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Regional Case Study

Affecting Factors of Generation and Weight Domestic Waste in Tanjung Karang Village Mataram City

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Abstract

Tanjung Karang Village is a priority tourism destination. Strategic tourist destinations need to maintain environmental cleanliness to achieve sustainable waste management to create comfort and satisfaction for visitors. The purpose of this study is to analyze the generation, weight, composition of waste, and influencing factors. The method in this study is a field survey to measure the generation and weight of waste with 13 households sample for 8 days. Data analysis has analyzed the Kolmogorov Smirnov Normality Test and the Dummy Variable Multiple Regression Test. The waste generation in Tanjung Karang Village is 3 liters/person/day and the weight of waste is 0.5 kg/person/day. The composition of the most waste is 56% organic waste. 28% plastic. and the others are metal, B3 waste, paper, glass, and so on. The most widely used plastic waste is food packaging plastic, High Density (HD), and High Density Polyethylene (HDPE). Influencing factors the generation and weight of waste are type of house, number of occupants, land area, occupation, and income. The recommendation for waste management in Tanjung Karang Village is that 56% of organic waste can be processed by composting, ecoenzyme, and biopore holes. Plastic waste 18% can be reduced by using plastic converted into containers.

Keywords: Urban waste; waste generation; the composition of waste; influencing factors, dummy variable multiple regression

1. Introduction

Waste management is a big challenge for environmental management, especially in urban areas. This happens because the higher waste generation will add to the regional budget in waste management (Shafy et al., 2018). The economic growth and high rates of urbanization rates in higher waste generation and composition. Exponential population growth continues to increase and people's lifestyles are getting higher, causing a consumptive lifestyle which results in increased waste generation. Environmental sanitation, including waste management, proper drinking water supply, and wastewater treatment according to quality standards must be prioritized to healthy and comfortable community life. Waste that is not managed in an integrated manner will have a negative impact on public health and environmental sustainability.

Urban waste is primarily grouped into residential waste, institutional waste, and commercial waste (Yousuf et al.. 2007). Based on Nasional Waste Management Information System (SIPSN) Ministry Of Environment And Forestry 2021 data related to the composition of waste based on waste sources, it was found that household waste was 38% with the highest composition compared to other waste sources. Residential waste comes from household waste which is routinely generated from household activities. The high generation of household waste causes fears of causing disease, air and odour pollution, and uncontrolled land use changes. Changes in land use that are not controlled are related to the landfill area and temporary shelter waste (TPS), which is increasingly widespread and causes the conversion of green land to disrupts the balance of the ecosystem.

Based on the research of (Han et al., 2017) explained that social factors such as population, education, and culture have a positive relationship with waste generation with R2 = 0.9405. Environmental education, training, and demonstration projects can be positive role models in increasing awareness to reduce and recycle waste. The research of (Kolekar et al., 2016) aims to review several models related to urban waste management using economic, social demographic, and data management orientations and identify factors that influence waste generation. This study uses correlation and regression analysis modeling with demographic and socioeconomic factors. Several models that have been reviewed allow the number of occupants, income, and level of education to have a significant effect on waste generation. The research of (Trang et al., 2017) determined the factors that influence the weight and generation of household waste by using the Ordinary Least Square (OLS) to estimate the regression parameter model with a significance level of 1%. The independent variables used in this study are income and socio-economic factors which include household size, education, and care. This study found that income had no significant effect on waste generation. Socio-economic factors that include household size, education variable and concern variable have a positive correlation with waste generation. Based on the research of (Tang et al., 2022) using descriptive statistics, validity and reliability tests using ANOVA, correlation and regression analysis. The results of this study indicate that women and residents with a high level of education participate more actively in classifying domestic waste. Promotion and education, classification standard, and recycling systems, regulations, knowledge and attitudes are highly correlated with the classification of household waste. Based on the results of research by (Garcia et al., 2015) using bivariate explorative analysis which states that urban morphology, tourism activities, education level, and economic situation have a lot of influence on household waste generation. Affecting factors the generation and weight of waste can increase the accuracy and reliability of waste quantitative data that can be used as a reference for making decisions on waste management. This study has a novelty in data processing methods using multiple linear regression analysis with dummy variables. The dummy variable is an analysis that can change the qualitative variable to be quantitative which is thought to have an effect on continuous variables in binary 1 and 0 formats. In a study that wants to know the effect of the combination of independent variables with response variables, the statistical method that can be used is Anova. Anova is an analysis that examines the average difference of a combination of independent variables or treatments. If on average, the combination of independent variables is significant, it can be concluded that there is an effect on the response variable. It turns out that Anova is a statistical method that is equivalent to regression analysis when the combination of the independent variables is in the form of dummy coding. In this study, to determine the factors that influence the generation and weight of waste in Tanjung Karang Village, a dummy regression analysis is used.

Tanjung Karang Village is one of the areas in Mataram City that has the potential to be developed because it is a Cultural Conservation Area (Mataram City Government 2009). This area must preserve physical buildings and conserve the natural environment that has historical and cultural values in the city of Mataram. Tanjung Karang Village is also a priority tourism destination that can be used for cultural tourism, artificial/creative tourism, and shopping tourism. The Mapak area consists of beach tourism, the Loang Baloq Tomb site, and a recreation park, as well as a tourist port development area includes strategic economic potential for Tanjung Karang Village (PUPR 2015). The community of Tanjung Karang Village can carry out integrated waste management as social capital in supporting sustainable tourism. Strategic tourist destinations need to maintain a clean environment to create comfort and satisfaction for visitors during their trips. The purpose of this study is to analyze waste generation and composition of household waste in Tanjung Karang Village and analyze the factors that influence it. Analysis of the factors that influence the generation and composition of waste is needed as an educational capital for the community to achieve integrated waste management so that it is more measurable, systematic, and effective.

2. Methods

2.1. Location and Time

This research was conducted in Tanjung Karang Village, Sekarbela District, Mataram City from January to February 2022 (figure 1).

Figure 1. Research location

2.2. Research Instrument

The tools and equipment used in measuring the generation and composition of domestic waste are:

1. Weigher
2. Compaction box
3. Sacks
4. Ruler
5. Gloves
6. Mask
7. Data recapitulation form

Another instrument for analyzing social data is using a questionnaire. The type of questionnaire used in this study is an open structured questionnaire.

