

Factors Influencing The Public Perception Towards Waste Sorting In Manado City

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Abstract

Waste sorting is the key to reducing waste. The public's perception affects the level of participation in sorting waste from home, and internal and external factors influence this. This study was conducted to determine the factors that influence the public's perception of waste sorting in Manado City through a descriptive quantitative approach with a survey in the form of a questionnaire. From 928 valid questionnaires analyzed by logistic regression using IBM SPSS Statistics Software, internal factors such as knowledge, expectations, and motivation influence public perceptions towards waste sorting. At the same time, the community effects become an external factor that matters. The economic benefits, necessities, and the government's participation in supporting the community in sorting waste turned out to have no effect. This should concern the Manado City Government so that waste sorting can be more effective and efficient in the future.

Keywords: Factors, Perception, Waste, Sorting, Manado

INTRODUCTION

Wastes are inseparable from human life. Globally, people produce an average of 0.74 kg of waste daily, and it is estimated that the world's waste generation will increase by 70% by 2050 [1]. Poorly managed wastes potentially pollute the environment and endanger health [2, 3, 4, 5].

To anticipate the hazards and disasters caused by improper waste management, the Republic of Indonesia issued the President Regulation Number 97 Years 2017 about the National Policies and Strategies for the Management of Household Waste and Waste Similar to Household Waste (Jakstranas). The target is to have a clean Indonesia by 2025 through 30% waste reduction and 70% waste handling from total household waste and waste similar to household waste [6].

Manado City, as the capital of the North Sulawesi Province, committed to implementing JAKSTRANAS by establishing Manado City Mayor Regulation Number 24 of 2019 [7] concerning Manado City Policies and Strategies in the Management of Household Waste and Waste Similar to Household Waste (JAKSTRADA). The exact target as the Manado City Government sets JAKSTRANAS by planning various programs and

actions for waste reduction and treatment referring to Minister of Environment Regulation Number: P.10/Menlhk/Setjen/PLB.0/4/ 2018 regarding Guidelines for Formulating Regional Policies and Strategies for Household Waste Management and Waste Similar to Household Waste [8].

Based on Manado City's Waste Management Report for 2022, the percentage of managed waste is 83.01%, of which waste handling is 77.30%, and waste reduction is 5.71%. The Manado City Government has already accomplished the waste management target, but the waste reduction is still beyond the target set in JAKSTRADA. According to data from the National Waste Management Information System (SIPSN), by 2022, the national waste management performance was 66.28%, with waste reduction of 18.68% waste handling of 47.6%. Comparing these results, Manado City's waste management achievements are above the national average, but in terms of waste reduction, Manado City's performance is below the national average.

To reduce waste generation, it must start from the source (household); waste sorting is an alternative. In sustainable waste management, waste segregation at the household level is the most important thing since it helps reduce the load of further management while increasing recycling efficiency [9, 10]. Community participation is the main factor that determines the success rate of waste reduction through sorting [11].

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According to Mulyana (2005), perception is an internal process that allows the selection, organization, and interpretation of stimuli from the environment. The process affects behavior, and perception determines individuals to choose or ignore other messages [12]. When someone perceives that waste needs to be sorted, the behavior of sorting waste will take place or vice versa. If the public perception is that garbage does not need to be sorted, then participation in waste sorting will automatically decrease.

Perceptions affect people's intentions to sort waste [13], and intentions can affect people's behavior in sorting waste [14]. Public trust in waste management by the government also influences perceptions, and people who are given convenience tend to have positive perceptions of government policies, such as the obligation to sort waste [15]. People's perceptions of the environment and pollution or domestic waste pollution positively influence people's perceptions of sorting waste, and they even generally agree to sort more types of waste after receiving a better education [16].

In the process, internal and external factors may influence everyone's perception. According to Toha (2003), internal factors that affect perception are inseparable from the conditions or situations in the person who perceives something: physiological factors, attention, interest, direct needs, experience and memory,

and atmosphere [17]. Meanwhile, Walgito (2004) states that the internal factors influencing perception are experience or knowledge, expectations, needs, and motivation [18]. External factors come from outside the perceiving individual and can be influenced by contrast, intensity changes, repetition, and something new or novelty [19].

This study was conducted to analyze the factors that influence people's perception of waste sorting so that it can be a reference for stakeholders in formulating policies related to waste management, especially waste sorting in Manado City.

