Household waste management behavior in the Blunyahrejo Village, Yogyakarta: insights from the theory of planned behavior and social capital

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Abstract. The escalating issue of waste highlights the importance of conducting this research to analyze household waste management behavior in the Blunyahrejo community from the perspectives of the Theory of Planned Behavior (TPB) and Social Capital. The key aspects analyzed from TPB include attitude toward the behavior, subjective norms, and perceived behavioral control, as well as social networks and social trust. This type of research is quantitative and uses convenience sampling for data collection. A total of 102 samples were analyzed using logistic regression analysis for multivariate analysis. The results of the logistic regression analysis indicate that age ($p<0.05$, OR: 6.29), attitude toward the behavior ($p<0.01$, OR: 11.09), and perceived behavioral control ($p<0.05$, OR: 5.91) are significantly related to waste management behavior. Additionally, the variable of social trust has the greatest influence on waste management behavior ($p<0.001$, OR: 19.47). Social trust is the key factor influencing waste management behavior, as it enhances confidence and environmental awareness. Age also plays a role, with older individuals managing waste better due to greater maturity. Positive attitudes towards waste management and perceived control over waste further impact behavior. Effective waste management thus requires a strategy that fosters social trust, offers environmental education, and provides adequate infrastructure.

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1 Introduction

Indonesia has a severe trash problem, particularly in Yogyakarta. The Piyungan, one of the main landfill, was closed permanently by the Yogyakarta Special Region Government in April 2024 due to its full capacity. This demonstrates how reliant on the landfill the community is. Since households generate the majority of waste, it is their responsibility to manage waste appropriately. The local government further promotes waste management at the source by implementing Yogyakarta City Regional Regulation Number 1 of 2022, which mandates that the community manage waste resulting from daily activities, and the Yogyakarta Mayor's Circular Letter 660/6123/SE/2022, which encourages the zero inorganic waste movement, allowing for waste sorting at households and the submission of inorganic waste to waste banks.

The development of habits is essential for improving community involvement in trash management. A number of theoretical frameworks have been used to explain community waste management practices, with the Theory of Planned Behavior (TPB) emerging as a major framework for comprehending individual pro-environmental behavioral intents [1]. Empirical findings indicate that all components of TPB interact and influence household waste management practices in a sample of Iranian communities [2].

In order to forecast behavior, it is essential to consider the interactions between society and its environment. Social capital, for instance, has been demonstrated to significantly influence pro-environmental behaviors. Empirical evidence suggests that the constructs of social capital, such as trust and social norms, positively and directly affect travelers' intentions to engage in waste sorting at rural tourism destinations. Travelers' intentions to sort the waste at rural tourism locations are positively and directly impacted by the social capital constructs of trust and social norms [3]. The way that societies classify urban trash is influenced by social networks, another construct [4]. Personal norms, which have been demonstrated to impact social norms in pro-environmental movements, are another crucial factor in establishing the motives behind a conduct [5]. This study aims to analyze household waste management behavior in the Blunyahrejo community from the perspectives of TPB and social capital.

2 Methods

2.1 Participants

The study involved 102 residents from Blunyahrejo Village, Yogyakarta City, including both male and female participants who provided written informed consent. The research session was conducted once. The population in this study was divided into three clusters based on neighborhood associations (RW): RW 04, RW 05, and RW 06. Samples were then drawn from each cluster using a convenience sampling method.

2.2 Research model teaching

This research employs a cross-sectional study design and is categorized as observational analytical research.

2.3 Data collection tools

A questionnaire was utilized as the study's instrument that includes questions regarding the TPB constructs (attitude, subjective norms, perceived behavioral control), as well as the social capital constructs (social networks, trust), and waste management behavior. The questionnaire was

distributed and completed directly by the respondents during various activities.

2.4 Data evaluation and statistical analysis

The questionnaire for the Theory of Planned Behavior (TPB) construct consists of three variables: attitude toward the behavior, subjective norms, and perceived behavioral control. The attitude toward the behavior variable includes 4 items, while the subjective norms and perceived behavioral control variables each consist of 5 items. All items are measured using a 5-point Likert scale (1 = strongly disagree; 2 = disagree; 3 = neutral; 4 = agree; 5 = strongly agree).

