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Eats for Earth: Understanding Consumer Intentions to Buy Suboptimal Food

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ABSTRACT

Food waste remains a major global sustainability challenge, particularly at the consumer level where suboptimal food is frequently rejected despite being safe and nutritious.
***Objectives**: This study aims to examine the effects of attitude, subjective norms, perceived behavioral control, and food waste awareness of consequences on consumers purchase intention of suboptimal food. The study integrates the Theory of Planned Behavior (TPB) and the Value-Belief-Norm (VBN) theory to explain pro-environment purchasing behavior.*
***Methodology**: A quantitative approach was applied using survey data collected from 228 consumers. The data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM).*
***Finding**: The results show that attitude and subjective norms have a strong and significant positive effect on purchase intention, while food waste awareness of consequences also contributes significantly. Perceived behavioral control, however does not significantly influence purchase intention.*
***Conclusion**: This study concludes that attitude, subjective norms, and food waste awareness of consequences significantly influence consumers' purchase intention toward suboptimal food, while perceived behavioral control does not exhibit a significant effect. By integrating Theory of Planned Behavior and Value-Belief-Norm theory, this study highlights the importance of psychological and moral factors in encouraging sustainable food purchasing behavior.*

***Keywords:** Suboptimal Food; Purchase Intention; Theory of Planned Behavior; Value-belief-norm; Food Waste.*

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INTRODUCTION

Food loss and waste have become crucial global and national issues in the context of food security and environmental sustainability. This is one of the main challenges in the global Sustainable Development Goals (SDGs) agenda, particularly in the twelfth goal, which is Responsible Consumption and Production. According to the Food Loss And Waste Report from Bappenas (2021), Indonesia produces food waste of 23 to 48 million tons per year during the period from 2000 to 2019, equivalent to 115 to 184 kilograms per capita per year. The economic value of this wasted food is estimated to reach IDR 213 trillion to IDR 551 trillion per year, with significant impacts on the environment, economy, and national food security.

One of the reasons that makes Indonesia the largest contributor to food waste in Southeast Asia is the consumptive behavior of Indonesian society. This is concluded from the data of Biro Pusat Statistik, which states that the average per capita expenditure of 2020 in one month in Indonesia was IDR 1,225,685, with food commodities accounting for IDR 603,236. Both data indicate that nearly 50% of per capita expenditure per one month in Indonesia for 2020 was for food (Eitiveni et al., 2025).

Food waste has a negative impact on the environmental and is a global concern due to its significant volume. Indonesia is the country with the highest amount of food waste in Southeast Asia, generating 20,93 tons, according to a report from the Ministry of Environmental and Forestry.

The most concerning impact of food waste, which poses as a threat, is food scarcity or crisis, due to the high volume of food that is not produced and utilized as it should be. Accumulated food waste in large quantities produces methane gas, which is one of the triggers of global warming (Environment-Indonesia, 2023).

A study of Bappenas (2021) also highlights that most food loss or waste occurs in the supply chain of horticultural crops, especially fruits and vegetables that are highly susceptible to damage during harvesting, storage, transportation and distribution. On the consumer side, losses occur when people refuse to buy products that are aesthetically imperfect, even though they are still safe for consumption.

Food waste has serious environmental, economic, and societal effects. Food waste has been linked to food security problems, climate change and greenhouse gas emissions and financial losses (Wang et al., 2021).

To maintain global food and nutrition security, food waste and loss must be reduced (Wani et al., 2024). Environmentalists say food waste strains freshwater, arable land, and energy (Wani et al., 2024). However, nutritioniss say food waste causes major nutritional losses. It also threatens global food security, social inequality, and economic decline.

According to the report, it is also explained that one of the causes of food waste problem was the low understanding of the public regarding expiry dates and best before labels on food. Many consumers in Indonesia believe that food with passed the best before date is not suitable for consumption, even though the product is still safe to eat as long as it has not exceeded the expiry date. The lack of public education and effective communication regarding this issue leads to a low purchase intention for suboptimal food, which in turn increases the level of food waste, especially in Indonesia.

In an article by Lim et al. (2023), suboptimal food is defined as food that is physically imperfect and deviates from norms in terms of appearance without compromising its intrinsic quality or safety. These deviations can be visual (e.g., imperfect appearance), temporal (e.g., approaching the expiration date), or peripheral (e.g., packaging damage).

