

The Determinants of Rural Community Participation in Waste Bank: An Approach Using the Theory of Planned Behavior

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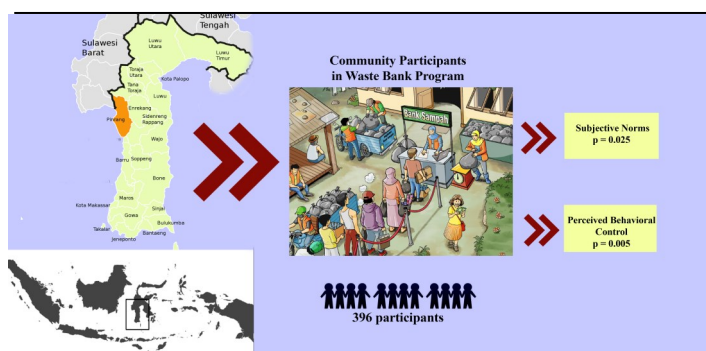
ABSTRACT

Waste management is a significant public health issue in rural areas, with most residents still disposing of waste on empty land in front of or behind their homes. Although proper management practices have been widely discussed in developing countries, limited studies are using comprehensive variables based on the Theory of Planned Behavior (TPB) to analyze the factors influencing community participation in Waste Bank programs. Therefore, this study aims to analyze the determinants of community participation in Waste Bank program in Paleteang District, Pinrang Regency, using TPB approach. The procedures were carried out using a quantitative survey with a cross-sectional design. Data were then collected from 396 participants using validated questionnaires, followed by analysis with Chi-Square tests and multiple linear regression. The results showed that subjective norms and perceived behavioral control significantly influenced community participation, with p-values of 0.025 and 0.005, and OR values of 4.183 and 8.250, respectively. Meanwhile, attitudes and satisfaction with local facilities had no significant influence. This showed the importance of social support and a sense of personal control in encouraging engagement. The results were expected to serve as a reference for policymakers in designing more effective and sustainable waste management programs in rural areas.

ABSTRAK

Sampah masih menjadi masalah kesehatan masyarakat pedesaan, sebagian besar masyarakat masih membuang sampah pada lahan kosong yang berada di depan maupun di belakang rumahnya. Meskipun banyak studi membahas pengelolaan sampah di negara berkembang, studi yang menggunakan variabel komprehensif berdasarkan Theory of Planned Behavior (TPB) untuk menganalisis faktor-faktor yang mempengaruhi partisipasi masyarakat dalam program Bank Sampah masih jarang dilakukan. Penelitian ini bertujuan untuk menganalisis determinan partisipasi masyarakat dalam program Bank Sampah di Kecamatan Paleteang, Kabupaten Pinrang, menggunakan pendekatan Theory of Planned Behavior (TPB). Metode penelitian yang digunakan adalah survei kuantitatif dengan desain cross-sectional. Data dikumpulkan dari 396 responden menggunakan kuesioner yang telah divalidasi. Analisis dilakukan menggunakan uji Chi-Square dan Regresi linear berganda. Hasil penelitian menunjukkan bahwa norma subjektif dan persepsi kontrol perilaku berpengaruh signifikan terhadap partisipasi masyarakat dalam program Bank Sampah, dengan nilai $p=0,025$ dan $p=0,005$ serta $OR=4,183$ dan $OR=8,250$. Sikap dan kepuasan dengan fasilitas lokal tidak menunjukkan pengaruh yang signifikan. Hal ini menunjukkan pentingnya dukungan sosial dan rasa kontrol pribadi dalam mendorong keterlibatan masyarakat. Hasil penelitian ini diharapkan dapat menjadi acuan bagi pengambil kebijakan dalam merancang program pengelolaan sampah yang lebih efektif dan berkelanjutan di pedesaan.

GRAPHICAL ABSTRACT



Keyword

behavioral control
community participation
subjective norms
theory of planned behavior
waste bank

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INTRODUCTION

Waste is a significant environmental challenge around the world, specifically in developing countries, such as Indonesia, where its production increases due to population growth and urbanization (Benedetti et al., 2019; Diana et al., 2022). In this context, the World Health Organization (WHO) has shown the adverse effects of ineffective management on the environment and public health (Adhikari, 2022). In Indonesia, the rising waste problem in urban and rural areas requires innovative solutions, such as Waste Bank initiatives to mitigate environmental and health risks by actively engaging community in proper management (Wiradimadja et al., 2023).

