Analysis The Impact of Waste Bank Assistance Program on Knowledge Level, Perception and Attitude of The Community in Waste Management

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Abstract. Waste bank is one of the informal sectors of community-based waste management in Indonesia. The establishment of a waste bank will certainly better if it starts with a mentoring program such as educating the waste bank administrator team and the society about the waste bank system and the importance of managing waste from sources. A waste bank with a mentoring program is expected to produce a better level of knowledge, perception and attitude of the community towards waste management. This study aims to compare Waste Bank A, which has received a mentoring program and Waste Bank B, which has not received a mentoring program. The results of the study stated that the variable levels of knowledge, perceptions, attitudes, Perceived Behavioral Control (PBC), intentions and behavior were significantly different between Waste Bank A and Waste Bank B. The average amount of segregated waste in Waste Bank A is 2.4 kg per respondent, while in Waste Bank B it is 1.5 kg per respondent.

Keywords: *household waste; mentoring program; waste bank; waste management*.

1   Introduction

Various countries experience problems with solid waste management [1]. One example is that large cities in a developing country have difficulty coping with the large volumes of solid waste generated by urban populations that continue to increase over time [2]. The largest solid waste contributor sector is household activities [3]. An example of waste composition in a city in a developing country is that 84% of waste consists of recyclable waste. The amount of waste with a high potential for recyclingrequires appropriate waste handling and processing facilities. The informal recycling sector is a party that has an important role in collecting, sorting and managing recyclable waste in several developing countries.

One example of the informal recycling sector in Indonesia is the waste bank. The waste bank is a facility for managing waste with the 3R principles (reduce, reuse and recycle) as a means of education, behavior change in waste management and implementation of a circular economy. Based on this, the manager of a waste bank and the community around the waste bank need to have good knowledge, perceptions and attitudes in waste management. Education on waste management at waste banks can be carried out by means of waste management training and the need for intensive assistance so that the waste bank program can run in a sustainable manner.

In previous research regarding the sustainability of a waste bank, the results indicated that the waste bank still needed assistance related to improving waste management performance so that the residue that was wasted in TPS was decreasing [4]. Results from other studies also state that the need for training is still quite high, namely that around 82.81% of waste bank managers still need training to improve their performance [5]. One way that can be done to improve performance is to do better waste processing, because further waste handling at the waste bank will increase the selling value of waste. The first step in better waste management can be done by socializing the waste bank program to increase public understanding and build positive perceptions about the waste bank program [6].

Examples are Waste Bank A in Kebon Pisang Village and Waste Bank B in Antapani Wetan Village. At the beginning of its establishment, Waste Bank A had received a mentoring program, while Waste Bank B did not receive a mentoring program. The mentoring program is in the form of initial education for administrators and community leaders regarding the working system of waste banks and education on how to sort waste and use waste through waste banks. Based on several previous studies, the waste bank assistance program is important for the sustainability of a waste bank. The mentoring program is also important to be able to build community self-reliance around the waste bank.

Therefore, it is necessary to conduct research to find out whether the assistance program provided to Waste Bank A is able to increase the level of public knowledge to manage waste more than the community around Waste Bank B who does not receive assistance programs. Research also needs to be conducted to find out whether the community around Waste Bank A has better perceptions and attitudes towards the waste management system implemented by the Waste Bank. The research results are expected to be used as recommendation material for the government and other related parties to be able to provide assistance programs to waste banks in order to increase the level of knowledge of community waste management.

2   Research Methodology

This research was conducted by direct observation at the research location using a questionnaire that was distributed to 154 communities around the waste bank. The question items consist of variable levels of knowledge, perceptions, attitudes, perceived behavioral control (PBC), intentions and community behavior in household waste management. The six variables are built into the research model in **Figure 1**. The difference in the research model between Waste Bank A and Waste Bank B is that there is no mentoring program intervention at Waste Bank B. **Figure 1** is the design of the research model for Waste Bank A which receives the mentoring program.
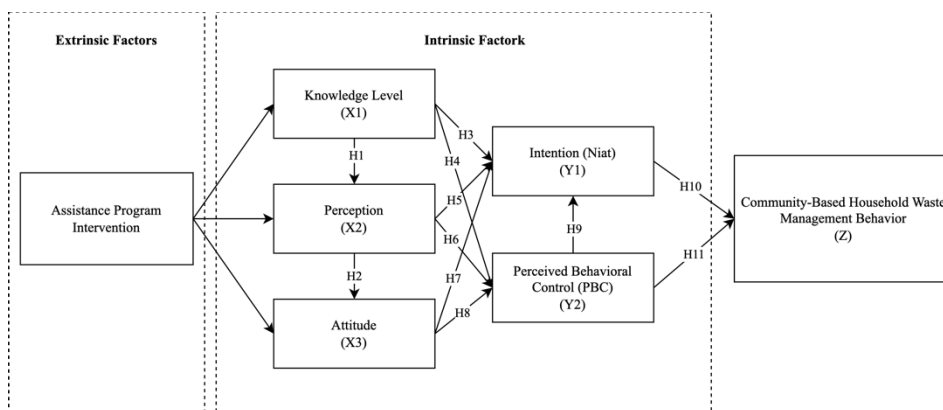
Figure 1 Research model design

