitable for explaining human behavior through the variables of attitude, subjective norm, and perceived behavioral control(Long et al., 2024; Panda et al., 2024). Attitude reflects whether an individual supports or rejects a certain behavior (Salem & Wagner, 2025). Considering that the relationship between behavior and the amount of food waste generated is not straightforward, and that food waste behavior involves strong habitual elements, it is not surprising that the factors motivating individuals to reduce food waste are diverse and encompass various themes and motivations (Quested et al., 2013).

Another factor related to food waste disposal behavior is personal norm. The Norm Activation Theory (NAT) is one of the theoretical foundations often used to explain behavioral intentions in the context of pro-environmental consumer behavior (Filimonau et al., 2023; Quested et al., 2013). Personal norms to reduce food waste can be formed at an early age and passed down within families from generation to generation.

The intention to reduce food waste involves rational decision-making processes, such as planning food purchases (Chang, 2022), implementing budgeting systems, fostering community understanding, and promoting awareness and concern about food waste. This study provides a new perspective on the issue of food waste in culinary tourism [12]. Batam is one of the most popular tourist destinations, offering a wide variety of attractions, including marine tourism, shopping tourism, and culinary tourism. However, culinary tourism can contribute to an increase in food waste in Batam City. Therefore, this study on food waste aims to produce practical recommendations for both the government and culinary business owners, ensuring that culinary tourism in Batam can develop sustainably.

Several studies have examined food waste using the Theory of Planned Behavior (Ajzen, 2020), such as those conducted by Salem et al. (2025), Filimonau et al. (2025), and Li et al. (2024). In addition, other studies on food waste behavior have applied the Norm Activation Theory (NAT), as this theory is more suitable for explaining pro-environmental behavior through the variable of personal norm, as seen in the studies by Panda et al. (2024) and Iriady et al. (2023). According to their findings, the Theory of Planned Behavior alone is no longer sufficient to accurately measure food waste behavior. Therefore, this study integrates the Theory of Planned Behavior—specifically the variable of attitude—with the Norm Activation Theory (NAT) variable of personal norm. This combination is expected to provide a more accurate understanding of food waste behavior.

This study involves several different culinary tourism locations within Batam City, including restaurants, street food vendors, food producers, and culinary tourism sites. The purpose of selecting diverse locations is to obtain unbiased and valid responses from participants. This approach differs from previous studies that focused on a single type of location, such as hotels (Quested et al., 2013), universities (Chang, 2022), restaurants (Alhamdi, 2018), (Filimonau et al., 2023), or online food delivery services (Li et al., 2024), (Iriyadi et al., 2023).

2. RESEARCH METHOD

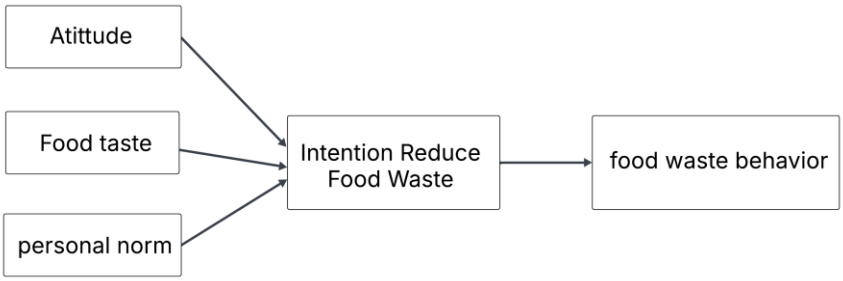

Figure 1. Research Framework

This study employs a quantitative approach with the aim of identifying and analyzing the factors that influence tourists' food waste behavior in Batam City. The quantitative approach was chosen because it allows the researcher to objectively measure the relationships among variables using numerical data and statistical analysis (Aktas et al., 2018). The population of this study consists of tourists visiting culinary tourism destinations in Batam City. The sampling technique used is random sampling, in which samples are randomly selected from the population that meets the research criteria. The sample size was determined using the formula proposed (Leguina, 2015)., which suggests a minimum of 5–10 times the number of indicators in the questionnaire. For example, if there are 20 indicators, the minimum sample size would be 100–200 respondents. The final sample size in this study was set at 350 respondents.

The research instrument used in this study was a closed-ended questionnaire with a 5-point Likert scale, ranging from strongly disagree to strongly agree. The questionnaire was developed based on the constructs of the Theory of Planned Behavior (TPB) and the Norm Activation Theory (NAT), which include the variables Attitude, Food Taste, Personal Norm, Intention to Reduce Food Waste, and Food Waste Behavior. Data collection was conducted by directly distributing the questionnaires to tourists at several major culinary centers in Batam City. Respondents were randomly selected based on the criteria of being tourists currently visiting the site and willing to complete the questionnaire. Data collection was carried out over a specific period. Respondents were randomly chosen in accordance with these criteria.