For the Social Capital construct, there are two variables: social networks and social trust. The social networks variable includes 4 items and is measured using a 7-point Likert scale (1 = Never; 2 = Once a year or less; 3 = A few times a year; 4 = About once a month; 5 = Several times a month; 6 = 1-2 times a week; 7 = Almost every day). The social trust variable consists of 3 items and is measured using a 5-point Likert scale (1 = Strongly Disagree; 2 = Disagree; 3 = Neutral; 4 = Agree; 5 = Strongly Agree).

The total score for each variable is obtained by summing all item scores. Subsequently, each variable will be converted into a dummy variable using the median value of each. Data analysis in this study employs both descriptive and multivariate analyses. Descriptive analysis is used to describe demographic factors, attitudes, subjective norms, perceived behavioral control, trust, social networks, personal norms, and waste management behaviors. Multivariate analysis, including logistic regression, is conducted to examine the relationships between all independent variables and the dependent variable.

3 Results and Discussion

Table 1. Factor Demographics (N=102)

Respondent Characteristics	**Frequency (N)**	**Percentage (%)**
Gender		
Male	53	52
Female	49	48
Total	102	100
Age		
Adult (≤ 45)	37	36
Elderly (≥ 45)	65	64
Total	102	100
Level Education		
Low (< high school)	31	30
High (≥ high school)	71	70

In Table 1, the total subject (n=102) comprised a slight majority of males (53 respondents, 52%). The largest age group was those over 45 years old (65 respondents, 64%). In terms of education level, the majority of respondents (71 respondents, or 70%) reported having a high level of education.

Table 2. Community Waste Management Behavior

Variable	Question	M (SD)
Waste Management Behavior	1. I reduce the use or purchase of single-use products/items in my daily life	3.95 (0.70)
	2. I reuse materials that can be recycled in my daily life	3.81 (0.74)
	3. I separate waste that can be recycled and then dispose of it properly in waste containers or sell it in my daily life	4.04 (0.80)

Table 2 shows that the majority of respondents predominantly engage in waste separation, particularly for recyclable materials. They then dispose of the waste properly in designated containers or sell it. Community-based waste management activities are conducted by the residents of Kampung Blunyahrejo, including initiatives such as the local Waste Bank in each neighborhood unit (RT).

Table 3. Description of each Variable

Variabel	Question	M (SD)
Attitude Toward the Behavior	1. In my opinion, reducing waste, reusing items that can still be utilized, and sorting waste are beneficial practices to implement.	4.31 (0.87)
	2. In my opinion, reducing waste, reusing items that can still be utilized, and sorting waste are activities that are enjoyable to undertake	3.99 (0.82)
	3. In my opinion, reducing waste, reusing items that can still be utilized, and sorting waste can mitigate environmental issues.	4.24 (0.84)
	4. In my opinion, reducing waste, reusing items that can still be utilized, and sorting waste can create a healthier environment for humans.	4.33 (0.83)
Social Norm	1. My neighbors believe that I should reduce waste, reuse items that can still be used, and sort waste.	4.03 (0.83)
	2. My family members believe that I should reduce waste, reuse items that can still be used, and sort waste.	4.04 (0.86)
	3. Most of my family reduces waste, reuses items that can still be used, and sorts waste.	4 (0.85)
	4. Most of my neighbors reduce waste, reuse items that can still be used, and sort waste.	3.82 (0.93)
	5. Many training sessions or workshops encourage me to reduce waste, reuse items that can still be used, and sort waste.	4.05 (0.83)
Perceived Behavior	1. I have the skills and ability to reduce waste, reuse items that can still be used, and sort waste into	3.74 (0.79)

Variabel	Question	M (SD)
Control	organic and inorganic in my daily life.	
	2. I find it easy and convenient to reduce waste, reuse items that can still be used, and sort waste into organic and inorganic in my daily life.	3.79 (0.80)
	3. I am confident that if I reduce waste, reuse items that can still be used, and sort waste into organic and inorganic, I can do it.	3.87 (0.68)
Social Network	1. How often do you gather with your relatives?	5.05 (1.81)
	2. How often have you met your friends over the past year?	4.55 (2.02)
	3. Frequency of doing recreational activities with other friends every day?	3.19 (1.77)
	4. How often do you meet or do activities with your neighbors?	5.35 (1.45)
Social Trust	1. I'm sure my neighbors will help me when I ask for their help	4.12 (0.71)
	2. I Trust in the people of this village	4.08 (0.67)
	3. The people in this village have sufficient capacity to overcome their own local problems	3.88 (0.72)