2.3. Data Type

The types of data taken in this study are waste generation (liters/person/day), waste weight (kg/person/day), and waste composition. The composition of the waste studied included in table 1:

Table 1. Primary and secondary composition of waste

No	Domestic waste composition		Description
1	Primary	Secondary	
2	Plastic	HD	Cracked bag
		HDPE	Bottles of shampoo, liquid soap, bleach, soy sauce, sauces, etc
		PS	Styrofoam dan foam
		PETE/PET	Plastic bottles of mineral water, juice, etc
		The other plastic	Clear plastic food packaging, scahet packaging, instant noodles, cooking oil packaging, fragrances, etc.
		Plastic bag	
3	Paper	Cardboard, paper, magazines, newspapers, tissue	

No	Domestic waste composition		Description
		Tetrapack package	
	Metal	Iron contains	Food contain and paint
		Aluminum cans	Soft drink cans
		The others cans	Scrap iron, wire, zinc, etc
4	Glass		
5	Textile	Cloth	Cloth waste
		Diapers	Diapers
6	Rubber		
7	Organic waste		
8	The others	Electronic	Light bulbs, electronic equipment, CD cassettes
		Ceramic	Glassware, objects containing clay
		Stone	

2.4. Data Collection

2.4.1. Sampling Methods

In this study, the population to be studied is households (Head of Family) located in Tanjung Karang Village, Mataram City consists of three categories. There are permanent housing, semi-permanent housing, and simple housing. The sampling technique was collected by stratified random sampling. According to SNI 19-3964-1994 concerning Methods of Collection and Measurement of Generated Samples and Composition of Urban Waste, the implementation and collection of generated samples are collected randomly for each stratum with the following amounts:

1. The number of samples of people and heads of families is calculated based on the following formula:

$$S = Cd\sqrt{Ps}$$

Where S are the number of soul samples; Cd is housing coefficient; Cd is big city/metropolitan = 1 or Cd is medium/small town/ KK = 0.5; Ps is population (people)
Information:

2. $K = S/N$

Where K are number of samples (KK); N are number of people per family

1. The number of examples of waste generation and housing is as follows:
   a. Example of permanent housing= (S1 x K) family
   b. Example of semi-permanent housing= (S2 x K) family
   c. Example of simple housing = (S3 x K) family

Based on the sampling calculation method above, the number of research samples can be analyzed as follows:

1. The number of samples of people and heads of families is calculated based on the following formula:

$S = Cd\sqrt{Ps}$ = 48 people

2. Based on Sekarbela District BPS data in 2018, it was found that 1 house in which there is 1 family head consisting of 4 people, then the calculation of the number of examples of waste generation is as follows:

$K = S/N$= 12 family head

3. The proportion of housing categories in Tanjung Karang Village is as follows in table 2:

Table 2. The proportion of housing categories

No	Housing Category	Number of Houses	Percentage
1	Permanent	940	49.13 %
2	Semi-permanent	433	22.63%
3	Simple	540	28.22%
	Total	1913	100%

Based on the results of the analysis, it was found that the number of samples (people) was 48 people and the number of samples were 13 families. The proportion of samples based on housing categories are 6 Permanent Housing, 4 Semi-Permanent Housing, and 3 Simple Housing. There are no specific criteria for permanent housing based on the price and size of the house, but it is visually estimated that it is inhabited by residents with high-income levels. The category of semi-permanent housing with non-rise buildings and renovations is a maximum of 1 time. The category of simple housing with subsidized housing conditions, is not too good, and not multi-story.

2.4.2. Measurements of Waste Generation and Composition

The measurement of waste generation and composition are according to the SNI 19-3964-1994 procedure. The frequency of sampling of waste composition is carried out for 8 days in Tanjung Karang Village. Sampling started at 09.00 WITA, then measurements of waste generation and composition were carried out at around 15.00 WITA. Measurement and calculation of generated samples must comply with SNI 19-3964-1994 with the following provisions:

1. The units used in the measurement of waste generation are:
   a. Volume (primary): liter/person day
   b. Weight (primary): kg/person/day
2. The unit used in measuring the composition of the waste is in % weight waste.
3. The number of units for each sampling location for waste generation for housing is the number of people in the family.
4. The method of measuring the sample generation is:
   a. The collected waste was measured in volume with a 40-liter compaction box and weighed.
   b. The collected waste is measured in a 500-liter compaction box and weighed. then separated based on the composition of the waste and weighed.

The collection and measurement of waste generation and composition samples are carried out as follows. First, the plastic bags that have been marked with waste sources were distributed one day before collection. Then, the number of units of each sample were recorded. The plastic bags filled with garbage were collected and the plasctic bag were moved to the measuring point. The compaction box is pounded three times as high as 20 cm. The compaction box was weighted and waste generated and that steps are carried out for the others waste. The waste was sorted base on the components of waste composition and measured waste generation and weight.

2.4.3. Community Socio-Economic Data Collection

Community socio- economic data collection conducted a survey with questionnaire is find out respondent income and economic level, respondent consumtion level, community education level, and community knowledge in managing waste. Socio-economic data collection of the community was carried out by distributing questionnaires to the same house with the sampling location for measuring waste generation and composition.

2.5. Data Analysis Method

2.5.1. Data Analysis of Waste Generation and Composition

The data obtained from the direct data collection method are waste generation, waste composition, and questionnaire data. The stages of analysis carried out are:

1. Calculating waste generation

$$waste\ generation = \frac{(waste\ volume: number\ of\ people)}{number\ of\ sampling\ time\ (day)}$$

Where waste generation are amount of waste per day in liters/person/day; Waste volume are waste volume (in liters) calculated during sampling; The number of sampling days are the number of days the measurements were taken in 8 days

2. Calculating trash weight

The weight of the waste is obtained by the formula:

Waste weight=(bkk+bs)-bkk

Where Bkk are the weight of compaction box; Bs are the weight of waste

3. Calculating the percentage of waste composition

The composition of the waste is calculated using the formula:

$$\%\ component = \frac{waste\ component\ weight}{total\ waste\ weight}\ x\ 100\%$$

2.5.2. Analysis of Factors Affecting Waste Generation and Weight

The factors that influence the generation and weight of waste were analyzed by multiple regression analysis of dummy variables. The dummy variable is a nominal or ordinal variable used for the regression model which is given a binary format of 1 and 0 (Juanda, 2009). The dependent variables in this study are waste generation and waste weight. The independent variables in this study include the type of house, number of occupants, occupation, education, land and building area, and income. The type of house is a categorical variable and is measured using specific coding presented in table 3. Determining the number of coding is the number in categorical variable be diminished by one. In the type of house in this study, there are three categories, so the number of coding is two codings.

