



Analysis Of Behavioral Determinants Preventing Food Waste In Consumers Based On The Theory Of Planned Behavior (TPB) Mediated By Behavior Intention

Piet Cintya Mawar^{1*}, Luki Adiati²

Universitas Trisakti Jakarta, Indonesia

E-mail: pietcintyamawar@std.trisakti.ac.id^{1*}, luki.adiati@trisakti.ac.id²

Keywords

Theory Of Planned Behavior; Food Waste; Consumer Behavior; Hotel.

Abstract

The hospitality industry is one of the largest sources of food waste, accounting for 17% of total food waste and more than two-thirds of avoidable food waste. Due to an increase in the trend of eating out driven by increased incomes and tourism, food waste in hospitality services is affecting the world. It has a significant impact on developed and developing countries. This is a major challenge for the hospitality industry. Using survey data from 230 respondents, researchers processed the data to analyse the influence between variables using the Structural Equation Modeling (SEM) AMOS application. The results showed that Subjective Norm (SN), Perceived Behavior Control (PBC), and Moral Norm (MN) had a significant positive effect on Behavior Intention (BI). Behavior Intention (BI) also has a significant positive effect on Food Waste Behavior (FW). In addition, subjective Norms (SN), perceived behaviour control (PBC), and moral norms (MN) also have a significant positive effect on food waste behaviour (FW). The Behavior Intention (BI) variable can mediate the influence between the Perceived Behavior Control (PBC) and Moral Norm (MN) variables with the Food Waste Behavior (FW) variable. While Attitude Towards Behavior (ATT) does not have a significant effect on Behavior Intention (BI) and Food Waste Behavior (FW). In addition, Behavior Intention (BI) cannot mediate the influence between Attitude Towards Behavior (ATT) and Subject Norm (SN) variables on Food Waste Behavior (FW).



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1 Introduction

Food waste or food waste is any food thrown away, even though it is suitable for consumption regardless of spoilage and past the expiration date (Food and Agriculture Organization of the United Nations, 2013). FAO states that 33% and 50% of food produced remains unconsumed and thrown away. Halving global food waste per capita at retail and consumer levels and reducing food waste in production and supply chains, including post-harvest waste, is SDG point 12.3 by 2030 (UNEP et al. 2021). Addressing the problem of food waste has become a priority to achieve

the Sustainable Development Goals and the 2030 Agenda (Hambrey, 2017). Mark Smulders, FAO Representative to Indonesia and Timor Leste, stated that, after Saudi Arabia, Indonesia is the second largest producer of scattered waste in the world, with a total of food waste of around 300 kilograms per person per year (Ministry of Agriculture, 2019). According to the Minister of Tourism and Creative Economy Sandiaga (Filimonau, Nghiem, & Wang, 2021), the tourism sector, such as hotels and restaurants, is the most significant contributor to this problem.

The hospitality industry is one of the largest sources of food waste, accounting for 17% of total food waste and more than two-thirds of avoidable food waste (Jia, Zhang, & Qiao, 2022). Due to the increasing trend of eating out of the home driven by increased incomes and tourism, food waste in hospitality food services is affecting the entire world and impacting both developed and developing countries. This is a significant challenge for the hospitality industry (Ang, Narayanan, & Hong, 2021). Consumers contribute to food waste because they have different behavioural patterns that can affect the amount of food waste produced (Aktas et al., 2018). According to (Hanafiah & Hamdan, 2021), buffet service design causes more food waste than other restaurants because many leftovers are left on plates and serving tables. After all, customers pay a fixed price and are encouraged to take what they want.

Studies on food waste have been conducted before. Daniele Eckert Matzembacher, Pedro Brancoli, Lais Moltene Maia, and Mattias Eriksson (2020) say that different incentives and levels of interaction in consumer choices of food types influence the leftovers on the plate. When incentives and interactions are low, food waste is more significant. The food that dominates food waste is rice, beans, and other carbohydrates. In addition, research by (La Barbera and Ajzen, 2020) said that young consumers who do not have farming experience and women tend to be more wasteful in ordering online food. By ordering more food online, more food waste is generated. These studies emphasise consumer behaviour factors that influence food-wasting behaviour (Hair, Risher, Sarstedt, & Ringle, 2019).