The design of the research model was built based on the Theory of Planned Behavior [7] and previous research on community participation in waste management based on intrinsic factors [8]. The variable level of knowledge is the knowledge of the community around the location of the waste bank regarding household waste management and the waste bank system. The level of knowledge was measured using four questions regarding the types of household waste, the types of waste that can be managed by waste banks and the benefits of waste bank activities. The perception variable is a variable for measuring understanding and evaluating the information received by the public regarding the concept of waste management in waste banks. The attitude variable is a variable to measure the community's agreement or disagreement with waste management through the waste bank. The PBC variable is a variable that measures the community's perception of control in managing household waste with the existence of a waste bank. The intention variable is a variable that measures a person's intention to manage household waste through a waste bank. The behavior variable is a

variable that measures the actions taken by the community in managing household waste through the waste bank.

The data analysis method was carried out by means of a comparative test to find out whether there were significant differences in the six variables in the two waste banks. Comparative tests were carried out using the Mann Whitney test for each variable. The second test to be carried out is a multiple linear regression test to determine the effect of each variable on waste management behavior in waste banks.

2.1   Comparative Test – Mann Whitney

The Mann Whitney comparative test was used to determine whether there was a significant difference between all variables in Waste Bank A and Waste Bank B. This test used the SPSS version 26.0 application with a significance level of 95% ($\propto$ = 5%). The comparative test hypothesis between the two waste banks is as follows [9] :
H0 : There is no significant difference between Waste Bank A and Waste Bank B
H1 : There is a significant difference between Waste Bank A and Waste Bank B

The basis for decision making in the Mann Whitney test is as follows:
If p-value > 0,05, then there is not enough evidence to reject H0.
If p-value < 0,05, then there is enough evidence to reject H0.

2.2   Multiple Linear Regression Test

Multivariate analysis is used to determine whether there is a significant relationship between the variables in the research model design. The relationship between the variables in the research model design is shown in **Figure 1**. Multivariate analysis was performed using multiple linear regression tests on the SPSS version 26.0 application with a significance level of 95% ($\propto$ = 5%). The hypothesis of the relationship between the variables in the waste bank is as follows [10] :
H0 : There is no significant relationship partially/simultaneously between the independent variables and the dependent variable
Hi : There is a significant relationship between partially/simultaneously between the independent variables and the dependent variable.

The basis for making decisions in the multiple linear regression test is as follows:
If p-value > 0,05, then there is not enough evidence to reject H0.
If p-value < 0,05, then there is enough evidence to reject H0.

3.   Results and Discussion

3.1   Demographic Data

The questionnaire in this study was given to the community around the research waste bank. The number of respondents is calculated using the slovin formula as follows [10] :

$$n = \frac{N}{(NE^2)+1}$$ (1)

Information :

n = Number of Samples

N = Total Population

E = percentage of accuracy of sampling error that can still be tolerated

In the Slovin formula there are the following provisions :

E value = 0.1 (10%) for a large population

E value = 0.2 (20%) for a small population

By using **Eq. (1)** above, it was found that the number of respondents to the Waste Bank A consisted of 78 respondents and the waste bank B consisted of 76 respondents. The identity of the respondents at each bank consisted of the type of membership, age, gender, education level, occupation and average monthly income. In Waste Bank A, respondents based on membership consisted of 72 members of the public and 6 waste bank administrators. Most of the respondents based on age were over 50 years old (44%). Respondents based on gender consisted of 49 women (63%) and 29 men (37%). The highest number of respondents based on education level was senior high school with 43 respondents (55%). Most of the respondents based on occupation were housewives with a total of 35 respondents (45%). While respondents based on average income per month are in the range below Rp. 1,500,000 with a total of 39 respondents (50%).