One of the main causes of high food waste at the consumer level is the perception and purchasing behavior towards suboptimal food products that are considered “imperfect”, or what is referred to as suboptimal food. Several studies have shown that there is a rejection of purchasing suboptimal food products, where consumer acceptance is relatively low.

There are several commonly used date labels (for example “Best Before”, “Best By”). Manufacturers of perishable foods (such as dairy products, meat, and poultry) use date labels

to help ensure that consumers buy, store, or use their products while they are at the quality and flavor considered desirable by the manufacturers, however this often confuses consumers (Patra et al., 2022).

According to Tufail (2022), from a consumer behavior perspective, purchase intention for suboptimal food is influenced by various psychological factors such as attitude, subjective norms, perceived behavioral control. Several previous studies have attempted to explain the factors influencing purchase intention for suboptimal food products. For example, international research shows that negative attitudes towards purchasing suboptimal food stem from concerns about the quality and taste of the food, as well as its freshness and safety (Hartmann et al., 2021). Consumers prefer suboptimal food with environmentally friendly packaging (Chang et al., 2024).

The Theory of Planned Behavior (TPB) has been widely used to explain consumer decision-making in the context of sustainable consumption. TPB suggest that attitude, subjective norms, perceived behavioral control determine an individual behavioral intention. However, TPB alone may not fully capture the moral and environmental motivations behind food waste reduction. The Value-Belief-Norm (VBN) theory complements TPB by emphasizing the role of moral awareness, particularly awareness of environmental consequences, in shaping pro-environmental behavior.

Previous studies have examined sustainable food consumption using either TPB or VBN, but limited research has integrated both frameworks to explain suboptimal food purchasing behavior. In Indonesia, research on suboptimal food is still limited. However, recent research by Eitiveni et al. (2025) fount that the factor of food waste awareness of consequences does not significally influence consumers purchase intention in using food rescue applications. This indicates a research gap where awareness of the consequences of food waste does not always translate into actual purchasing behavior.

LITERATURE REVIEW

Theory of Planned Behavior

As previous study (Tufail et al., 2022), the theory of Planned Behavior explains behavioral intention as a function of attitude toward the behavior, subjective norms, and perceived behavioral control. TPB has been extensively applied to sustainable consumption contexts, including organic food, surplus food and suboptimal food purchasing (Adel et al., 2021). In the context of suboptimal food, TPB suggests that consumers' evaluations of imperfect food, perceived social approval, and perceived ease of purchase jointly shape their intention to buy.

Value-Belief-Norm Theory

The Value-Belief-Norm theory proposes that pro-environmental behavior arises from personal values, beliefs about environmental consequences, and moral norms (Soemantri et al., 2025). Awareness of consequences constitutes a central belief component, reflecting individuals understanding of the negative impacts of environmentally harmful behaviors such as food waste (Chen, 2024).

Awareness of the social and environmental impacts of food waste enhances consumers' moral responsibility, which in turn increases their likelihood of engaging in waste-reducing behaviors such as purchasing suboptimal food (Chen et al., 2024).

This moral awareness activates internalized norms that guide individuals to align their consumption choices with broader sustainability goals rather than purely aesthetic or convenience-based preferences. When consumers perceive food waste as a social and environmental problem, purchaseing suboptimal food is reframed from a compromised choice into a morally meaningful action that contributes to waste reduction and environmental protection.

Furthermore, heightened awareness of food waste consequences strengthens the connection between personal values and behavioral intentions by reinforcing pro-environmental beliefs. Consumers who understand the long-term environmental degradation and social inefficiencies caused by food waste are more inclined to translate their ethical concerns into concrete purchasing decisions. In this context, buying suboptimal food functions as a form of responsible consumption, reflectiong not only individual moral considerations but also a broader commitment to sustainable food systems (Chen et al., 2024).

Hypothesis Development

Attitude and Purchase Intention

Attitude refers to an individual's overall evaluation of performing a spesific behavior (Tufail et al., 2023). Prior studies consistently demonstrate that favorable attitudes toward sustainability and waste reduction positively influence consumers' intention to purchase suboptimal food (Tufail et al., 2023).

H1: Attitude has a positive and significant effect on purchase intention toward suboptimal food.

