

Perceptions and Behavioral Intentions Regarding Composting Among Students and Staff of Metro Manila Universities Using the Theory of Planned Behavior and Norm Activation Model

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Abstract – This study investigates the perceptions and behavioral intentions toward composting among students and staff in Metro Manila universities, using the Theory of Planned Behavior (TPB) and the Norm Activation Model (NAM) as frameworks. The research aims to explore how psychological, social, and moral factors influence composting behavior, with a particular focus on composting knowledge as a moderating variable. Addressing the need for more proactive, sustainable waste solutions in academic institutions, the study contributes to ongoing efforts to reduce food waste and support SDGs 11 and 13.

A mixed-methods approach was employed, combining a survey of 324 participants with five semi-structured interviews. Structural Equation Modeling (SEM) was used to assess hypothesized relationships. Findings indicate that attitude, perceived behavioral control, and personal norms significantly influence behavioral intention to compost, while subjective norms do not. Composting knowledge moderates the relationship between personal norms and behavioral intention, but not between other TPB variables.

Limitations of the study include its geographic focus on Metro Manila universities and its exclusion of external factors such as composting infrastructure. Future research should examine broader populations and other moderating influences such as institutional support or access to facilities.

Practically, the study suggests that universities should emphasize environmental education, promote composting as a moral responsibility, and invest in visible composting systems. Theoretically, the study contributes by integrating TPB and NAM and challenging the assumed role of social norms in pro-environmental behavior, particularly in urban academic contexts.

Key Words: Waste management; organic waste; composting; sustainability; composting knowledge

1. INTRODUCTION

The Philippines generates up to 61,000 metric tons of trash daily — enough to fill 37 Olympic-sized swimming pools (Baclig, 2024). For the average Filipino, a piece of trash's journey seemingly ends when tossed into a bin. However, what is the true story of our waste after that moment? With this staggering volume of daily waste, a critical question emerges: Where will all this trash go?

To combat this issue, the Philippine government enacted Republic Act 9003, also known as the Ecological Solid Waste Management Act of 2000. This law provides a comprehensive

strategy for managing solid waste. It mandates local government units and institutions to implement systematic waste management practices, including promoting composting and other eco-friendly methods, to reduce the burden on landfills and lessen environmental risks (Atienza, 2011). Additionally, the government has explored waste-to-energy initiatives as a dual strategy to mitigate waste and foster energy production (Baclig, 2024).

Despite existing programs and extensive research, sustainable waste management practices such as segregation have yet to be fully normalized in society. This issue was highlighted by a professor specializing in humanistic management, who shared

his frustration over the disconnect between promoted practices and actual waste disposal, where segregated waste often ends up in the same landfill. This testimony prompted the researchers to explore perceptions and behavioral intentions toward composting as a waste management strategy in Metro Manila universities.

Composting is a natural and efficient process of “converting organic waste, such as food scraps and yard waste, into nutrient-rich fertilizer that enhances soil health” (Aloian, 2014). This method has been recognized as an effective way to reduce waste and support sustainable agriculture.

Locally, however, composting remains limited in scope and implementation, particularly in urban educational institutions. Only a number of educational institutions have taken steps to make this possible. For example, the Far Eastern University of the Philippines Sustainable Report (2023) reported a successful partnership with Soil Mate, an application that helps facilitate the collection of food waste, which is subsequently composted. De La Salle University Manila has recently signed a Memorandum of Understanding with the same mobile developer in the hopes of starting bokashi composting within the university. The partnership began in January 2025 (De La Salle University, 2024). The UP Diliman Task Force on Solid Waste Management (UPD-TFSWM) collects approximately 200 kilograms of food waste daily from campus facilities, which is then converted into compost to support urban farming and vegetable production (Cabigao, 2017). Given this information, it may indeed prove to be difficult for Philippine universities, as some lack the space, and even when space is available, other issues may arise, whether it be cost or the odor from the waste. Regardless of these hurdles, however, universities must still hold onto their responsibility of waste management. Studies have shown that solid waste management in educational institutions is crucial for health, environmental, and socio-economic reasons (Sepe, 2024)

1.1 RESEARCH QUESTIONS

To recognize the gap in composting initiatives locally, the study aims to bridge the gap in understanding composting perceptions and behavioral intentions within Metro Manila’s academic community. Hence, to operationalize the study, the following research questions were formulated:

1. What are the perceptions of Metro Manila University students, faculty, and staff toward composting?
2. What influences Metro Manila University students, faculty, and staff’s behavioral intention to compost?
3. Does composting knowledge affect the behavioral intention of Metro Manila University students, faculty, and staff to compost?

2. METHODOLOGY

2.1 FRAMEWORK

To achieve these objectives, the research employs a mixed-methodology approach, combining both quantitative and qualitative methods. A combined framework of NAM and TPB by Kopaei et al. was utilized for the study.

