



ASEAN FOUNDATION



ASEAN  
DATA SCIENCE  
EXPLORERS

# Managing E-waste

A new circular economy to generate economic growth and transparent management process

**Team:** Green Letter

**Institution:** RMIT University Vietnam

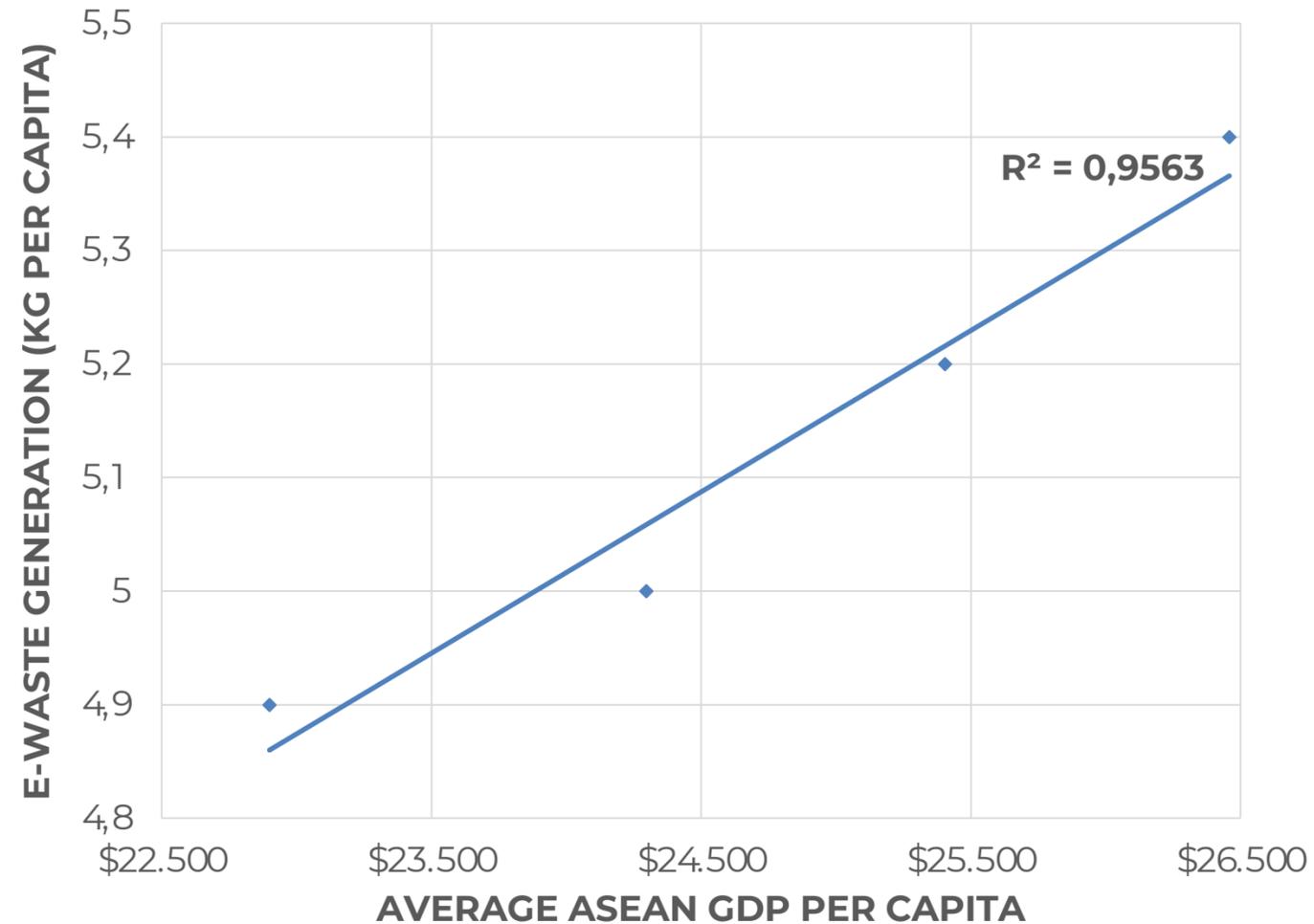
