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Analysis of Understanding and Attitudes of the Muntilan District Community towards Cell Phone Waste

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Abstract - *One of the wastes that includes hazardous and toxic waste is electronic waste. Electronic waste such as phone waste is classified as hazardous and toxic waste based on Government Regulation of the Republic of Indonesia No. 101 of 2014. The number of cellular phone uses in Indonesia is increasing every year, the increasing number of cellular phone users in Indonesia has an impact on the amount of cellular phone waste that if not accompanied by the treatment of cellular phone waste as hazardous and toxic waste will harm the environment. This research aims to determine the understanding of the people of Muntilan District towards electronic waste (cell phone) and to determine the attitude of the people of Muntilan District towards unused cell phones. This research uses descriptive methods with quantitative and qualitative analysis. The data used in the study consists of primary and secondary data, where primary data is obtained through structured interviews. The data obtained from this study are people in Muntilan District are quite familiar with hazardous and toxic waste but most of them did not recognize that cell phone wastes are included in the category of hazardous and toxic waste. The community's attitudes towards unused cellular phones are to keep the phone.*

Keywords *– cell phones, electronics, hazard, toxic, waste*
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1. Introduction

Hazardous and Toxic Materials are substances, energy, and/or other components which due to their nature, concentration and/or amount, either directly or indirectly, can pollute and/or damage the environment, and/or endanger the environment. life, health and survival of humans and other living things (Fajriyah and Wardhani, 2020). A waste is classified as a hazardous and toxic material if it has certain properties, including explosive, easily oxidized, flammable, contains poison, is corrosive, causes irritation, or causes health symptoms such as carcinogenic, mutagenic, and others. Based on the source, B3 waste is divided into 3 types. First, hazardous waste from unspecified sources. This waste does not come from the main process, but from equipment maintenance activities, corrosion inhibitors, scale dissolution, washing, packaging and others. Second, B3 waste from specific sources. This waste comes from an industrial process (main activity). Third, B3 waste from other sources. This waste comes from unexpected sources, such as expired products, leftover packaging, spills, and product waste that does not meet specifications.

One of the wastes including hazardous and toxic waste is electronic waste. Electronic waste is classified as hazardous and toxic waste according to PP RI No. 101 of 2014 Article 1, namely substances, energy, and/or other components which due to their nature, concentration, and/or amount, either directly or indirectly, can pollute and/or damage the environment, and/or endanger the environment, health, as well as the survival of humans and other living things. E-waste increases three times faster than other general waste. The handling of electronic waste in Indonesia still does not have special regulations, even though electronic waste that is disposed of carelessly will endanger the environment and the health of living things in the vicinity (Anandita and Trihadiningrum, 2020). Most of the components in electronic waste can indeed be recycled. However, only about 20 percent of the e-waste in the world has been successfully recycled. The rest is burned, stockpiled or some is dumped into water areas, such as into rivers or oceans. This is the problem. On the other hand, with the development of electronic products, the service life will be shorter (Yoga et al., 2020). The rapid turnover of electronic

goods has resulted in an increase in the growth rate of electronic waste (e-waste). It is feared that the materials contained in electronic waste will further interfere with human health, because these materials can damage body tissues. In addition, these materials also affect environmental damage (Nahor, 2019). Data released by the United Nations University together with the International Telecommunication Union (ITU) and the International Solid Waste Association (ISWA) in their research, The Global E-waste Monitor 2017 Quantities, Flows, and Resources, states that the electronic waste generated by the Indonesian population is estimated at 1,274 million. tons or an average of 4.9 kilograms per capita throughout 2016. The study also states that the world community produced 44.7 million tons or an average of 6.1 kilograms per person in 2016. This number is calculated to increase to 52.2 million tons in 2016. 2021

One example of electronic waste is cell phone waste. All electronic goods have a certain life span. Electronic goods that have lost their functional value will become electronic waste that must be managed (Adi and Trihadiningrum, 2020). In one cell phone waste, there are components that contain various metals, therefore cellphone waste cannot be equated with ordinary waste (Rofika and Rachmanto, 2018). Some of the materials contained in cellphone waste are mercury, lead, cadmium, arsenic, beryllium and various other materials that can release dioxins and furans when burned (Martin, 2014).