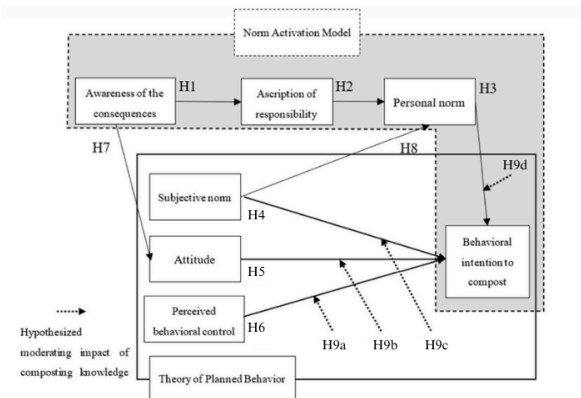


Fig. 1. Theoretical and Conceptual Framework of the Theory of Planned Behavior and Norm Activation Model Note: Adapted From “Integrated Conceptual Model,” by Kopaei, R. H., Nooripoor, M., Karami, A., Petrescu-Mag, R. M., & Petrescu, D. C. (2021). Drivers of Residents’ Home Composting Intention: Integrating the Theory of Planned Behavior, the Norm Activation Model, and the Moderating Role of Composting Knowledge. *Sustainability*, 13(12), 6826. <https://doi.org/10.3390/su13126826>. Copyright 2021 by Kopaei, R. H., Nooripoor, M., Karami, A., Petrescu-Mag, R. M., & Petrescu, D. C

As represented by the grey area in Figure 1, the NAM is often interpreted as a mediator model, where awareness of consequences leads to feelings of responsibility, which in turn activate personal norms that guide behavior. The model aims to clarify how these personal norms can motivate individuals to act in ways that align with their moral beliefs and societal expectations, particularly in the context of pro-environmental actions. Numerous studies have been conducted testing the NAM model. According to Savari

et al. (2023), the NAM assumes that personal norms—defined as feelings of moral obligation—are central to predicting individual behavior, specifically in pro-environmental behaviors. The model suggests that three key factors connect Awareness of Consequences (AC) and Ascribed Responsibility (AR) to Personal Norm (PN).

The theory of planned behavior (TPB), as represented by the outlined box, is said to be a supplement to the Theory of Reasoned Action, which often describes what drives a particular individual's behaviors (Ajzen, 1991). It connects Subjective Norm (SN), Attitude (ATT), and Perceived Behavioral Control (PBC), leading to Behavioral Intention (BI) (Ajzen, 1991).

Connecting them, NAM and TPB have been widely used to analyze pro-environmental behavior determinants. The combination of the two frameworks also results in the hypothesized link between Awareness of Consequences (AC) and Attitude (ATT) and Subjective Norm (SN) and Personal Norm (PN). For instance, Han & Hyun (2017) combined these theories to examine customer behavior toward visiting environmentally friendly museums, demonstrating that an individual's awareness of environmental issues positively influences their attitude, which furthers into behavioral intention. This is also supported by Bamberg & Möser (2007), who found that problem awareness and emotions such as pride and guilt significantly affect attitudes. Specifically, pride fosters a more positive attitude, while guilt leads to a more negative attitude. Based on these findings, a link between AC and ATT can be hypothesized.

Moreover, the framework suggests that when a person perceives a task as easy to accomplish, they are more likely to complete it, and conversely, if the task is seen as complicated, they are less likely to engage in it. This is supported by various studies linking subjective norms (SN) and personal norms (PN), such as Han et al. (2019), which examined consumer behavior toward environmentally friendly cruise products. Le & Nguyen (2022) also proved the significance of the relationship between SN and PN by investigating organic food purchasing intentions.

Lastly, knowledge is included as a moderating variable, as previous research by Liu et al. (2020)

suggests that greater knowledge can enhance individuals' behavioral intentions to engage in pro-environmental actions. Composting knowledge may strengthen or weaken the relationship between independent and dependent variables, potentially influencing behavioral intention (BI).

Guided by these frameworks, the researchers derive the following hypotheses:

Hypothesis 1. AC of composting positively affects AR to compost at the university.

Hypothesis 2. AR to compost in the university positively affects PN's composting intention.

Hypothesis 3. PN related to composting positively affects BI to compost at the university.

Hypothesis 4. ATT towards composting positively affects BI to compost at the university.

Hypothesis 5. SN related to composting positively affects BI to compost at the university.

Hypothesis 6. PBC related to composting positively affects BI to compost at the university.

Hypothesis 7. AC of composting positively affects ATT on composting.

Hypothesis 8. SN about composting positively affects PN related to composting.

Hypothesis 9a (H9a). Composting knowledge plays a moderating role in the relationship between PBC about composting and BI to compost.