MATERIAL AND METHOD

This research is conducted through a descriptive quantitative approach with a survey in the form of a questionnaire. To determine the factors that influence people's perceptions of waste sorting, 7 independent variables were identified, as shown in Table 1. The dependent variable is waste sorting with categories (0) for not sorting waste and (1) for sorting waste. To measure the response of each independent variable, a 5-point Likert scale was used for positive statements, which are (1) highly disagree, (2) disagree, (3) neutral, (4) agree, and (5) highly agree [20]—valid questionnaires analyzed with IBM SPSS Statistics software, version 29.0.1.0 (171).

Table 1. Factors, variables and statements

Factors	Variables	Statements
Knowledge	X ₁	I have good knowledge of how to sort my waste properly.
Expectation	X ₂	I expect to be able to sort out more waste every day in the future.
Expectation	X ₃	I expect the waste I sort will provide economic benefits such as money, groceries, and other things.
Necessity	X ₄	I think I need to sort out my waste.
Motivation	X ₅	I feel motivated to sort out my waste.
Government	X ₆	The government supports me in sorting waste.
Neighborhood	X ₇	The community where I live supports me in sorting my waste.
Sorting Waste	Y	To do and not to do waste sorting

Data Collection

Data collection through questionnaires was conducted online and offline in May 2023. 975 questionnaires were collected, 761 in person and 214 online using Google Forms. After filtering by location of residence, 47 respondents who completed the questionnaire and did not live permanently in Manado City were identified as invalid. The total number of valid questionnaires was 928. The data of respondents based on

gender, marriage status, age, education, occupation, and residence based on sub-districts in Manado City can be found in Table 2.

Validity and reliability tests were conducted using IBM SPSS Statistics Version 29.0.1.0 software (171). The validity test or Pearson Product Moment test is performed on 928 valid questionnaires. According to the analysis, all independent variables (X1 to X7) have a value > table (0.062) so that they can be declared valid. Based on the significance value (P-Value), all independent variables < 0.05, so they are declared valid [21]. The results of the validity test

using IBM SPSS Statistics Version 29.0.1.0 software (171) can be seen in Table 3.

Table 2. Respondent Data

Gender	Male	396	Marriage Status	Not Married	488
	Female	532		Married	440
Age	< 20 Years	369	Education	SD	10
	20-29 Years	110		SMP	149
	30-39 Years	166		SMA	422
	40-49 Years	189		DIII/S1	274
	50-59 Years	91		S2/S3	73
	> 60 Years	3			
Occupation	Civil Servants	184	District	Malalayang	160
	National Owned Enterprises	5		Sario	25
	Soldier/Police	6		Wanea	165
	Private Sector	160		Tikala	189
	Housewives	119		Wenang	21
	Students	408		Paal 2	40
	Labor	17		Mapanget	158
	Religious	5		Singkil	36
	Retired	3		Tuminting	100
	Others	16		Bunaken	34
	Not Working	5		Bunaken Kep.	0

Table 3. Validity Test

		X ₁	X ₂	X ₃	X ₄	X ₅	X ₆	X ₇	Total
X ₁	Pearson Correlation	1	.401**	.275**	.321**	.312**	.348**	.303**	.628**
	Sig. (2-tailed)		<,001	<,001	<,001	<,001	<,001	<,001	<,001
	N	928	928	928	928	928	928	928	928
X ₂	Pearson Correlation	.401**	1	.426**	.505**	.491**	.309**	.250**	.719**
	Sig. (2-tailed)	<,001		<,001	<,001	<,001	<,001	<,001	<,001
	N	928	928	928	928	928	928	928	928
X ₃	Pearson Correlation	.275**	.426**	1	.290**	.224**	.210**	.198**	.560**
	Sig. (2-tailed)	<,001	<,001		<,001	<,001	<,001	<,001	<,001
	N	928	928	928	928	928	928	928	928
X ₄	Pearson Correlation	.321**	.505**	.290**	1	.635**	.243**	.192**	.676**
	Sig. (2-tailed)	<,001	<,001	<,001		<,001	<,001	<,001	<,001
	N	928	928	928	928	928	928	928	928
X ₅	Pearson Correlation	.312**	.491**	.224**	.635**	1	.385**	.334**	.724**
	Sig. (2-tailed)	<,001	<,001	<,001	<,001		<,001	<,001	<,001
	N	928	928	928	928	928	928	928	928
X ₆	Pearson Correlation	.348**	.309**	.210**	.243**	.385**	1	.630**	.690**
	Sig. (2-tailed)	<,001	<,001	<,001	<,001	<,001		<,001	<,001
	N	928	928	928	928	928	928	928	928
X ₇	Pearson Correlation	.303**	.250**	.198**	.192**	.334**	.630**	1	.645**
	Sig. (2-tailed)	<,001	<,001	<,001	<,001	<,001	<,001		<,001
	N	928	928	928	928	928	928	928	928
Total	Pearson Correlation	.628**	.719**	.560**	.676**	.724**	.690**	.645**	1
	Sig. (2-tailed)	<,001	<,001	<,001	<,001	<,001	<,001	<,001	
	N	928	928	928	928	928	928	928	928

** . Correlation is significant at the 0.01 level (2-tailed).

RESULT AND DISCUSSION

To determine the factors influencing people's perceptions of waste sorting, the questionnaire data were analyzed with IBM SPSS Statistics software, version 29.0.1.0 (171), where the research data were processed using logistic regression. Of the 928 samples processed, all were valid, with no missing cases.