The data obtained were analyzed using the SmartPLS (Partial Least Squares) application. The analytical steps included validity and reliability testing by examining the Outer Loadings, where values equal to or greater than 0.7 were considered valid. Next, the Average Variance Extracted (AVE) was assessed; a value of ≥ 0.5 indicated construct reliability. The Fornell-Larcker Criterion was then used to analyze discriminant validity, while Composite Reliability (CR) values of ≥ 0.7 indicated construct reliability. After evaluating the outer model, the next step was to analyze the Structural Model or Inner Model. The R-Square (R^2) test was used to determine the magnitude of influence among variables. The Bootstrapping procedure was conducted to obtain t-statistics, p-values, and path coefficients, which served as the basis for hypothesis testing.

Table 1. Research Statement and Language Sources

Code	Source	Research Statement
ATT1	Attitude (Aktas et al., 2018)	I feel uncomfortable when uneaten food is thrown away.
ATT2		I was raised with the belief that food should not be wasted.
ATT3		I believe that food should not be wasted.
ATT4		Throwing away food does not bother me.
FT1	Food taste (Zhang & Zhang, 2025)	I think the food I bought at the culinary tourism site is not tasty.
FT2		I think the food I bought at the culinary tourism site is not something I like.
FT3		I throw away food that doesn't taste good or that I don't like to eat.
PN1	Personal norm (Iriyadi et al., 2023)	I feel guilty when throwing away food because there are others who cannot get enough to eat.
PN2		I would be a better person if I did not waste food or if I were someone who did not litter.
PN3		I feel disturbed by the amount of food being wasted because food production requires many resources to grow, process, package, and transport it.
PN4		I feel obligated to reduce food waste, and this becomes a consideration when choosing food or groceries.
IRFW1	Intention reduce food waste (Fazal-e-Hasan et al., 2024)	I am willing to reduce food waste in the future.
IRFW2		I am willing to put in the effort to reduce food waste.
IRFW3		I intend to reduce food waste.
IRFW4		I plan to reduce food waste.
FWB1	Food waste behavior (Aktas et al., 2018)	I throw away food every time I go out with friends or family.
FWB2		I throw away food every time there are guests at my house.
FWB3		I throw away food at work or school.
FWB4		I throw away food at home every time I am about to travel.

3. RESULTS AND DISCUSSION

3.1 Description of Respondents

After the data collection was completed, the researcher conducted an analysis of the data obtained. The data are presented as follows.

Table 2. Respondent Characteristics

Characteristics of the Respondents	Frequency	Percentage
< 20 Years	110	34%
21-30 Years	160	49%
31-40 Year	40	12%
31-40 Years	15	5%
Gender		
Male	115	35%
Female	210	65%

Table 2. Based on age characteristics, the majority of respondents were in the 21–30 year age range, totaling 160 people (49%). This indicates that the young adult group dominated the study, which is generally considered a productive age group with high mobility in both tourism and public activities. Respondents under 20 years old were the second largest group, with 110 people (34%), indicating significant participation from teenagers or university students. Meanwhile, respondents aged 31–40 totaled only 40 people (12%), and those over 40 were the smallest group, with 15 people (5%). This condition shows that most respondents came from the younger age group, accounting for 83%, so the study results tend to more strongly represent the perspectives of this age group. In terms of gender, the number of female respondents was higher than that of male respondents. A total of 210 respondents (65%) were female, while 115 respondents (35%) were male. This significant difference indicates that female participation in the study was higher than male participation. Thus, it can be concluded that the majority of respondents involved in this study were young and female. The following section presents the factor loadings for this study.

3.2 Outer Model Assessment

Table 3. Loading Factor

Indicators	Mean	Outer loading	Composite Reliability	AVE	Cronbach Alpha	Standard Deviation
ATT1	3.692	0.816	0.897	0.687	0.847	1.149
ATT2	4.075	0.888				0.975
ATT3	4.031	0.864				0.974
ATT4	3.994	0.74				0.887
FT1	4.201	0.898	0.93	0.815	0.887	0.801
FT2	4.239	0.919				1.755
FT3	4.258	0.891				1.437
IRFW1	4.27	0.895	0.946	0.813	0.924	0.75
IRFW2	4.208	0.916				0.778
IRFW3	4.277	0.904				0.776
IRFW4	4.252	0.893				0.824
PN1	4.327	0.86	0.939	0.795	0.914	0.813
PN2	4.308	0.937				0.76
PN3	4.252	0.9				0.769
PN4	4.34	0.867				0.792
FWB1	4.409	0.883	0.926	0.759	0.893	0.72
FWB2	4.277	0.917				0.743
FWB3	4.233	0.906				0.787
FWB4	4.308	0.772				0.768

