COMMUNITY PERSPECTIVE ON THE WASTE MANAGEMENT SYSTEM IN LAMBANGSARI BEKASI VILLAGE BASED ON SMART GARBAGE ROBOTS

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History Article

ABSTRACT

Garbage is an unavoidable part of everyday life. Everyone has to take out the trash. Therefore, waste is a major source of problems that directly affect the environment. Moreover, waste management in Indonesia is definitely not good. Most of the waste is thrown away without being sorted. This also ultimately contributes to the complexity of the waste problem. This research was conducted to determine the perception of the waste management system in the village of Lambangsari Bekasi by utilizing intelligent robots based on IoT (Internet of Things). The survey method used is an online questionnaire filled out by 100 people from the age range of 20-25 years. Respondents consist of students, students to workers. The collected data were analyzed using descriptive statistical analysis techniques. The results obtained from the analysis data are that most of the waste management in Indonesia is not appropriate because of the very low knowledge of understanding waste management by utilizing the latest technology, one of which is IoT-based intelligent robots. In addition, the government also does not educate the public about the importance of sorting waste by type and also does not socialize the movement to dispose of waste.

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INTRODUCTION

Waste is the unwanted residue after the completion of the process. Garbage is an artificial concept resulting from human activity (Writing Team PS, 2016). Garbage (solid waste) is any form of waste generated by human or animal activities, usually in solid form, which is generally discarded, unused, or no longer needed. Yes (Tchobanoglous, Theisen & R. Eliassen, 1977). Alternatives are needed to reduce

waste products so that the adverse effects caused by waste can be reduced. Indonesia's current population density is very high, especially in urban areas. This also affects the amount of waste or the increase in the amount of waste. Based on the statistics of the Indonesian waste ministry for 2008, the estimated volume of waste in the country is 38.5 million tonnes per year.

Garbage is something that must be avoided. Therefore, waste must be disposed of properly to avoid causing new problems. Waste treatment and management systems worldwide vary according to society's social and cultural conditions, government policies and regulations, existing infrastructure, technological approaches, etc. (Hendra, 2018). The problem of waste management is still a big homework problem for Indonesia. Up to 24% of Indonesia's waste still needs to be appropriately managed, according to the latest research by Sustainable Waste Indonesia (SWI) published on CNN Indonesia. This means that of the 65 million tons of waste generated daily in Indonesia, around 15 million tons pollute the ecosystem and environment because they need to be appropriately handled.

Meanwhile, another 7% of waste is recycled, and the remaining 69% is in the Final Disposal Site (TPA). The survey results obtained illustrate several types of waste that the respondents know. The types of waste that are generated the most are organic waste (60%), plastic waste (14%), paper waste (9%), metal (4.3%), glass, wood and other materials, up to 12.7%. What makes waste a problem is that most household waste in Indonesia is thrown away without being processed or categorized first. As a result, the waste collected in the TPA needs to be organized and significantly impact the environment.

This, of course, requires a solution that can handle these problems. Public awareness of waste is still low; many litters and do not care about the environment. Based on this, innovation is needed so that people have more attention to the importance of disposing of waste in its place. As time goes by and technology advances. Technology systems are growing and widely applied in everyday life in various fields. Education on intelligent robots like trash based on the Internet of things (IoT) is an effort made to solve the waste problem. This survey was conducted to determine public opinion on the existing waste management system in their area. Is waste management adequate and orderly, or vice versa.

METHODS

The survey was conducted for five days from 20 to 25 August 2022 using the questionnaire survey method. This survey was published boldly via the Google Forms page and distributed via social media, accepting respondents from all over Indonesia.

Figure 1. Research Instrument

Respondents who participated were 100 people and came from different backgrounds with an age range of 20-25 years. Respondents consisted of students, students to workers. The collected data were analyzed using descriptive statistical analysis techniques.