Hypothesis 9b (H9b). Composting knowledge plays a moderating role in the relationship between ATT towards composting and BI towards composting.

Hypothesis 9c (H9c). Composting knowledge plays a moderating role in the relationship between SN concerning composting and BI to compost.

Hypothesis 9d (H9d). Composting knowledge plays a moderating role in the relationship PN between composting and BI to compost.

2.1 RESEARCH DESIGN

As for the quantitative portion, the participants will be asked to complete a 5-point Likert scale survey, which will be accomplished through Google Forms. We aim to gather responses from approximately three hundred (300+) participants to establish satisfactory evidence for our study (Sommet et al., 2022). In addition to the quantitative analysis, interviews shall be conducted as a

supplementary source for the numerical data and results collected. The same questions from the survey shall be used for the interview; however, they shall be reformatted into open-ended questions. A total of fifteen (15) respondents for the interviews shall be done (Francis et al., 2010). The interview participants will be selected using purposive sampling from the survey respondents willing to participate in follow-up discussions. This approach ensures that the interviewees can provide rich, detailed insights that complement and expand upon the quantitative findings while maintaining the coherence between both data collection methods.

In line with the main design of SEM, a pretest among 30 participants was required to confirm model fit and scale validity. The pretest involved 30 participants to establish the validity and reliability of the research instrument adapted from Kopaei et al. (2021), which used a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Cronbach's alpha values exceeded the 0.7 threshold, indicating acceptable internal consistency reliability. Factor loadings also showed moderate correlations, with values above 0.30 ($p > 0.001$), supporting the validity of the constructs for the main study.

3. RESULTS AND DISCUSSION

Construct and Scale Item	Standardized Loading
Awareness of the Consequences ($\alpha = 0.868$)	
Composting helps to protect the environment.	0.536
Composting reduces the amount of waste that goes into landfills.	0.616
Composting creates a better environment for the future generation.	0.618
Ascription of Responsibility ($\alpha = 0.807$)	
The responsibility of recycling waste is borne by the people who produce it.	0.469
I feel a duty to increase the culture of waste recycling.	0.934
Despite a low volume of waste produced at the university, I feel a duty to protect the environment through recycling.	0.928
Personal Norms ($\alpha = 0.829$)	
It would be wrong of me not to recycle my waste.	0.576
I would feel guilty if I did not recycle my waste.	0.685
Not recycling goes against my principles.	0.661
Subjective Norms ($\alpha = 0.826$)	
Many of my friends find compost useful.	0.891
Many of my relatives find compost useful.	0.768
People who influence my decisions think that I should compost.	0.855
Perceived Behavioral Control ($\alpha = 0.845$)	
I have tools to compost my waste inside the university.	0.967
I know how to compost waste in the university.	1.210
I have enough time for composting.	0.943
Attitude ($\alpha = 0.761$)	
Composting is rewarding.	0.777
Composting is hygienic.	0.741
Composting is necessary.	0.537
Behavioral Intention ($\alpha = 0.864$)	
I intend to compost food waste in the university.	1.134
Level of planning to compost waste in the university.	1.022

Fig 2. Survey results of the sample (n=324)

Table 1. Fit Measures CFI, TLI, and RMSEA

CFI	TLI	RMSEA	RMSEA 90% CI	
			Lower	Upper
0.966	0.957	0.0505	0.0409	0.0599

3.1 DESCRIPTION

The quantitative aspect of the study comprised 324 respondents from various universities in Metro Manila, with 44% males (n=143) and 56% females (n=181). Participants are predominantly undergraduate students aged 18-22, with a mean age of 21. 23% of the respondents are employees/staff who are mostly full-time faculty members and belong to the millennial generation. Additionally, a total of 5 interviews were completed with 2 of the participants being staff members and 3 as students.

Confirmatory factor analysis (CFA) was conducted using Jamovi version 2.6.2.0 to evaluate the measurement model. In addition, we also utilized SmartPLS 4.0, M3 software to further assess the measurement model. All items demonstrated significant loadings onto their associated constructs ($p > 0.001$), with factor loadings ranging from 0.47 to 1.21. The analysis revealed satisfactory internal consistency reliability across all constructs, with an overall Cronbach's alpha of 0.912 and individual construct values all exceeding the recommended threshold of 0.7. Multiple fit indices were examined to assess the model's overall adequacy. The Comparative Fit Index (CFI) yielded a value of 0.966, conveying an acceptable value that exceeds the recommended threshold of ≥ 0.90 , which indicates that the data from the hypothesized model fits the baseline model. The Root Mean Square Error of Approximation (RMSEA) was 0.0505, falling under the acceptable range of 0.05-0.08, indicating that the statistical model fits the data involving multiple variables. Similarly, the Tucker-Lewis Index (TLI) value of 0.957 fits the recommended threshold of ≥ 0.90 , indicating that the model's incremental fit is relative to a null model. The results confirm that the measurement model demonstrates strong measurement qualities. The fit indices significantly indicate a strong and meaningful association with its corresponding construct, with the reliability of the constructs demonstrating internal consistency as evidenced by the high Cronbach's alpha scores.