Table 3. Coding variable type of house

Type of House	**Coding**	
	PP	**PSP**
Permanent housing (PP)	1	0
Semi-permanent housing (PSP)	0	1
Simple housing (PS)	0	0

This study's residents were categorized according to the number of people living in the house in each family head. So, the number of occupants, six categories are measured using specific coding presented in table 4. The number of coding are three codings.

Table 4. Coding variable number of occupants

Number of occupants	**Coding**			
	JP6	**JP5**	**JP4**	**JP3**
6	1	0	0	0
5	0	1	0	0
4	0	0	1	0
3	0	0	0	1
2	0	0	0	0

The occupation is a categorical variable measured using a special coding presented in table 5. In this case, there are five definite occupants, so the number of coding is four codings.

Table 5. Coding variable occupations

Occupants	**Coding**			
	P1	**P2**	**P3**	**P4**
Trader	1	0	0	0
Teacher	0	1	0	0

Occupants	Coding			
	P1	**P2**	**P3**	**P4**
Enterpreneur	0	0	1	0
Student	0	0	0	1
House wife	0	0	0	0

The land area in this study was categorized based on the land area of each family head, so seven categories were obtained for the variable land area. The land area was measured using specific coding presented in table 6.

Table 6. Coding variable land area

Land Area	Coding					
	L1	**L2**	**L3**	**L4**	**L5**	**L6**
5	1	0	0	0	0	0
4,5	0	1	0	0	0	0
4	0	0	1	0	0	0
3.5	0	0	0	1	0	0
3	0	0	0	0	1	0
2.5	0	0	0	0	0	1
2	0	0	0	0	0	0

The income variable, in this case, is categorized into four categories, measured using specific coding presented in table 7. So, the number of coding is 3.

Table 7. Coding variable income

Income	Coding		
	S1	**S2**	**S3**
Rp 1000.000- Rp 3000.000	1	0	0
Rp 1000.000- Rp 1.500.000	0	1	0
Rp 500.000- Rp 1000.000	0	0	1
< Rp 500.000	0	0	0

3. Result and Discussion

3.1. Waste Generation and Composition

Domestic waste generation in Tanjung Karang Village was analyzed by calculating the volume and weight generation of 13 households for 8 days. The generation and weight of waste came from 13 families with the categories of permanent housing (PP), semi-permanent housing (PSP), and simple housing (PS). Based on the results of the analysis, the waste generation in Tanjung Karang Village is 3 liters/person/day (figure 2). The highest waste generation is produced by Semi-Permanent Housing (PSP). The weight of waste in Tanjung Karang Village is 0.5 kg/person/day (figure 2). The highest weight of waste is produced by Permanent Housing (PP). The weight of waste in Tanjung Karang Village has the same amount of waste generation in Mataram City are 0.5 kg/person/day. The results of this study indicate that the percentage of volume is relatively high, although the percentage of weight is decreasing. This means, the space that will be occupied by plastic waste in the landfill is relatively very high (Palanivel et al., 2014). This is indicated by the high generation in the PSP are 3.6 liters/person/day, but the weight of the waste is only 0.5 kg. Waste generation in PP is 3 liters/person/day with a weight of up to 0.6 kg.

The generation and weight of waste is a calculation of the amount of waste based on volume and weight that needs to be calculated accurately in preparing an integrated waste management plan. Waste generation as the main data in the effort to plan waste management includes temporary dump site capacity, the volume of transportation vehicles, transportation cycles, and landfill capacity. The weight of waste needs to be analyzed accurately in an effort to calculate the economic potential of waste so that it can revive the circular economy of the community. The imbalance in the generation of urban waste is not only influenced by the geographical location of the city, regional boundaries, and urban levels, but is also influenced by the development of standards and regulations. Based on the Princip Component Analysis, economic growth, urbanization, and geographic location are three main things in influencing the imbalance in waste generation in Africa (Shi et al., 2021)

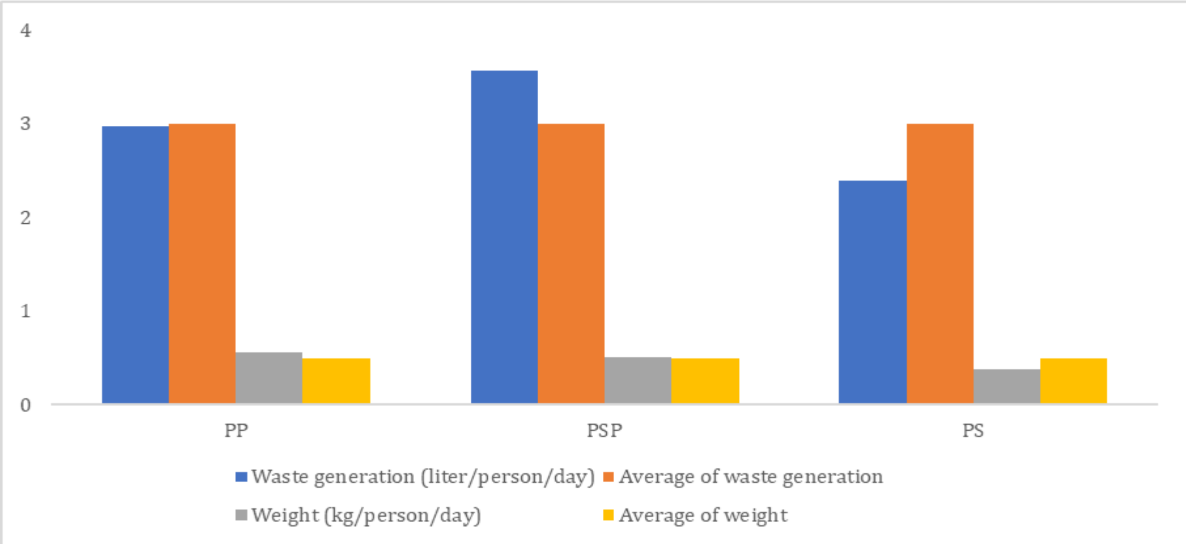

Figure 2. Waste generation in tanjung karang village

The composition of waste in Tanjung Karang Village is categorized into the primary and secondary compositions. The percentage of waste composition based on the highest weight produced by the people of Tanjung Karang Village are organic waste as much as 53%, plastic as much as 26%, and the others metal, B3, glass, textile, and rubbish (Figure 3). The percentage of types of plastic waste based on the most weight produced by the community in Tanjung Karang Village is other plastics as much as 78% such as clear plastic food wrapper, sachet packaging, instant noodles, cooking oil packaging, and fragrances (Figure 3). Types of High Density (HD) plastic waste such as plastic bags produce quite a lot of waste as much as 19%. Types of High Density Polyethylene (HDPE) plastic waste such as shampoo bottles, liquid soap, bleach, soy sauce, and sauces have a relatively small composition of 3%. The highest potential organic waste can be recycled by making compost or ecoenzymes applied to plants.

