ASSIGNMENT 1 FRONT SHEET

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I. Introduction.

I.1 Introduction purpose of research

Currently, technology is rapidly advancing, and technological issues are constantly evolving. Living in the 4.0 technology era requires us to learn and learn about the current problems associated with technological development. We will be able to see a huge problem in this 4.0 era that is e-waste in this study. Please read this research article to learn more about e-waste, the problems it causes, and the benefits it has on our lives.

I.2 Project research scope and objectives

Research Scope:

Because technology is constantly evolving in response to human needs, a plethora of technological products will be developed. Furthermore, the use of technology is expanding into any type of service or even factories with some technology such as Batteries, TVs, PCs, Laptops, etc. With the introduction of numerous new technological items, ewaste is rapidly increasing and has become a public health concern in many countries. This study will demonstrate the status of e-waste, the dangers of e-waste, and the effects of e-waste.

We investigate the e-waste influence to our live, hence our target audience is university students. Here we gather information regarding e-waste by come to ask students from 4 universities surrounding Hanoi. After asking questions regarding e-waste and its effects, we surveyed 20 participants, interviewed a user, and watched several videos about e-waste effects to gain information about their e-waste knowledge. The obtained data will be rigorously examined before drawing judgments regarding the impact of e-waste.

Research objectives:

We undertake research on what constitutes e-waste, who it impacts, and how it affects them. Our goal is to determine the definition of e-waste as well as the items that e-waste can affect. Then we want to know if e-waste will have an impact on HCM City and why:

- The following are some highlights from the report:
- The definition of e-waste.
- E-waste has the potential to harm both human health and the environment.
- E-waste has advantages in that it helps small manufacturers develop.
- E-waste can have an impact on the city of HCM.
- E-waste must be recycled or reused.

II Literature Review

1. What is E-waste?

Definition: E-waste is unwanted electronic items that are no longer functional and are nearing or have reached the end of their "useful life." Everyday electrical items include computers, televisions, VCRs, stereos, copiers, and fax machines. The issue of how to properly dispose of used and unwanted electronics is not a new one, dating back at least to the 1970s. But a lot has changed since then, particularly the number of gadgets wasted. Another thing we have today is a word for this problem. After numerous titles were proposed, including "Digital garbage," a consensus developed around the simple term "e-waste." (ewaste1, 2022) Types of E-waste:

- Home Appliances
- Communications and Information Technology Devices
- Home Entertainment Devices
- Electronic Utilities
- Office and Medical Equipment

2. How has E-waste impacted?

- The effect of e-waste to environment:

Modern gadgets are safe to use and be around above ground. Most gadgets, on the other hand, include toxic compounds such as beryllium, cadmium, mercury, and lead, which pose major environmental dangers to our soil, water, air, and wildlife. When e-waste is dumped in a landfill, minuscule traces of it can dissolve into the foul sludge that permeates the landfill. These remnants of harmful compounds eventually settle into the ground beneath the landfill. This is referred to as leaching. The more E-waste and metals disposed of at a landfill, the more these trace harmful chemicals end up in groundwater. The issue is that there is so much E-waste that trace amounts have increased over time. The unsafe water beneath the waste does not stop there. It flows into groundwater and the sources of all freshwater in the surrounding area. This is not only harmful to people utilizing a natural well, but it also harms adjacent species. As a result of the high concentration of these minerals, animals become ill from lead, arsenic, cadmium, and other metal poisonings. This is not simply a problem for E-waste at landfills, but it is also a side consequence of mining for new metal supplies. Having an environmentally beneficial source of recycled metal is preferable to a corporation digging up new ore sources. When you recycle old gadgets, you are avoiding harmful metals from leaking into your groundwater. But you're also stopping it from happening at another mine. E-waste is hazardous, non-biodegradable, and accumulates in the environment, including soil, air, water, and live organisms.

Toxic elements leach into the environment when open-air burning and acid baths are used to recover precious materials from electronic components, for example. These procedures can also expose employees to high quantities of toxins like lead, mercury, beryllium, thallium, cadmium, and arsenic, as well as brominated flame retardants (BFRs) and polychlorinated biphenyls, which can cause cancers, miscarriages, neurological damage, and lower IQs. It is also worthwhile to evaluate the impact of electronic goods on climate change. Every device ever manufactured has a carbon footprint that contributes to man-made global warming. A tonne of laptops is manufactured, and potentially 10 tons of CO2 is emitted. When the carbon dioxide released across the lifetime of a gadget is evaluated, it occurs primarily during production, before consumers purchase a product. As a result, reduced carbon production processes and inputs (such as the use of recycled raw materials) and product lifetime become critical determinants of overall environmental effect.

- E-waste in Vietnam and the endanger of E-waste in Vietnam:

June 26, 2015, much of the world's electronic garbage ends up in Vietnam, including not only cellphones, computers, printers, and televisions, but also items that many people do not consider when thinking about e-waste, such as washing machines, microwaves, and fans. This garbage is frequently burned or disposed of in landfills, where toxicants such as arsenic, mercury, lead, and cadmium are discharged into the atmosphere or seep into groundwater. Perhaps most worrying, domestic e-waste in Vietnam is increasing by roughly 25% per year, with up to 113,000 metric tons (124,500 tons) dumped this year. According to the Global E-Waste Statistics Report, Vietnam imports or manufactures 524,000 tons of EEE (Electrical & Electronics Equipment) on a yearly basis and generates 257,000 tons of E-waste. Despite the fact that Vietnam now has one of the lowest E-waste creation rates per capital in the area, 2.7kg per capital compared to Japan's 20.4kg, E-waste volume has surged by 50% between 2015 and 2019. Vietnam is one of the world's fastest developing economies. Vietnam has moved from being one of the world's poorest countries to a lower middle-income country in the twenty-first century, with an annual average GDP growth rate of 6.5%. With a population of about 100 million people and rapid economic expansion, Vietnam is experiencing a severe influence on its environment and quality of life. According to the Global E-Waste Statistics Report, Vietnam imports or manufactures 524 000 tons of EEE (Electrical & Electronics Equipment) on a yearly basis and generates 257 000 tons of E-waste. Despite the fact that Vietnam now has one of the lowest E-waste creation rates per capital in the area, 2.7kg per capital compared to Japan's 20.4kg, E-waste volume has surged by 50% between 2015 and 2019. E-waste recycling in Vietnam is now primarily handled by the informal sector (waste buyers, junk shops, dismantler villages). Some hazardous E-waste is handled in the official stream but is inefficiently managed. E-waste is expanding year after year, and today 20% of the rubbish is kept at home or in the second-hand market. A Vietnamese corporation with many ecosystems, ranging from distributing FMCG, industrial machines and engines,

automobiles, fashion, producing and trading veterinary drugs, to developing real estate projects, has been encouraged by the Vietnamese government's initiatives and is interested in investing in improving the environment in Vietnam. They intend to expand their operations to include E-Waste Recycling (Nguyen, 2022).

3. What e-waste can do to the HCM city environment and how to reduce it?

- E-waste can do to affect the HCM city environment:

VNA - HCM CITY Because of the large quantities wasted every day and limited collection and treatment, electronic waste levels in HCM City have reached alarming proportions, ranging from old and damaged television sets to computers, tablets, and mobile phones (VNA, 2015).

According to a recent study by the HCM City Environmental and Tropical Technique Institute, obsolete TV sets have created approximately 4,062 tons, mobile phones have produced 81 tons, and laptops have produced 1,800 tons since 2011. Households, offices, schools, hotels, factories, distributors, repairers, and even illicit imports generate electronic garbage. The city is expected to create approximately 11,000 tons per year by 2020. According to the publication Sai Gon Giai Phong (Liberated Saigon), Dr. Tran Minh Tri of the institute, HCM City is the country's largest economic hub, and "along with development, electronic trash would expand dramatically". "However, electronic garbage collection and treatment in the city is restricted, and this type of waste can impair people's health and the ozone layer". Electronic waste management is managed not by particular legislation but by rules governing solid and hazardous wastes; manufacturers and distributors do not participate, and the majority of treatment plants are tiny and unregistered. "Local administrations have not paid enough attention to electronic trash treatment, and the majority of it is classified as domestic waste," Tri cautioned. HCM City's recycling rates are low. Even in the EU, which is the world leader in e-waste recycling, only 35% of e-waste is officially recognized as collected and recycled. The global average is 20%; the remaining 80% is undocumented, with much of it buried for millennia as trash. Electronic garbage is not biodegradable. The global electronic sector suffers from a shortage of recycling, and as gadgets become more numerous, smaller, and more complex, the problem worsens. Recycling some types of e-waste and recovering materials and metals is currently an expensive procedure. The remaining bulk of e-waste, primarily plastics laced with metals and chemicals, presents a more difficult challenge (genevaenvironmentnetwork, 2022).

