

# **BINUS INTERNATIONAL UNIVERSITY**

FACULTY OF COMPUTER SCIENCE

PROGRAM METHOD DESIGNS

CASE STUDY RESEARCH ASSIGNMENT

## **DANGER OF E-WASTE FROM LACK OF MANAGEMENT**

GREEN COMPUTING

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## Background

The environment is where we live as a human. Every human being expects a clean and comfortable environment to live in. However, judging from the environment in which we live today, it seems that we are familiar with the various damages that arise as a result of human activity itself. If this continues to happen, it is certain that our environment will be destroyed. This is certainly not what every human being wants, and fortunately some of us create movements to improve the existing environment. One of these activities is "green computing", considering that one of the impacts of environmental damage is waste from the production of technological goods. In this case, one of the topics that we will discuss is about "end of life management: e-waste and recycling. There are several explanations that will be explain later, such as background, problems, and others.

Firstly, let's discuss about the background of e-waste and recycling. Human growth and development is unavoidable. This is a natural thing, where human beings are destined to grow and develop in their lives. This also does not rule out the possibility of the Indonesian people, where it is known that Indonesia is the 4th in the world with the largest population. The more population in a country, of course, indirectly leads to an increase in population activity. This causes the emergence of more existing problems such as population density. With a dense population and activities carried out will lead to an increase in the amount of existing waste. This is due to the increasing human needs, especially electronic needs that cannot be separated from society. Garbage resulting from damaged or used electronic goods will become waste that we know as Electronic Waste (E-Waste).

The world today is living in harmony with technology and electronics. This is what causes the amount of Electronic Waste (E-Waste) not only in Indonesia, but throughout the world. Electronic Waste (E-Waste) has a very dangerous impact on the environment

and if there is no solution or movement to reduce it, then the environment in which humans live will be increasingly destroyed. The buildup of Electronic Waste (E-Waste) is very fast considering the high public consumption of electronic goods. Some examples of electronic goods that have become mandatory to buy are household electronic equipment, such as water pumps (jet pumps), air conditioners, TVs, refrigerators, and many more. Generally, these household electronic devices have an active product period and do not last forever. When this electronic device product is no longer active, it will become garbage that accumulates. One of the efforts that have been tried is to carry out a process that we call the recycling process.

Goods whose active period is no longer valid, in order to be recycled, a disassembly process must be carried out or disassembly of goods into separate materials. This process aims to separate hazardous components and retrieve parts that can be recycled later. Related to this, it is necessary to do research to determine the order of disassembly that makes it easier for used goods collectors and recycling business owners in the disassembly process, as well as to get a fast and efficient unloading time.

## **Problem**

Due to the more used of technology, e-waste is starting to increase. According to the United Nations University's Global e-waste monitor, 50 million metric tons of electronic products are discarded every year. E-waste usually are electronics that are already used, worn off, or broken. It's dangerous to the environment and people since it contains dangerous materials like mercury, lead, beryllium and many other. This waste should be disposed wisely. If not, it will cause various problems.

The problems caused by wastes can be contamination and can be dangerous to human health. During dismantling the e-waste, the dust particles can spread into the air. This dust can also cause chronic diseases and cancers not only giving health risk to humans but also animals. Not only air, if the e-wastes were dumped illegally it can cause the soil to contaminate and affect the crops which is what we eat later on, It can cause illness. This waste contains toxic materials which can cause many negative health problems like brain, heart, liver, kidney and skeletal damage.

## Short Literature Review

**Public Awareness, Laws & Regulation of e-waste.** Currently, there is not much effort and concern given by the government about the threat of data privacy and security. Most of the public is still unaware of such potential danger, despite often interacting with computer devices in this modern era. Even if the data is deleted, it can still be recovered, which is why e-waste is precisely such a good target to collect intelligence and sensitive information. This is proven by: “means that the E-waste data constitutes a soft target to obtain sensitive information by unauthorized person(s) to gain political and economical advantage.” Alghazo, J., Ouda, O., & Elhassan, A. (2018). Of course, there is software which makes data recovery nearly impossible. However, the safest method is always to physically destroy it, but then the topic of our concern is e-waste management, so that's off the list. Civilians are most likely to be unwilling to hand over their old or unused computers, should be due to lack of trust. Which is why the government should enact laws that safeguards the privacy and security rights of every citizen.

**Massive Quantity of Hazardous e-waste.** According to the expert's point of view, which states that 19% of e-waste is recycled and 81% is disposed of on land. Bhutta, M.