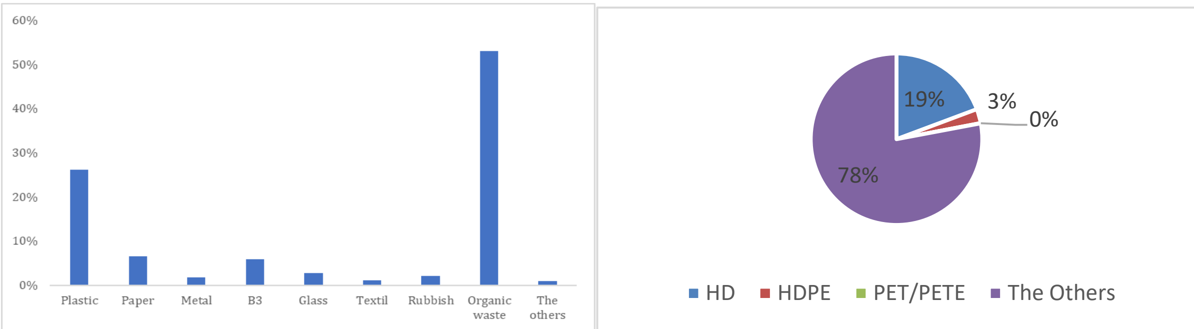

Figure 3. Waste composition

3.1.2. Affecting Factors of Weight Waste

The factors have influenced the weight of waste were analyzed by using multiple linear regression test with dummy variables. The data will be tested first with the Kolmogrov Smirnov Test. The Kolmogrov Smirnov test is a test to measure whether a research data has a normal distribution based on the cumulative frequency of the empirical distribution and the cumulative frequency of the theoretical distribution. Based on the Kolmogrov Smirnov test, it is found the overall data for variable X has an P-Value 0.200 which is more than 0.05 so the data is normally distributed (table 8).

Table 8. Distributed tabel of the Kolmogrov Smirnov test

Variabel Y	Variabel X	Nilai Kolmogrov	P-Value	Decision
Weight Waste	Type of House	0.142	0.200	Normally distributed
	Number of occupants	0.097	0.200	Normally distributed
	Land Area	0.093	0.200	Normally distributed
	Occupants	0.102	0.200	Normally distributed
	Income	0.093	0.200	Normally distributed

Based on the Kolmogrov Smirnov test, it was found that the variable number of occupants, land area, and income had an asymp sig > 0.050 so the data was normally distributed. The variable type of house and income has a value of P-Value <0.050 so that the data is not normally distributed (table 9).

Table 9. Distributed tabel of kolmogrov Smirnov test

Variabel Y	Variabel X	Nilai Kolmogrov	P-Value	Conclusion
Waste Generation	Type of House	0.95	0.01	Normally distributed
	Number of occupants	0.137	0.057	Normally distributed
	Land Area	0.053	0.200	Normally distributed
	Occupants	0.29	0.000	Normally distributed
	Income	0.089	0.200	Normally distributed

In the multiple linear regression analysis of the dummy variable, there are three important components that need to be analyzed R^2, the significance value, and the influence of variable X causing whether or not variable Y is significant. Based on the summary regression model in the table 10 it was found that the value of R^2 in each independent variable of each model was more than 50%. That means that the high and low weight of the waste is influenced by the variable type of house, number of occupants, land area, occupation, and income by more than 50%. The value of R^2 obtained is statistically significant, as can be seen from the opportunity to get the results of the F test ratio (P'value = 0.000).

Table 10. Model summary and f-test regression analysis

Variabel Y	Variabel X	R	R square	Adjusted R Square	SE Estimated	F	Sig
Weight Waste	Type of House	0.771	0.593	0.555	3.108	15.358	0.000
	Number of occupants	0.823	0.678	0.641	2.016	18.416	0.000
	Land Area	0.744	0.552	0.499	1.69	10.466	0.000
	Occupants	0.919	0.845	0.827	2.153	47.714	0.000
	Income	0.734	0.538	0.489	2.355	10.884	0.000

Based on the results of the coefficients analysis, the variable type of permanent housing has a regression coefficient = 8.183 and P-value = 0.000 (p <0.05) (table 11) meaning that there is a difference in the average weight of domestic waste between types of permanent housing (PP) which is higher than simple housing. A positive coefficient value indicates the direction of the relationship, meaning that the higher the type of house, the higher the weight of the waste.

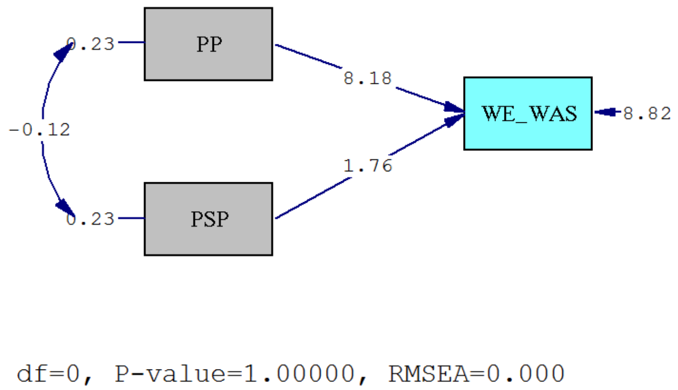

Figure 4. The path analysis of type of house and weight waste

Table 11. Regression coefficient type of house to the weight of the waste

Variabel X dummy	β	SE	T-value	P-value
PP	8.183	1.554	5.265	0.000
PSP	1.761	1.554	1.133	0.270

In the variable number of occupants, there are three categories that have a P-value <0.05 and a regression coefficient value of 3.083; 7.246; and 6.071 in JP6, JP4, and JP3 with 6, 4, and 3 inhabitants (table 12). This means that there is a difference in the average weight of the waste group at the number of occupants of 6, 4, and 3 people to the weight of the waste by the number of occupants of 2 people (as a comparison variable). A positive coefficient value indicates the direction of the relationship, meaning that the more residents there are the higher the weight of the waste.