**Country:** Vietnam

**Members:** Ma Thi Ngoc Bich  
Ngo Quoc Anh Thu



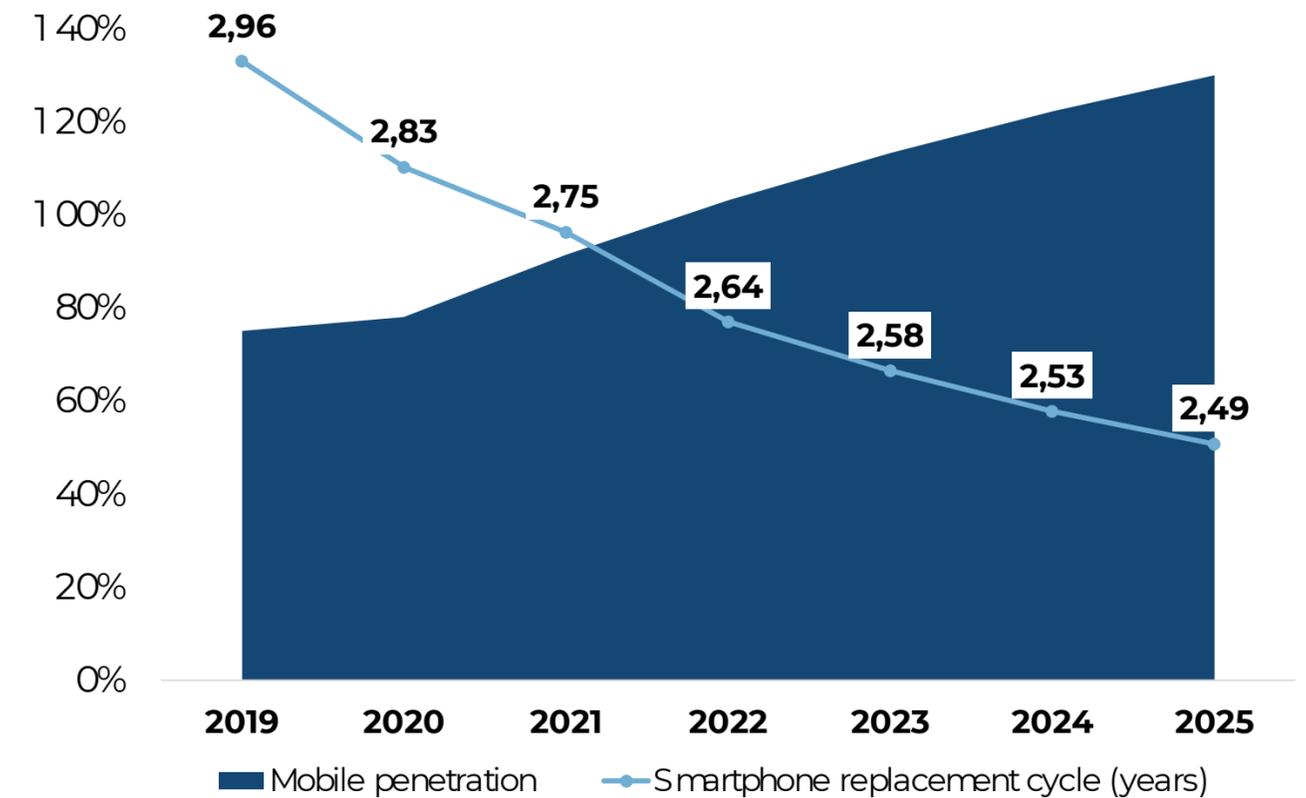
# Finding 1: ASEAN Domestic e-waste is surging

The **richer** the ASEAN people, the **more e-waste**.



Source: Global E-waste Statistic Partnership 2020, IMF 2022.