- An example of programs to reduce e-waste in HCM city:

MM Mega Market An Phu in Thu Duc City's An Phu Ward, the People's Committee of Ward 17 at 22 Nguyen Van Troi Street in Phu Nhuan District, and the People's Committee of Ward 9 at 82 Ba Huyen Thanh Quan Street in District 3 are the three new locations in Ho Chi Minh City. "In the past, computer repair shops often handed me damaged or

broken components, which I used to mix with household debris to be collected by garbage trucks," said Vu Mai Cuc, a 30-year-old resident of Ho Chi Minh City's Tan Phu District. "I know they contain poisonous components that are hazardous to human health," Cuc admitted, adding that she had little alternative but to keep larger ones, such as computer monitors, in her homes year after year. "It's now convenient for me because there are places that collect them for recycling." According to the United States Environmental Protection Agency, electronic garbage, or e-waste, accounts for only 2% of total solid waste but contains up to 70% of dangerous compounds such as lead and cadmium. Vietnam Recycles is a free electronic waste take-back and recycling initiative launched by electronic manufacturers to comply with a resolution issued by the Vietnamese Prime Minister in 2015 on the retrieval and disposal of rejected devices (Anh, 2022).

- HCM City is a really large city in Vietnam but in a lot of reports, I can't find any numbers on the e-waste problem. If I could find one of the reports that numbered about e-waste, it did not have enough information to do the research. After all reports I have read and have gathered, I make a point that the HCM city is really in the alarm of the e-waste problem. Because of the large quantities wasted every day and limited collection and treatment, electronic waste levels in HCM City have reached alarming proportions, ranging from old and damaged television sets to computers, tablets, and mobile phones. For that, we need to act and do something more than just standing still to reduce and also recover the environment of the HCM city.

4. Review research methodologies

1.Definition:

1.1 Interview:

An interview is a qualitative research approach that collects data by asking questions. Interviews are conducted by two or more people, one of whom is the interviewer who asks the questions. There are various sorts of interviews, which are often distinguished by their level of structure. Predetermined questions are asked in a predetermined order during structured interviews. Semi-structured interviews are more free-flowing than unstructured interviews. In market research, social science research, and ethnographic research, interviews are frequently employed (George, 2022).

- Type of interview:
    - Structured interviews have predefined questions that are asked in a specific order. They are frequently closed-ended, with binary (yes/no) or multiple-choice questions. Although open-ended

structured interviews exist, they are uncommon. Structured interviews are primarily a quantitative tool due to the types of questions answered.

- Semi-structured interviews combine organized and unstructured questions. While the interviewer has a rough idea of what questions they want to ask, the questions do not have to be phrased or ordered in any particular way.
- The most adaptable sort of interview is the unstructured interview. The questions and their order are not predetermined. Instead, based on the participant's past responses, the interview can proceed more naturally.
- A focus group brings together a group of people to answer questions about a certain topic in a moderated setting. Focus groups are qualitative in nature, and they frequently examine the group dynamic and body language in addition to their responses. Responses can help shape future study on consumer goods and services, human behavior, and contentious issues.

1.2 Survey*:*

Survey research is described as the process of doing research through sending surveys to survey respondents. The survey data is then statistically evaluated to obtain significant study results. Every corporation in the twenty-first century wants to know what their customers think about their products or services so that they may make better business decisions. Researchers can do research in a variety of ways, but surveys have been shown to be one of the most productive and reliable research tools. An online survey is a means of gathering information regarding a key business matter from a single person or a group of people. It is made up of organized survey questions that encourage people to reply. Credible survey research can provide these businesses with access to a big data bank. Survey research is used by media organizations, other businesses, and even governments to gather accurate data. Survey research is often defined as a quantitative approach of gathering information from a group of respondents by asking many survey questions. Individual recruitment, data collection, and analysis are all part of this research type. It can help researchers communicate new features or trends to their respondents. In general, it is the first step in gathering quick information about popular topics, after which more rigorous and extensive quantitative research methods such as surveys/polls or qualitative research methods such as focus groups/on-call interviews can be conducted. There are numerous scenarios in which researchers can conduct study utilizing a combination of qualitative and quantitative methods (questionpro, 2021).

- Type of survey:
    - Online/ Email ○ Phone

- Face-to-face

1.3 Observation

Observational research is a study technique that involves observing participants and occurrences in their natural environments. This allows researchers to see their subjects making decisions and responding to circumstances in their natural environment, as opposed to structured settings such as research labs or focus groups (Delve, 2022).

- Type of observation
  - Naturalistic observation takes place immediately in the setting where the phenomenon occurs. The observations are made as inconspicuously as possible, with the researcher avoiding direct interaction with the subjects.
  - Researchers actively participate in the study through participant observation. A researcher may conduct interviews, take notes, examine documents, and take photographs in addition to watching behavior.
  - Structured observation involves researchers observing in a lab or simulated environment rather than in the field. A structured observation is intended to capture a specific, constrained set of behaviors. This strategy is less natural, but it allows for fewer variables to be present.

To demonstrate e-waste and its effects on our lives and the environment around us. We will undertake interviews, surveys, and observations to show the issues around e-waste and what it may do to our lives and the environment. These interview, survey, and observation questions will draw 20 participants from four Hanoi universities. Hopefully, the results will demonstrate people's understanding of e-waste and its consequences.

In interview:

We will meet at one of the four universities in Hanoi mentioned above and select one of the 20 participants with the most expertise on e-waste. After selecting one, we will show the e-waste problem to that person and schedule an interview with that person on the day we are available. When we started our interview, the most crucial thing was to be prepared with e-waste information and e-waste questions. After we've developed 16 questions about ewaste, we'll begin to draw conclusions based on all of that person's responses.

In survey:

We must construct a Google Form with questions and options for each question. When we send out a request for

20 volunteers, we will blend single and multiple-choice alternatives. These 20 individuals were chosen through classes at four universities where they learned about technology. Following the creation and distribution of all questions, we will convert all answers to percentages and begin to use the data we have to get a finding result.

In observation:

Because of the difficulty in traveling, we will do our investigation using videos that provide accurate information and scientific data. That will be three linked videos of 5 minutes or more each talking about e-waste and drawing some conclusions. We would put down the primary topic in the video so that the reader could read about what the people in the video were talking about. After writing those down, we will come to a conclusion about the impact of e-waste for each video, which we will then use for our final step, which is finding results.

5. Hypothesizes

- Health concerns may come from direct contact with harmful compounds that leach from e-waste. Minerals such as lead, cadmium, chromium, brominated flame retardants, and polychlorinated biphenyls are examples.

- Danger can arise from inhaling hazardous vapors as well as chemical accumulation in soil, water, and food in the HCM city area, this endangers land and sea wildlife. The risks are especially severe in the HCM city because some factories send their e-waste into the environment where those creatures live in like sea, river, lake or burry in land.

- E-waste causes a lot of problems in HCM, but it also helps emerging enterprises evolve. E-waste from other large corporations all over the world is extremely inexpensive for manufacturers in HCM City to purchase and recycle. As a result, those companies will have to spend less money on supplies and research because we will only be working with E-waste from other companies.

III. Research implementation

1. Conducting Interview, Survey, Observation and their results

I prefer using interviews. Because of these advantages:

- The interview receives a higher response rate than postal questions, and persons who cannot read or write can also respond.
- The interviewer can assess the respondent's nonverbal conduct.

- Unlike emails, which can have an entirely different setting, the interviewer can choose a secluded and silent location for the interview.
- As with a questionnaire, the interviewer has control over the order of the questions and can assess the respondent's spontaneity.