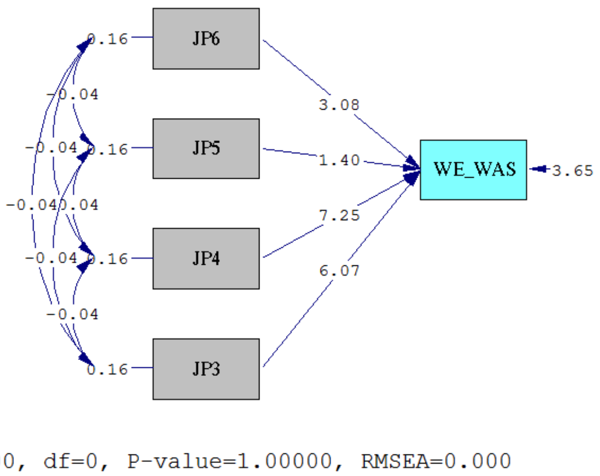

Figure 5. The path analysis between the occupants and weight waste

Table 12. Regression coefficient number of occupants to the weight of the waste

Variabel X dummy	β	SE	T-value	P-value
JP6	3.083	1.008	3.057	0.004
JP5	1.403	1.008	1.392	0.173
JP4	7.246	1.008	7.186	0.000
JP3	6.071	1.008	6.021	0.000

In the land area variable, there are three categories that have a P-value <0.05 and a regression coefficient of2.038;4.713; and 2.768at L1, L3, and L6 which are land area of 5 acre, 4 acre, and 2.5 acre (table 13). This means that there is a difference in the average weight of the waste group on the weight of the waste with a land area of 5 acres, 4 acres, and 2.5 acres to the weight of waste with a land area of 2 acres (as a comparison variable). A positive coefficient value indicates the direction of the relationship, meaning that the larger the land area, the higher the weight of the waste.

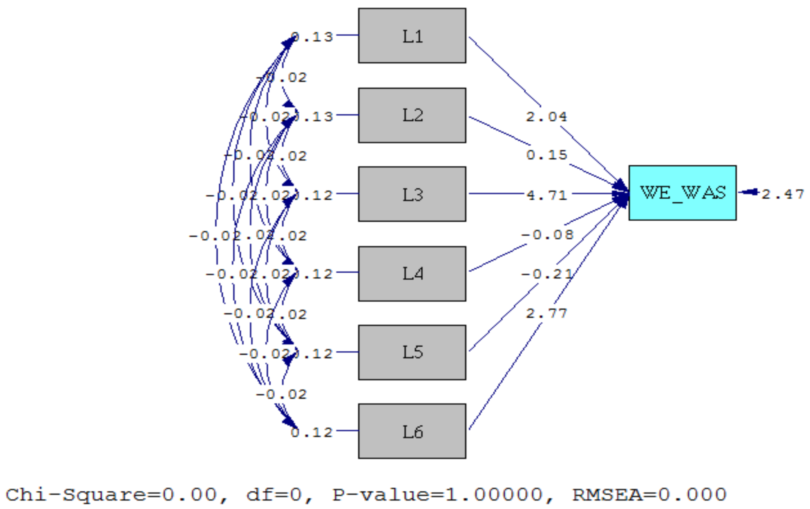

Figure 6. The path analysis between the land area and weight waste

Table 13. Regression coefficient land area to the weight of the waste

Variabel X dummy	β	SE	T-value	P-value
L1	2.038	0.807	2.525	0.015
L2	0.155	0.807	0.192	0.849
L3	4.713	0.830	5.676	0.000
L4	-0.075	0.830	-0.90	0.928
L5	-0.213	0.803	-0.256	0.799
L6	2.768	0.803	3.334	0.002

In the work variable, all variables P1, P2, P3, and P4 have a P-value <0.05 with a regression coefficient of 7.251; -4.341; -5.430 and -4.39 which are traders, teachers, entrepreneurs, and students (table 14). This means that there is a difference in the average weight of waste groups at P1, P2, P3, and P4 compared to P5 (housewife) as a comparison variable. People who work in the public sector produce a large average weight of waste compared to housewife. There is a study (Wu et al., 2019) that the consumption level of students explained that there was strong correlation between food waste organic waste and class level and financial condition. Lower levels of education and higher incomes lead to more food waste. The results of several studies of the largest food waste found were stapled foods and meat.

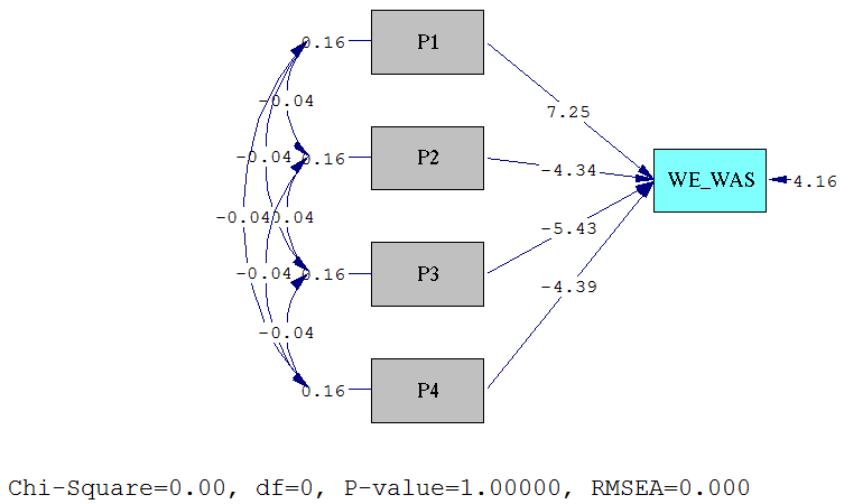

Figure 7. The path analysis between the P-value and weight waste

Table 14. Regression coefficient occupants to the weight of the waste

Variabel X dummy	β	SE	T-value	P-value
P1	7.251	1.077	6.734	0.000
P2	-4.341	1.077	-4.031	0.000
P3	-5.430	1.077	-5.042	0.000
P4	-4.395	1.077	-4.081	0.000