**More** people **possess** smartphones and replace **more frequently**.

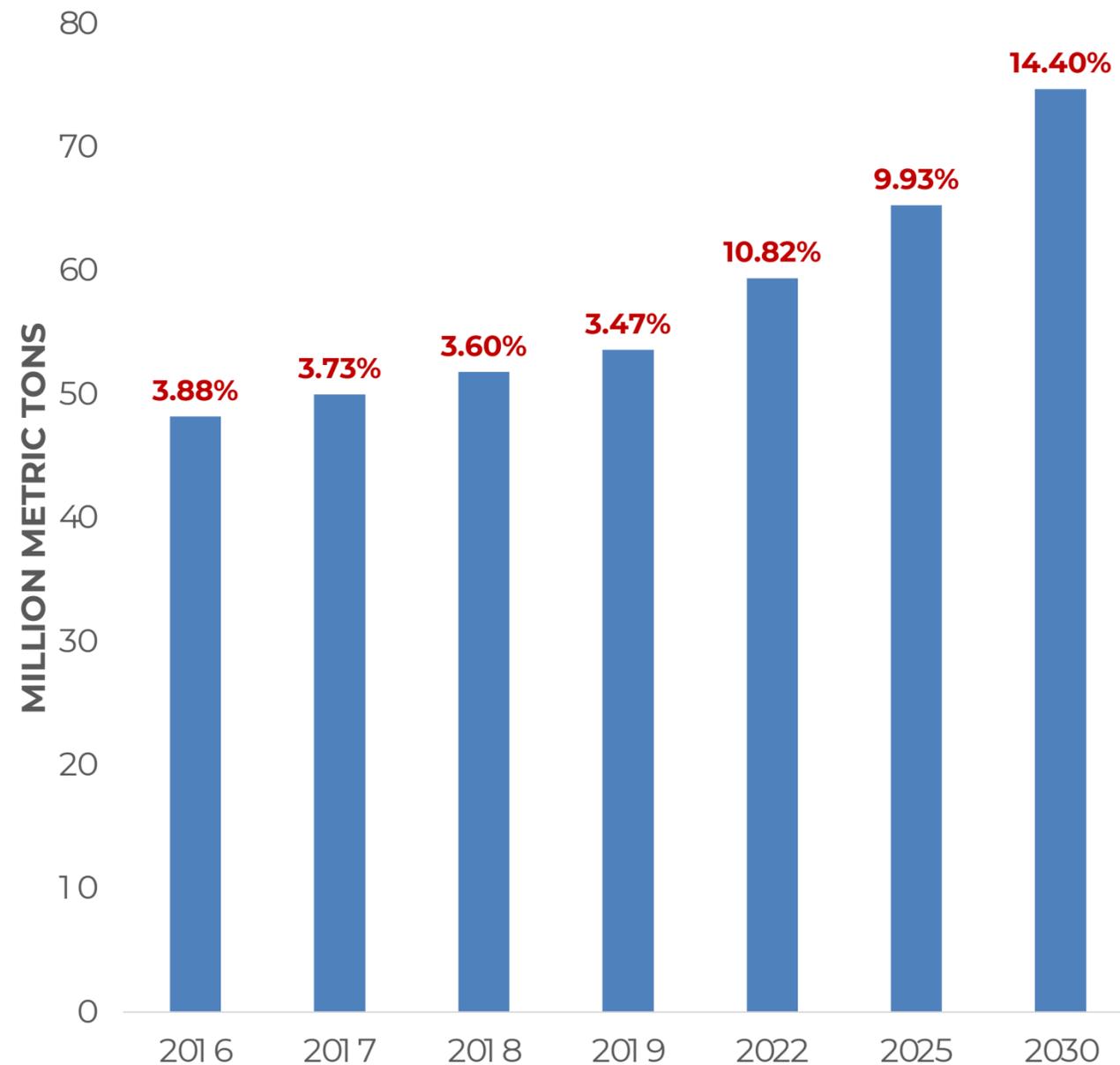


Source: Statista 2021, Euromonitor 2021.

**Increase by >4.5%** e-waste generation annually and become **3<sup>rd</sup> largest e-waste generation** in Asia continent.