I prefer using survey. Because of these advantages:

- It is relatively simple to administer.
- Can be created in less time (compared to other data-collection methods).
- Cost-effective, but costs vary according to survey style.
- Remote administration is possible via online, mobile devices, mail, email, kiosk, or phone.
- Remote operations can minimize or eliminate geographical dependence.
- Capable of gathering information from a huge number of respondents.
- Numerous questions regarding a subject can be asked, providing significant flexibility in data processing.
- Advanced statistical approaches, such as the capacity to examine many variables, can be used with survey software to analyze survey data to establish validity, reliability, and statistical significance.
- A wide range of data can be gathered (e.g., attitudes, opinions, beliefs, values, behavior, factual).
- Several sorts of errors are rare in standardized surveys.

I prefer using observation. Because of these advantages:

- Easiest method
- Natural surrounding
- High accuracy
- Appropriate tool
- Less cooperation of the respondent is needed

Questions for the research:

Interview:

1. What do you know about E-waste and what E-waste contain?
2. What do you think about E-waste can do to our health?
3. What disease does E-waste cause in HCM city?

4. How can E-waste cause respiratory disease?
5. Which kind of toxic materials E-waste have cause disease?
6. Where do factories throw their E-waste to?
7. How much E-waste was thrown to the environment per month in HCM city?
8. What flora and fauna species are in danger, and why?
9. How lakes, rivers, seas and jungles are polluted?
10. How can you know they are polluted?
11. Do E-waste have any advantages? Why?
12. How do you feel when there are some peoples said that E-waste helps small companies develop?
13. How can it help small factories develop?
14. Why they can help small factories in financial?
15. How can E-waste help small factories with their products?
16. How can E-waste help small factories have more fame?

Survey:

Do you know about E-waste and the E-waste problem in HCM city?

- ◯ Yes
- ◯ No

Which you think that E-waste can affected to in HCM city?

- ☐ Affect health
- ☐ Affect wildlife
- ☐ Affect small factories
- ☐ Nothing

What E-waste contain?

- ◯ Fresh air
- ◯ Lead, cadmium, chromium, brominated flame retardants, polychlorinated biphenyls, ...
- ◯ Healthy materials

Which disease does E-waste cause?

- ☐ Cancer, skin disease, damage to eyes, brain, kidney, liver... even death because of mercury, lead, arsenic, barium... in groundwater
- ☐ Respiratory disease, lung and liver damage, cancer... because of hydrocarbon
- ☐ None

How can people get disease by E-waste

- ☐ E-waste toxic materials in food
- ☐ E-waste toxic materials goes into solid and groundwater
- ☐ Breath smoke from E-waste on fire

Where do factories throw their E-waste?

- [ ] Land
- [ ] Sea
- [ ] Nowhere

How much E-waste throw out to the HCM city per month?

- [ ] None
- [ ] 1kg
- [ ] 10kg
- [ ] 1tones

What E-waste cause to wildlife?

- [ ] Water polluted
- [ ] Soiled solid
- [ ] Make environment better than it used to

Which kind of animals that E-waste affect

- [ ] Fish and Invertebrates
- [ ] Amphibians and Reptiles
- [ ] Birds and Mammals

Do E-waste have any advantages?

- ◯ Yes
- ◯ No

Why E-waste can help small factories to develop?

- ☐ Cost less money to spend on materials
- ☐ Have a base machine to copy
- ☐ Don't have to do many research
- ☐ Help small factories have more fame

Why E-waste can reduce expend for small factories

- ☐ Don't have to import raw materials
- ☐ Cheaper than buy materials from other companies
- ☐ Don't have to spend money on research for new product

Which materials from E-waste can help small factories

- ◯ Fe, Cu, Al, Ag, Au, Pd, and Plastic
- ◯ O2, Co2
- ◯ None

How can E-waste help small factories make their products?

- ☐ E-waste can have needed materials to make products
- ☐ E-waste can be model for products
- ☐ E-waste can't do anything for small companies

Observation:

https://www.youtube.com/watch?v=iP-qsS6dE1o

The observation is aiming on the effect of e-waste for kid's health. There are some families which recycle e-waste to create new products and sell it for business but they don't know how toxic e-waste are and don't even know it could affect their children. Next, we go to a village of e-waste recycle and they use them as business, in 2015, there are 207/335 kids have lead contamination take 63.3% and include 33 kids have lead concentration more than 6-7 concentration than normal. Living near e-waste could decreased a lot of neuroimaging scores in infants, cause many kinds of disease about brain, lung, eye, organ, … Follow the WHO, there are 12.9 million women who work with ewaste can make them affect the poison from the e-waste toxic materials could cause dangerous disease for themselves and for their kids.

https://www.youtube.com/watch?v=vsARjUJNJvM

The observation talks about e-waste and the effect of e-waste to the environment. The IT is developing so strong so that e-waste continues to throw out to the environment with a huge number. But without plan to recycle, peoples keep throw it away to the environment with no plan. Each people in Vietnam have thrown to the environment 1.3kg/year which is 116 thousand tons of e-waste. E-waste takes 2% of total waste in Vietnam but even so, they really toxic if we don't use it anymore and throw it or burn it to recycle without any plan and could create dioxin or toxic materials. Some people have been choosing recycle it by bring to some companies to fix or recycle it by sell to factories. Government has created a law to prevent peoples from throw more e-waste and recycle or reduce it in a safe way.

(354) How 6 Million Pounds Of Electronic Waste Gets Recycled A Month | Big Business - YouTube

Electronic garbage is only recycled in 17% of cases. This is due to the fact that devices are not designed to be recycled. They include small, hazardous compounds that are difficult and expensive to degrade. However, if retrieved securely, such materials might be worth a lot of money to e-recyclers. The observation helps us see the work of engineers who decide to recycle and reuse e-waste like laptop, phone, TV, … They can make it but they have to be

really skillful because to reuse e-waste materials, they have to be careful not to break any of worthy materials. After a lot of difficult steps, they finally could have materials need or some can sell like gold, iron, and remove hazardous like lead, dioxin, … Result:

Interview:

https://drive.google.com/file/d/1SrVsR14mwMjE1we7tCISfxq4WqYfJyD0/view?usp=sharing

1. What do you know about E-waste and what E-waste contain?

E-waste is any electrical or electronic equipment that's been discarded. This includes working and broken items that are thrown in the garbage or donated to a charity reseller. Often, if the item goes unsold in the store, it will be thrown away. Computers, televisions, VCRs, stereos, copiers, and fax machines are everyday electronic products.

2. What do you think about E-waste can do to our health?

The negative health effects of these toxins on humans include brain, heart, liver, kidney and skeletal system damage. It can also considerably affect the nervous and reproductive systems of the human body, leading to disease and birth defects.

3. What disease does E-waste cause in HCM city?

Cancer, skin disease, respiratory disease damage to the eyes, brain, heart, liver, lung, kidney, and skeletal system. For examples like dioxin can make you have lung disease, it could burn your lung and make them white. Or when you contact with lead for too long, you could get cancer and the cancer still have no cured.

4. How can E-waste cause respiratory disease?

Because of hydrocarbon, it was coming from the smoke when factories burned them. When someone breath it in, they will catch the disease which have toxic materials inside like dioxin would make them hard to breath or even death.

5. Which kind of toxic materials E-waste have cause disease?

Copper, gold, lead, mercury, nickel, brominated flame retardants and polycyclic aromatic hydrocarbons (PAHs). Those can cause a lot of dangerous disease like lung disease and some disease could kill them right away when they contact to them.

6. Where do factories throw their E-waste to?

To the river, ocean, or burn it, burry it under the ground is the way factories throw their e-waste and sometime, the e-waste maybe right next to you like old air condition, fridge, fan, …

7. How much E-waste was thrown to the environment per month in HCM city?

I remember when I heard a news about e-waste, there is a report that every single person in Vietnam throw out 13kg of e-waste per month so in the HCM city, I guess it must to be 10tones per month.

8. What flora and fauna species are in danger, and why?

Fish, amphibians, reptiles, bird, mammals. As you can see, I have been listed almost all kinds of species and those are really in danger because of e-waste and how its effects to others species. Flora in the list too because e-waste can even destroy their living area and poison their water.