The study of consumer behaviour is research often done to understand consumer motivation in taking action; one of the theories often used is the theory of planned behaviour (TPB), introduced by (Ajzen, 2020). Theory Of Planned Behavior: There are three factors, namely attitude towards behaviour (Attitude Towards Behavior), subjective norms (Subjective Norm), and behavioural control (Perceived Behavioral Control). In addition, there is also the Moral Norm (MN) factor, which is often debated as one of the essential constructs for predicting behaviour with moral considerations (La Barbera, Amato, & Sannino, 2016). Research by Girish Nair (2021) found that attitude and perceived behaviour control (PBC) are significant predictors of the intention to avoid food waste and food waste behaviour. In addition, it was also revealed that Perceived Behavioural Control (PBC) is a direct predictor of Food Waste behaviour.

With the high rate of food waste in Indonesia, with hotels as one of the largest sources of food waste producers, researchers felt it was essential to conduct this study. Previous research has discussed chiefly food waste in households, while food waste in hotels is rarely discussed. This research is expected to educate the public and hotel management on reducing food waste in Indonesia. This study is intended to analyse consumer food waste behaviour factors at hotel buffets using the Theory of Planned Behavior (TPB).

Food waste and food loss in the hotel industry are divided into many areas because of its unique industry structure and the many services offered to its guests. Several recent studies provide information regarding food waste in this industrial service, based on research by (Wang LinJuan et al., 2017), which found that 69.59 and 84.77 g of waste came from per consumer. Therefore, food waste in the hotel industry can be interpreted as food waste generated from purchasing overall services from hotel rooms. Waste, or waste from the use of goods, production processes, and service activities, is the most recognisable thing synonymous with the hotel industry (Cahyani, Wulandari, & Putri, 2022). This, combined with the production of large amounts of food in the hospitality industry globally (e.g., one-third of food in Denmark is in the hospitality industry, resulting in a large percentage of food waste in the total percentage of waste generated in the hospitality industry, it is estimated that more than 50% of waste from the hospitality industry is food waste (Fatimah & Baliwati, 2022).

2 Materials and Methods

This study took samples with criteria for eating at a hotel buffet with 230 respondents. This study applied a quantitative research model by distributing questionnaires using the Likert scale. According to Hermawan (2005), quantitative research is an objective approach that involves collecting and analysing data through statistical testing. This study uses a hypothesis test design to test hypotheses about how one variable affects another variable.

This study uses a hypothesis test design to test hypotheses about how one variable affects another variable. In this case, the hypothesis tested is about the influence of attitudes on tested behaviour (Attitudes Towards Behavior), subjective norms (Subjective Norms), behavioural control (perceived behavioural control), and moral norms (Moral Norms) on individual intentions (Behavior Intention) to behave food waste (food waste behaviour).

Data Collection Methods

Data collection uses a survey method with cross-sectional data, namely observing and collecting data carried out at a specific time limit. The unit of analysis is individuals who have had the experience of eating at a hotel buffet. The research survey starts from September 10 to September 15, 2023. This study has two variables: the independent variable (independent variable) and the dependent variable (dependent variable).

Table 1
Characteristics of Respondents

Variable	Category	Frequency	Percentage
Gender	Man	118	51,3%
	Woman	112	48,7%
Age	17-21 Years	8	4%
	22-26 Years	39	17%
	27-31 Years	51	22%
	32-36 Years	13	6%
	37-41 Years	19	8%
	42-46 Years	28	12%
	47-51 Years	18	8%
Recent Education	>51 Years	54	23%
	SMA	27	11,7%
Employment	Bachelor	203	88,3%
	Student	12	5,2%
	PNS	27	11,7%
	Wiraswasta	59	25,7%
	Private Officers	84	36,5%
Earnings per Month	Other	48	20,9%
	<Rp. 1.000.000	15	6,5%
	IDR 1,000,000-IDR 3,000,000	14	6,1%
	IDR 3,000,000-IDR 6,000,000	44	19,1%
	IDR 6,000,000-IDR 10,000,000	51	22%
Marital Status	>Rp. 10.000.000	106	46,1%
	Marry	125	54,2%
	Unmarried	95	41,3%
	Divorce	10	4,3%

Data Analysis Methods

Researchers use the SEM (Structural Equation Modeling) method to analyse research data, which explains the relationship between observed and latent variables through indicators. Structural Equation Modeling (SEM) or

structural equation model is a multivariate analysis used to analyse relationships between variables in a complex manner.