K. S., Omar, A., & Yang, X. (2011). This shows that e-waste has accumulated on land and has the potential to pollute the environment. A study conducted by Dejo Olowu on the impact of the e-commerce movement waste as a toxic and dangerous material for developing countries stated that although e-waste is one of the many other hazardous wastes, it is necessary efforts are made to reduce the dangers of e-waste. From this it can be concluded that we must immediately make great efforts in overcoming this e-waste, both in the recycling process, and other activities in order to maintain the balance of the environmental ecosystem.

**Side-effects of e-waste.** According to experts, e-waste contains harmful substances including lead, mercury. This can cause many problems to the human health and to children in young ages. Johnson, C. (2021). When they are growing, they can potentially get increased rates of attention deficit / hyperactivity disorders, behavioural problems, sensory integrations. These problems can be caused by e-waste spread within air and soil. In air which the human breathes in and in the soil where it goes near the farm into the crops that we usually eat. In this case E-waste can cause harmful damage to human health.

## **Findings & Discussions**

### **Security and Privacy**

According to the data in the article titled "E-waste environmental and information security threat: GCC countries' vulnerabilities," despite e-waste possibly being more manageable, it is easier said than done, as according to the forecast model presented in the research, even in the best scenario, the amount of e-waste produced per year will continue to increase year by year, up to the year 2040, reaching about a thousand tons, as it's also affected by another factor, population growth. This means that governments

must be adaptable and periodically change their policies and methods regarding the management of e-waste. Considering both the danger and value of metals found in devices, it's something worth investing in if a part can be reused after recycling. Even in countries where privacy and security awareness are high, there also seems to be a huge lack of trust due to concerns about handing over personal devices to others, based on a study conducted by Haung et al. (2009).

### **Reducing Waste**

According to green.harvard.edu titled 6 ways to minimize your e-waste, we can learn various way to reduce the usage of E-waste. There are 6 ways which are Re-evaluate which means that we need to re-evaluate when buying electronics if we really need them or not. We can also extend the life of electronics by cleaning them and reduce overcharge of battery. We can also buy eco-friendly electronics which are certified and donate used electronics to other people who need it. By reducing the usage of electronics it automatically reduce E-waste produced when being destroyed

### **Effects on Health**

According to the article from World Health Organization (WHO) titled "Soaring e-waste affects the health of millions of children, WHO warns", There are as many as 12.9 million women are working in the informal waste sector, and there are 18 million children and adolescents, some as young as 5 years of age, that are actively engaged in the informal industrial sector, which waste processing is a sub-sector. For an expectant mother, exposure to toxic e-waste can affect the health and development of her unborn child for the rest of its life. E-waste volumes are surging globally, it grew by 21% in the five years up to 2019, and Only 17.4% of e-waste produced in 2019 reached formal management or recycling facilities.

## **Conclusions**

We live in a world where technology evolve exponentially, but this is also what is responsible for the amount of Electronic Waste (E-Waste). With only a small percentage of Electronic Waste (E-Waste) that are recycled properly, there's still a large percentage of Electronic Waste (E-Waste) that is either goes to landfills or disposed improperly.

Most electronic waste (E-Waste) contains toxic materials that mostly comes face-to-face with people of all ages and physical condition as they are left in stagnant rather than being disposed or recycled. There are some reasons, such as inefficient management of e-waste as well as the lack of options to recycle and dispose of certain e-waste. One major reasons is the lack of trust due to handing personal devices which may cause personal information leakage. Improper disposal of electronic products can not only cause negative impact on health but also the environment.

In conclusion, we generate large amount of Electronic waste (E-Waste) than what we can recycle properly. At the rate at which e-waste is being produced and its recycling rate, we're basically harming ourselves more than the benefits provided by electronic devices for us. while innovation in recycling industries is a good thing, it is also important to reduce generation of Electronic Waste (E-Waste); be it from increasing its recyclability or eco-friendly to be disposed of.

## **Recommendations**

The government should establish a regulation for enterprises to be motivated to carry out proper standardized procedures for the disposal and recycling of e-waste for the benefits of the economy, environment, and security. Incentives of sufficient value

should also be given to civilians to recycle their old computers; otherwise, storing them personally seems to be the better choice. Advertising and campaigns are also great options to spread awareness and build trust with the people, something important to take note of. Recycled materials are a saving, which, after all, will help reduce expenses.

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