The results of the validity and reliability tests in Table 3 show that all research constructs Attitude (ATT), Food Taste (FT), Intention to Reduce Food Waste (IRFW), Personal Norm (PN), and Food Waste Behavior (FWB)—meet the required criteria. The Attitude construct has outer loading values ranging from 0.740 to 0.888, with a Composite Reliability (CR) of 0.897, an AVE of 0.687, and a Cronbach's Alpha of 0.847. This indicates that respondents' attitudes toward the issue of food waste can be measured reliably, even though some indicators have relatively lower loading values. The Food Taste construct shows very high outer loading values (0.891–0.919), with a CR of 0.930, an AVE of 0.815, and a Cronbach's Alpha of 0.887, indicating that food taste is an important and consistent factor influencing behavior. Next, the Intention to Reduce Food Waste construct demonstrates excellent reliability, with outer loadings of 0.893–0.916, CR of 0.946, AVE of 0.813, and Cronbach's Alpha of 0.924, reflecting that respondents' intentions to reduce food waste are very strong.

The Personal Norm construct also shows excellent results, with outer loadings of 0.860–0.937, CR of 0.939, AVE of 0.795, and Cronbach's Alpha of 0.914, indicating that personal norms play a significant role as a moral driver in reducing food waste. The Food Waste Behavior construct has outer loading values of 0.772–0.917, CR of 0.926, AVE of 0.759, and Cronbach's Alpha of 0.893. Although some indicators have lower loadings, overall, food waste behavior can be measured consistently. Thus, it can be concluded that all constructs in this study are valid and reliable, and can be used for testing the structural model to examine the relationships among variables. The following section presents the Fornell-Larcker data.

Table 4. Fornell–Larcker

	Attitude	Intention Reduce Food Waste	food taste	food waste behavior	personal norm
Attitude	0.829				
Intention Reduce Food Waste	0.57	0.902			
food taste_	0.724	0.649	0.903		
food waste behavior	0.537	0.795	0.596	0.871	
personal norm	0.531	0.86	0.612	0.837	0.892

Based on **Table 4**, the results of discriminant validity testing using the Fornell–Larcker criterion show that all research constructs meet the requirements for discriminant validity. The square root of the AVE (√AVE) for each construct is higher than its correlations with other constructs. The Attitude construct has a √AVE of 0.829, which is greater than its correlations with other constructs (0.531–0.724). The Intention to Reduce Food Waste construct shows a √AVE of 0.902, higher than its correlations with other constructs (0.570–0.860). Similarly, the Food Taste construct has a √AVE of 0.903, exceeding its correlations with other constructs (0.596–0.724). The Food Waste Behavior construct has a √AVE of 0.871, also higher than its correlations with other constructs (0.537–0.837). Meanwhile, the Personal Norm construct records a √AVE of 0.892, which is greater than its correlations with other constructs (0.531–0.860). Thus, it can be concluded that each construct has clear uniqueness and can be distinguished from one another. Therefore, this research model meets the criteria for discriminant validity and is suitable to proceed to the structural model testing stage.

Table 5. Hypothesis

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
Attitude -> Intention Reduce Food Waste	0.075	0.09	0.067	1.12	0.263
Intention Reduce Food Waste -> food waste behavior	0.795	0.797	0.042	18.903	0
food taste_ -> Intention Reduce Food Waste	0.148	0.17	0.095	1.553	0.121
personal norm -> Intention Reduce Food Waste	0.73	0.697	0.097	7.559	0

The results of the structural model analysis indicate that not all relationships between constructs have a significant effect. The Attitude variable has a positive but not significant effect on the Intention to Reduce Food Waste (ß = 0.075; t = 1.12; p = 0.263), suggesting that respondents' attitudes toward food waste are not strong enough to form an intention to reduce it. Similarly, Food Taste also shows a positive but not significant effect on Intention (ß = 0.148; t = 1.553; p = 0.121), meaning that food taste does not directly encourage the formation of an intention to reduce food waste. In contrast, Personal Norm has a positive and significant effect on the Intention to Reduce Food Waste (ß = 0.730; t = 7.559; $p < 0.01$), indicating that personal norms are an important factor in shaping respondents' intentions. Furthermore, the Intention to Reduce Food Waste has a very strong and significant effect on Food Waste Behavior (ß = 0.795; t = 18.903; $p < 0.01$), showing that a strong intention drives actual behavioral changes in reducing food waste. Thus, the findings of this study confirm that personal norms are a key factor in forming intentions, and these intentions play a dominant role in influencing food waste reduction behavior, while general attitudes and food taste do not have a significant impact on respondents' intentions.