Subjective Norms and Purchase Intention

Subjective norms capture perceived social pressure from important referents to perform or avoid a behavior (Tufail et al., 2022). Social endorsment from family, peers, or society can legitimize suboptimal food purchases and enhance intention (Pandey et al., 2023; Tsalis, 2021).

H2: Subjective norms has a positive and significant effect on purchase intention toward suboptimal food.

Perceived Behavioral Control and Purchase Intention

Perceived behavioral control reflects individuals' perceptions of their ability and resources to perform a behavior (Tufail et al., 2023). While PBC often predicts intention, empirical findings in suboptimal food contexts remain mixed, particularly when product availibility and information are limited (Hartmann et al., 2021).

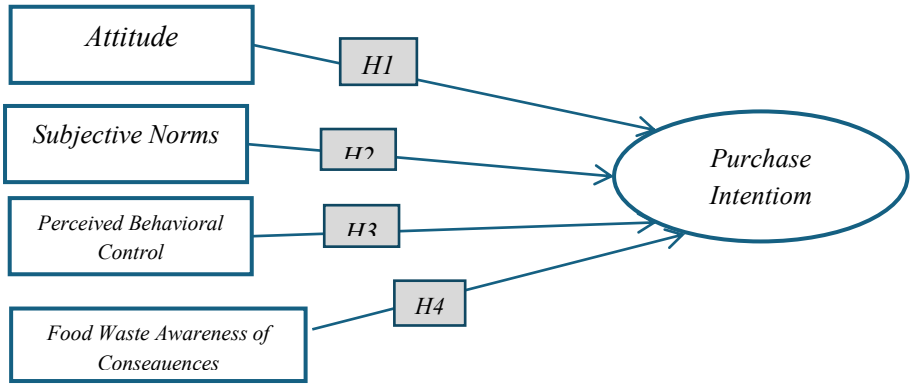
H3: Perceived behavioral control has a positive and significant effect on purchase intention toward suboptimal food.

Food Waste Awareness of Consequences and Purchase Intention

FWAC represents consumers' beliefs regarding the negative environmental, economic, and social impacts of food waste (Soemantri et al., 2025). Higher awareness has been shown to foster moral motivation and increase intention to purchase suboptimal food as a waste-reduction strategy (Ni-Ying et al., 2025; Vesela et al., 2023).

H4: Food waste awareness of consequences has a positive and significant effect on purchase intention toward suboptimal food.

Figure 1. Hypothesis Framework



METHOD

3.1. Research Design and Sample

The study employs a quantitative, cross-sectional survey design. Data were collected from consumers' shopping at high-end supermarkets in Jakarta using purpose sampling. A total of 228 valid responses were obtained, exceeding the minimum sample size recommended for PLS-SEM analysis using G*Power.

3.2. Construct Measurements

All constructs were measured using previously validated scale adapted to the suboptimal food contents. A seven-point Likert scale was used to measure items for each construct, with the range of "strongly disagree" (1) to "strongly agree" (7). All constructs were adapted from the studies of Tufail et al. (2023), Adel et al. (2021).

3.3. Data Analysis

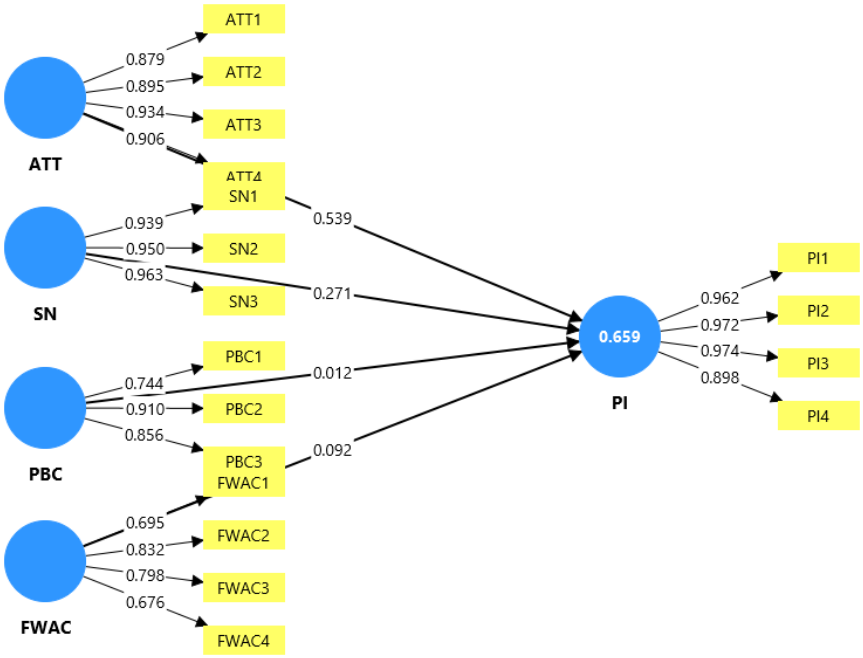
Data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) with SmartPLS 4.0. Analysis follows of two-steps approach: assesment of the measurement model (reliability and validity) and evaluation of structural model to test the hypothesized relationships (Hair et al., 2019).