In Indonesia, most people already have cell phones, with the highest users being in the range of 20-29 years. The number of cell phone usage in Indonesia is increasing every year, and Indonesia is one of the largest consumers of electronic equipment in Asia (Astuti and Rufiyanto, 2017). This increase in the amount of waste is based on the high level of public consumptive use of electronic devices / gadgets and the high tendency to change the latest models, where now almost every individual has one to two cellular phones and one folding computer / laptop (Kumaladewi, 2020). The increasing number of cellular phone users in Indonesia has an impact on the amount of cellular phone waste which, if not accompanied by the treatment of cellular phone waste as hazardous and toxic waste, will harm the environment. Therefore, the writer in this article aims to determine the understanding of the people of Muntilan District towards electronic waste (cell phone) and to determine the attitude of the people of Muntilan District towards unused cell phones.

2. Materials and Methods

2.1. Research Location

This research was conducted in Muntilan District, Magelang Regency, Central Java. This research was conducted from November 6 to November 14, 2021. Geographically, Muntilan District is located at 7° 34' 52" S / 110° 17' 34" E. Administratively, Muntilan District is located in several other sub-districts around it. There are Mungkid District on the Western and Sawangan Districts on the Northern. Meanwhile, there are several districts on the Eastern, namely Dukun, Srumbung and Salam Districts and on the Southern, there are 2 districts namely Borobudur and Nguwar Districts.

2.2. Method and Data Analysis

This research uses a descriptive method with quantitative and qualitative analysis. The data used in this study consisted of primary and secondary data. Primary data was obtained through structured interviews consisting of 14 questions. The interview consisted of 4 substance of the question materials in accordance with the research objectives, namely, the characteristics of the interviewee (5 questions), the interviewee's understanding of hazardous and toxic waste (2 questions), information regarding the use of cellphones in the community (3 questions) and the respondent's attitude towards unused cell phones (2 questions).). The interview was conducted to a 0.6% sample of people aged 20-29 years who live in Muntilan District, Magelang. Meanwhile, secondary data obtained through the results of previous research related to electronic waste (mobile phone) as hazardous and toxic waste.

3. Result and Discussion

3.1. Public Understanding Regarding Hazardous Waste

Hazardous and toxic waste are substances, energy, and/or other components that can pollute and/or damage the environment, and/or endanger the human environment, health, survival of humans and other living creatures, either directly or indirectly (Damayanti et al., 2021). Based on the Table 1, people in Muntilan District are quite familiar with hazardous and toxic waste. This can be seen from the results of structured interviews with 62 interviewees who stated that 72% of them knew what hazardous and toxic waste was. In addition, 52% of the informants also already know the types of hazardous and toxic waste. Types of hazardous and toxic waste, although in very small amounts or concentrations, they still contain toxic hazardous materials. This type of waste includes used batteries, used neon and light bulbs, paint packaging, cosmetics, electronic waste, or vehicle lubricants which generally contain ingredients that cause irritation or other health problems, for example metal mercury contained in batteries in general. Hazardous and toxic waste in the Temporary Disposal Site of waste or Final Disposal Site of waste is a threat to the environment. According to the US-AEP (United States Agency for Environment Protection), a mercury battery in six tons of waste exceeds the permissible mercury threshold in solid waste, and one gallon of used oil is enough to pollute a million gallons of water and form an oil film covering an area of 3.7 hectares (Putra et al., 2019).

Table 1. Public Understanding Regarding Hazardous Waste

No.	The knowledge of the people in Muntilan District about hazardous and toxic waste	Interviewees	
		Know	Doesn't Know
1.	People who know about hazardous and toxic waste	44 people	17 people
	Precentage (%)	*72%*	*28%*
2.	People who know about the types of hazardous and toxic waste	32 people	29 people
	Precentage (%)	*52%*	*48%*
3.	People who know that cell phone waste is included in the category of hazardous and toxic waste	30 people	31 people
	Precentage (%)	*49%*	*51%*

Table 2. Hazardous Content of Component Waste Produced

Component	Hazardous Element
LCD and Printed Circuit Board	Mercury (Hg) Copper (Pb) Beryllium (Be) Antimony (Sb) Tin (Sn)
Battery	Nickel-Metal hybrid (Ni-MH) Lithium ion (Li-On) Cadmium (Cd) Mercury (Hg)