In the income variable, there are two categories that have a P-value <0.05 and a regression coefficient of -5.970 in S2 which are income of Rp. 1.000.000 to Rp. 1.500.000 (table 15). This means that there are differences in the average weight of the waste groups in people with incomes of Rp. 500.000 to Rp. 1.000.000 for the weight of community waste with incomes of <Rp 500.000. The positive coefficient value in S1 indicates that people who have high incomes can produce large amounts of waste. Based on (Trang et al.. 2017), it was found that the size of the household or the number of families had a positive effect on the generation of household waste. Families with high incomes produce more paper, plastic, and PET waste than organic waste. Economic inequality is an important factor in urban waste management to complete data on individual incomes and economic levels. Economic inequality is not overcome by policy, but is a factor that must be investigated separately. Economic inequality needs to be addressed in tiered political policies to support socio-economic resilience (Viera et al., 2017)

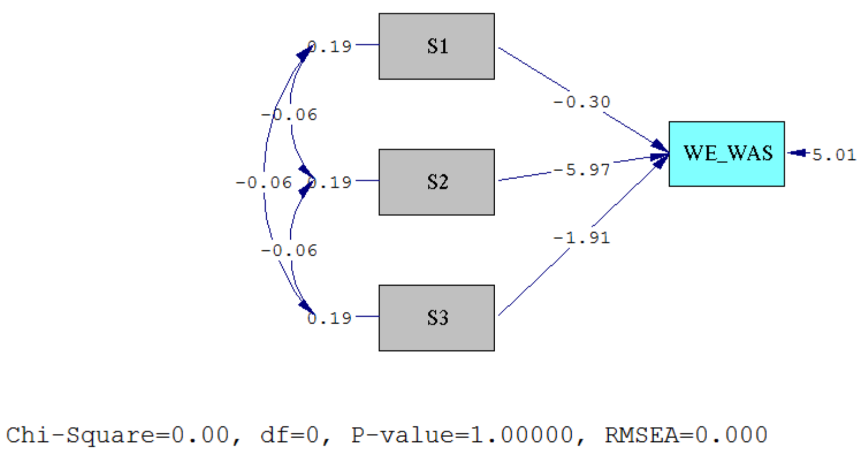

Figure 8. The path analysis between income and weight waste

Table 15. Regression coefficient income to the weight of the waste

Variabel X dummy	β	SE	T-value	P-value
S1	-.298	1.178	-.253	.802
S2	-5.970	1.178	-5.068	.000
S3	-1.914	1.178	-1.625	.115

3.1.3. Affecting Factors of Waste Generation

Based on the regression summary model in table 7, it was found that the value of R^2 on each independent variable was more than 69%. The level of waste generation is influenced by the variables of house type, number of occupants, land area, occupation, and income as much as more than 69%. The value of R2 obtained is statistically significant, as can be seen from the opportunity to get the results of the F test ratio (P-value = 0.000) (table 16). This is suitable with the research of (Shafy et al., 2018) that the generation and composition of the impact are influenced by the number of family members, the number of rooms in the house, monthly income, and employment status. There is a correlation between waste composition and community social activities. Another factor that affects the generation of waste is the selection of good behaviour and public consumption of waste.

Table 16. Model summary regression

Variabel Y	Variabel X	R	R square	Adjusted R Square	SE Estimated	F	Sig
Waste Generation	Type of House	0.83	0.693	0.663	11.971	23.668	0.000
	Number of occupants	0.914	0.835	0.816	7.027	44.363	0.000
	Land Area	0.917	0.842	0.822	6.084	43.454	0.000
	Occupants	0.951	0.904	0.893	10.193	82.71	0.000
	Income	0.859	0.739	0.711	10.55	26.378	0.000

Based on the results of the coefficients analysis, the variable type of permanent housing has a regression coefficient = 40.747 and P-value = 0.000 ($p < 0.05$) meaning that there is a difference in the average weight group of waste between the type of permanent housing (PP) which is higher than the type of housing. (PS) in influencing waste generation (table 17). A positive coefficient value indicates the direction of the relationship, meaning that the higher the type of house, the higher the waste generation.

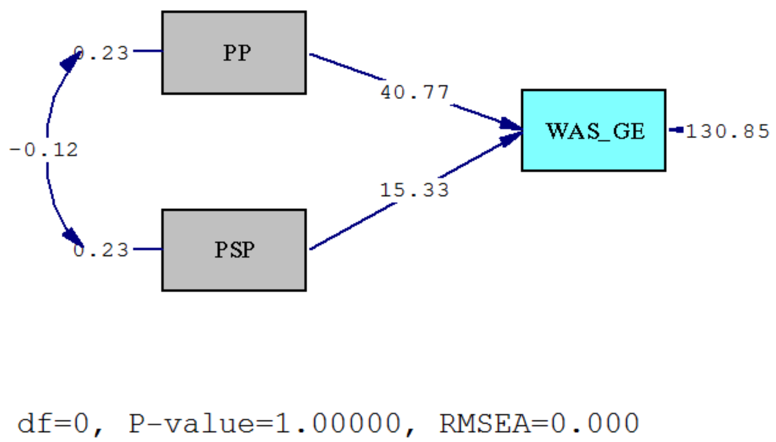

Figure 9. The path analysis between type of hosen and waste generation

Table 17. Regression coefficient type of house to the waste generation

Variabel dummy	X β	SE	T-value	P-value
PP	40.767	5.986	6.811	0.000
PSP	15.332	5.986	2.561	0.018

In the variable number of occupants, there are four categories that have a P-value <0.05 and a regression coefficient value of 19.345. respectively; 9.290; 40.801; and 32.165 in JP1, JP2, JP3, and JP4 or houses with 6, 4, and 3 inhabitants (table 18). This means that there is a difference in the average weight of the waste group on the number of occupants of 6, 5, 4, and 3 people (as a comparison variable) to the waste generation of the number of occupants of 2 people. A positive coefficient value indicates the direction of the relationship, meaning that the more residents there are, the more waste will be generated. This study is in line with the research of (Yusof et al 2002), the factors that influence the generation of waste are the number of family members, lifestyle, and family eating habits.