RESULTS AND DISCUSSION

3.1. Measurement model assessment (outer model)

The measurement model demonstrated adequate internal consistency and convergent validity, with all construct meeting recommended thresholds for composite reliability (>0.70) and average variance extracted (AVE) (>0.50) (Hair et al., 2019).

Figure 2. Outer Model Result



3.1.1. Reliability and Convergent Validity

Table 1 presents the results of the reliability and convergent validity assessment. All constructs show Composite Reliability (CR) values above 0.70, indicating satisfactory internal consistency. The Average Variance Extracted (AVE) values for all constructs exceed the minimum threshold of 0.50, confirming adequate convergent validity.

Although two indicators of food waste awareness of consequencess (FWAC1 and FWAC4) show factor loadings slightly below 0.708, these two indicators were retained as the construct's CR and AVE values remained acceptable, consistent with Hair et al. (2019).

Table 1. Measurement model evaluation

Items	Factor Loading	CR	AVE
ATT1	0.879	0.931	0.817
ATT2	0.895		
ATT3	0.934		
ATT4	0.906		
SN1	0.940	0.948	0.904
SN2	0.950		
SN3	0.963		
PBC1	0.763	0.804	0.706
PBC2	0.899		
PBC3	0.853		

FWAC1	0.701	0.764	0.567
FWAC2	0.825		
FWAC3	0.799		
FWAC4	0.678		

Source: PLS-SEM Data

3.1.2. Discriminant Validity

Discriminant validity was assessed using the Heterotrait-Monotrait ratio (HTMT) by comparing the average correlations among indicators from different variables with the average correlations among indicators within the same variable. An HTMT value below 0,90 indicates that the latent variables in the research model are empirically distinct enough.

Table 2. Discriminant Validity assessment Heterotrait-Monotrait Ratio (HTMT)

	ATT	FWAC	PBC	PI	SN
ATT					
FWAC	0.525				
PBC	0.682	0.663			
PI	0.829	0.481	0.588		
SN	0.784	0.338	0.591	0.734	

Source: PLS-SEM Data

As shown in Table 2, all HTMT values are below the conservative threshold of 0.90, indicating that the constructs are empirically distinct.

3.1.3. Multicollinearity Assessment

Multicollinearity is a condition when two or more formative indicators in a model have a very high correlation with each other, which can complicate the accurate estimation of indicator weights and potentially lead to errors in interpreting the analysis results. According to Hair et al. (2019), an acceptable VIF value should be below 5.

Table 3. Multicollinearity assessment

Relationships	VIF	Result
ATT $\longrightarrow$PI	2.681	No multicollinearity
FWAC $\longrightarrow$PI	1.454	No multicollinearity
PBC $\longrightarrow$ PI	1.883	No multicollinearity
SN $\longrightarrow$ PI	2.286	No multicollinearity

Source: PLS-SEM Data

As reported in Table 3, all VIF values are below 5, indicating the absence of multicollinearity issues in the structural model.

3.3. Structural model assessment (inner model)

3.3.1. Coefficient of Determination and Predictive Relevance

Structural model assessment begins with evaluating the predictive model assessment. Table 4 showed that the value of R^2 is 0.659 that indicating 65.9% of the variance on PI is explained by ATT, SN, PBC and FWAC. The R^2 value of 0.2 is the minimum requirement (Hair et al., 2019). Meanwhile the effect size (f^2) of the observed relationships is ranged from small to large. Where as the predictive relevance (Q^2) evaluation showed that PI has a Q^2 value of 0.641. This value indicates that the model has good predictive ability in explaining the endogenous variable.