RESULTS AND DISCUSSION

Based on the survey, all respondents agree that waste is an integral part of life, especially at home. This statement follows the theory put forward by Hidayat (2017) that waste cannot be separated from daily activities. This problem must be addressed because waste is inevitably generated in everyday life. Below are the results of my research, presented using figures and tables.
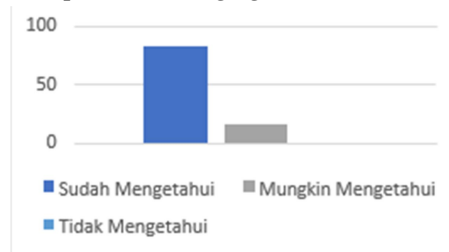

Figure 2. Community Knowledge Regarding Types of Waste

Figure 2 shows the results of respondents regarding their knowledge of types of waste. Most of the respondents said they already knew the types of waste. In simple terms, waste can be classified according to its type, namely organic and non-organic waste (Djajawinata & Wibowo, 2016). Another theory from Astuti (2015) states that waste is differentiated based on its type: organic waste, inorganic waste and B3 household waste. B3 waste is waste that contains hazardous or toxic substances.
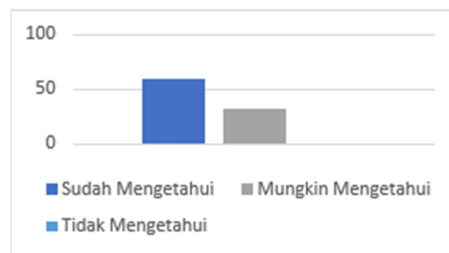

Figure 3. Knowledge of other types of waste (paper, plastic, glass, metal, rubber, cloth, and B3 (hazardous

and toxic materials)

The picture above represents respondents' knowledge about other types of waste, such as paper, plastic, glass, metal, rubber, cloth, and B3 (hazardous). You can see that many respondents already know. Indonesian people need to understand the types of waste so that it is good. Hazardous and Toxic Materials (B3) are hazardous and toxic materials which, according to their nature, concentration and amount, can directly or indirectly damage, pollute and endanger human health. Waste from household activities, including substances. (General, 2017). According to Suryati (2009), types of B3 waste include hospital and polyclinic waste, agricultural waste, poisons, gunpowder, used sanitary pads and diapers, styrofoam, used cans, batteries, or nuclear waste. Hazardous and toxic waste (B3) must be disposed of separately from other waste. This B3 waste can be dangerous or injure people if just thrown away. Some may also disintegrate or mix and may contaminate the compost.
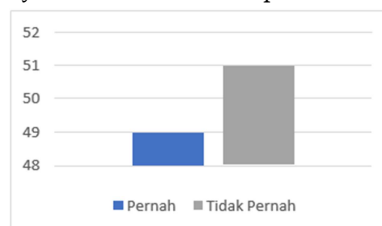

Figure 4. Education or Socialization Regarding Waste Management

The figure above shows that more respondents have never received socialization or education about good waste management. However, the difference is that only two respondents were. Respondents who claimed to have received socialization regarding good waste management consisted of 49 people. The 49 respondents mostly came from the provinces of Bali, East Java and East Kalimantan.

For the Bali area, the local government has done much outreach about the environment, especially waste. According to Putra's statement (2019), the Denpasar City Government has taken many steps regarding environmental protection, such as banning the use of plastic, regulating waste sorting according to its category, and linking it with the role of traditional villages. Traditional Balinese people are used to managing waste, although it is still straightforward. They separate the organic waste they can still use, some for animal feed (pigs) and some for fertilizer (Wardi, 2011). Another non-organic waste is set aside and adequately disposed of in TPS. This traditional waste management pattern can bring multiple benefits. The first benefit is that it helps reduce the volume of landfills, and the second is that livestock such as pigs can grow relatively quickly. The community's land conditions have become more fertile using organic fertilizers.

The government's role in sorting and managing waste is, of course, significant. If the local government educates its people about proper waste segregation, people will gradually get used to managing their waste. By doing segregation, the volume of landfill waste usually generated will begin to decrease, and the community will also receive its positive impact. The positive impact that can be felt is that the environment is cleaner, it can increase income if recycled into more valuable goods, and it can also fertilize the land if organic waste is used as fertilizer.