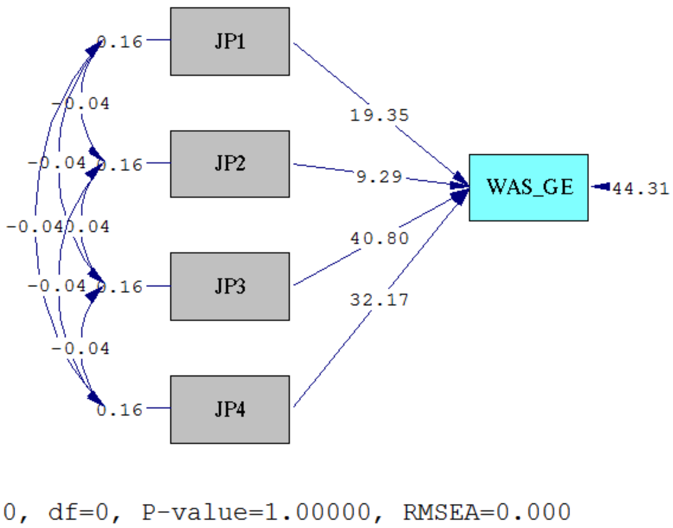

Figure 10. The path analysis between occupants and waste generation

Table 18. Regression coefficient number of occupants to the waste generation

Variabel X dummy	β	SE	T-value	P-value
JP6	19.345	3.514	5.506	0.000
JP5	9.290	3.514	2.644	0.012
JP4	40.801	3.514	11.613	0.000
JP3	32.165	3.514	9.155	0.000

In the variable land area there are three categories that have a P-value <0.05 and a regression coefficient of 12.678, respectively; 27.398; and 28.559 in L1. L3. L6, which are 5 acres, 4 acres, and 2.5 acres (table 19). This means that there is a difference in the average group weight of waste in the weight of waste with a land area of 5 acres, 4 acres, and 2.5 acres in terms of waste generation compared to a land area of 2 acres (as a control variable). A positive coefficient value indicates the direction of the relationship, meaning that the larger the land area, the more waste will be generated.

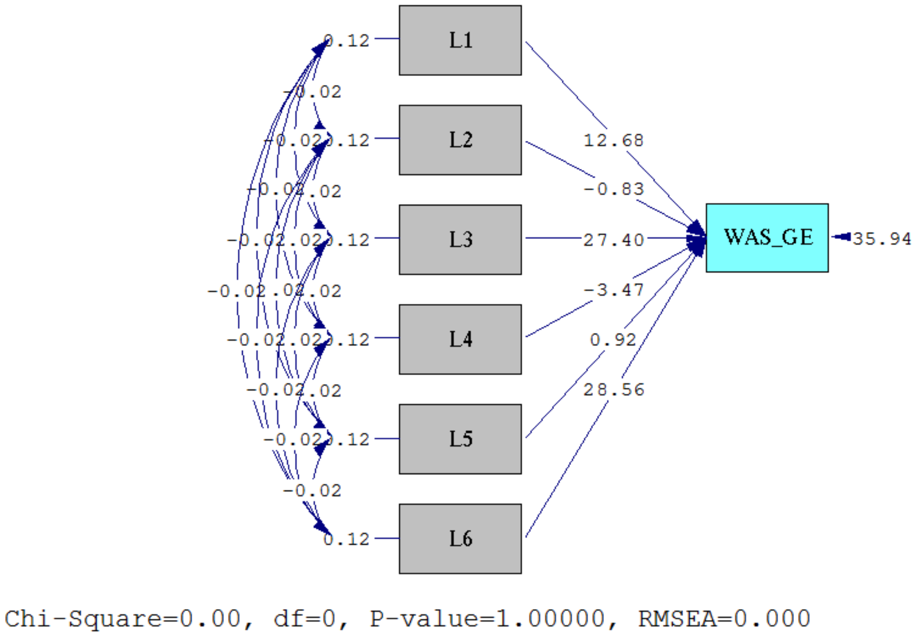

Figure 11. The path analysis between land area and waste generation

Table 19. Regression coefficient land area to the waste generation

Variabel X dummy	β	SE	T-value	P-value
L1	12.678	3.042	4.167	0.000
L2	-4.053	3.042	-1.332	0.189
L3	27.398	3.042	9.005	0.000
L4	-3.473	3.042	-1.141	0.259
L5	0.920	3.042	0.302	0.764
L6	28.559	3.042	9.387	0.000

In the occupants variable, all variables P1, P2, P3, and P4 have a P-value <0.05 with a regression coefficient of -75.265; -75.800; -47.089. and -74.170 are entrepreneurs, teachers, traders, and housewife (table 20). This means that there is a difference in the average group of waste generation for entrepreneurs, teachers, traders, and housewives in terms of waste generation compared to students. The negative coefficient value has an inverse relationship, people who already have fixed incomes produce less waste than students.

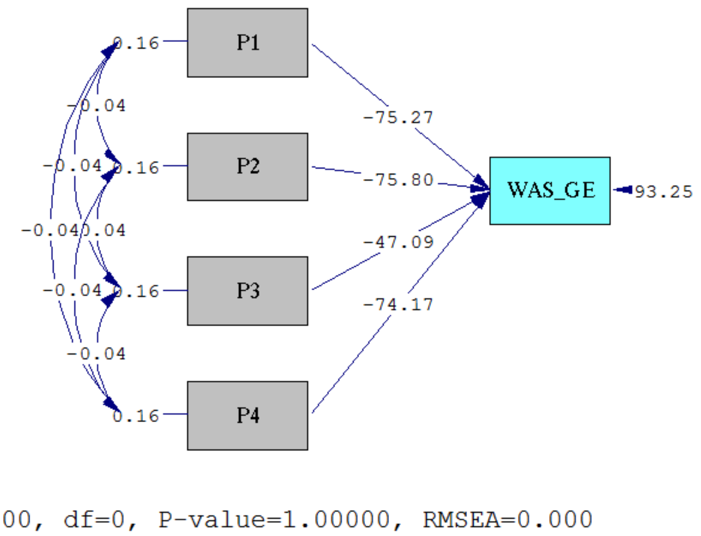

Figure 12. Path analysis between occupants and waste generation

Table 20. Regression coefficient occupants to the waste generation

Variabel X dummy	β	SE	T-value	P-value
P1	-75.265	5.097	-14.767	0.000
P2	-75.800	5.097	-14.872	0.000
P3	-47.089	5.097	-9.239	0.000
P4	-74.170	5.097	-14.553	0.000

In the income variable, there are two categories that have a P-value <0.05 and a regression coefficient of 9.077 and 1.724 in S1 and S3 which are income of Rp. 1.000.000 to Rp. 3.000.000 and Rp. 500.000 to Rp. 1.000.000 (table 21). This means that there is a difference in the average generation group for people with incomes of Rp. 1.000.000 to Rp. 3.000.000 and Rp. 500.000 to Rp. 1.000.000 for community waste generation with incomes of <Rp 500.000. The positive coefficient value in S1 indicates that people who have high incomes tend to produce large amounts of waste.