In Table 3, regarding the advantages of waste management in promoting a healthy environment, the majority of respondents similarly expressed a positive opinion (M = 4.33). Furthermore, the fact that the respondents regularly receive waste management advice through a variety of training sessions and seminars suggests that they are in a setting that is generally supportive of waste management (M = 4.05). On the other hand, the perceived behavioral control variables, which include confidence in completing waste management tasks (M = 3.87), perceptions of ease and convenience in managing waste (M = 3.79), and skills and abilities in waste management (M = 3.74), show relatively low average scores across all questions. According to these results, participants believed they had little behavioral control over waste management procedures. The social network variable shows that people meet or do activities with neighbors more often (M = 5.35). In addition, respondents showed a high level of social trust, especially in their neighbors' ability to help when needed (M = 4.12).

Multivariate analysis was conducted using logistic regression to examine the relationships between all independent variables and the dependent variable. This analysis was carried out in stages by creating several analytical models. Model 1 included only demographic factors. Model 2 added variables related to the Theory of Planned Behavior (attitude toward the behavior, subjective norms, and perceived behavioral control). Model 3 further included variables associated with the Social Capital construct (social networks and social trust).

Model 3 exhibits the lowest AIC value (73.15), indicating that it is the best model for predicting waste management behavior compared to the other three models. The social trust variable is significantly associated with waste management behavior ($p<0.001$) and is the most influential factor, with an OR value of 19.47. This suggests that respondents with high social trust have 19.47 times greater potential to manage waste effectively. When social trust is applied, people are more likely to undertake pro-environmental actions because they feel more confident and trusting of different types of information that can increase environmental awareness [6]. People will also voluntarily commit to particular actions based on trust,

expecting others to do the same [7].

Age is also significantly related to waste management behavior ($p<0.05$) with an OR of 6.29, indicating that elderly respondents have 6.29 times greater potential to manage waste more effectively. Age is frequently linked to maturity, which has a big impact on how aware a person is of environmental health issues [8]. Growing older and gaining life experience can encourage pro-environmental attitudes and behaviors [9].

Table 4. Multivariate Analysis

Variable		Model 1	Model 2	Model 3
Demographics	Gender	0.75 (0.30-1.91)	0.49 (0.14-1.65)	1.26 (0.27-5.81)
	Age	1.96 (0.72-5.36)	3.07 (0.85-11.11)	6.29* (1.28-30.79)
	Education Level	2.27 (0.75-6.87)	3.73 (0.76-18.26)	1.37 (0.22-8.54)
TPB	Attitude Toward the Behavior		9.22** (2.45-34.70)	11.09** (2.27-54.02)
	Social Norm		1.82 (0.48-6.82)	1.85 (0.37-9.18)
	Perceived Behavior Control		7.21** (1.71-30.47)	5.91* (1.00-34.76)
Social Capital	Social Network			3.23 (0.69,15.05)
	Social Trust			19.47*** (3.54-106.9)
N		102	102	102
AIC		119.5	87.85	73.15

*** p<0.05, ** p<0.01, *** p<0.001**

The variables of attitude toward the behavior ($p<0.01$) are statistically significant in relation to waste management behavior, with OR values of 11.09. Respondents with a positive attitude toward the behavior have 11.09 times greater potential to manage waste effectively. In the Theory of Planned Behavior (TPB), attitude reflects an individual's evaluation of a specific behavior, indicating whether the behavior is perceived as positive or negative, enjoyable or unpleasant, and so forth [10]. Households that recognize a positive impact from waste management behaviors have a significant influence on their attitudes [11]. A positive attitude can serve as a driver or motivation for engaging in pro-environmental behavior [12].

Perceived behavioral control ($p<0.05$) are also statistically significant in relation to waste management behavior, with OR 5.91, it means positive perception of behavioral control has 5.91 times greater potential to manage waste effectively. Previous research has also found that perceived behavioral control can significantly predict household waste management behavior [13]. Perceived behavioral control refers to an individual's belief in their ability to perform a specific behavior [14]. The stronger an individual's perception of behavioral control, the higher the likelihood that they will engage in that behavior [10].

