The study of urban waste management through the role of youth as an effort to protect Sinjai area, South Sulawesi Province, Indonesia

A Waris1, A Rashid2 and I R Rahim3
1Regional Development and Planning Study Program Student, Youth Leadership Management, Graduate School Hasanuddin University
2Students from the Departement of Marine Sciences, Hasanuddin University
3Lecturer of Development and Regional Planning Study Program, Postgraduate School of Hasanuddin University

Email: abdulwariss.kel@gmail.com

Abstract. This study aims to determine the potential and new models and motivation of youth in urban waste management. This research method conducted using descriptive data collection using a questionnaire in the form of Google Form and interviews with the Department of Environment and Forestry and the determination of waste management models using SWOT analysis (Strength, Weakness, Opportunity, and Threats). The number of the questioner is 150 with the characteristics of respondents aged 16-30 years. The results showed that the attitude of the youth in waste management in Sinjai has the lowest rank, especially in waste management and utilization of waste generated. It is shown by the scale of 100% is obtained 63% of youth do not perform sorting of waste and 64% of youth do not perform using waste.

1. Introduction
The garbage problem in Indonesia is very complicated. Waste production in Indonesia reached 200 thousand tons/day [1]. It is often the case in some cities and counties, including Sinjai Regency. Waste production in Sinjai reached more than 36 tons/day in 2018. Furthermore, the volume of landfill waste per capita in Sinjai reached 0.693 kg/person/ day. It means that the level of waste products in Sinjai is still high, especially in urban areas (personal interview, 2019).

The present time waste management in Sinjai Regency was still using the old concept, which is collected and then carried out and ends to waste disposal. This method can not resolve the problem of waste for waste management technique known as 3R (Reduce, Reuse and Recycle) has not been applied properly (Personal Interview).

Waste management is not only the duty of the government alone, young society (youth), as well as a waste producer, must also be responsible for protecting the environment to stay clean and healthy. The role of the various stakeholders is a key hygiene activity or a program model that includes decision-making implementation, assessment and use of results [2,3].

Waste management activities in Sinjai have not been able established as well. This was due to the lack of young people's participation to increase awareness of the urban to keep their environment. Waste management in urban areas has encouraged appearing of ideas that will be used as the design
model youth involvement in sustainable waste management efforts. Based on the background, the study conducted urban waste management through the role of youth as an effort to keep the environment, especially in Sinjai.

2. Research methods

This research was conducted in the District of North Sinjai, Sinjai Regency, South Sulawesi Province, Indonesia. The selection of Sinjai Regency as a research location is based on the consideration that the Sinjai Regency does not yet have a waste management model by involving the role of effective and efficient youth.

![Figure 1. Research Location](image)

The study is using purposive sampling and snowballing sampling techniques [4]. The population in this study are young people who according to constitution No. 40 of 2009 concerning youth are aged 16-30 years and the population by age groups of youth in the region of North Sinjai district is 15,664 people [5]. In conducting the study, the technique data sources initially small in number, gradually became numerous through the distribution of questionnaires in the form of Google Form and the samples taken must be truly representative [4].

Data collection techniques in this study used a questionnaire [6]. The type of questionnaire used was a closed questionnaire where the respondent's statements by choosing alternative answers provided. The research instrument was used as a questionnaire in Google Form. The trial was conducted on the Google Forms, and then through a questionnaire that was distributed in the form of a Google Form the youth's involvement in waste management was assessed. Furthermore, the observation of waste management in Sinjai was conducted. The steps taken in collecting data are looking for data on the number of youth in BPS Sinjai then mapping the number of youth in the Urban Area especially in North Sinjai which is the city center of Sinjai Regency. After that, we look for information about the waste management in Sinjai Department of Environment and Forestry and determine the number of samples of youth who live in Sinjai city, share the questionnaire and take the documentation.