Today's all-digital life has an impact on the increasing demand and use of electronic devices in society. One of them is a cell phone. Cellphones that are not used will become electronic waste. Electronic waste includes hazardous and toxic waste which has now become the world's main concern. Electronic waste contains hazardous substances such as lead, mercury, cadmium and other hazardous materials. Indonesia has a fairly large potential for electronic waste and it continues to grow every year (Syahputri and Waliyansyah, 2020). Cellphones are one of the electronic devices that has become an important need for everyone (Friansyah et al., 2021). As many as 49% of the interviewees knew that cellphone waste was one of the hazardous and toxic wastes and 51% did not know it. The increasing use of electronic goods resulted in the resulting electronic waste is also getting bigger. Garbage can be categorized as dangerous if it has one of the properties, such as flammable, corrosive, reactive, and toxic. Electronic waste has the characteristics of being hazardous and toxic. Therefore, e-waste management requires special management to avoid potential hazards to the environment and health. Some hazardous and toxic substances of which are carcinogenic can trigger cancer (Anjasmara et al., 2020).

3.2. Potential Hazards and Toxic Emerging from Cell Phone Waste

From table 2, it is known that many harmful substances are present in cell phones, which can persist in the environment, bioaccumulate through the food chain, and pose a risk that adversely affects human health and the environment. Mobile phone plastics, PWBs and batteries and hence the mobile phone as a whole, fall in the category of hazardous waste and can be a potential source of toxic metals in the environment, if dumped in open landfill sites (Yadav et al., 2014). A variety of metals are used in the PCB, components, frames, plates, screws, and other parts (Wu et al., 2008). Related to Singh et al. (2020), the content of Hg, Cr, Pb, Sb, and Br could pose a potential danger to the environment and human health in the developing countries if these plastics ended up open burning. Hg contributed the major risk for carcinogens and noncancer disease in the plastic of mobile phones while the contribution of Pb was also significant. In the case of eco-toxicity, total Cr posed the most significant risks in plastics.

3.3. The Use of Cellphones in the Muntilan District Community

The increasing need for the use of telecommunications technology in today's life is due to the use of telecommunications which is believed to help ease one's work. One of the telecommunications technology products currently contested by many manufacturers is cellphones (Hamidah and Anita, 2013). The human need for the use of cellphones on this time is very important, therefore almost everyone has a cellphone to maximize their work in communicating (Rahman et al., 2020). Most of the interviewees only have one cell phone currently in use, but there are 16% of the interviewees who use two cell phones. The reason for the resource persons who use two mobile phones is that there are several different needs, including for business purposes, lectures, storing files, and being used as wifi. Cellphones are not only to meet the need for communication, but increasingly modern developments today make many people want to use cellphones because of the many features and of course they can support their appearance when in the midst of society (Mokoagouw,

2016). The time that people use cellphones varies. Most people in Muntilan use their cellphones for 3-4 years. As many as 2% of people use their cellphones for less than 1 year, as many as 15% of people use their cellphones for 1-2 years, 49% of people use their cellphones for 3-4 years, and as many as 34% of people use cellphones for more than 4 years before switching to a new cell phone.