In Waste Bank B, respondents based on membership consisted of 65 members of the public and 11 waste bank administrators. Most respondents based on age were over 50 years old (62%). Respondents based on gender consisted of 38 women (50%) and 38 men (50%). The highest number of respondents based on education level was senior high school with 36 respondents (47%). Respondents by occupation are mostly housewives with a total of 30 respondents (39%). While respondents based on average income per month are in the range below Rp. 1,500,000 with a total of 29 respondents (38%).

3.2   Comparative Test – Mann Whitney

The data obtained from the questionnaire will be processed using IBM SPSS software version 26. The first part of data processing is a comparative test of each variable in the two waste banks using a comparative test - Mann Whitney.

Table 1   Comparative test results for each variable.

No	Variabel	Asymp. Sig (2-tailed)	Mean Rank Waste Bank A	Mean Rank Waste Bank B
1	Knowledge Level	0.000	106.49	47.75
2	Perception	0.000	95.58	58.95
3	Attitude	0.000	92.70	61.90
4	PBC	0.000	95.53	58.99
5	Intention	0.000	90.36	64.30
6	Behavior	0.000	91.99	62.63

The data obtained from each variable is numerical data in the form of a score. The results of the normality test show that all variables are not normally distributed, therefore a comparison test is used - Mann Whitney. This is because the Mann Whitney test does not require the initial assumption that the data is normally distributed. The hypothesis of the test are as follows:

H0 : There is no significant difference between Waste Bank A and Waste Bank B

H1 : There is a significant difference between Waste Bank A and Waste Bank B

Based on **Table 1,** the significance value (2-tailed) of all variables shows a value of 0.000 at a 95% confidence level. Based on the provisions of the Mann Whitney test, if the significance value is less than 0.05 then H0 is rejected and there is a significant difference in each variable in the two waste banks. The mean rank results for each variable of Waste Bank A have a higher value than the mean rank of Waste Bank B. This shows that the value of Waste Bank A is higher and better than Waste Bank B.

Next comparison test - Mann Whitney is used for behavioral variables. In the behavioral variable, there are three questions in the form of behavior that has been carried out by the community in managing household waste through the waste bank as follows :

Table 2   Comparative test results of behavioral sub-variables

No	Sub Variabel	Asymp. Sig (2-tailed)	Mean Rank Waste Bank A	Mean Rank Waste Bank B
1	The amount of segregated waste	0.041	84.63	70.18
2	Balance	0.000	93.38	61.20
3	The number of people invited to join	0.023	85.56	69.23

Based on **Table 2**, the significance value (2-tailed) of all behavior sub-variables shows a value less than 0.05 at the 95% confidence level. Based on the provisions of the Mann Whitney test, if the significance value is less than 0.05 then H0 is rejected and there is a significant difference in each of the behavioral sub-variables in the two waste banks. The average segregated waste in Waste Bank A is 2.4 kg per respondent per week, while in Waste Bank B it is 1.5 kg per respondent per week. The average balance of respondents in Waste Bank A is Rp. 107,000, while in Waste Bank B it is Rp. 88,000. The average number of people who have been invited to join the waste bank by respondents in Waste Bank A is 9 people, while in Waste Bank B is 4 people. Based on previous research, the amount of residual waste that is disposed of at TPS can be reduced by increasing the performance of household waste management, one of which is by assisting a waste bank [4]. The increase in household waste management performance due to the assistance program can be seen from the average results of segregated waste generated, customer balances and the number of people who have been invited to Waste Bank A.

3.3   Multiple Linear Regression Test

The second analysis test is the regression test to determine the effect of each variable based on the research model design in **Figure 1**. The regression test used in this study is multiple linear regression. This is because there is more than one independent variable in this research model.

Table 3   Multiple linear regression test results

No	Hypothesis	Sig. Waste Bank A	Sig. Waste Bank B	Information
1	H1	0.760	0.020	A : 0.76 > 0.05 (No effect partially) B : 0.020 < 0.05 (Partially affected)