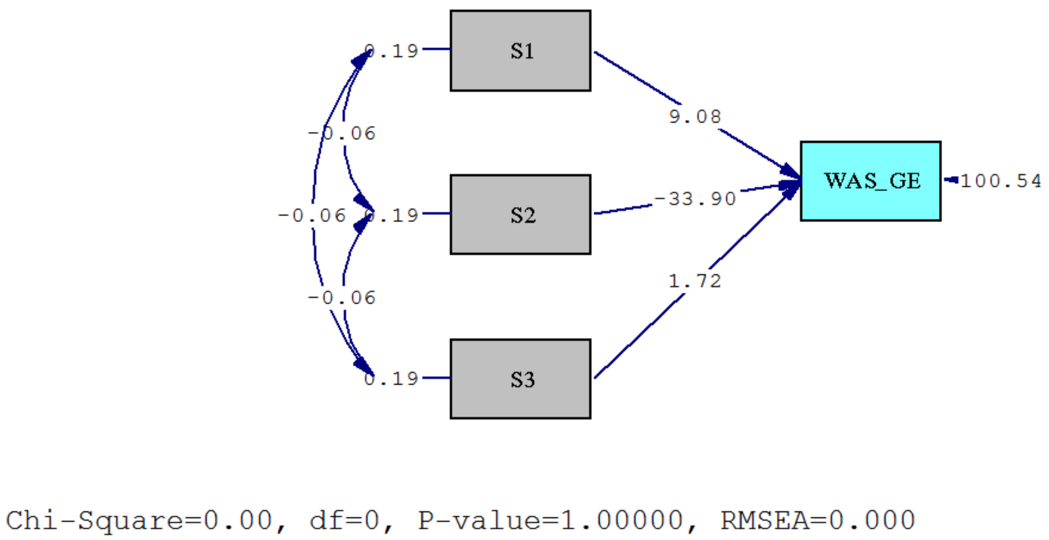

Figure 13. The path analysis between income and waste generation

Table 21. Regression coefficient income to the waste generation

Variabel dummy	X	β	SE	T-value	P-value
S1		9.077	5.275	11.425	0.000
S2		-33.899	5.275	1.721	0.096
S3		1.724	5.275	-6.426	0.000

3.1.4. Respondents Socio-Economic Data

Respondents in this study had an income of Rp. 1.000.000 – Rp. 3.000.000 as much as 38%. Rp. 500.000 – Rp. 1.000.000 as much as 32%. Rp. 1.000.000 – Rp. 1.500.000 as much as 15% and <Rp 5000.00 as much as 15%. Respondents who completed the education level of Senior High School 31%, Elementary School 23%, Junior High School, bachelor's degree each 15%, diploma and did not attend school 8%. Respondents who work as housewife are 54%, traders are 19%, the last consist of construction workers, teachers, and students 6% each. The response in Tanjung Karang Village still has unused yard area with an average area of 0.9 acre. In meeting their daily needs, research respondents in Tanjung Karang shop at the market or vegetable shop as much as 92% every day and 8% one week. All respondents in the Tanjung Karang Village carried out cooking activities and used plastic bag as a place to accommodate domestic waste.

Based on the data on the generation, weight and composition of the waste, as well as the socio-economic data of the respondents, community-based waste management can be initiated. Community-based waste management is an effort to plan, process, reduce, and utilize waste carried out by the community independently and sustainably. The composition of waste in Tanjung Karang Village are 58% organic waste and 26% plastic has a high reduction potential to be managed on a household scale. According to research (Ramadan et al,. 2022), the production of organic waste produced, especially from garden waste, has the potential to be burned 73.61% of the total waste burned. Plastic waste is the second largest type of waste that has the potential to be burned after garden waste. Uncontrolled burning of waste will cause emissions that have a negative impact on air pollution and climate change. Plastic waste that is burned in large quantities will produce a relatively high concentration of CO. Paper and cardboard waste that is burned will cause a high concentration of NOx. Within 24 minutes of open burning, very significant amounts of CO and CO_2 were produced at the beginning of the combustion activity. Research respondents who still have a yard at home have the potential for processing organic waste in the form of composting, eco enzymes, and making biopore holes. Plastic waste are 26% such as plastic bags can be reduced by replacing product packaging containers with plastic bags or environmentally friendly packaging. Research respondents as much as 85% have not done waste sorting. However, as many as 46% of respondents already know the correct way of processing waste from information from various sources. Family members who play a role in waste management at home are the wife 46% and other family members 54%. In the research of (Pakpor et al 2014), attitudes, behaviour control, motivation, moral obligations, self-identity are significant factors in behaviour toward household waste. Waste management education needs to be emphasized in formal education materials that target waste management as a moral obligation with concrete action plans. Based on the data waste generation, community-based waste management can start with education and sharing information about preventing waste production, sorting out waste, and processing waste into valuable goods. According to research by (Vassanadumrongdee et al., 2018) that sorting waste from home in an effort to recycle is the most effective way of urban waste management. This study states that public discomfort and distrust in the waste collection process are the main obstacles to waste segregation in Bangkok. Separation of waste from the source can be tested in the workplace in order to create motivation for the community to apply it at home.

4. Conclusions

The waste generation in Tanjung Karang Village is 3 liters/person/day and the weight of waste is 0.5 kg/person/day. Affecting factors of the waste generation and weight were analyzed by multiple regression analysis of dummy variables. The dummy variable is an analysis that can change the qualitative variable to be quantitative which is thought to have an effect on continuous variables in binary 1 and 0 formats. The factors that influence the generation and weight of waste are type of house, number of occupants, land area, occupation, and income. Some recommendations to realize management are processing organic waste in the yard of the house with composting, eco enzymes, and making biopore holes. Plastic waste processing can be done by converting plastic waste into useful and high economic value products.

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