Analysis of the data is used descriptive analysis by using Weighted Means Scored (MWS) techniques, as follows:

\[ \bar{X} = \frac{X}{N} \]

Information:
X: The average score
X: Total composite score
N: The number of respondents
Table 1. Variable average score criteria [7]

| Score     | Category   |
|-----------|------------|
| 3.51 to 4.25 | Very high  |
| 2.76 to 3.50 | High       |
| 2.01 to 2.75 | Less       |
| 0.00 to 2.00 | Very less  |

SWOT analysis to compare internal factors IFAS matrix inserted into the external factors [8]. SWOT Analysis facilitates in problem-solving and helping in decision making [9-15] included into the EFAS matrix with weight determination carried out by using the calculation formula [16]:

\[ W_j = \frac{(n - r_j + 1)}{\sum(n - r_p + 1)} \]

Description:
- \( W_h \) = Weight
- \( n \) = number of parameters studied
- \( r_j \) = Position parameter rankings
- \( r_p \) = parameter \( (p = 1, 2, 3 \ldots n) \)

Figure 2. Quadrant SWOT Analysis

3. Result and discussion

3.1. Characteristics of Respondents

In figure 2 to study the characteristics of the respondent are using four indicators (education, gender, occupation, and income) from the youth in Sinjai Regency.

Figure 3. Characteristics of Respondents
The study results on data A showed that most respondents who filled out the questionnaire are located at the level of higher education, representing 62%. However data B, based on gender it can be seen that most of the respondents are male, representing 53%. While based on the characteristics data C of income respondents, it can be seen that 60% earn 0-1 million and only 8% of respondents who earn 8 million or more but regarding the job, characteristics show that most of the respondents are students, representing 30% and followed by 23% of respondents as self-employed.

Based on the educational of the respondents (figure 2), indicating that respondents predominantly in university education. It causing that the youth who was educated at the college level is a response to the discussion of environmental improvement. While based on gender is seen that most of the respondents were more male respondents than female respondents because the male has more leisure time in charging via Google Form questionnaire, As explained by [17,18] that in order to define the forms of waste management can be identified through interviews in respondents of different characteristics and supported by documentation.

3.2. *The percentage of youth in waste management of Sinjai*

To measure the youth in waste management of the Sinjai area are using four indicators, they are throwing waste, Sorting waste, using waste and Waste transportation. Further, it can be seen in figure 3 below:

![Figure 4. Percentage of Youth in Waste Management](image)

Description : (a) Throwing waste, (b) Sorting waste, (c) Using waste, (d) Transportation of Waste

Data A shows that young people of Sinjai Regency showed concern to dispose of household waste to the TPS in front of the house is quite well, that is 40% of respondents dispose of waste every day which will be transported by garbage trucks. Once until 3 times a week disposing of garbage reaches 36%, 4-6 times a week disposing of garbage gets 18% results and the lowest is never disposing of garbage reaching only 6%.

On data B it is shown that the treatment of sorting waste shows 63% of young people who have not done household sorting waste. While who do 2 sortings (organic and non-organic) are 34% and the lowest is sorting 3 types, representing 3%. While data C using waste shows that it is not optimal with the high number of youth who have not used garbage with 64% who have no waste treatment. While those who make use of organic or non-organic waste are 29% and 6% using organic and non-organic waste. Furthermore, the lowest is 1% who uses Organic, Non-organic and B3. However, Figure 2 data D shows 53% of youth stated that the waste processing process was not good and 33% stated that it was good, while 9% and 5% were very good.

Sinjai youth tend to have a concern dispose of household waste to polling stations or bins (Figure 3) but the front of the house is good enough for separation and utilization still uncontrolled. The results were consistent with the results of research conducted [19] that the waste management problem in Indonesia is a complicated issue because the increasing survival rate of people who are not accompanied by a harmony of knowledge about sorting and utilization of garbage, the difficulty of storing garbage while perishable and inadequate financing remembering until now mostly junk managed by the government, causing the transport system is not organizer well.
3.3. The Percentage of youth response to the role of government

To see the youth response to the role of government in regarding waste management, the study used by socialization waste management and government response in making waste management community on figure 3 as follows:

![Figure 3](image)

Description: (A) Socialization waste management, (B) Government response in making waste management community.

**Figure 5.** Percentage of youth response to the role of government

On data A from the result showed that 59% of youth have never attended the socialization use of waste, 22% attended socialization of waste utilization once a year, 12% attended socialization more than 3 times in a year and the lowest is 7% only attended twice of socialization of waste management in a year. Besides that, data B shows that 55% of the youth said that the government as a supporter to build of waste management community is enough and 35% they said is good. While 6% said it is very good and 4% is not good.