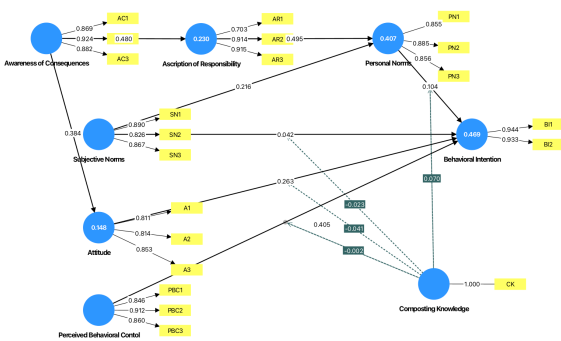


Fig. 3. SEM Pathways

Table 2. Results of structural equation modeling

Path	Path coefficients	Hypothesis
AC → AR	0.48	Do not reject
AR → PN	0.495	Do not reject
PN → BI	0.104	Do not reject
ATT → BI	0.263	Do not reject
SN → BI	0.042	Reject
PBC → BI	0.405	Do not reject
AC → ATT	0.384	Do not reject
SN → PN	0.216	Do not reject

SEM was used to test Hypotheses 1–8. Most hypotheses resulted in not rejecting the hypothesis ($p > 0.05$), except for the effect of subjective norm (SN) on behavioral intention (BI) ($p = 0.042$, $p > 0.05$). This suggests that one’s perception of social pressure to compost does not significantly influence their intention to do so. These findings contrast with Kopaei et al. (2021), who found SN to be a significant factor. One possible reason for the discrepancy is the lack of visible composting practices in the participants’ universities. Interviews also revealed that participants did not consider social pressure relevant to their composting behavior. Instead, they emphasized that the consequences (AC) of not composting are a stronger driver for their behavior than social pressure, which aligns with the results. Without strong social cues or encouragement from peers, individuals may not feel motivated to compost based on social expectations alone.

Table 3. Composting Knowledge (CK) as a Moderating Variable to Behavioral Intention

Path	Path coefficients	Hypothesis
CK x PBC → BI	-0.002	reject
CK x ATT → BI	-0.041	reject
CK x SN → BI	-0.023	reject
CK x PN → BI	0.07	Do not reject

Contrary to the findings of Kopaei et al. (2021), this study found that composting knowledge does not act as a moderating variable between PBC, SN, and ATT on behavioral intention. Only personal norms (PN) showed a significant moderating effect with composting knowledge, indicating that composting knowledge strengthens the influence of personal norms on the intention to compost.

Aligning with our interview findings, participants shared that their knowledge of composting increases their behavioral intention to compost. Two participants specifically mentioned that they often “feel guilty” when they do not or are unable to compost, as the practice strongly aligns with their own values.

One possible explanation for the lack of a moderating effect between composting knowledge and PBC, SN, and ATT on behavioral intention is that knowledge alone may not be enough to change how individuals perceive control, social pressure, or their general attitudes toward composting. For instance, even if participants in our interviews expressed that even if they are knowledgeable on composting, they might still face external barriers (e.g., lack of space or facilities), reducing the effect of perceived behavioral control. Similarly, subjective norms may remain weak regardless of knowledge if composting is not widely practiced or encouraged in their social circles. Additionally, attitudes toward composting may already be formed based on personal or cultural beliefs, and thus, further knowledge does not significantly strengthen this pre-existing attitude toward composting behavior.

4. CONCLUSIONS

Using the TPB and NAM, this study examined the factors influencing composting intentions among

students and staff in Metro Manila universities using composting knowledge as a moderating variable. Results showed that ATT, PBC, and PN have a significant effect on BI, while SN did not. Composting knowledge moderated only the relationship between personal norms and BI, suggesting that internal values paired with awareness drive behavior more than social pressure. Interview responses supported this, with participants expressing guilt when not composting due to their knowledge and values. These findings highlight the importance of strengthening personal responsibility and environmental education to promote composting.

This study is limited to Metro Manila universities, which may not reflect other populations or contexts. Other potential moderators, such as access to composting facilities or institutional support, were not explored. Future studies could explore a wider demographic and test additional moderating factors. Based on these findings, universities should focus on increasing composting knowledge through awareness campaigns, integrating composting practices into the curriculum, and providing accessible composting systems on campus. Encouraging a sense of personal responsibility, alongside environmental education, will help strengthen composting behavior among students and staff.

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