Effect size analysis shows that attitude ha sa large effect on purchase intention, while subjective norms and food waste awareness of consequences have small effects. Perceived behavioral control shows no meaningful effect.

Table 4. Predictive Model Assessment

Relationships	R^2 (low/high)	Q^2 (low/high)	f^2 (low/high)	Effect size (low/high)
ATT ⟶ PI	0.659/0.652	0.641	0.318	High
SN ⟶ PI			0.094	Low
PBC ⟶ PI			0.000	-
FWAC ⟶ PI			0.017	Low

Source: PLS-SEM Data

Hypotheses Testing Results

Hypotheses were tested using a bootstrapping procedure with 5000 iterations. Table 5 summarizes the results.

Table 5. Hypothesis Testing Results

Hyphoteses	Relationships	Path Coefficient (β)	T-statistics	p-values	Decision
H1	ATT ⟶ PI	0.539	6.003	0.000	Accepted
H2	SN ⟶ PI	0.271	3.453	0.001	Accepted
H3	PBC ⟶ PI	0.012	0.214	0.830	Rejected
H4	FWAC ⟶ PI	0.092	2.120	0.034	Accepted

Source: PLS-SEM Data

The results revealed that there are three hypotheses that are supported (ATT-PI, β = 0.539, t = 6.003; SN-PI, . t = 3.453; FWAC-PI, β = 0.092. t = 2.120) and one hypotheses that is not supported (PBC-PI. B = 0.012. t - 0.830).

From Table 5 showed attitude is the strongest predictor of purchase intention, as indicated by highest path coefficient (β = 0.5390 and a large effect size (f^2 = 0.318). This result confirms that evaluative judgments toward suboptimal food dominate intention formation.

Subjective norms show a statistically significant but smaller contribution (β = 0.271) suggesting that social influence functions as a secondary determinant. Food waste awareness of consequences also exhibits a significant effect (β = 0.092), although with a small effect size, indicating that moral awareness supports but does not dominate purchase intention.

In contrast, perceived behavioral control does not significantly affect purchase intention ($\beta = 0.012$; $p > 0.05$), implying that perceived ability alone is insufficient to motivate suboptimal food purchasing in the current retail context.

Discussion

The results confirm the applicability of TPB and VBN in explaining consumers' intention to purchase suboptimal food. Attitude emerges as a key determinant, indicating that positive evaluations of suboptimal food, significantly enhance purchase intention (Tufail et al., 2023). Subjective norms also exert a significant influence, highlighting the importance of social acceptance and normative support in legitimizing non-conventional food choices (Pandey et al., 2023).

Food waste awareness of consequences significantly predicts purchase intention, supporting VBN theory and underscoring the role of moral and belief-based motivations in sustainable consumption (Soemantri et al., 2025; Chen, 2024). Consumers who recognize the broader impacts of food waste are more inclined to support waste-reducing practices through their purchasing decisions. In contrast, perceived behavioral control does not exhibit a significant effect on purchase intention.

This finding aligns with prior studies reporting inconsistent PBC effects in suboptimal food contexts, particularly in retail environments where availibility and information remain constrained (Wong et al., 2018; Hartmann et al., 2021).

CONCLUSION

This study concludes that attitude, subjective norms, and food waste awareness of consequences significantly influence consumers' purchase intention toward suboptimal food, while perceived behavioral control does not exhibit a significant effect. By integrating Theory of Planned Behavior and Value-Belief-Norm theory, this study highlights the importance of psychological and moral factors in encouraging sustainable food purchasing behavior.

The findings indicate that positive consumers evaluations, social support, and awareness of the negative consequences of food waste play a crucial role in motivation consumers to purchase suboptimal food. These results provide valuable insights for marketers, policymakers, and sustainability inititatives in designing effective communication and educational strategies to reduce food waste and promote responsible consumption.

Practical Implications

Retailers should focus on communication strategies that foster positive attitudes, emphasize social endorsment, and highlight the environmental consequences of food waste. Educational campaign and in-store messaging can strenghten consumers' awareness and normalize suboptimal food purchases.

Theoretical Implications

This study extends TPB by incorporating a belief component from VBN theory, enriching explanations of sustainable consumption behavior in emerging market contexts.

Limitations and future research

Future research may incorporate experimental designs, longitudinal data, or actual purchase behavior to validate and extend the present findings.

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