Lack of youth participating in the socialization of urban waste management (Figure 4) shows a lack of government response to the establishment of waste management community and organization. These becomes a problem in the handling of municipal waste because even non-governmental organizations is one of the solutions to improve human resources in waste management sustainable as non-governmental organizations into the efforts taken in order to address any problems that arise, such as waste management, one of the efforts is by improving the institutional role through institutional development program [20,21] describes institutional aim is to organize inter-relationship which exists to meet human needs is most important. Furthermore [22], insists that institutions are a set of norms and behaviors that persist over time to meet the collective needs.

3.4. The percentage of youth motivation in waste management

In figure 5 provides information about the percentage of youth motivation in waste management:

![Figure 4](image)

Description: (A) Youth Motivation, (B) Waste Distribution

**Figure 6.** Motivation youth participation in waste management

It can be seen on data A shows that 55% of youth have high motivation in waste management and they said that youth participation in waste management is needed as well. While 35% said unnecessarily. Furthermore, they said 4% necessary and 6% said unnecessarily.

On the other hand, data B shows that 89% of youth do not mind and ready for waste distribution but there are 11% of youth was not ready.

Figure 5 shows that youth have high motivation in waste management and expressed needs of youth participation in waste management. The data show the motivation of the youth to participate in waste management is very important. Because participation is an important component in the generation of self-reliance and social empowerment process [23]. Figure 5B shows the youth Sinjai very concerned with the improvement of the environment which is not only for his benefit but for the benefit of the people. [24] states that youth awareness about the environment is not for the benefit of himself and his group, but to a wide interest for the betterment of the community, the nation, and the State. In other words, youth motivation more powerful than ages. It is no exaggeration to say that a young age is the age of the most productive in human beings [25].
3.5. Waste Urban Management

The results of interviews with the Department of DLHK Sinjai and the results of the location survey found three results of the pattern of waste management operations, namely: (1) Direct individuals, (2) Indirect individuals, and (3) Indirect Communal.

3.5.1. Direct Individual system

![Figure 7. Pattern door to door system](image1)

The results of interviews with dependable waste policymakers in Sinjai District, in this case, the DLHK Office and the results of the location survey, show that there are three patterns of management and handling of municipal solid waste, namely: Direct individuals, indirect individuals, and indirect Communal. That is in line with the rules of the National Standardization Agency, where the operational procedures for urban waste management techniques are carrying out with three collection patterns, namely direct individual patterns, complicated own patterns, and straightforward communal patterns [26]. Figure 6 shows the door to door system operating pattern is still less effective where the process of transporting waste from the collected waste sources; the process is directly disposed of at the Tondong landfill without sorting.

![Figure 8. New Direct Pattern door to door system](image2)

So a new planning is carried out in a door to door system operating pattern (Figure 7) where the design is producing in regular residential areas such as real estate or complexes, in the main road and protocol areas, garbage from sources is collected and directly transported by garbage collection vehicles to the TPS Kelurahan by type, garbage organic in the TPS Kelurahan is composting, and inorganic waste and residues are transferred to the District TPS using a dump truck. According to Pramono (2008), the process of garbage collection can finish with a door to door system, pick up the container or community participation [27]. Where is the method of moving rubbish from a temporary disposal site to a waste management installation [28].

3.5.2. Indirect Individual system

![Figure 9. Pattern indirect individual system](image3)
The individual indirect system is showing in Figure 8 that the process of collecting and transporting waste is not sorted before the disposal of the Tondong landfill so that organic and inorganic waste is mixed without any prior use.

Contrast in Figure 9, The new pattern of individual system operation is not an indirect concept of waste management, which is more efficient where the system is operating in irregular residential areas. The waste from the source of the garbage is transporting using a garbage motor. Then the trash is taken to the urban TPS and composted for organic waste. Still, inorganic waste and the residue is transferred to the TPS in the Subdistrict using dump trucks, residues the remaining are transported to the landfill using dump trucks. According to Hadiwiyoto (1982), waste management is a management effort from the process of collection, separation, transfer, transportation to management and final disposal [29].

### 3.5.3. Direct Communal

The process of direct Communal waste management Figure 10 shows that each waste collector collects his garbage to a place and then transports it is to the landfill using DUMP Trucks.