3 Results and Discussions

The data analysis method is the SEM (Model Equation Structural) method. This research uses AMOS 26 software with the following processing stages:

1. Build an SEM model based on a review of current literature and empirical studies. The proposed SEM model is shown in the following figure:

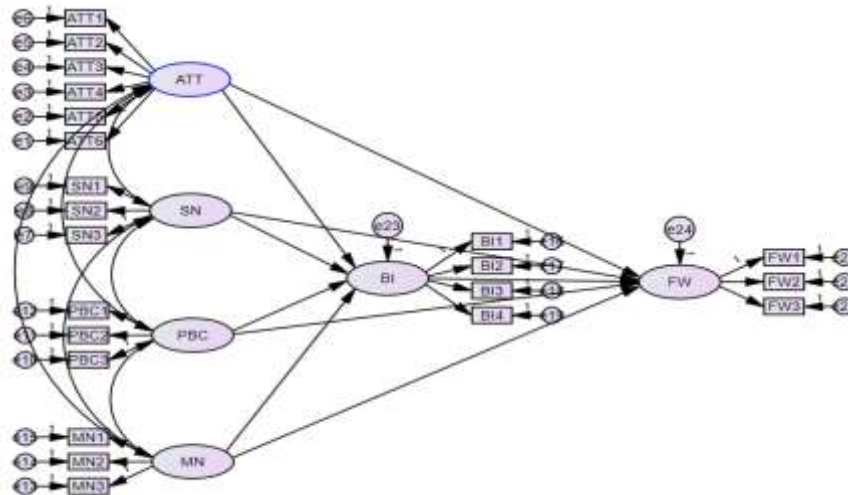


Figure 1
Research SEM Model

Through validity and reliability testing, the SEM model used after improvement is made by removing invalid indicators, as shown in Figure 10.

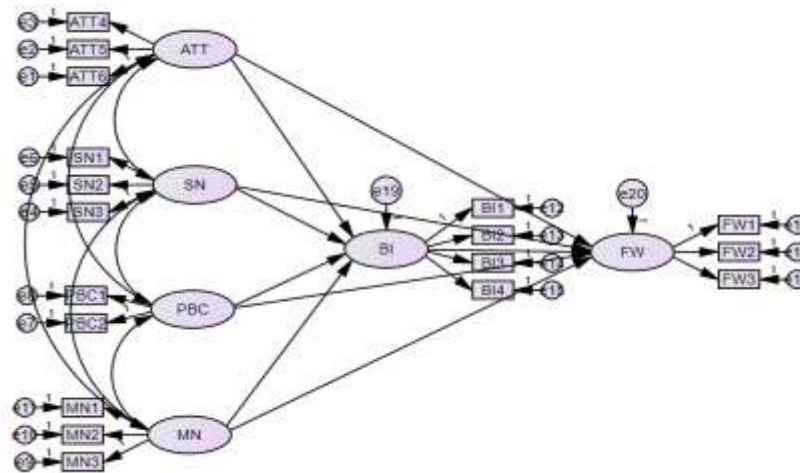


Figure 2
Research SEM Model After Instrument Testing

2. Conduct model fit testing.

The SEM model has several kinds of fit model testing criteria. This study used eight fit model criteria with the fit model criteria listed in Table 1.

Table 1
Model Conformity Rating Indicator

Kind Measurement	Measurement	Fit Model Results	Result Olahan	Results
Absolute fit measures	<i>Chi-square</i>	low Chi-Square	402,944	
	<i>p-value Chi-Square</i>	≥ 0,05	0,000	Poor fit
	GFI	≥ 0,90	0,837	Marginal fit
	RMSEA	≤ 0,10	0,101	Poor fit
	NFI	≥ 0,90	0,844	Marginal fit
	SMOKE	≥ 0,90	0,885	Marginal fit
	TAG	≥ 0,90	0,851	Marginal fit
	CFI	≥ 0,90	0,884	Marginal fit
Parsimonious fit measure	CMIN/DF	Between 1 to 5	3,358	Model fit

Corrective actions on the model are performed using modification indices, as seen in Figure 3. The results of model fit testing after improvements can be found in Table 2. Five of the eight fit model criteria tested resulted in the conclusion that the model was suitable (fit model), namely RMSEA, IFI, CFI, TLI, and CMIN/DF. The other two criteria resulted in the conclusion that the model had a marginal level of fit (marginal fit model), namely GFI and NFI, while one criterion resulted in the conclusion that the model was not suitable (poor fit model), namely the p-value of chi-square. Since part of the fit model criteria are met, testing of theoretical hypotheses can continue.