# Finding 2: Global e-waste with economic opportunities

Global e-waste is forecasted to **sharply increase till 2030.**



Source: Statista 2021

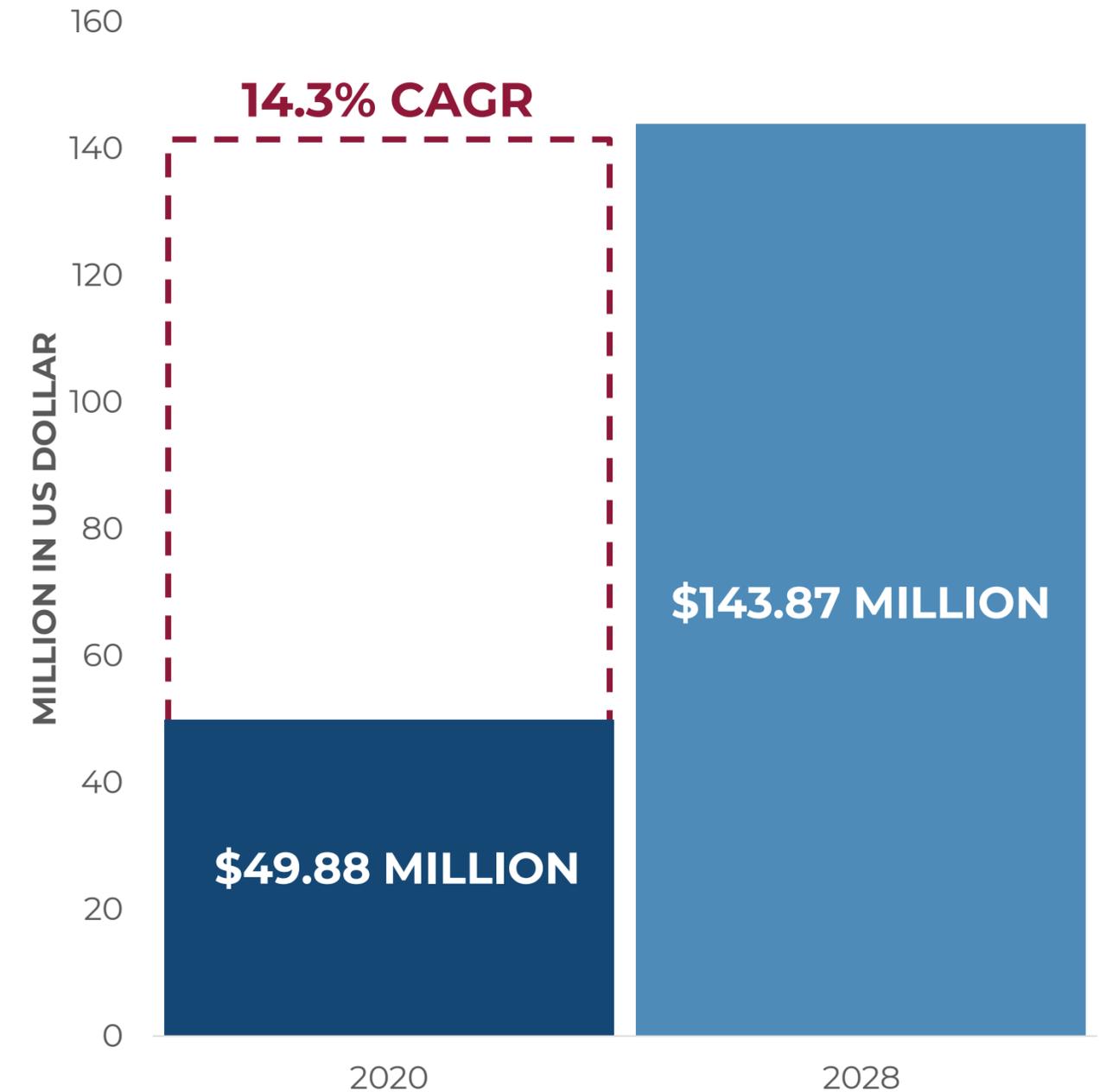
Global e-waste flow remains **unproductive.**