2	H2	0.000	0.000	0.000 < 0.05 (Partially affected)
3	H3-H5-H7-H9	0.000	0.000	0.000 < 0.05 (Simultaneously affected)
4	H4-H6-H8	0.000	0.000	0.000 < 0.05 (Simultaneously affected)
5	H3	0.280	0.216	A : 0.280 > 0.05 (No effect partially) B : 0.216 > 0.05 (No effect partially
6	H4	0.894	0.006	A : 0.894 > 0.05; (No effect partially) B : 0.006 < 0.05; (Partially affected)
7	H5	0.002	0.983	A : 0.002 < 0.05; (Partially affected) B : 0.894 > 0.05; (No effect partially)
8	H6	0.008	0.233	A : 0.008 < 0.05; (Partially affected) B : 0.233 > 0.05; (No effect partially)
9	H7	0.003	0.000	A : 0.003 < 0.05; (Partially affected) B : 0.000 < 0.05; (Partially affected)
10	H8	0.034	0.000	A : 0.034 < 0.05; (Partially affected) B : 0.000 < 0.05; (Partially affected)
11	H9	0.078	0.195	A : 0.078 > 0.05; (No effect partially) B : 0.195 > 0.05; (No effect partially)
12	H10-H11	0.000	0.000	0.000 < 0.05; (Simultaneously affected)
13	H10	0.000	0.000	0.000 < 0.05; (Partially affected)
14	H11	0.305	0.787	A : 0.305 > 0.05; (No effect partially) B : 0.787 > 0.05; (No effect partially)

Based on the multiple linear regression test in **Table 3**, it is known if there are differences between the results at Waste Bank A and Waste Bank B. The following is a detailed explanation of the relationship between the variables:

1. H1: Effect of level of knowledge on perception.

In Waste Bank A, the level of knowledge has no effect on perception because it has a significance level above 0.05 which is equal to 0.760. In Waste Bank B, the level of knowledge influences perception with a significance level below 0.05. The results on Waste Bank A are not in line with the previous analysis, which states that the level of knowledge has a significant effect on perceptions. This can be caused by some factors, including the fact that respondents at Waste Bank A have received door to door socialization. With socialization, it can increase the level of public knowledge regarding

household waste and the waste bank system, so that the level of knowledge of respondents in Waste Bank A is in the good category (91%) although the respondents' perceptions still have various answers.

2. H2: The effect of perception on attitude.

In Waste Bank A and Waste Bank B, perception has a significant effect on attitudes with a significance level below the alpha value of 0.05 which is equal to 0.000. Based on previous research, a good perception of waste management will lead to good community attitudes towards waste management in the surrounding environment [11].

3. H3, H5, H7 dan H9: The effect of the level of knowledge, perception, attitude and PBC on intention.

In Waste Bank A and Waste Bank B, the level of knowledge, perception, attitude and PBC simultaneously influence intention with the same level of significance, which is 0.000, less than 0.05. Based on the results of previous studies, attitudes toward pro-environmental behavior, subjective norms and PBC can predict pro-environmental behavior intention [12].

4. H4, H6 dan H8: The influence of the level of knowledge, perceptions and attitudes towards PBC.

In Waste Bank A and Waste Bank B, the level of knowledge, perceptions and attitudes influence PBC simultaneously with the same significance value of 0.000, less than 0.05. Based on the Theory of Planned Behavior, variable levels of knowledge, perceptions and attitudes are some of the factors that can influence PBC [7].

5. H10 dan H11: The influence of intention and PBC on behavior.

In Waste Bank A and Waste Bank B, intention and PBC have a simultaneous effect on behavior with a significance value of 0.000 less than 0.05. These results are in line with the Theory of Planned Behavior which states that intention and PBC have a significant effect on a person's behavior in managing waste [7].

4.   Conclusion

The results of the analysis show that there are differences between Waste Bank A and Waste Bank B. The following is the conclusion of the research analysis:

    a.   The influence of the mentoring program is found in the significant differences between the six research variables. Variable levels of knowledge, perception, attitude, PBC, intention and behavior in Waste Bank A are significantly different from Waste Bank B. The mean rank value in Waste Bank A is also higher than the mean rank value in Waste Bank B. This shows that Waste Bank A with a mentoring program is better than Waste Bank B without a mentoring program.

    b.   The influence of the mentoring program is found in significant differences between the behavioral sub variables, which is the amount of segregated waste, the balance and the number of people invited to join. In Waste Bank A, the average value of the three behavioral sub-variables has a greater value than the average value in Waste Bank B. This shows that the community in Waste Bank A with a mentoring program has a waste management behavior through a waste bank that is better than the people in Waste Bank B.

    c.   The design of the research model shows that the variable level of knowledge, perception, and attitude have a significant effect on the PBC variable. Therefore, the level of knowledge, perceptions and attitudes of the community together can influence PBC.

    d.   The design of the research model shows that the variable level of knowledge, perception, attitude and PBC have a significant effect on the intention variable. Therefore, a good level of knowledge, perception, attitude and PBC of the community can affect intention.

    e.   The design of the research model shows that the PBC and intention variables have a significant effect on the community-based waste management behavior variable. Therefore, PBC and intention towards good waste management together can influence behavioral variables.

Acknowledgement

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