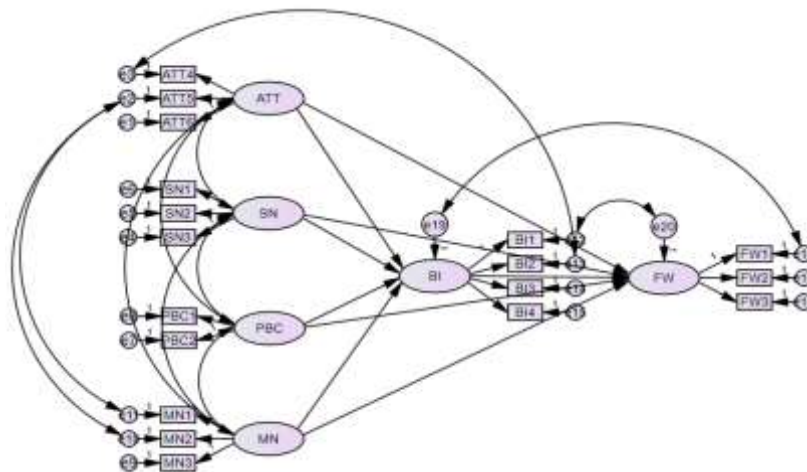


Figure 3
SEM Model Research After Improvement With Modification Indices

Table 2
Model Conformity Rating Indicator

Kind Measurement	Measurement	Fit Model Results	Result Olahan	Results
	<i>Chi-square</i>	low Chi-Square	293,419	

Absolute fit measures	<i>p-value Chi-Square</i>	≥ 0,05	0,000	Poor fit
	GFI	≥ 0,90	0,879	Marginal fit
	RMSEA	≤ 0,10	0,082	Model fit
	NFI	≥ 0,90	0,886	Marginal fit
	SMOKE	≥ 0,90	0,928	Model fit
	TAG	≥ 0,90	0,902	Model fit
	CFI	≥ 0,90	0,927	Model fit
Parsimonious fit measure	CMIN/DF	Between 1 to 5	2,551	Model fit

3. Uji Hypoplant

Table 3
Conclusion of Direct Influence Hypothesis Test

Variable	Estimate	Statistics	<i>p-value</i>
ATT --> BI	-0,157	-2,873	0,002
SN --> BI	0,103	2,071	0,019
PBC --> BI	0,491	3,295	0,000
MN --> BI	0,621	7,315	0,000
BI --> FW	1,204	9,576	0,000
ATT--> FW	-0,017	-0,155	0,876
SN --> FW	0,23	3,463	0,000
PBC --> FW	0,221	2,077	0,012
MN --> FW	0,764	3,042	0,002

Table 4
Conclusion of Mediation Hypothesis Test

Variable	Sobel Test	
	Statistics	<i>p-value</i>
ATT --> BI --> FW	-1,925	0,054
SN --> BI --> FW	1,773	0,076
PBC --> BI --> FW	2,563	0,010
MN --> BI --> FW	2,983	0,002

From Table 4, it can be seen that:

H1: Attitude Towards the Behavior (ATT) has a positive and significant effect on Behavior Intention (BI)

From the results of the processing, an estimated coefficient value of -0.157 is obtained, which means that increasing Attitude Towards the Behavior (ATT) will increase Behavior Intention (BI) and vice versa, decreasing Attitude Towards the Behavior (ATT) will increase Behavior Intention (BI). The value of the estimation coefficient that does not match the theory shows that the hypothesis that Attitude Towards Behavior (ATT) positively affects Behavior Intention (BI) is not proven.