According to previous studies, best practices from other regions emphasize the importance of public participation, modernization, and solid waste management to effectively address waste-related challenges (Sinanto et al., 2022). The implementation of the initiatives and practices can contribute to a cleaner environment and healthier living conditions, particularly in rural areas. Indonesia, with a projected population of around 318 million by 2045, generates a substantial amount of waste, posing significant threats (Sunaryani, 2022). The issue is further exacerbated by the lack of policies and infrastructure, as evidenced by the struggles of Lampung Province to provide regional landfills and establish effective regulations (Margaretta et al., 2023).

In line with these results, data from the Ministry of Environment and Forestry (KLHK) showed that in 2021, Indonesia produced approximately 182 million tons of waste per year, with approximately 72.95% being properly managed (Yandri et al., 2023). The remaining waste is often improperly disposed of in landfills, potentially causing environmental pollution. In addition, more than 40% of waste generated originates from households, showing the importance of community participation in waste management efforts (Sucipto & Setiadi, 2023). A district in Pinrang Regency, namely Pal-

eteang District, can produce a volume of up to 150m³ per day (Amirudin, 2020), creating serious management challenges. Therefore, Waste Bank in the region is expected to provide a solution through active community participation.

Previous studies have extensively discussed factors influencing community participation in waste management. For instance, a study by Fatliana et al. (2021) showed that attitudes, subjective norms, knowledge, and situational factors positively influenced the intention to participate in various associated activities, while perceived control had no influence. Maryati et al. (2018) also reported that higher education levels influenced participation in waste management, while Purnomo et al. (2023) reported the influence of communication strategies. Despite the availability of literature, there are limitations to specific regions without the combination of the factors in an analytical model. Therefore, this study aims to fill the gaps by combining variables of attitude, subjective norms, perceived behavioral control, and satisfaction with local facilities into a model to assess community participation in Waste Bank of Paleteang District. The results are expected to serve as a reference for policymakers and community leaders in designing more effective and sustainable waste management programs.

METHODS

A quantitative approach with a cross-sectional design was used to explore factors influencing community participation in Waste Bank program in line with Han (2023). In addition, this study aimed to understand the intentions and behaviors of rural community members regarding participation in using the Theory of Planned Behavior (TPB) framework as described by Ajzen (1991). The theory emphasized personal norms, satisfaction with services, and the intention to serve as the primary motivators (Babazadeh et al., 2023). The procedures were conducted in Paleteang District, Pinrang Regency, South Sulawesi Province. The region was selected due to the ability to gather data

Table 1
The characteristics of respondents

Characteristics	Frequency	Percentage
Gender		
Male	177	44.7
Female	219	55.3
Age		
18-40 years	257	64.9
41-60 years	133	33.6
>60 years	6	1.5
Last Education		
Elementary School	126	6.3
Junior High School	70	17.7
Senior High School	157	39.6
Association Degree	9	2.3
Bachelor/Master/Doctoral Degree	34	8.6
Occupation		
No	25	6.3
House Wife	174	43.9
Student	44	11.1
Civil Servant/Teacher/Honorary	16	4
Farmer/Fishermen	50	12.6
Entrepreneur	85	21.5
Retired	1	3
Driver	1	3

from respondents in a single period and analyze the relationships between the studied variables, a common practice in waste management behavior studies. The study period from March to May 2023 ensured the accuracy of data in assessing the impact of Waste Bank program on community participation. The region was also selected based on significant waste management issues in the rural area and the presence of an active waste bank program.

The respondents comprised residents of the rural Paleteang District, who were selected based on their participation in waste bank program and their relevance in providing accurate data. Literature sources and information, such as scientific journals, textbooks, institutional reports, and data from government agencies were also used for analysis.