3.3 Inner Model Assessment

Table 6. Hypotheses with Mediation

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
Attitude -> Intention Reduce Food Waste -> food waste behavior	0.06	0.072	0.054	1.109	0.268
food taste_ -> Intention Reduce Food Waste -> food waste behavior	0.117	0.134	0.075	1.576	0.116
personal norm -> Intention Reduce Food Waste -> food waste behavior	0.581	0.557	0.088	6.632	0

The results of the indirect effect analysis indicate that not all constructs have a significant impact on Food Waste Behavior through the mediation of the Intention to Reduce Food Waste. The pathway from Attitude to Intention and then to Food Waste Behavior shows a positive but not significant effect (β = 0.060; t = 1.109; p = 0.268), suggesting that respondents' attitudes are not strong enough to shape behavior through intention. A similar result is observed for the pathway from Food Taste, which has a positive but not significant effect on Food Waste Behavior through Intention (β = 0.117; t = 1.576; p = 0.116). In contrast, the pathway from Personal Norm shows a positive and significant effect on Food Waste Behavior through the mediation of Intention (β = 0.581; t = 6.632; p < 0.01). These results indicate that personal norms are a key factor in forming intention, and this intention effectively drives actual behavior in reducing food waste. Thus, the role of personal norms is proven to be dominant in bridging the relationship between individual moral values and concrete actions to reduce food waste, while general attitudes and food taste do not have a significant effect through the intention mechanism.

3.4 Discussion

The results of the study indicate that food taste does not have a significant effect on food waste behavior. This suggests that food taste is not the primary factor determining the behavior of discarding food at culinary tourism sites in Batam. Although previous literature (Zhang & Zhang, 2025) found that food taste can contribute to food waste, in the context of Batam, visitors may place greater emphasis on other factors, such as portion sizes, menu variety, or personal norms in food consumption. Therefore, food taste is not a dominant variable in shaping food waste behavior at culinary tourism sites in Batam. The study also shows that attitude does not have a significant effect on food waste behavior. This differs from previous research (Aktas et al., 2018; Melnyk et al., 2025), which stated that individual attitudes influence the intention and behavior of discarding food. This lack of significance may be due to the fact that, although someone may have a positive attitude toward not wasting food, real-life situations such as oversized portions or the desire to try various foods during culinary tourism actually encourage food waste. In other words, attitude alone is not strong enough to influence behavior without the presence of personal norms or stronger social factors.

The findings of the study indicate that personal norm has a significant effect on food waste behavior. This is in line with the research of Al Mamun et al.(2024), Filimonau, Matute, et al.(2025), and Chen et al. (2024), which emphasize that personal norms play an important role in reducing food waste behavior. Personal norms represent an internal moral drive that makes individuals feel obligated to reduce food waste. In the context of culinary tourism in Batam, visitors who have personal awareness of the negative impacts of food waste are more likely to act responsibly when selecting and consuming food, for example, by finishing their portions or sharing with others. This study found that the intention to reduce food waste does not mediate the effect of food taste on food waste behavior. This indicates that even if someone has the intention to reduce food waste, food taste alone is not strong enough to trigger a change in behavior.

The results of the study show that the intention to reduce food waste does not mediate the relationship between attitude and food waste behavior. Thus, a positive attitude toward reducing food waste does not automatically translate into a consistent intention or concrete action to minimize food waste. This study demonstrates that the intention to reduce food waste mediates the effect of personal norm on food waste behavior. In other words, a strong personal norm fosters a greater intention to reduce food waste, and this intention ultimately influences actual behavior. These findings are consistent with the research of Iriyadi et al. (2023), which emphasizes that personal norms can shape an individual's intention to reduce food waste. In the context of Batam, this means that culinary tourists with moral awareness tend to have a strong intention not to leave food uneaten, which is ultimately reflected in more responsible consumption behavior.

4. CONCLUSION

Based on the results of the study, it can be concluded that food waste behavior at culinary tourism sites in Batam City is not significantly influenced by food taste or attitude, even though these factors have been shown to be influential in previous studies. This indicates that the taste of food and a positive attitude toward reducing food waste are not strong enough to drive behavioral change in the context of culinary tourism. In contrast, personal norm has been proven to play an important role both directly and indirectly through the mediation of the intention to reduce food waste. A strong personal norm shapes an individual's intention to reduce food waste, and this intention ultimately manifests in actual behavior. The findings broadly illustrate that personal norms form the disposition not to waste food. Personal norms can also be instilled from an early age, for example, through parental guidance at home. Therefore, it can be concluded that moral awareness and a sense of personal responsibility are key factors in reducing food waste behavior at culinary tourism sites in Batam City. This study was conducted over a relatively short period. In addition, it used a small sample size and a limited scope, focusing only on Batam City. Several questions arise from this research, such as how personal norms differ between Generation Z and previous generations. Addressing this could help clarify which personal norms are most effective.

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