9. How lakes, rivers, seas and jungles are polluted?

Because of E-waste from factory and industrial company throw their e-waste to environment. The toxic in e-waste hasn't been take care of yet so the toxic could leak out and go into dirt or groundwater. After go into dirt and groundwater, those toxics could go anywhere underground and come to rivers, lakes, seas or even into dirt in jungles and make them polluted.

10. How can you know they are polluted?

When you go around some lakes or rivers are polluted, you would see a really big different between them and clean water. The polluted area will bring a smelly smell like death creature left there for couple of weeks or look in those polluted area, we could see the color in the rivers or lakes is totally black. And in jungles, we could look at trees and dirt in it, there some places that grass can't even grows, trees look so old and beginning to corrupted.

11. Do E-waste have any advantages? Why?

Conserves natural resources: Recycling recovers valuable materials from old electronics that can be used to make new products. As a result, we save energy, reduce pollution, reduce greenhouse gas emissions and save natural resources by extracting fewer raw materials from the earth.

Protects Environment: E-waste recycling provides proper handling and management of toxic chemical substances like mercury, lead and cadmium contained in the e-waste stream.

Creates Jobs: E-waste recycling creates new jobs for professional recyclers and creates a second market for the recycled materials.

Saves Landfills: E-waste recycling saves unnecessary dumps and landfills.

12. How do you feel when there are some peoples said that E-waste helps small companies develop?

First time, I think I don't believe them, I think that all just liar because of after all these problems that e-waste has done, no one will think it could help small companies to develop in any reason. Then I find out, it really did have so I feel really nice if e-waste can help small companies. It would be really great because if e-waste can help small companies, then there would be a way to recycle and reuse e-waste.

13. How can it help small factories develop?

E-waste can help small factories in finance, reputation, and product. Finance is the process of raising funds or capital for any kind of expenditure, e-waste can increase the funds and reduce the spending of small factories. Reputation is the opinion that people in general have about someone or something, or how much respect or admiration someone or something receives, e-waste can help factories for what they do to it.

14. Why they can help small factories in financial?

Finance is the process of obtaining funds or capital for any type of expenditure; e-waste can increase finances while decreasing small factory spending. When a small company recycling E-waste, they can save money from buy raw material from the mine which are now reducing.

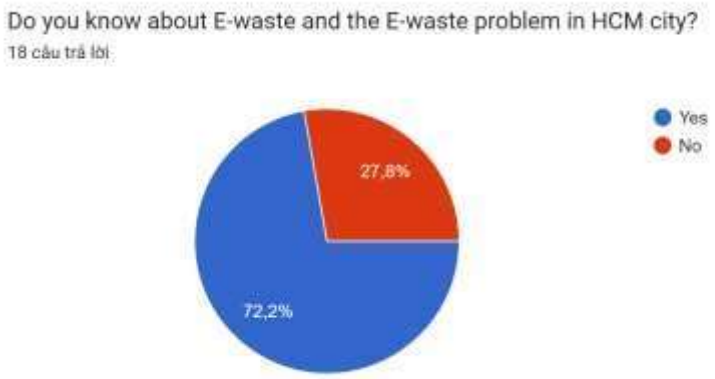
15. How can E-waste help small factories with their products?

It can be environmental propaganda. Customers nowadays tend to buy eco-product, so to have a company provide environment-friendly product is a great marketing plan.

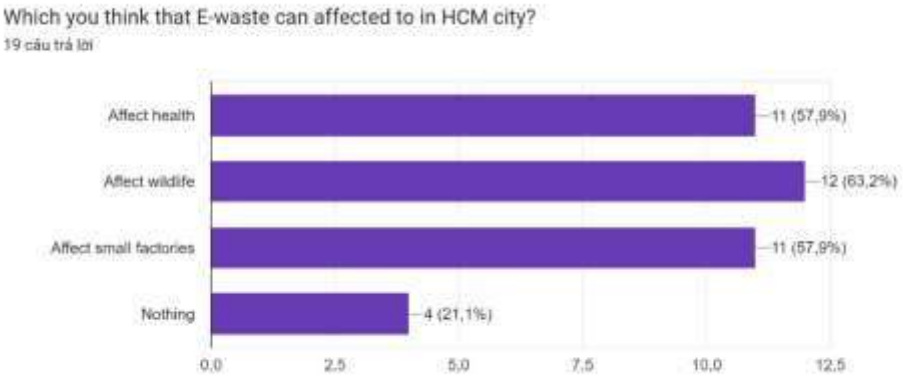
16. How can E-waste help small factories have more fame?

Reputation is the general public's view of someone or something, or how much respect or adoration someone or something receives, and e-waste may help factories for what they do with it. They can have an e-waste recycling tag to their product, which helps them to have a reputation in the industry.

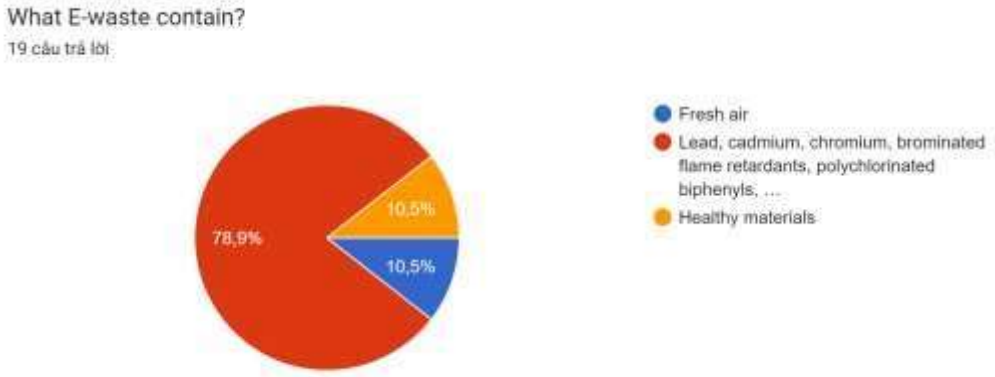
Survey:



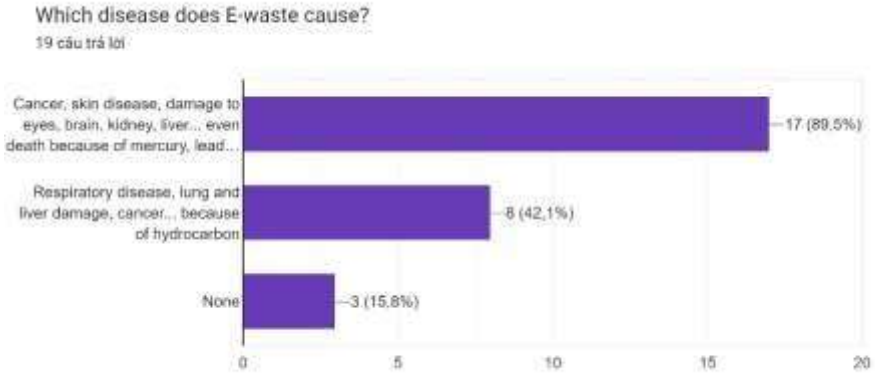
A lot of people do the research know about E-waste. But there still 27.8% others don't know about it. That make me really disappointed because we are now in the 4th evolution of technology and e-waste is a really big problem to know and to prepare for.



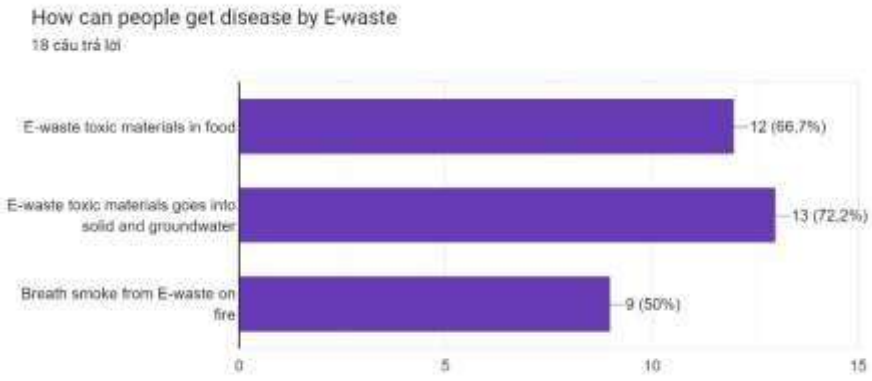
The affected of E-waste to the HCM city known as affect health, wildlife, and small factories. But some still think that E-waste doesn't affect anything to the HCM city which is a warning sign because that is a really big problem if peoples don't know about e-waste effect.