The sample population consisted of the entire community of Paleteang District, totaling 42,678 individuals. In addition, the sample size was determined using the Slovin formula with a 5% margin of error, leading to 396 individuals. A non-probability sampling method with an accidental sampling was used, where respondents were selected based on easy access and availability during the study.

The stages included preparing the study proposal, obtaining ethical approval, collecting primary data through questionnaires distributed to respondents, and gathering secondary data from literature with institutional reports. The respondents were informed about the objectives and were required to sign informed consent before participating. Data obtained from the questionnaires were then processed using SPSS statistical software. In this context, data analysis included univariate, bivariate, and multivariate tests to observe frequency distribution, analyze relationships between 2 variables, and observe the simultaneous influence of multiple variables on community participation.

The main instrument used was a questionnaire designed by the study teams based on TPB theory by Ajzen (1991) and the methods of Astuti & Linarti (2020) and Han (2023). The questionnaire measured attitudes, subjective norms, perceived behavioral control, and satisfaction using local facilities. Subsequently, it was carefully validated using the validity and reliability tests before being utilized in the procedures.

Data were analyzed by utilizing descriptive and inferential statistical techniques,

Table 2
Univariate analysis

Variable	Category	Frequency	Percentage
Behavior	Positive	317	80.1
	Negative	79	19.9
Subjective Norms	Positive	325	82.1
	Negative	71	17.9
Perceived behavioral control	Positive	296	74.7
	Negative	100	25.3
Satisfaction with local facilities	Satisfied	356	89.9
	Not satisfied	40	10.1
Community participation	Participate	87	22
	Not Participating	309	78

while the results were presented in tables, graphs, and descriptive narratives, which facilitated interpretation and understanding. The Chi-Square test was used to examine the relationships between variables, while logistic regression analysis was used to determine significant factors influencing community participation in waste bank program. The Odds Ratio was used to identify the most influential variables.

This study received approval from the Health Study Ethics Committee of the Faculty of Medicine and Health Sciences, UIN Alaudin Makassar, with approval number: B.390/KEPK/FKIK/III/2023. Informed consent was obtained from all respondents before data collection, ensuring voluntary participation and being informed about the objectives and procedures.

RESULTS

This study aimed to analyze the determinants of community participation in waste bank program in Paleteang District, Pinrang Regency, using TPB. The variables studied were attitudes, subjective norms, perceived behavioral control, and satisfaction with local facilities. Table 1 showed the results obtained from the analysis of the collected data.

A total of 396 respondents participated in this study, with a characteristics distribution showing that the majority were women (55.1%) and most were aged between 18-40 years (64.9%). In addition, most respondents had completed high school education (39.6%) and

were self-employed (43.9%). This frequency distribution provided a general overview of the demographics of the respondents in this study.

Univariate analysis was carried out to examine the frequency distribution of each variable studied. The results, as shown in Table 2, showed that the majority exhibited a positive attitude towards participation in waste bank program (80.1%). A total of 82.1% had subjective norms that supported their participation in waste bank program. In addition, 74.7% were perceived to have sufficient control over their behavior, while 89.9% were satisfied with the local facilities available for waste management. However, only 22% actively participated in waste bank management program.

The chi-square test was used to analyze the correlation between the independent variables such as attitudes, subjective norms, perceived behavioral control, as well as satisfaction with local facilities, and the dependent variable, including community participation in waste bank program. The chi-square test results, shown in Table 3, showed that attitudes ($p=0.000$), subjective norms ($p=0.000$), and perceived behavioral control ($p=0.000$) had a significant relationship with community participation in waste bank program. However, satisfaction with local facilities did not have a significant association ($p=0.054$).

A logistic regression analysis was conducted to examine the simultaneous impact of the independent variables on community partici-

Table 3*The relationship between variables*

Variable	Category	Participating (%)	Not Participating (%)	p-value
Behavior	Positive	26.5	73.5	0.000*
	Negative	3.8	96.2	
Subjective Norms	Positive	25.8	74.2	0.000*
	Negative	4.2	95.8	
Perceived Behavioral control	Positive	28.4	71.6	0.000*
	Negative	3	97	
Satisfaction with Local Facilities	Satisfied	23.3	76.7	0.054
	Not satisfied	10	90	

Note: * $p < 0.05$ significant value; using Chi-Square test

pation. The logistic regression analysis results, shown in Table 4, showed that subjective norms and perceived behavioral control were significant predictors after controlling for other variables. In addition, subjective norms exhibited a significant influence on community participation in waste bank program ($p=0.025$; $OR=4.183$), and perceived behavioral control also had a significant effect ($p=0.005$; $OR=8.250$). However, attitudes and satisfaction with local facilities had no significant influence on the logistic regression model.