H2: Subjective Norm (SN) has a positive and significant effect on Behavior Intention (BI)

The results of the analysis show that the value of the estimation coefficient is 0.103, which indicates that an increase in Subjective Norm (SN) will increase Behavior Intention (BI) and, conversely, a decrease in Subjective Norm

(SN) will reduce Behavior Intention (BI). The results of the statistical test t showed a value of 2.071 with a p -value of $0.019 < 0.05$. This shows that the null hypothesis (H_0) is rejected and the alternative hypothesis (H_a) is accepted, so it can be concluded that there is a significant favourable influence between Subjective Norm (SN) and Behavior Intention (BI).

H3: Perceived Behavior Control (PBC) has a positive and significant effect on Behavior Intention (BI)

The results of the analysis show that the value of the estimated coefficient is 0.491, which indicates that an increase in Perceived Behavior Control (PBC) will result in an increase in Behavior Intention (BI) and, conversely, a decrease in Perceived Behavior Control (PBC) will reduce Behavior Intention (BI). The results of the statistical test t show a value of 3.295 with a p -value of $0.000 < 0.05$. This shows that the null hypothesis (H_0) is rejected and the alternative hypothesis (H_a) is accepted, so it can be concluded that there is a significant favourable influence between Perceived Behavior Control (PBC) and Behavior Intention (BI).

H4: Moral Norm (MN) has a positive and significant effect on Behavior Intention (BI)

The results of the analysis show that the value of the estimated coefficient is 1.204, which indicates that an increase in Moral Norm (MN) will result in an increase in Behavior Intention (BI), and vice versa, a decrease in Moral Norm (MN) will reduce Behavior Intention (BI). The results of the t -statistical test showed a value of 9.576 with a p -value of $0.000 < 0.05$. This shows that the null hypothesis (H_0) is rejected and the alternative hypothesis (H_a) is accepted, so it can be concluded that there is a significant favourable influence between Moral Norm (MN) and Behavior Intention (BI).

H5: Behavior Intention (BI) has a positive and significant effect on Food Waste Behavior (FW)

The results of the analysis show that the estimated coefficient value is 0.621, which indicates that an increase in Behavior Intention (BI) will result in an increase in Food Waste Behavior (FW), and vice versa, a decrease in Intention to Behavior (BI) will reduce Food Waste Behavior (FW). The results of the statistical t -test show a value of 7.315 with a p -value of $0.000 < 0.05$. This shows that the null hypothesis (H_0) is rejected and the alternative hypothesis (H_a) is accepted, so it can be concluded that there is a significant favourable influence between Behavior Intention (BI) and Food Waste Behavior (FW).

H6: Attitude Towards the Behavior (ATT) has a positive and significant effect on Food Waste Behavior (FW)

From the results of the processing, an estimated coefficient value of -0.017 is obtained, which means that increasing Attitude Towards Behavior (ATT) will lead to Food Waste Behavior (FW) and vice versa, decreasing Attitude Towards Behavior (ATT) will increase Food Waste Behavior (FW). The value of the estimated coefficient that does not match the theory shows that the hypothesis that Attitude Towards Behavior (ATT) has a positive effect on Food Waste Behavior (FW) is not proven.

H7: Subjective Norm (SN) has a positive and significant effect on Food Waste Behavior (FW)

The analysis results show that the estimated coefficient value is 0.23, which indicates that an increase in Subjective Norm (SN) will increase Food Waste Behavior (FW). Vice versa, a decrease in Subjective Norm (SN) will reduce Food Waste Behavior (FW). The results of the statistical test t show a value of 3.463 with a p -value of $0.000 < 0.05$. This shows that the null hypothesis (H_0) is rejected and the alternative hypothesis (H_a) is accepted, so it can be concluded that there is a significant favourable influence between Subjective Norm (SN) and Food Waste Behavior (FW).

H8: Perceived Behavior Control (PBC) has a positive and significant effect on Food Waste Behavior (FW)

The results of the analysis showed that the estimated coefficient value was 0.221, which indicates that an increase in Perceived Behavior Control (PBC) will result in an increase in Food food-throwing behaviour (FW) and, conversely, a decrease in Perceived Behavior Control (PBC) will reduce Food Throwing Behavior (FW). The results of the statistical test t showed a value of 2.077 with a p -value of $0.012 < 0.05$. This shows that the null hypothesis (H_0) is rejected and the alternative hypothesis (H_a) is accepted, so it can be concluded that there is a significant favourable influence between Perceived Behavior Control (PBC) and Food Waste Behavior (FW).