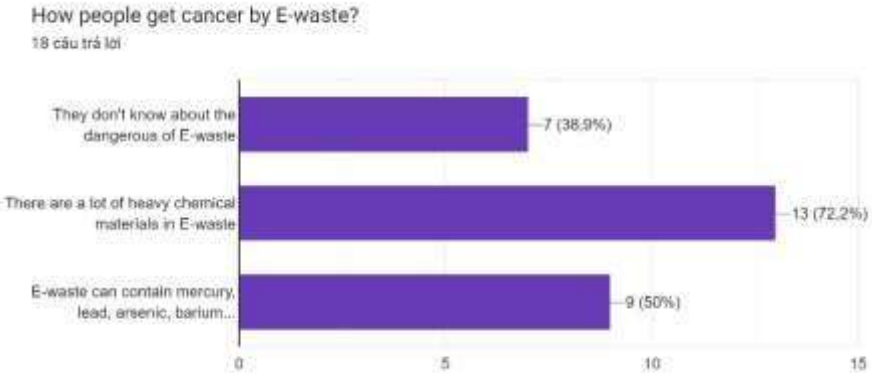
E-waste contains a lot of heavy metal and poison materials and it really dangerous to our life and there are a lot of peoples choose the answer that have list of toxic materials. But some still have opinion that e-waste has healthy materials or fresh air and there are 10.5% for each part.



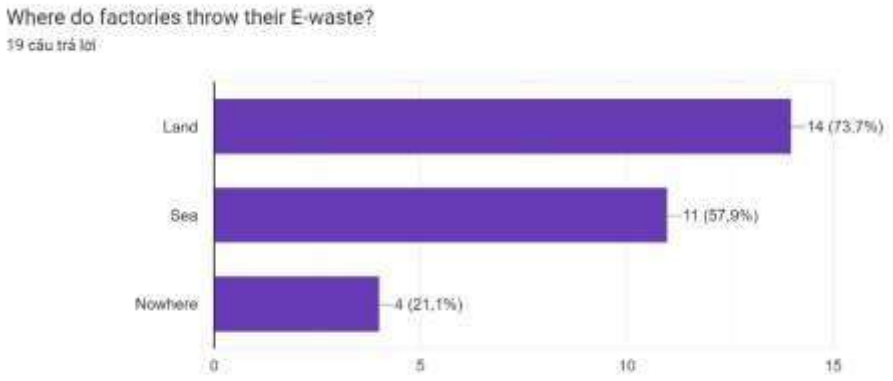
The result showed us that a lot of people know that e-waste can affect really bad disease or even death to them. But follow the result, there still 15.8% people think that e-waste can't affect their health. Besides, e-waste can also affect our lung but there only 42.1% of peoples doing the survey think that it really causes respiratory disease.



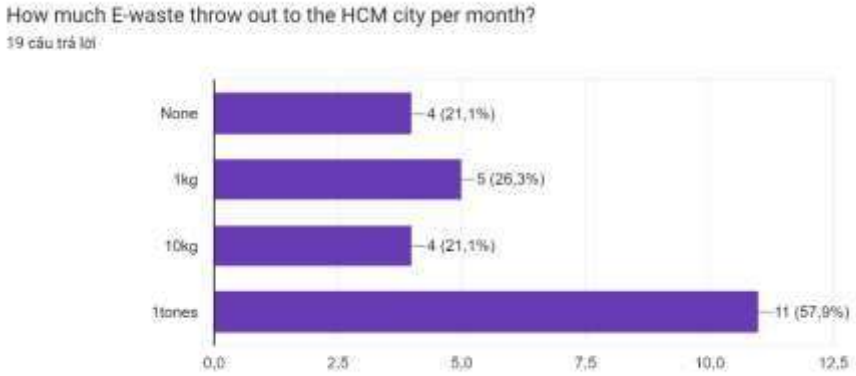
In this table, the result showed that people really care about their health because they know how e-waste can affect them. This result showed there are 66.7% people think e-waste have its toxic materials in food, 72.2% think that toxic materials go into solid and groundwater and 50% else think they can get disease by breath the smoke from ewaste is on fire.



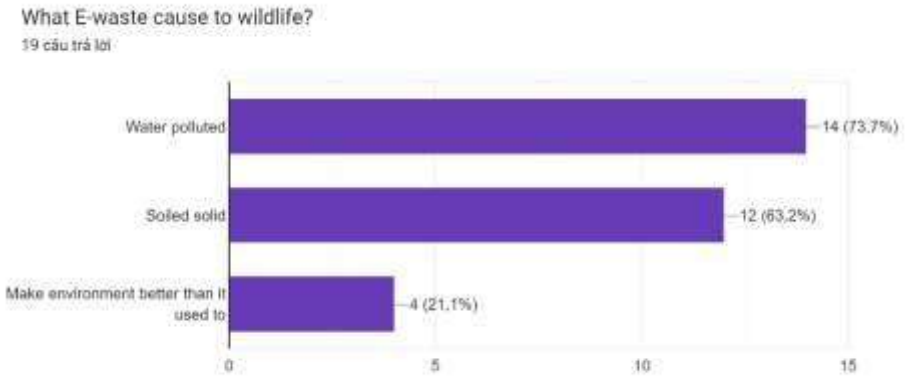
This shows the reason of people get cancer by e-waste not really because their knowledge about the dangerous of e-waste because it only has 38.9%. It depends much more on the heavy chemical materials that have in e-waste with 72.2% of vote and other is metal from e-waste like mercury, lead, arsenic, barium, … with 50%.



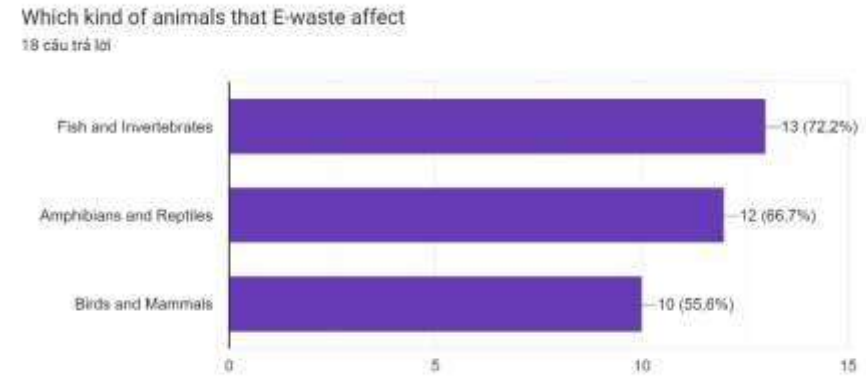
Mostly people think that they throw it on land and bury it in the ground or throw it in sea. There are 73.7% people choose that factories throw e-waste on land or bury in land and 57.9% think that they throw it to sea. But there still some think that e-waste thrown by factory throw to nowhere and only have 21.1% of vote.



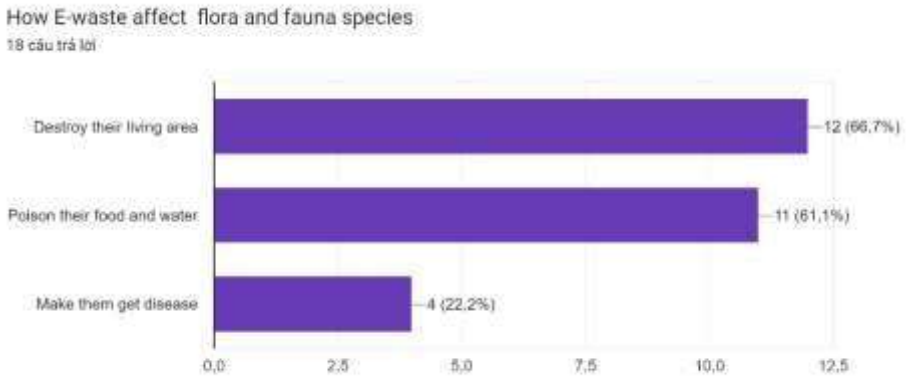
As we can see in the result, there are 57.9% people think that a tone of e-waste has been thrown into the HCM city per month. There still an argument between none and 10kg because their number are both 21.1%. Other choose 1kg with the number is 26.3%.