Then, from the results of the data, it seems that the Province of East Kalimantan, to be precise, the City of Balikpapan, has also implemented a waste management system, followed by East Java Province, namely the City of Surabaya, where the government has been looking for a way out to overcome environmental problems, especially waste. It turns out that Surabaya has experienced the status of a "Waste Emergency" status, which impacted the local community's closing of the TPA. Because this is one of the reasons for the Surabaya City Government to look for alternative solutions (Dellavalerin, 2019), the several regions mentioned above can be used as a reference or role model for other regions in Indonesia, especially those with problems regarding waste. The local government's policies will significantly affect the improvement of environmental quality. Then if it is not yet possible for the government to make a policy, it can also be done by providing outreach and education from the relevant agencies to the community regarding methods of waste management, starting with independent waste segregation in each house.
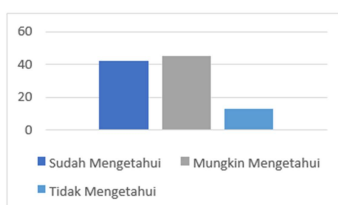

Figure 5. Community understanding of how to manage waste

The next aspect is the respondent's knowledge of good waste management. Most of the respondents already know how to properly dispose of waste. However, in practice, most people only dispose of their household waste in one place (except for scattered waste) (Fitriana, 2017). Waste must be treated according to its respective category. Basically, good waste management starts with simple actions. This activity consists of separating organic and inorganic waste (Widiyaningrum, Lisdiana, and Purwantoyo, 2018). Almost the same as Setiadi's theory (2018) that almost all households in Bantul Province separate household waste into three types. The first is plastic, the second is paper, and the third is other organic waste. Sorted waste is sorted. Plastic waste is sent to industries that process plastic waste. The separated waste paper is also sent to the paper industry, and the organic waste is composted. This

application is very good considering not only the amount of waste piles that can be reduced, but also the principle of recycling or recycling can be applied indirectly in the processing.

Table 1. Availability of the use of technology in waste disposal

Question	Ammount
Separate manual waste bins (organic, inorganic, B3)	19
Mixed manual waste bin	68
There is already a technology-based trash can	13

Table 1 describes the availability of technology utilization in waste disposal. As it turns out, indeed the majority of landfills in several regions of Indonesia still do not take advantage of developing technology. 13 respondents stated that at home or in their environment they had utilized technology in waste disposal such as IoT-based or smartphone-based smart trash cans. Such a situation is unfortunate because technological developments cannot be avoided from human life. According to Budiharto (2018) household waste consists of organic waste (garbage that can rot) such as vegetables, plants, food scraps) and inorganic waste (garbage that cannot decompose) such as plastic, glass bottles, cans and so on. So, a good trash bin is one that is separated according to its category.

CONCLUSION

Based on the survey results presented with pictures, we found that waste management is still inadequate in several regions in Indonesia. Actually, many people already know about waste sorting, but in reality they don't. Only 30% of the waste that is managed is segregated according to the type of waste, and the municipal waste segregation process is largely non-existent. This phenomenon also occurs due to the availability of landfill sites. At least 60% said they had a bin, but all types mixed in. Finally most of the waste is collected together until it reaches the TPA. The government also does not educate the public about proper waste management, only 49% do it.

Relevant authorities must ensure proper waste disposal by installing adequate trash cans in every corner of the city by utilizing the latest technology and educating the public to ensure that there is no waste from the community and no direct waste sorting in public places. Waste management is recommended. organic and inorganic waste. It would be even better if people at home could separate their waste by category and implement IoT in their household trash.

Almost the same as Setiadi's theory (2015) that almost every house in Bantul Regency sorts their household waste into three types. The first type is plastic, the second type is paper, and the third is other organic waste. Then, the separated waste will be distributed. Plastic waste is sent to industries that process plastic waste. Paper waste that has been sorted will also be sent to the paper processing industry, while organic waste will be processed into compost. Application in such a way is good enough, considering that not only can it reduce the volume of landfills, but with such a processing process it indirectly also applies the principle of recycle or recycling.

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