Before the independent variables are entered in the model, the -2 log-likelihood value value is 1,252.899, then the calculated Chi-Square Table

value at degrees of freedom (DF) 927 and probability 0.05 is 998.943. The -2 Log Likelihood value (1,252,899) > Chi Square Table (998.943) so that the model before entering the independent variable is declared NOT FIT with the data.

The independent variables are entered in the model, and the result is that the -2 Log Likelihood value has decreased from the initial value of 1,252.899 to 1,151.487, meaning that the model has improved after the independent variables are

included in the model or, in other words, the independent variables have an influence on the model. The calculated Chi-Square value after the independent variables are included in the model becomes 101.412. Next, the Chi-Square Table value is determined at DF = 7 with a probability of 0.05; the value is 14.607. Because Chi Square count > Chi Square Table, adding independent variables can really influence the model, and the model is declared FIT. It can be concluded that there is a simultaneous significant effect of the independent variables on the dependent variable, where the Nagelkerke R Square value was 0.104, and the Cox & Snell R Square value was 0.140, which indicated that the ability of the independent variable to explain the dependent variable was 0.140 or 14%.

The Hosmer and Lemeshow Test or Goodness of Fit Test (GoF) is then conducted to determine whether the model formed is correct. It is said to be accurate if no significant difference exists between the model and its observation value. The Chi-Square Table value for DF 6

$$\ln\left(\frac{P}{1-P}\right) = -3,29 + 0,64X_1 + 0,49X_2 - 0,28X_3 - 0,18X_4 + 0,07X_5 - 0,17X_6 + 0,26X_7$$

Table 4. Logistic Regression result with SPSS

	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I. for EXP(B)	
							Lower	Upper
X ₁	.639	.112	32.857	1	<.001	1.895	1.523	2.358
X ₂	.488	.120	16.391	1	<.001	1.629	1.286	2.062
X ₃	-.276	.101	7.490	1	.006	.759	.623	.925
X ₄	-.183	.126	2.112	1	.146	.833	.651	1.066
X ₅	.072	.128	.316	1	.574	1.074	.837	1.380
X ₆	-.017	.110	.024	1	.877	.983	.792	1.220
X ₇	.262	.108	5.930	1	.015	1.300	1.053	1.606
Constant	-3.285	.563	34.054	1	<.001	.037		

Based on the results of data analysis, the factors that influence public perceptions of waste sorting in Manado City are:

1. People's Knowledge of waste sorting

Knowledge is the internal factor that has the greatest influence on waste sorting. The Exp(B) or Odds Ratio (OR) value of the independent variable knowledge (X1) is the greatest compared to others, as shown in Table 4. The coefficient or Odds variable X1 in the logistic regression equations shows that knowledge is the most influential factor in waste sorting in Manado City.

A similar result was shown by several previous studies, such as Wang et al. (2020) in a study in Hefei City, China, indicating that public knowledge about waste sorting affects intention and behavior in sorting waste [14]. Tian et al. (2022) found that knowledge affects

(Independent Variable - 1) at the 0.05 significance level is 12.592. Since the Chi-Square Hosmer and Lemeshow Test value calculated (10.850) < Chi Square Table (12.592) for a significance value of 0.210 (>0.05), it is indicated that the MODEL FIT. The accuracy of the research model is 67.8%.

The effect of the independent variables on the dependent variable is indicated by the Exp(B) value, also known as the Odds Ratio (OR). The greater the OR value of independent variables, the greater its effect on the dependent variable. The Wald test was analyzed to determine which independent variable had a significant partial effect on the dependent variable (Significance <0.05). The results are shown in Table 4, and the internal factors, i.e., knowledge (X1), expectations (X2), and motivation (X5), as well as external factors, i.e., environmental influences (X7), had a significant partial influence on people's perceptions of waste sorting. The logistic regression equation of this research is:

community participation in sorting waste, both in regions with specific policies for sorting waste and those that have not yet established waste sorting as an obligation [22]. In their research in Ecuador, Negash et al. (2021) described that knowledge of waste separation and willingness to participate are the main driving factors to increase waste segregation in the community [23].