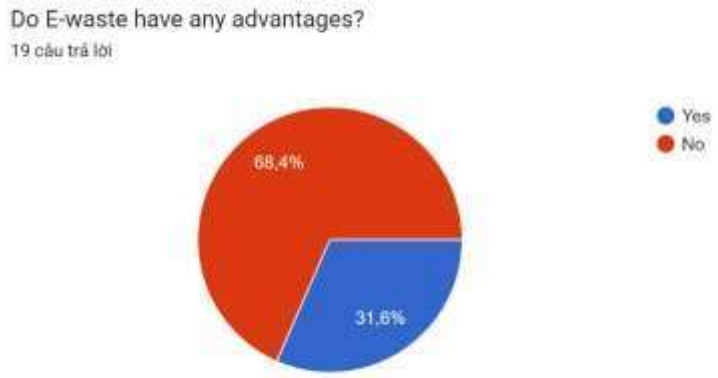
We can see that in the result we collect, water and solid polluted are two main problem that e-waste cause to the wildlife. Water polluted is 73.7% while soiled solid is 63.2% show that a lot of peoples are really care about the polluted in the environment but still some don't have their opinion in these two. It takes 21.1% peoples in this survey think that e-waste make environment better.



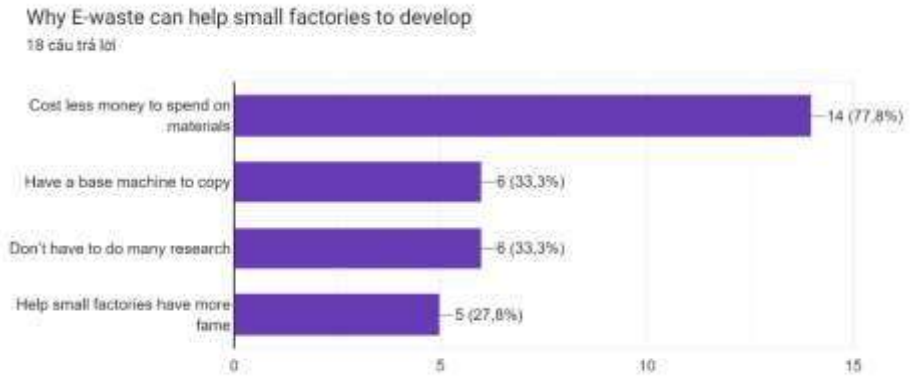
As we can see here, the result show that almost all kind of animals have been affected by e-waste in a bad way. We can see here that have 6 kinds of main animals in the animal world are fish, invertebrates, amphibians, reptiles, birds and mammals. But they all have one same problem that is e-waste problem which fish and invertebrates have 72.2%, amphibians and reptiles have 66.7% and others are birds and mammals have 55.6% affect by e-waste.



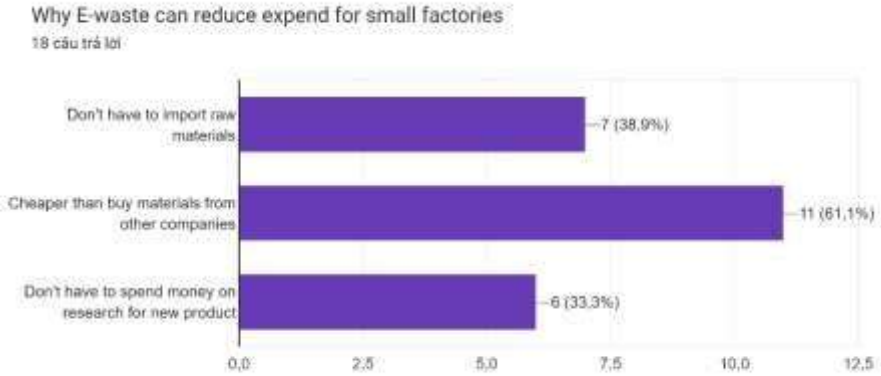
E-waste affects to the wildlife so they do affect flora and fauna species in those are and destroy their living area and poison their food and water are two main problems. The percent of two main problem that peoples have been choose are 66.7% and 61.1%. But there still have an option that e-waste makes flora and fauna species get disease and it only have 22.2%.



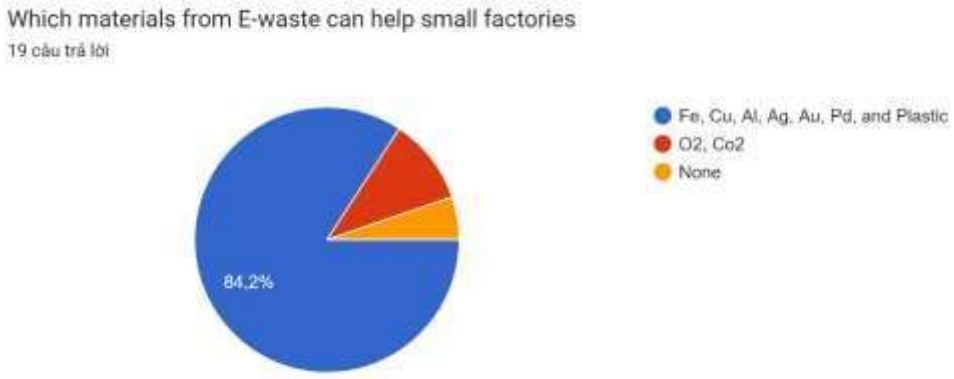
After make this question, we have collected a lot of answer from the result that is 'No'. Almost all people think that e-waste don't have any advantages and it take 68.4% and the answer 'Yes' only have 31.6%.



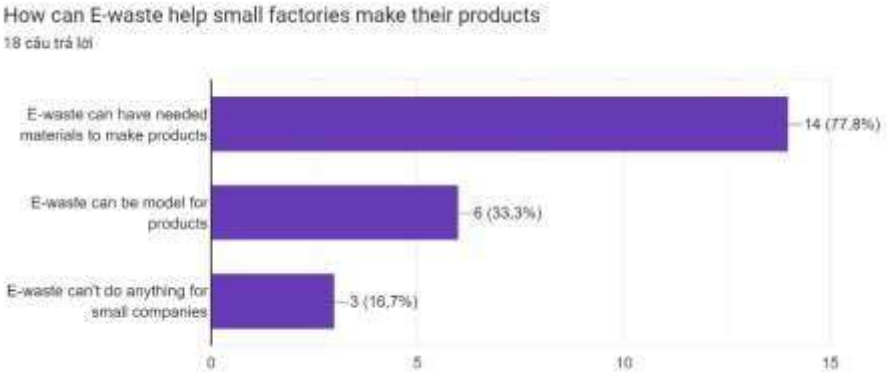
Actually, the e-waste does have advantages that is help small factories to develop. This is the result of why e-waste can help small factories to develop. The cost less money to spend on materials have 77.8% people choose so that must to be the main reason that e-waste can really help small factories. Others like copy or don't have research only have 33.3% and the last one is help small factories have more fame only have 27.8%.



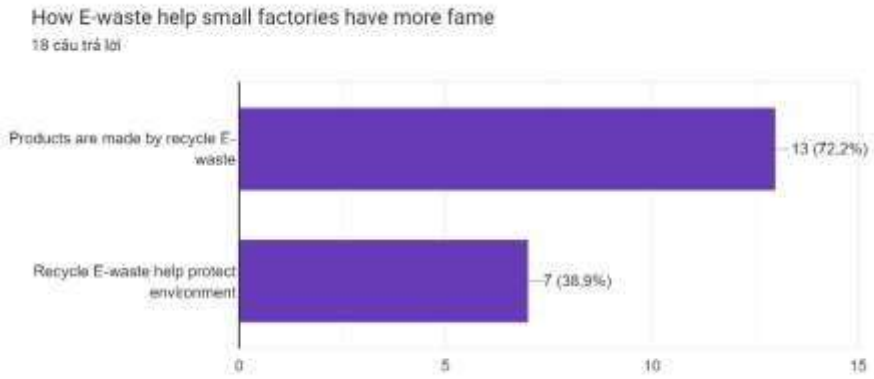
E-waste can reduce expend for small factories because it can help small factories don't have to import raw materials, buy materials from other companies with cheaper price and don't have to spend on new product. We can see here, the reason e-waste can help small factories mostly on small factories can buy materials that in e-waste with a cheaper price than buy raw materials, and there are 61.6% peoples accept this idea. 38.9% accept with small factories don't need to import raw materials and 33.3% think that they don't need spend money on research for new product.



