

Exploring food waste behaviour during dining out at restaurants: Young consumers' intention as a mediator

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ABSTRACT

Food waste is a global issue with significant social, economic, and environmental implications. Food waste can lead to environmental problems, including the release of greenhouse gases, global warming, and pollution. Food waste also affects society, as 800 million people experience hunger or malnutrition every year. Banyumas Regency, Indonesia, is one of the regencies that generates high food waste. One of the leading causes of food waste is post-consumer waste resulting from eating at restaurants or dining out. This study aims to analyze the influence of dining out behavior on food waste among young consumers in Banyumas Regency. The study examines dining-out behavior by identifying factors that contribute to food waste during dining out and exploring alternatives to mitigate its impact. The method employed was quantitative, involving interviews with 401 respondents. The data were analyzed using SEM-PLS. The results show that food choice (FC) has a significant influence on intention to reduce food waste (IFW), IFW has a significant influence on food waste behavior (FWB), and IFW mediates the relationship between FC and FWB. Furthermore, restaurants in Banyumas Regency can offer multiple portion sizes to young consumers, thereby reducing food waste. They can also provide a service to repackage leftovers made by consumers.

Keywords: *Banyumas; dining out; food choice; food-ordering routine; food waste behaviour*

INTRODUCTION

Food waste is a global problem with social, economic, and environmental (Coşkun & Özbük, 2020). From 2.5 billion tons of food consumed, one-third is wasted, and it causes an annual financial loss of \$750 billion (Forbes et al., 2021). Food waste can cause environmental problems, such as greenhouse gases, global warming, and pollution (Attiq et al., 2021). Food waste also affects society, as 800 million people experience hunger or malnutrition every year (Bravi et al., 2020).

Most developed countries generate the highest food waste at the retailer and consumer stages, and in developing countries, food waste occurs due to losses at the farm and pre-market levels (Economist Intelligence Unit, 2015). Food waste is generated at various stages, from farm to fork, and from households and outside the home during the consumption stage. It is related to consumer behaviour (Talwar et al., 2021).

In Indonesia, food waste is the most significant contributor, with 300 kg per capita annually (Economist Intelligence Unit, 2015). On the other hand, according to the Global Hunger Index Score, the hunger rate in Indonesia is 17.6% of the total population (Global Hunger Index, 2023). Food waste generated can come from households or non-household sources. A percentage of 40.7% of existing food waste is food waste suitable for consumption, and one of the factors contributing to food waste in restaurants (BAPPENAS, 2021). Banyumas Regency, Indonesia, is one of the regencies that produces high food waste. Based on data

from SIPSN, Banyumas Regency generated 536.89 tons of waste daily in 2022 and 195.96449 tons annually. One of the leading factors contributing to food waste is post-consumer waste, such as leftovers from eating at restaurants or dining out. The data showed that 52% of people's habits when eating outside the home, in response to food waste on plates, are mostly to leave it, and 48% of consumers wrap leftover food to take home (SIPSN, 2023).

Dining out behaviour is often considered a necessity and inseparable from people's lifestyles due to convenience and demographic changes (Kwon et al., 2020). All age groups, including young consumers, tend to exhibit the behaviour of eating out when they have less food at home. Young consumers tend to produce more food waste because of a lack of cooking skills (Cozzi et al., 2023; Vargas-Lopez et al., 2022). Therefore, this study aims to analyze the influence of dining out behaviour on the young consumer's perception of food waste in the Banyumas Regency. This study examines dining-out behaviour by identifying factors that cause food waste during dining out. This research provides insights to young consumers on how to participate in food waste reduction by increasing their awareness and knowledge of how to produce less food waste when dining out. It also plays a role for restaurants, eateries, and cafes to provide more environmentally friendly menu options, thereby reducing food waste.

Literature Review

Food waste (FW) is inserted in human consumption but not consumed, and thrown away, especially at the consumption stage (Ishangulyyev et al., 2019). Food waste is a significant global issue today, affecting both homes and restaurants. Food waste in restaurants is generated from three phases: food preparation, service, and customer consumption (Principato et al., 2021). The shame of taking home leftovers can cause food waste. The social norms and consumer attitudes are related to the intention to reduce food waste during dining out (C.-H. Huang & Tseng, 2020). Food waste also occurs due to the attention of information providers and restaurant consumers (Dagiliūtė & Musteikytė, 2019). Research framework can be seen in Figure 1.

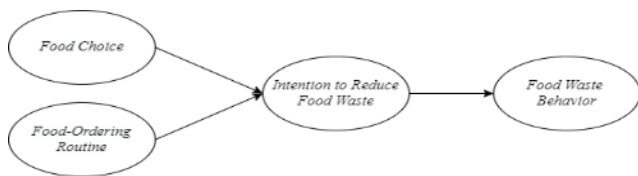


Figure 1. Research framework.