2. Expectation to sort more waste daily

Based on the results of the analysis, the expectation factor (X2) has the second largest OR, so it becomes the second-greatest influence factor after knowledge. According to Walgito (2004), one of the internal factors that can affect perception is expectation, where expectations of something will affect the perceptions of the stimulus. In this case, the expectation of the Manado City residents to

sort waste affects each individual's perception. Naturally, expectations will vary between individuals, and this is normal [18].

3. Motivation for waste sorting

Motivation (X5) is the next internal factor influencing waste sorting but has the most negligible influence value compared to knowledge and expectations. The motivation of the community needs to be improved, among others, by providing incentives or awards for both individuals and community groups so that the perception of waste segregation will be more positive.

4. The influence of the neighborhood on individuals to sort waste

Environmental factors (X7) are the external factors that positively influence waste sorting. This is consistent with several other studies, such as research on community-based waste management systems in Sukunan, Yogyakarta, which can encourage local communities to sort waste, thus providing economic benefits and reducing waste generation by 30% [24]. Intention to sort waste is affected by subjective norms in society, where individuals tend to sort waste if their neighbors or neighborhoods are commonly sorting it [11].

While the factors that do not influence public perception towards waste separation are:

1. Expectation to get economic benefits from waste sorting

The study results indicate that the expectation of receiving economic benefits from waste sorting does not affect people's perceptions of waste sorting. This contrasts with the results of studies such as those conducted by Govindan et al. (2022) in Shanghai City, China [25], Alhassan et al. (2020), and Adu-Gyamfi et al. (2023) in Accra City, Ghana, which explain the influence of people's expectations to get economic value from waste on public perceptions of sorting waste [26, 27].

This difference is likely caused by the low selling value of waste in Manado City, so people rarely use the services of waste banks to manage their waste. Based on SIPSN data, there are only 3 active waste banks, and many are no longer operating. The low selling value of waste in Manado City reduces the interest of residents in starting a waste bank business. The buying price of plastic waste by collectors in Manado City is only about Rp. 2000,- per Kg, collecting plastic or paper wastes from daily activities at home may require more time, thus discouraging people

from getting economic benefits from sorting waste. The number of waste banks in Manado needs to be increased so that the public is given the convenience of managing waste, especially recyclable waste that can be sorted at home, providing facilities for residents such as the use of technology for sorted waste pickup by waste bank officers, as well as establishing a recycling center so that the selling value of waste will increase in the future.

2. Sorting waste is a necessity.

The results showed that the necessity factor (X4) did not affect public perceptions of waste sorting. Based on the theory by Walgito (2004), the necessity factor affects perception and will lead someone to perceive the stimulus differently [18]. If the individual feels it needs to be done, a positive perception will automatically form and vice versa. In this case, some community groups in Manado City believe that waste sorting is unnecessary and mandatory.

This difference may be due to the community's lack of education and socialization. The public needs to be encouraged so that they individually feel the necessity to sort waste. Incentives such as convenience can be one solution because the ease of sorting waste can affect people's intention to sort waste [11].

3. Government support in sorting waste.

The results showed that government factors did not affect public perceptions of waste sorting. This differs from the study by Tian et al. (2022), which explains the difference in public perceptions between cities that have established a waste sorting policy from home and cities that have not required the public to sort waste [22]. Wang et al. (2021), in their research on several communities in China, found a connection between public trust of the government in addressing environmental issues and public perceptions of sorting waste [15].

This difference may be due to the lack of socialization and education about waste sorting from the government to the community. In addition, the behavior of waste collectors who often mix waste when transporting waste creates a negative perception in the community. Implementing a policy requiring residents to sort waste [22] could also be another solution to increase public trust in the government, especially regarding waste separation. This is very possible considering that the Government has established several regulations related to waste management and sorting

CONCLUSION

Based on the results of this study, it can be concluded that the factors that influence people's perceptions of waste sorting in Manado City are (1) The community's knowledge of waste sorting, (2) The expectations of each individual to be able to sort more waste daily, (3) The motivation of the community to sort waste, and (4) The influence of the neighborhood on each individual in sorting waste. The Manado city government should optimize these four factors to increase waste segregation in the community. The economic benefits, necessities, and the government's participation in supporting the community in sorting waste must be of concern to the Manado City Government so that waste sorting can be more effective and efficient in the future. Other factors that may affect waste sorting other than those discussed in this study can be researched and improved to complete all factors that may have an effect

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