We can see that small factories can take materials in e-waste but what kind of materials in e-waste they can use. This result shows us that 84.2% of peoples do the survey think that Fe, Cu, Al, Ag, Au, Pd, and Plastic are materials in e-waste needed for small factories. Less than 10% of others think it's Co2 and O2 or even none.



E-waste can also help small factories with their products and this result show us that the main reason is E-waste can have needed materials to make products. It takes total 77.8% of peoples do the survey and 33.3% other think that e-waste could be a model to create new products. And the 16.7% left think that e-waste can't do a thing to help small factories with their products.



There are a lot of people don't think that e-waste can't help small factories with their fame. But e-waste can even create more fame for the small factories. As the result, we can see that e-waste can actually help by create a brand that their product made by recycle e-waste. This take 72.2% of peoples do the survey choose this option because the environment is really warning now and if they pronounce that their products are made by recycle e-waste, a lot of people will choose to use the product. The other option has 38.9% people do the survey choose it.

3. Finding research

From the results of interview, survey, and observation have been created:

According to the survey and interview data, individuals are aware of e-waste and its potential consequences. However, some people are still unaware of e-waste and what it may do to our lives. So, based on these findings, we can conclude that the three main hypotheses we introduced into this study have been proven.

Firstly, **health concerns may come from direct contact with harmful compounds that leach from e-waste**. According to the study results, 72.2% of the participants understand what e-waste is and e-waste might harm their health take 57.9%. For what materials in e-waste, there are 89.5% peoples join into the research think that they contain a lot of heavy materials that toxic materials to health. Copper, gold, lead, mercury, nickel, brominated flame retardants and polycyclic aromatic hydrocarbons (PAHs). Those can cause a lot of dangerous disease like lung disease and some disease could kill them right away when they contact to them. Toxic components in electronic trash include mercury, lead, cadmium, polybrominated flame retardants, barium, and lithium, all of which are hazardous to human health. Toxins' harmful health impacts on humans include damage to the brain, heart, liver, kidneys, and skeletal system. It can also have a significant impact on the neurological and reproductive systems of the human body, resulting in sickness and birth abnormalities (elytus, 2019). Following the observation, the study focuses on the impact of e-waste on children's health. Some families recycle e-waste to make new items and sell them for

profit, but they have no idea how dangerous e-waste is or that it could harm their children. Next, we proceed to an e-waste recycling village, where they use them for business. In 2015, there were 207/335 children with lead contamination, accounting for 63.3% of the total, with 33 children having lead concentrations greater than 6-7 times higher than usual. Living near e-waste has been linked to lower neuroimaging scores in infants, as well as a variety of diseases affecting the brain, lung, eye, organs, and so on. According to the WHO, there are 12.9 million women who work with e-waste, and the poison from e-waste toxic elements can cause fatal disease in themselves and their children.

Second, **danger can arise from inhaling hazardous vapors as well as chemical accumulation in soil, water, and food in the HCM city area, this endangers land and sea wildlife**. Most people believe that factories dump it on land and bury it or throw it in the sea. Factory e-waste is thrown on the ground or buried in the ground by 73.7% of individuals, whereas 57.9% believe it is thrown into the sea by manufacturers. However, some people believe that factorygenerated e-waste goes nowhere and have only 21.1% of the vote. According to the results, 57.9% of individuals believe that a ton of e-waste is thrown into HCM City each month. There is still a debate between none and 10kg because their percentages are both 21.1%. Other others chose 1kg, with a percentage of 26.3%. We can see from the results that water and solid contamination are the two main problems e-waste causes to wildlife. Water pollution is 73.7%, while dirty solid is 63.2%, indicating that many people are concerned about environmental pollution, although others still do not have an opinion on these two issues. In this survey, 21.1% of respondents believe that e-waste helps the environment. As we can see, the results demonstrate that practically all types of animals have been negatively impacted by e-waste. We can observe that there are six basic types of animals in the animal world: fish, invertebrates, amphibians, reptiles, birds, and mammals. However, they all have one problem: e-waste, which affects 72.2% of fish and invertebrates, 66.7% of amphibians and reptiles, and 55.6% of birds and mammals. E-waste has an impact on wildlife, affecting flora and fauna species in particular areas, as well as destroying their living areas and poisoning their food and water. The percentages of the two major issues that people have chosen are 66.7% and 61.1%. However, there is still the possibility that e-waste causes disease in flora and fauna species, and it only has 22.2%. When e-waste is heated, harmful compounds are discharged into the air, harming the ecosystem; this is one of the most serious environmental effects of e-waste. Toxic pollutants can then leach into groundwater, hurting both land and sea species (ewaste1, 2022). The observation discusses e-waste and its impact on the environment. Because information technology is growing so rapidly, a large amount of e-waste is being discarded into the environment. However, without a plan to recycle, individuals continue to toss it out into the environment. Each person in Vietnam discarded 1.3kg of e-waste every year, totaling 116 thousand tons. Ewaste accounts for 2% of total garbage in Vietnam, but it is extremely harmful if we no longer use it and toss it or burn it to recycle without a plan, which could result in dioxin or poisonous compounds. Some people have chosen to recycle

it by bringing it to firms for repair or recycling it by selling it to factories. The government has enacted legislation to encourage people to recycle or minimize their e-waste in a safe manner.

Thirdly, **E-waste causes a lot of problems in HCM, but it also helps emerging enterprises evolve.** After posing this question, we received a large number of 'No' responses. Almost everyone believes that e-waste has no benefits, with 68.4% believing this and 31.6% believing otherwise. Actually, e-waste has advantages that aid in the development of small industries. This is why e-waste can assist tiny industries in developing. 77.8% of people want to spend less money on resources, thus that must be the main reason that e-waste may actually benefit tiny enterprises. Others, such as copying or not conducting research, have only 33.3%, while the last one, assisting small factories in gaining more reputation, has only 27.8%. E-waste can help small enterprises save money by eliminating the need to import raw materials, purchase resources from other companies at a lower cost, and avoid spending on new products. We can see here that the reason e-waste can aid small companies is that small factories can buy materials from e-waste at a lower cost than raw materials, and 61.6% of people embrace this viewpoint. 38.9% believe that small firms do not need to import raw materials, and 33.3% believe that they do not need to spend money on product research. We can observe that tiny factories can accept e-waste materials, but we don't know what kind of e-waste resources they can use. This result indicates that 84.2% of those who responded to the survey believe that Fe, Cu, Al, Ag, Au, Pd, and Plastic are materials in e-waste required for small enterprises. Others believe it is Co2 and O2, or maybe none at all. E-waste can also assist small firms with their products, and this finding demonstrates that the main reason is that E-waste can contain ingredients needed to make items. The survey was completed by 77.8% of those who responded, with 33.3% believing that e-waste might be used to generate new items. And the remaining 16.7% believe that e-waste can't help small factories with their products. Many people believe that e-waste can help small businesses gain recognition. However, e-waste can help small factories gain notoriety. As a result, we can see that e-waste can actually benefit by establishing a brand for products created from recycled e-waste. This choice was chosen by 72.2% of those who responded to the survey because the environment is a very concern right now, and if they declare that their products are created from recycled e-waste, many people will prefer to utilize the product. The other option was chosen by 38.9% of those who responded to the survey. While businesses confront the brand and reputational concerns posed by e-waste, the debate about e-waste continues to evolve. As the globe transforms from a linear to a circular economy, mining of prime materials required for electronics is no longer economically viable. While the technology for efficiently recovering and recycling crucial components is still evolving, more businesses are investing in recovery and recycling technologies since it benefits their bottom line in the long run. Creating value from current e-waste will save billions of dollars in material costs and drastically lower a product's carbon footprint (Lee, 2022). In the observation, only 17% of electronic waste gets recycled. This is because devices are not designed to be recycled. Small, dangerous chemicals that are difficult and

expensive to breakdown are among them. However, if such items are recovered securely, they may be worth a lot of money to e-recyclers. The observation allows us to view the work of engineers who opt to recycle and reuse ewaste such as laptops, phones, televisions, and so on. They can do it, but they must be extremely skilled since, in order to repurpose e-waste materials, they must be careful not to break any valuable materials. After a series of laborious stages, they may ultimately get the materials they require or that they can sell, such as gold, iron, and the removal of hazardous substances such as lead, dioxin, and so on.