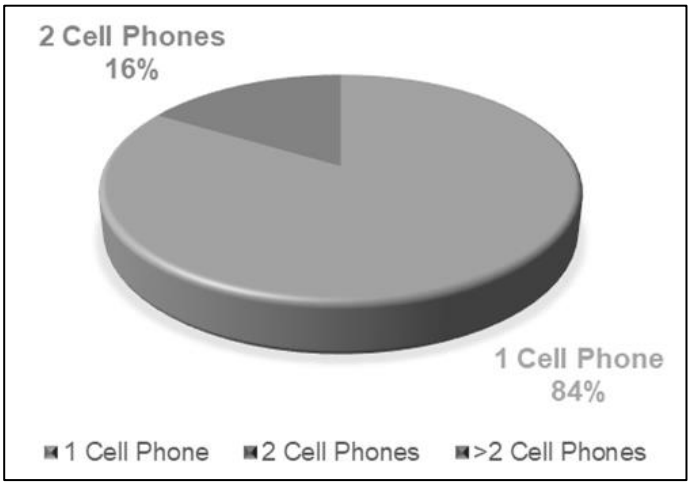

Figure 1. Diagram of the Number of Cellphones Used by the Community in Muntilan

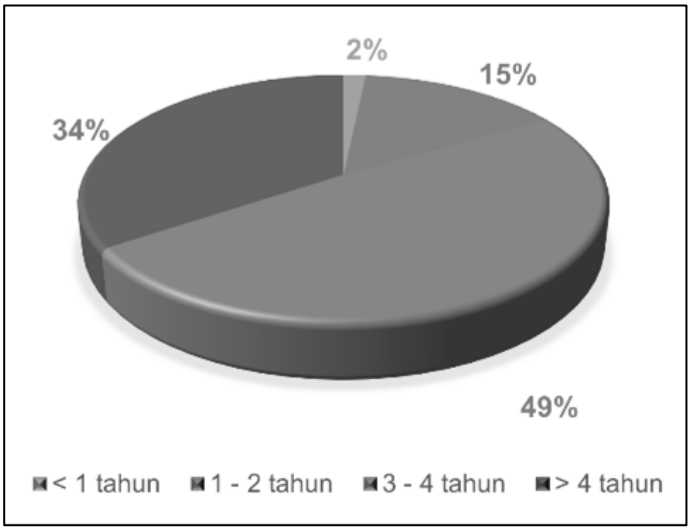

Figure 2. Diagram of the Period of Cell Phone Used by the Community in Muntilan

Most people replace their cellphones because they are damaged. In addition, there are also people who change cellphones because they want to follow the trend, upgrade to the latest version, want to get better specifications, full storage, and cellphones are not working properly. In its development, cellphones have also shown a symptom, namely the increasing number and variety of cellphone products offered by the company and the development of cellphone products that are getting faster. The rapid development of mobile phone products mainly lies in the shape, size and facilities. The longer the shape of the cellphone, the more attractive it is, the smaller the size and the more complete the usability facilities. This is also the reason people change cellphones. It is undeniable that in Indonesia there are more and more mobile phone users. Regardless of class, job, salary, etc. Just look around us, even scavengers now have cellphones. Without data, it can be seen roughly how much mobile phone penetration is in Indonesia. Indonesia was ranked sixth in the world for mobile phone users in 2011 (Ananda, 2013).

3.4. The Attitudes of the Community towards Unused Cell Phone

From the data on Figure 3 that has been conducted, it is known that respondents have various reasons for replacing their cellphones. The most dominating reason chosen by respondents, as much as 72%, was because their cell phone is broken. Another reason why respondents replace their cell phone is because they follow the trend and 23% of respondents chose for other reasons. The results of the interview shows that most of the respondents replaced their cellphones because the devices they were using were no longer compatible and did not work well.

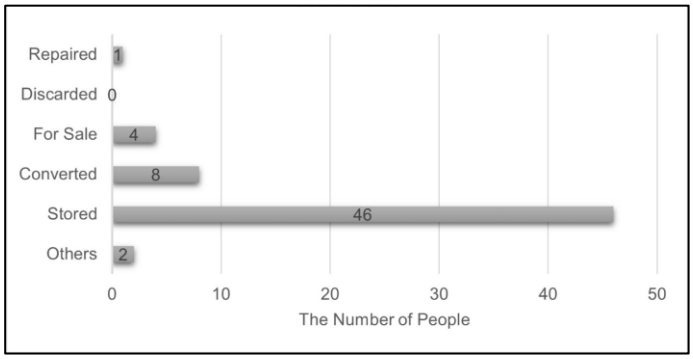

Figure 3. The Attitudes of the Community towards Unused Cell Phone

The survey was also conducted to find out how the attitudes chosen by the respondents towards cell phone were no longer used. The results showed that most of the respondents, as many as 46 people, tend to keep their unused cell phone. In addition, as many as 8 people choose to use their unused cell phone for other purposes, for example to be used as modems, for doing business, and so on. Several other respondents choose a different attitude towards unused cell phone, including 4 people choose to resell their cell phone, 1 person choose to repair their cell phone, and 2 more people for other reasons. As known from the interviews, there were no respondents who disposed of their unused cell phone into the environment openly. This attitude needs to be considered and the community must continue to be educated so that they never throw away unused cell phone into the environment considering that there are many negative impacts that can be caused. In this case, most people in Muntilan District made the right decision by not throwing away their unused cell phone.

4. Conclusion

People in Muntilan District are quite familiar with hazardous and toxic waste but most of them did not recognize that cell phone wastes are included in the category of hazardous and toxic waste. It can be seen that 51% people has not understood yet. The attitude made by the people of Muntilan District towards cellular phones that have not been used is mostly choosing to keep the phone. In addition to being stored, there are some people who choose to switch unused cellular phones for other purposes, such as for modems, for business, and so on. Another attitude of some Muntilan district communities towards unused cellular phones is that some choose to resell, repair mobile phones, and others.

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