H9: Moral Norm (MN) has a positive and significant effect on Food Waste Behavior (FW)

The results of the analysis showed that the estimated coefficient value was 0.764, which indicates that an increase in Moral Norm (MN) will result in an increase in Food Throwing Behavior (FW), and vice versa, a decrease in Moral Norm (MN) will reduce Food Throwing Behavior (FW). The results of the statistical t -test showed a value of 3.042 with a p -value of $0.002 < 0.05$. This shows that the null hypothesis (H_0) is rejected and the alternative

hypothesis (H_a) is accepted, so it can be concluded that there is a significant favourable influence between Moral Norm (MN) and Food Waste Behavior (FW).

H10: Behavior Intention (BI) can mediate the influence between Attitude Towards the Behavior (ATT) and Food Waste Behavior (FW)

The analysis results after the Sobel Test showed that the Statistical T value was -1.925. At the same time, the p-value itself is $0.054 > 0.05$. Statistical T-values smaller than 1.96 and p-values greater than 0.05 indicate that Behavior Intention (BI) cannot mediate the influence between Behavioral Attitude (ATT) variables and Food Waste Behavior (FW), so the hypothesis is rejected.

H11: Behavior Intention (BI) cannot mediate the influence between Subjective Norm (SN) and Food Waste Behavior (FW)

The analysis results after conducting the Sobel Test showed that the Statistical T value was 1.773. At the same time, the p-value itself is $0.076 > 0.05$. Statistical T-values smaller than 1.96 and p-values greater than 0.05 indicate that Behavior Intention (BI) cannot mediate the influence between Subjective Norm (SN) variables and Food Waste Behavior (FW), so the hypothesis is accepted.

H12: Behavior Intention (BI) can mediate the influence between Perceived Behavior Control (PBC) and Food Waste Behavior (FW)

The analysis results after the Sobel Test showed that the Statistical T value was 2.563. At the same time, the p-value itself is $0.010 < 0.05$. Statistical T values greater than 1.96 and p-values smaller than 0.05 indicate that Behavior Intention (BI) can mediate the influence between Perceived Behavior Control (PBC) variables and Food Wasting Behavior (FW), so the hypothesis is accepted.

H13: Behavior Intention (BI) can mediate the influence between Moral Norm (MN) and Food Waste Behavior (FW)

The analysis results after conducting the Sobel Test showed that the Statistical T value was 2.983. At the same time, the p-value itself is $0.002 < 0.05$. Statistical T values greater than 1.96 and p-values smaller than 0.05 indicate that Behavior Intention (BI) can mediate the influence between Moral Norm (MN) variables and Food Waste Behavior (FW), so the hypothesis is accepted.

4 Conclusion

The results of this study show that Subjective Norm (SN), Perceived Behavior Control (PBC), and Moral Norm (MN) have a positive and significant effect on Intention to Food Waste (BI). This is shown by the hypothesis test results, which show a positive estimate and a p-value of less than 0.05. Similarly, Intention to Food Waste (BI) has a positive and significant effect on Food Waste Behavior (FW), with an estimate of 9.579 and a p-value of 0.000. This also shows that Intention to Food Waste (BI) has the most significant influence on the Food Waste Behavior (FW) variable compared to other variables. In addition, subjective Norms (SN), perceived behaviour control (PBC), and moral norms (MN) also have a positive and significant effect on food waste behaviour (FW). For the mediating variable, Intention to Food Waste (BI) has been tested to mediate the influence between the variables Perceived Behavior Control (PBC) and Moral Norm (MN) with the variable Food Waste Behavior (FW) with t-statistics of 2.563 and 2.983 respectively and p-values of 0.01 and 0.002 respectively. Attitude Towards Food Waste Behavior (ATT) does not significantly affect Intention to Food Waste (BI) and Food Waste Behavior (FW) because it has a negative estimate value and a p-value of more than 0.05. In addition, Intention to Food Waste (BI) cannot mediate the influence between the variables Attitude Towards the Food Waste Behavior (ATT) and Subjective Norm (SN) on Food Waste Behavior (FW) because the t-statistic is less than 1.96 and the p-value is more than 0.05, respectively.

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