Food choice is an individual selection process that differentiates the food or menu (Teng et al., 2022). The Important aspects that are considered in food selection include good taste, low price, quality, and nutritional value (Marsolaa et al., 2022). Consumers make food choices based on awareness of prices, demonstrating that price awareness is essential to consumer decision-making. Price-conscious consumers tend to have the intention to reduce food waste (IFW) (Principato et al., 2018). Food selection is related to the health and moral aspects of food, and it affects consumers' food purchase decisions (Aktas et al., 2018). Therefore, food choices (FC) based on sensory appeal, price sensitivity, and health are used to reduce FW. Thus, the hypothesis is set as follows: **H1: FC influences IFW.**

A food-ordering routine (FO) is a process individuals use to buy food. Food-ordering routines enable consumers to order a wider variety of foods. A food-ordering routine is an essential stimulus in food waste because it reflects the possibility of leftover food due to less consumption (Talwar et al., 2021). In addition, some experts have discussed food portion size as one of the factors of food waste in restaurants (Berkowitz et al., 2016). Over-ordering and food being wasted on plates are factors related to food waste in restaurants (Talwar et al., 2023). People with regular food ordering patterns tend to have higher IFW. Therefore, the hypothesis is set as follows: **H2: FO influences the IFW.**

The theory of planned behaviour (TPB) mentions that intention has a significant influence on behaviour (Ajzen, 1991). It is assumed that the higher the intention toward

a behaviour, the more likely it is to be conducted. Behaviour is under a person's control, meaning a particular behaviour is intentionally based on the person's intention (Wajon et al., 2019). IFW helps reduce behaviour that lead to food waste (Aktas et al., 2018). Previous research suggested that intention to minimize food waste predicts food waste behaviour (FWB) (Coşkun & Özbük, 2020). The IFW is often associated with an individual's belief about the importance of the action. The hypothesis can be set as follows: **H3: IFW influences FWB.**

FWB occurs due to differences in skill levels in managing food in terms of buying, storing, and cooking food (Karunasena et al., 2021). The attitudes and perceived behavioural control significantly influence students' IFW (Wajon et al., 2019). There are 30% of young consumers choose to throw away leftover food rather than store it or give it to others, and they feel guilty when they waste food; it is a reasonable basis for efforts to prevent food waste (Lemy et al., 2020). The behaviour of vegetarians and non-vegetarians, which is influenced by values, attitudes, and behaviour when dining out (Kim et al., 2020).

In TPB, the IFW can mediate the interaction between individual attitudes towards food waste avoidance behaviour (Ajzen, 1991). Consumers with good food selection skills will order food and generate less food waste. Some studies suggest that the IFW mediates the effects of food choice on factors such as taste, appetite, price, and nutritional content. Customers who make the proper food selection exhibit environmentally friendly eating behaviours, leading to reduced food waste (Teng et al., 2022). Therefore, the hypotheses are set as follows: **H4: IFW mediates the relationship between FC and FWB** as well as **H5: IFW mediates the relationship between FO and FWB.**

METHODS

This research was conducted in Banyumas Regency. The method employed was quantitative, involving interviews with 401 respondents. The questionnaire was developed based on a literature study of factors contributing to food waste, and then distributed to respondents dining out in Banyumas. Data collection techniques were employed by distributing questionnaires offline and online. Then, the results were entered and collected into Google Forms. The questionnaire was divided into demographics and the food waste variable. The demographics included gender, occupation, age, spending, and frequency of dining out. The food waste variable included FC, FO, IFW, FWB, and the attributes are listed in Table 1.

The questionnaire for the food waste variable was measured on a Likert scale, ranging from 1 (never) to 5 (very often). Then, the data were analyzed using structural equation modeling with partial least squares

(SEM-PLS), which is used as an alternative to finding correlations and validating complex causal relationships between variables (Hair et al., 2021).

Table 1. Questionnaire attributes.

Var.	Code	Attributes
FC (Coşkun & Özbük, 2020), (Marsolaa et al., 2022; Teng et al., 2022)	FC1	Choose and order food that tastes good
	FC2	Ordering food based on what you like
	FC3	Ordering food based on nutritional content
	FC4	Ordering food based on taste
	FC5	Economical food prices are significant
	FC6	When ordering food, opt for healthy options
FO (Aktas et al., 2018; Talwar et al., 2021)	FOR7	Planning a menu before ordering food
	FOR8	Ordering more food dishes than needed
	FOR9	Ordering more when unsure of portion size
	FOR10	Ordering more dishes due to the varied menu
	FOR11	Ordering more dishes without thinking
IFW (Aktas et al., 2018; Coşkun & Özbük, 2020)	INT2	Eating all the food that has been ordered
	INT3	Order food
	INT4	Intention to finish all the food
	INT5	Reducing food waste to the greatest extent possible
	INT6	Intention to avoid food waste
	FWB7	Leftovers when eating out
FWB (Aktas et al., 2018; Talwar et al., 2021)	FWB18	Bringing home leftovers to save money
	FWB19	Bringing home leftovers to avoid food waste
	FWB20	Throwing away leftover take-out food