The sorting process does not occur, but in Figure 11 is a new pattern of direct communal operational systems in which this pattern is operating in dense settlements, markets, and commercial areas. Then, garbage collectors collect their waste into containers then the garbage in the boxes is transported by collecting vehicles to the TPS of the Kelurahan and sorting then the organic waste is immediately composting. Inorganic waste is carrying to the District TPS. In waste management, it is necessary to apply systematic, comprehensive, and sustainable activities that include the reduction and handling of waste [30].

### 3.6. SWOT Analysis

The chart below shows a matrix of sustainable waste management strategy has strength is 3.33 while the weakness shows the value of 3.53. The accumulated value of these internal factors is -0.2.
Table 2. Matrix Analysis IFAS

| Internal Factor Strategy | Weight | Rating | Score | Result |
|--------------------------|--------|--------|-------|--------|
| **Strengths**            |        |        |       |        |
| The youth have a 59% motivation | 0.33   | 4      | 1.32  | 3.33   |
| The youth have a creativity and innovation | 0.27   | 3      | 0.81  |        |
| The youth education is 62% good | 0.13   | 3      | 0.39  |        |
| Ability to use a technology | 0.07   | 3      | 0.21  |        |
| **Weakness**             |        |        |       |        |
| The habit of using difficult items to decompose | 0.33   | -4     | -1.32 | -3.53  |
| The habit of littering everywhere | 0.27   | -3     | -0.81 |        |
| No treatment is sorting waste of 63% | 0.2    | -4     | -0.8  |        |
| Small in number of youth in utilizing garbage is 64% | 0.13   | -3     | -0.39 |        |
| 80% of youth do not implement the 3 R methods | 0.07   | -3     | 0.21  |        |
| Total                    |        |        |       | -0.2   |

The Matrix's external strategy in table 3 shows that the result of 3.46 opportunities components and threat components are -2.53 with a total accumulation of external factors obtained is 0.93.

Table 3. Analysis Matrix EFAS

| Eksternal Factor Strategy | Weight | rating | score | result |
|--------------------------|--------|--------|-------|--------|
| **Opportunities**        |        |        |       |        |
| 64% competitor of a waste processing is relatively low | 0.33   | 4      | 1.32  | 3.46   |
| The market potential for processed products | 0.27   | 3      | 0.81  |        |
| Youth motivation to build a community is 55% | 0.2    | 4      | 0.8   |        |
| Motivation to pay the waste payment is 89% | 0.13   | 3      | 0.39  |        |
| Contributing in opening job vacancy | 0.07   | 2      | 0.4   |        |
| **Threats**              |        |        |       |        |
| 59% There is no training and socialization | 0.27   | -2     | -0.54 |        |
| Inability to access a capital | 0.2    | -2     | -0.4  |        |
| Government support in the developing a community is weak | 0.13   | -3     | -0.39 |        |
| Transportation of waste 55% is not good marketing network is low | 0.07   | -3     | -0.21 |        |
| Total                    |        |        |       | 0.93   |

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3.6.1. The accumulated value of internal factors and external factors. Decision making strategy of SWOT analysis based on Figure 6 showed that the various internal factors (Table 1) and external factors (Table 2) indicated that they are in quadrant III, WO Strategy (Weakness - Opportunity).

[Diagram: SWOT Marks]

Figure 13. SWOT Marks

Decision making of SWOT analysis showed that the various internal factors (Table 1) and external factors (Table 2) shows the results that were in WO Strategy (Weakness - Opportunity). And waste management model that will be the solution to the problem of waste in Sinjai is a young community-based Waste Management [31,32] stated that the society based waste management became popular in the Philippines and various non-governmental organizations have successfully implemented Community-Based Solid Waste Management program. Community-Based Waste Management Program Young was able to involve citizens and communicate and be able to identify existing needs in the field. It is also easy to evaluate a program run [33,34]. Young people were able to strengthen the capacity and skills [35]. On the other hand, a community-based waste management approach will enable socio-economic and cultural forms are better than as a solution for environmental improvement [36].

4. Conclusion

Based on the results it can be concluded that:
1. Sinjai Regency has the potential of youth participation 89% in urban waste management. This potential needs to be utilizing by maximizing youth motivation to play a direct role in the new pattern of waste management operations. Individual direct, indirect individual and indirect communal.
2. From the test results, EFAS and IFAS obtained results are in quadrant III, W-O Strategy (Weaknesses- Opportunities) and it was concluded that the waste management model that will be the solution to the problem of waste in Sinjai is a young community-based Waste Management

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