V. Limitation and improvement

1. Limitation

The study's flaws are the features of the design or procedure that molded or hampered interpretation of the results. There are limitations to the ability to generalize, extend to reality, and the effectiveness of the findings that are the result of the forms in which you initially choose to construct the analysis or the methodology used to assess the internal and external validity of the outcomes of unexpected test challenges.

Survey data is limited: To conduct this study, we posed questions regarding e-waste in several ways to students who could respond. We conducted questionnaires and interviews with participants, however the information we acquired was limited to a few students in Hanoi. We admit the project's weaknesses here, because children in each location will be affected by the environment, which has its unique way of life. However, our study is limited to students in the Hanoi area.

Lack of prior research on this topic: Previous citations and references will serve as the research foundation for our document and project, providing us with the basic theory for the query. However, research publications on this issue are scarce or non-disclosed, necessitating a high charge for a document. As a result, our evidence and foundation for this topic are limited.

Time Limit: Our project begins and concludes in one month, and we make the software available to users for two weeks. This is the moment for users to recognize their differences from the past, although it is still not easy. We need more time to track and survey user behavior changes.

2. Improvement

We anticipated the project's limitations while investigating, therefore we devised corrective measures to ensure the project's accuracy. We conduct student surveys at many of the schools listed above in the surveyed area. To confirm the objectivity of the survey, we performed a survey of students using the application in the four schools mentioned above while in Hanoi. Although the universities in the Hanoi metropolitan region are not concentrated in one place,

they are dispersed around the city. To assure objectivity, we interviewed multiple universities in various areas, professions, and training contexts. The data is then analyzed to produce the most intuitive outcomes. Second, due to the scarcity of study on this area, the themes we are working on are available for a price or free on the internet. That is why we require mentor assistance in contacting us and directing us to the appropriate sources of citations. Third, due to time constraints, to maintain the research schedule. Instead of shortening the processes, we run them in parallel to ensure that the research time is sufficient to acquire the most reliable data.

Aside from advancements in the research process. To continue developing the project, we will implement a variety of improvements in the future, including:

Extending the research's scope: The scope of our research, as indicated in the limited portion, is students in the Hanoi area. Only students from the Hanoi area are objective enough to speak on e-waste and its consequences. To continue improving the project, we will expand it to additional cities such as Ho Chi Minh, Da Nang, Can Tho, and others in order to obtain accurate research data.

Currently, our research employs three primary methods of information collection: survey, interview, and observation. If the research may be expanded in the future, we would like to add more approaches such as questionnaires and focus groups to gather information and provide a holistic view of user responses. From there, a rich outcome that is easy to evaluate and discover new ideas.

Extending the time for project implementation:

We believe that one month is insufficient time to complete the project. If the project proceeds, we will plan a research term of 4-6 months. The amount of research and the quality of the time it takes to view the results are both heavily influenced by study duration. That is why we aim to educate participants about e-waste and what it can do. After learning more about e-waste, they will have a more detailed answer and a broader perspective on this subject.

VI. Conclusion.

Research Proposal Form

Student Name: Nguyen Duc Tu **Student Number**: GCH200690

Tutor: Do Tien Thanh **Date**: 29/10/2022
Unit 13: Computing research project

Propose title: The environmental implications of e-waste and ways to reduce it.

Section One: Title, objective, responsibilities
Research question: How does E-waste affect the environment of HCM city? **Objectives** I want to learn: ● What is E-waste? ● How does E-waste affect HCM city? ● Does everyone in HCM city well-known about the E-waste problem? ● How many percent of E-waste has been released into the environment? ● Can we do anything to solve the problem of e-waste? ● What solutions for the e-waste?
Section Two: Reasons for choosing this research project

Reasons for choosing the project

- Any species need the environment but the e-waste problem is corrupting our environment so we need to act.
- I'm on my way to finding a way to solve the e-waste problem in the environment.
- HCM city is well-known as the most economical city in Vietnam so the e-waste problem must be one of the most technical consumption

(e.g. links to other subjects you are studying, personal interest, future plans, knowledge/skills you want to improve, why the topic is important):

Section Three: Literature sources searched

The initial sources which could help me to answer those questions:

1. https://www.academia.edu/7208935/The_5_th_AUN_SEED-Net_Regional_Conference_on_Global_Environment_Assessment_of_EWaste_Collection_Model_in_Ho_Chi_Minh_City(The 5 th AUN/SEED-Net Regional Conference on Global Environment Assessment of E-Waste Collection Model in Ho Chi Minh City)
2. https://link.springer.com/chapter/10.1007/978-4-431-54264-3_7(Analysis of Intentions to Recycle Electronic Waste (E-Waste) Using the Theory of Planned Behavior: A Case Study in Urban Areas of Vietnam)
3. https://www.ewaste1.com/what-is-e-waste/(What is E-waste? Definition and Why It's Important)
4. http://www.iep-global.org/wp-content/uploads/2020/01/8.-Vietnam.pdf(E-waste in Vietnam)
5. https://green.harvard.edu/tools-resources/how/6-ways-minimize-your-e-waste(6 ways to minimize your e-waste)
6. https://news.climate.columbia.edu/2018/08/27/growing-e-waste-problem/(What Can We Do About the Growing E-waste Problem?

Use of key literature sources to support your research question, objective or hypothesis:

Section Four: Activities and timescales

1. Collect materials relating to research's question and objectives
2. Complete research proposal
3. **Milestone 1[11-6]**: Get feedback from the Tutor about the research proposal 4. Produce project plan
5. Writing literature review and represent the findings in term of hypothesizes
6. Check project progress: research proposal, plan, literature review
7. Preparation for primary research(to confirm the findings in literature review or clarify the questions might arise after the literature review)
8. **Milestone 2[25-6]**: Get feedback from the Tutor about the plan of primary research.
9. **Milestone 3[27-6]**: Get feedback from the Tutor about the result of literature review 10. Conducting the primary research
11. **Milestone 4[16-7]**: Represent the findings in primary research and get feedback from Tutor
12. Writing assignment 1 which contains LO1, LO2
13. **Milestone 5[29-7]**: Submit assignment 1 -Draft
14. **Milestone 6[1-8]:** Submit assignment 1- Final
15. Writing Assignment 2 which contain LO3, LO4
16. **Milestone 7[10-8]:** Submit assignment 2 -Draft
17. **Milestone 8[12-8]:** Presentation- put everything together. 18. **Milestone 9[18-8]:** Submit assignment 2- Final

Activities to be carried out during the research project (e.g. research, development, analysis of ideas, writing, data collection, numerical analysis, tutor meetings, production of final outcome, evaluation, writing the report) and likely durations:

Milestone one:

Target Date(set by tutor) Milestone two:

Target Date(set by tutor)

Section Five: Research approach and methodologies

- Research process: sequential
- Research classes: quantitative and qualitative
- Research methods: case study, survey

Type of research approach and methodologies you are likely to use, and reasons for your choice:

What your areas of research will cover:

Comments and agreement from tutor

[This part not for student] Comments (optional):

I confirm that the project is not work which has been or will be submitted for another qualification and is appropriate.

Agreed: ..... (Name) ..... (Date) .....

Comments and agreement from project proposal checker (if applicable)

[This part not for student] Comments (optional):

Agreed: ..... (Name) ..... (Date) .....

References

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Index of comments

3.1 Enough parts for a research: Proposal, Plan, LW, Primary, Secondary research... The objectives of research are clear

LW have been review Ewaster in general and its impact. Some reason why you need to conduct weight control research

Hypothesis is very clear

Using graphs, charts for explanation of data.

Clear explanation of hypothesis. Lots of secondary data to support your explanation of hypothesis

Overall, welldone. Most parts are correct and logical