In SEM-PLS, the model evaluation was conducted to test validity and reliability. Validity is tested through average variance extracted (AVE), convergent validity, and discriminant validity. The last was the composite reliability to test reliability, which used Cronbach's alpha (Hair et al., 2019). Then, this study conducted a structural model analysis to analyze the relationship among the variables. The structural model analysis referred to R^2 and path coefficient values. After analyzing the structural model, this study conducted a bootstrapping process to test the hypotheses.

RESULT AND DISCUSSION

Respondent Demographics

The total number of respondents was 401. Most respondents were female, comprising 59% of the total,

and 41% were male. Based on occupation, the majority of respondents are students, at 68%. Based on the frequency of eating out, the majority of consumers eat one to two times a week (42%), then three to five times a week (37%), and lastly six to seven times a week (21%). Then, most of them spend less than IDR 500,000 on dining out and between IDR 500,000 and IDR 1,500,000. The summary of respondent demographics is presented in Figure 2.

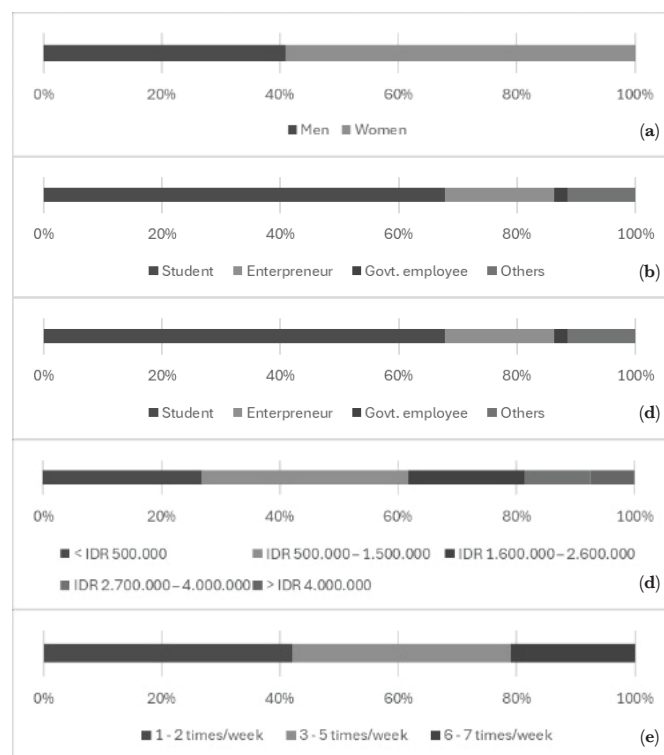


Figure 2. Respondent demographics: gender (a), occupation (b), age (c), spending (d), dining out frequency (e).

SEM-PLS Result

The SEM-PLS was conducted to analyze the correlation between these criteria: FC, FO, IFW, and FWB. Based on the measurement model output, indicators with an outer loading coefficient below 0.5 are removed from the research diagram, and the final model is presented in Figure 3.

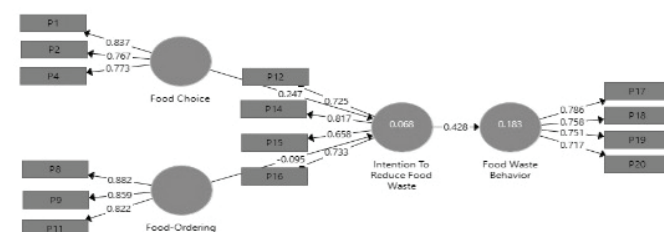


Figure 3. Final model.

In the model evaluation, Table 2 presents the reliability test results, which show that all variables had Cronbach's alpha and composite reliability values

greater than 0.7, indicating claimed reliability. All variables were also declared valid because they had AVE values greater than 0.5. Additionally, the R² values for IFW and FWB are 0.068 and 0.183, respectively. Those values show that R² is weak, and those were acceptable for social study because human behaviour may change, and human behaviour has a non-linear relationship (Ozili, 2023).

Next, the structural model analysis is the next step. The step involved bootstrapping, and Table 3 presents the results of the testing hypothesis, which indicate that FC influences IFW, and IFW significantly influences FWB. IFW mediates the relationship between FC and FWB. However, the FO has an insignificant influence on IFW, and IFW does not mediate the relationship between FO and FWB.