DISCUSSION

This study explored the determinants of community participation in waste bank program in rural areas of Paleteang District, Pinrang Regency, using TPB. Based on the data analysis results, subjective norms and perceived behavioral control significantly influenced community participation, while attitudes and satisfaction with local facilities had no significant impact. In this aspect, the results were compared with other studies and related to relevant theory to illustrate the significance and their contribution to public health science.

Subjective Norms

Subjective norms played an important role in influencing community participation in waste management programs, such as waste bank initiative, as supported by various studies (Astuti & Linarti, 2020; Cao et al., 2023; Sari et al., 2021). Studies by Astuti & Linarti (2020) in Bantul, Indonesia, found that the variable

significantly influenced community's intention to participate. This showed that social pressure and expectations from close individuals, such as family, friends, and neighbors, strongly encouraged engagement in recycling programs.

When individuals perceived that those in their environment supported participation in waste bank program, the motivation was often high. This was consistent with TPB, emphasizing that subjective norms, representing social pressure and expectations from close contacts, played an important role in driving participatory actions. When individuals perceived support from their social circle, including family, friends, and neighbors, their participation became more active (Obuobi et al., 2024). Consequently, fostering a supportive social environment could improve engagement.

Perceived Behavioral Control

The results showed that perceived behavioral control had a strong influence on community participation. Perceived behavioral control reflected individuals' belief in their ability to control and execute specific actions. In addition, this study observed that individuals who were perceived to have control over their waste management were likely to participate in Waste Bank programs. This result was supported by Chengqin et al. (2022), who showed that the variable was an important determinant in Malaysia. According to TPB, perceived behavioral control affected both intentions and actual behavior, as individuals who were perceived capable of performing specific actions were more

Table 4*Multivariate analysis results*

Variable	p-value	OR
Behavior	0.783	1.244
Subjective Norms	0.025*	4.183
Perceived Behavioral control	0.005*	8.25
Satisfaction with Local Facilities	0.054	-

Note: * $p < 0.05$ significant value; using logistic regression test; OR: Odds Ratio

likely to do such.

Perceived behavioral control had been identified as a major factor influencing community participation in waste management programs. Babazadeh et al. (2023) and Mustafa et al. (2023) both emphasized the significant impact of perceived behavioral control on the intentions of individuals and behaviors related to waste separation and zero-waste practices.

Perceived behavioral control played an important role in community participation in waste management programs, as the beliefs of individuals in their ability to control and execute actions significantly impacted their intentions and behaviors (Santoso & Farizal, 2019). This was consistent with TPB, which emphasized that individuals who were perceived as capable of performing specific actions were more likely to do such. This highlighted the importance of behavioral control in encouraging engagement in waste management efforts (Bardus & Massoud, 2022).

According to TPB, perceived behavioral control influenced intentions and behavior, which showed that individuals who believed in their ability to act were more likely to do so (Bardus & Massoud, 2022).

Attitude

The initial results of the study showed a significant relationship between attitude and participation ($p=0.00$). Moreover, after performing logistic regression tests, this relationship became weak ($p=0.783$; $OR=1.224$). The difference between positive attitudes towards Waste Bank and the lack of participation could be attributed to the lack of knowledge about waste management and Waste Banks, potentially from

lower education levels among respondents. The majority of respondents in this study were high school or vocational school graduates (39.6%) and elementary school graduates (31.8%). According to Pradiko et al. (2021), education played an important role in enhancing knowledge and shaping attitudes, with higher education often correlating with better behavior. In addition, the distance between respondents' homes and Waste Bank locations, which were often remote and not available in all villages, could hinder participation despite positive attitudes.