4 Conclusion

In conclusion, social trust is the most crucial factor influencing waste management behavior. People are more likely to engage in pro-environmental activities when they have higher levels of social trust, which boosts their confidence and belief in information that enhances environmental awareness. Age is also an important factor, with older respondents managing waste better due to their maturity and life experience. Additionally, having a positive attitude towards waste management practices makes individuals more likely to adopt them. Finally, a person's behavior is significantly affected by their perceived control over managing waste. These findings suggest that promoting effective waste management requires a comprehensive strategy that includes building social trust, providing environmental education, and ensuring adequate infrastructure support.

References

1. Han, H. Travelers' Pro-environmental Behavior in a Green Lodging Context: Converging Value-Belief-Norm Theory and the Theory of Planned Behavior. Tour. Manag. **47**, 164–177. (2015). https://doi.org/10.1016/j.tourman.2014.09.014
2. Pakpour, A.H., Zeidi, I.M., Emamjoeh, M.M., Asefzadeh, S., dan Pearson, H. Household waste behaviours among a community sample in Iran: An application of the theory of planned behaviour. Waste Manag. **34**(6), 980-986. (2014). https://doi.org/10.1016/j.wasman.2013.10.028
3. Liu, M., dan Feng, Q. Does Social Capital Promote Garbage Classification? Evidence From China. SAGE Open, **11**(3). (2021). https://doi.org/10.1177/21582440211040781
4. Lee, S.S., Kim, Y., dan Roh, T. Pro-environmental behavior on electric vehicle use intention: Integrating value-belief-norm theory and theory of planned behavior. Journal of Cleaner Production. **418**, 138211. (2023). https://doi.org/10.1016/j.jclepro.2023.138211
5. Janmaimool, P., dan Denpaiboon, C. Evaluating determinants of rural Villagers' engagement in conservation and waste management behaviors based on integrated conceptual framework of Pro-environmental behavior. Life Sci Soc Policy. **12**. (2016). https://doi.org/10.1186/s40504-016-0045-3
6. Atshan, S., Bixler R.P., Rai, V., dan W.Spinger, D. Pathways to Urban Sustainability Through Individual Behaviors: The Role of Social Capital. Environmental Science & Policy. **112**, 330-339. (2020). https://doi.org/10.1016/j.envsci.2020.07.005
7. Liao, Y., dan Xing, Y. Social capital and residents' plastic recycling behaviors in China. Journal of Environmental Planning and Management. **66**(5), 955-976. (2023). https://doi.org/10.1080/09640568.2021.2007062
8. Fadhullah, W., Imran, N.I.N., Ismail, S.N.S., Jaafar, M.H., dan Abdullah, H. Household solid waste management practices and perceptions among residents in the East Coast of Malaysia. BMC Public Health. **22**, 1. (2022). https://doi.org/10.1186/s12889-021-12274-7
9. Shaw, P.J. Age, ageing and their influence on waste management behaviour. Waste Management. **59**, 1-2. (2017). https://doi.org/10.1016/j.wasman.2016.11.036
10. Harjana, N.P.A. Perilaku Kesehatan: Kumpulan Teori dan Penerapan. (Ngakan Putu Anom Harjana, Indonesia, 2023).
11. Arkofur, V.E., Shiliang Z., dan Lugu, B.K. Investigating Household Waste Separation Behavior: The Salience of An Integrated Norm Activation Model and The Theory of Planned Behavior. Journal of Environmental Planning and Management. **66**(10), 2195-2221. (2022). https://doi.org/10.1080/09640568.2022.2063112
12. Janmaimool, P., dan Denpaiboon, C. Evaluating determinants of rural Villagers' engagement in conservation and waste management behaviors based on integrated conceptual framework of Pro-environmental behavior. Life Sci Soc Policy. **12**. (2016).

https://doi.org/10.1186/s40504-016-0045-3
13. Zhang, D., Huang, G., Yin, X., dan Qinghua, G. Residents' Waste Separation Behaviors at the Source: Using SEM with the Theory of Planned Behavior in Guangzhou, China. Int. J. Environ. Res. Public Health. **12**(8), 9475-9491. (2015) https://doi.org/10.3390/ijerph120809475
14. Ajzen, I. The Theory of Planned Behavior."Organizational Behavior and Human Decision Processes. **50** (2), 179–211. (1991). https://doi.org/10.1016/0749-5978(91)90020-T