Table 2. Composite reliability, AVE, and the result of R².

Variable	Cron. alpha	Comp. Rel.	AVE	R ²	R ² Adj.
FC	0.710	0.836	0.629		
FO	0.817	0.890	0.730		
IFW	0.714	0.824	0.541	0.068	0.063
FWB	0.799	0.840	0.568	0.183	0.181

Table 3. The result of hypothesis test.

	Hypothesis	T-Stats	P-Values	Status
H1	FC → IFW	4.971	0.000	Supported
H2	FO → IFW	1.681	0.093	Not Supported
H3	IFW → FWB	1.829	0.000	Supported
H4	FC → IFW → FWB	4.378	0.000	Supported
H5	FO → IFW → FWB	1.651	0.099	Not Supported

Implications and Recommendations

Food waste is a global issue influenced by various factors, including consumer dining behaviour. This study examines the impact of dining out behaviour on food waste among younger consumers in Banyumas Regency. According to the model, a relationship exists between FC and IFW, and IFW mediates the relationship between FC and FWB.

Food choice has a relationship with the IFW. It means that the right food choice can increase individual awareness of not throwing away their food while dining out. The result aligns with previous research that mentioned taste, price, and food health suit individual desires and affect consumer behaviour in reducing food waste on plates.

There is no relationship between the FO and the IFW. This means an excessive FO with many food menus ordered is less related to individual attitudes toward reducing food waste produced. It is influenced by personal norms aimed at minimizing food waste (Wang et al., 2022). Social norms and consumer attitudes are related to the intention to reduce food waste behaviour, such as throwing away plate waste in restaurants (C. H.

Huang & Tseng, 2020). Furthermore, some people's attitudes overestimate food orders, resulting in waste (Chen et al., 2021). The extensive menu of dishes and the culture of over-ordering food result in higher food waste (Filimonau et al., 2022).

The IFW is related to FWB among young consumers, which aligns with the TPB (Ajzen, 1991). This behaviour means that the higher the individual's IFW, the more likely they are to dine out. Individual perceptions and awareness when ordering food drives young consumers' behaviour in food waste reduction (Teng et al., 2022). The IFW significantly predicts food waste behaviour when dining out. On the other hand, there is a hostile factor when consumers waste food, which is a reasonable basis for food waste prevention efforts (Lemy et al., 2020).

The IFW mediates the relationship between FC and FWB among young consumers in the Banyumas Regency. FWB can be controlled by considering food choices and the IFW. Proper food selection can reduce the amount of plate waste generated when dining out. If restaurant customers leave food, they will eventually choose to take the leftovers home, indicating that they have a solid intention to avoid food waste (Teng et al., 2022). Meanwhile, the IFW can not mediate the relationship between the FO and FWB. This means that ordering multiple courses increases food waste, but menu planning can reduce the amount of food waste generated (Zeineddine et al., 2021). Although consumers order excessive food, there is no intention to prevent food waste behaviour.

Consumers must be responsible for finishing the food that has been ordered. At the food selection stage, young consumers must carefully consider their food choices when dining out. The young consumer should pay attention to the taste and avoid eating food that is not on the plate. It is essential to understand the food consumption capacity of young consumers to minimize food waste when dining out.

Furthermore, restaurants in Banyumas Regency can offer multiple portion sizes to young consumers, thereby reducing food waste. Restaurants can ask their servers to inform customers about the portion that they are choosing, as well as information about the ingredients, to avoid food waste due to a dislike of a specific type of food (Ibtayah et al., 2023). At the same time, restaurants can ask their servers to remind customers to order food as they need and take away leftovers after meals. They can also provide a service to repackage leftovers made by consumers. The excellent personality of young consumers when dining out is to know the food portion that they want (Qornaeni et al., 2023). It makes a habit of ordering food as they want and packing up leftovers. Therefore, the young consumers can access information about the food in the restaurant in advance.

CONCLUSION

This study examines the dining-out behaviour of young consumers in relation to food waste in Banyumas Regency, Indonesia. The results indicate that the FC has a significant impact on IFW, and IFW has a significant impact on FWB. In addition, IFW mediates the relationship between FC and FWB. This means that FWB can be controlled by considering FC and the IFW. The young consumer can be aware of their choices to reduce food waste generation at the restaurant.

This study has several limitations. First, the study can be expanded by considering fancy dinners, all-you-can-eat restaurant concepts, or restaurants near tourist attractions for young consumers in Banyumas Regency. Second, this study focuses on the food choices and food-ordering routines of young consumers to reduce food waste, examining the resulting behaviour. Future research can explore additional factors related to eating out that may influence reducing food waste, such as local value, household practices, and campaigns.

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