Although attitude was considered one of the key variables in TPB, this study found that it had no significant influence on community participation in Waste Bank. This was consistent with Yilmaz & Ari (2022) but differed from some previous studies that showed positive attitudes towards waste management contributed to community participation. For example, Kamarudin & Jody (2022) in Malaysia stated that attitude was the most important factor in encouraging community's intention to participate in food waste separation. Similarly, a study in Thailand emphasized the importance of knowledge, attitude, and perceived behavioral control (Kaewprapun et al., 2022). However, in the context of the rural areas in Paletang, Pinrang Regency, other factors namely subjective norms and perceived behavioral control seemed to be more dominant. This could be due to different cultural and social contexts, where social pressure and a sense of personal control were more influential than individual attitudes.

Satisfaction with Local Facilities

This study also observed that satisfac-

tion with local facilities did not significantly impact community participation in Waste Bank program. The results showed that while local facilities were important, intrinsic motivational factors, namely subjective norms and perceived behavioral control were more dominant. The result was consistent with a study by [Silvi & Padilla \(2021\)](#), that intrinsic motivational factors had a greater influence on pro-environmental behavior. In addition, [Utari et al. \(2021\)](#) showed that intrinsic motivation and social support had a greater influence compared to external factors like facilities.

The theory by [Deci & Ryan \(2000\)](#) supported this results, emphasizing that intrinsic motivation was a major factor in driving individuals' participation and engagement, beyond external facilities. [Ajzen \(1991\)](#), using TPB, also showed that subjective norms and perceived behavioral control were major determinants, dominating external factors, such as facilities.

These result had various important implications for public health including the discovery that subjective norms and perceived behavioral control significantly impacted community participation. This emphasized the importance of community-based approaches in waste management programs. Programs that engaged community and build social support could be more effective in encouraging community participation. Furthermore, these results highlighted the need to improve perceived behavioral control through education and community empowerment, so individuals could be capable and in control of their waste management.

The contribution of this study to public health was the strengthening of the understanding of the determinants of community participation behavior in waste management programs, specifically in Indonesia. The results provided empirical evidence on the importance of social factors and behavioral control in encouraging community participation, which could be used as a basis for designing effective

and sustainable waste management programs.

The use of the comprehensive TPB approach to analyze the factors influencing community participation was one of the strengths of this study. This approach allowed for a more comprehensive and structured analysis of how attitudes, subjective norms, and perceived behavioral control influenced participation behavior. In addition, it was conducted in a location with significant waste management issues, making the results relevant and applicable in real-world contexts.

Despite the results obtained, this study had several limitations. First, the use of non-probability sampling methods, specifically accidental sampling, could lead to sample bias, as respondents were selected based on easy accessibility and availability. Second, the procedures were limited to one district, thereby limiting the generalization of the results to other areas. Third, the study used a cross-sectional design, which could only identify relationships between variables at specific periods and was unable to determine causal relationships.

CONCLUSIONS

In conclusion, this study showed that subjective norms and perceived behavioral control were the major factors influencing community participation in Waste Bank program in Paletang District, Pinrang Regency. Social support and the beliefs of the individuals in their ability to manage waste played a crucial role in encouraging participation. Meanwhile, attitudes towards participation and satisfaction with local facilities had no significant association.

These results showed the importance of community-based approaches and individual empowerment in waste management programs. Strong social support and a sense of self-control were essential in increasing community participation, which could ultimately reduce waste generation and enhance environmental health and cleanliness in rural areas

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AUTHORS' CONTRIBUTIONS

Muhammad Saleh designed the study, formulated the concept, wrote and revised the manuscript, acquired and analyzed the data, performed the field work. Nilda Alfiyah designed the study, wrote manuscript, acquired and analyzed the data. Andi Susilawaty designed the study, wrote manuscript. Muhammad Ikhtiar and Abdul Gafur wrote and reviewed manuscript, enrolled participants and collected data. All authors read and approved the final manuscript.

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COMPETING INTERESTS

The authors confirm that all of the text, figures, and tables in the submitted manuscript work are original work created by the authors and that there are no competing professional, financial, or personal interests from other parties.

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