Source: World Economic Forum 2019

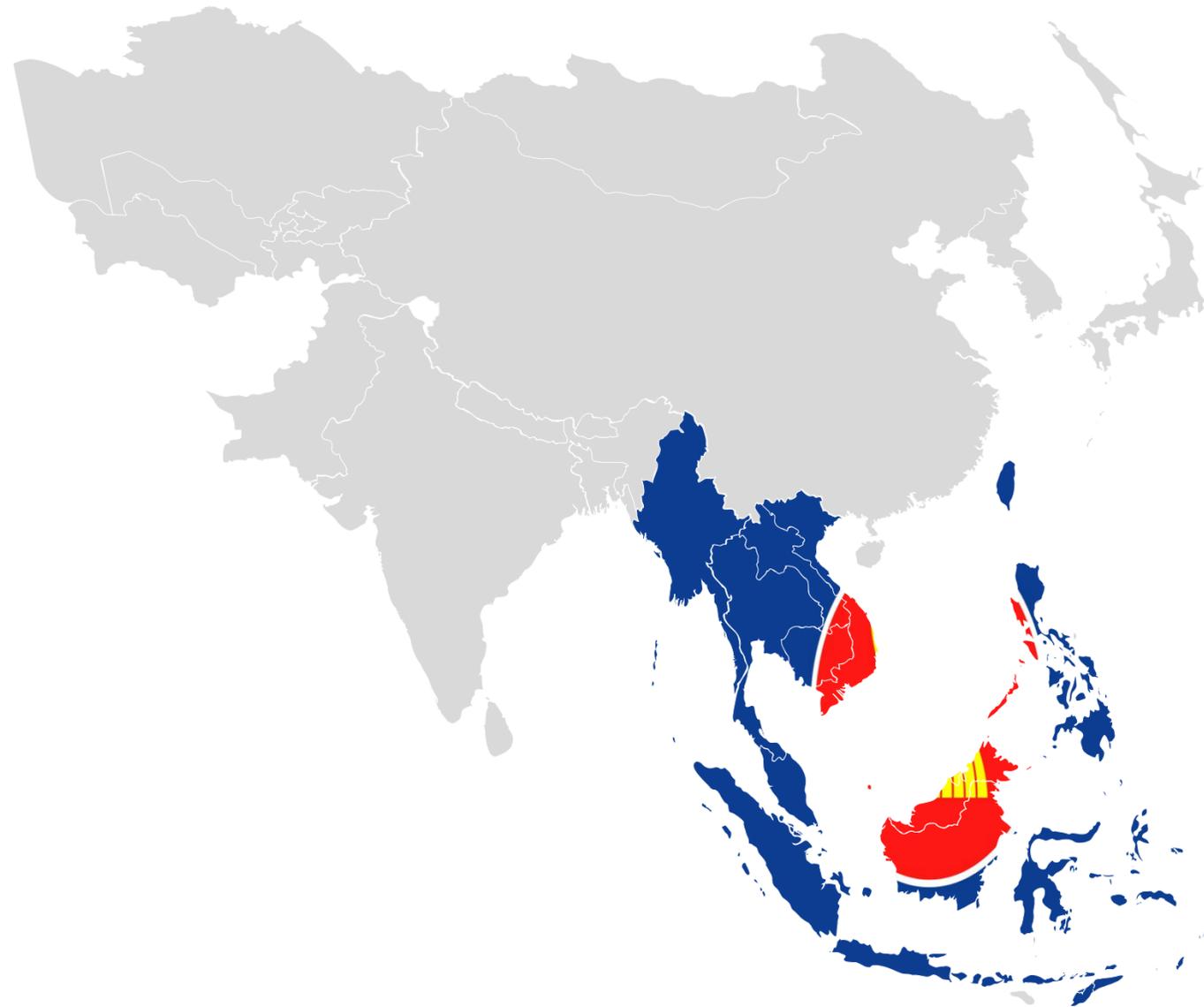
# Finding 2: Global e-waste with economic opportunities

Global e-waste industry is promising with **stable double-digit growth** from 2021-2028.



Source: Nair 2021.

# Finding 3: E-waste hub shifts to ASEAN



**14.3%**

CAGR growth of e-waste management industry value from 2021 to 2028



**Ban**

in 2018 has shifted global e-waste flow to Southeast Asia.



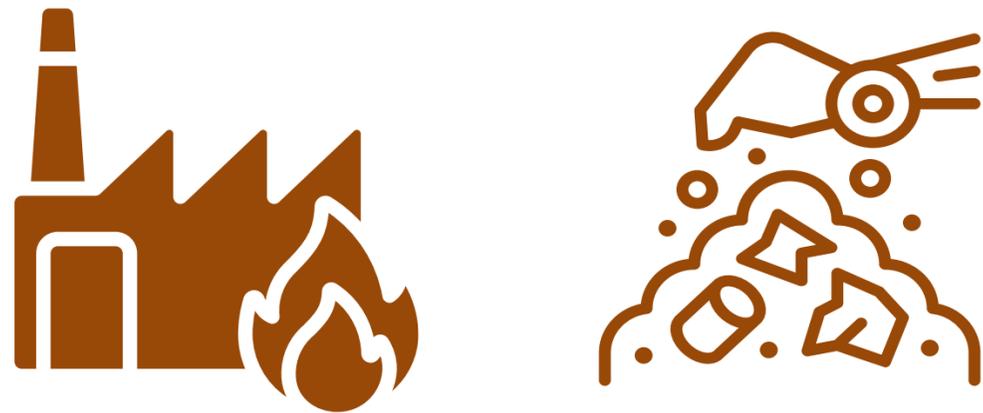
**171%**

e-waste exporting to Southeast Asia increased in 2016-2018

# Finding 4: ASEAN ineffective e-waste management

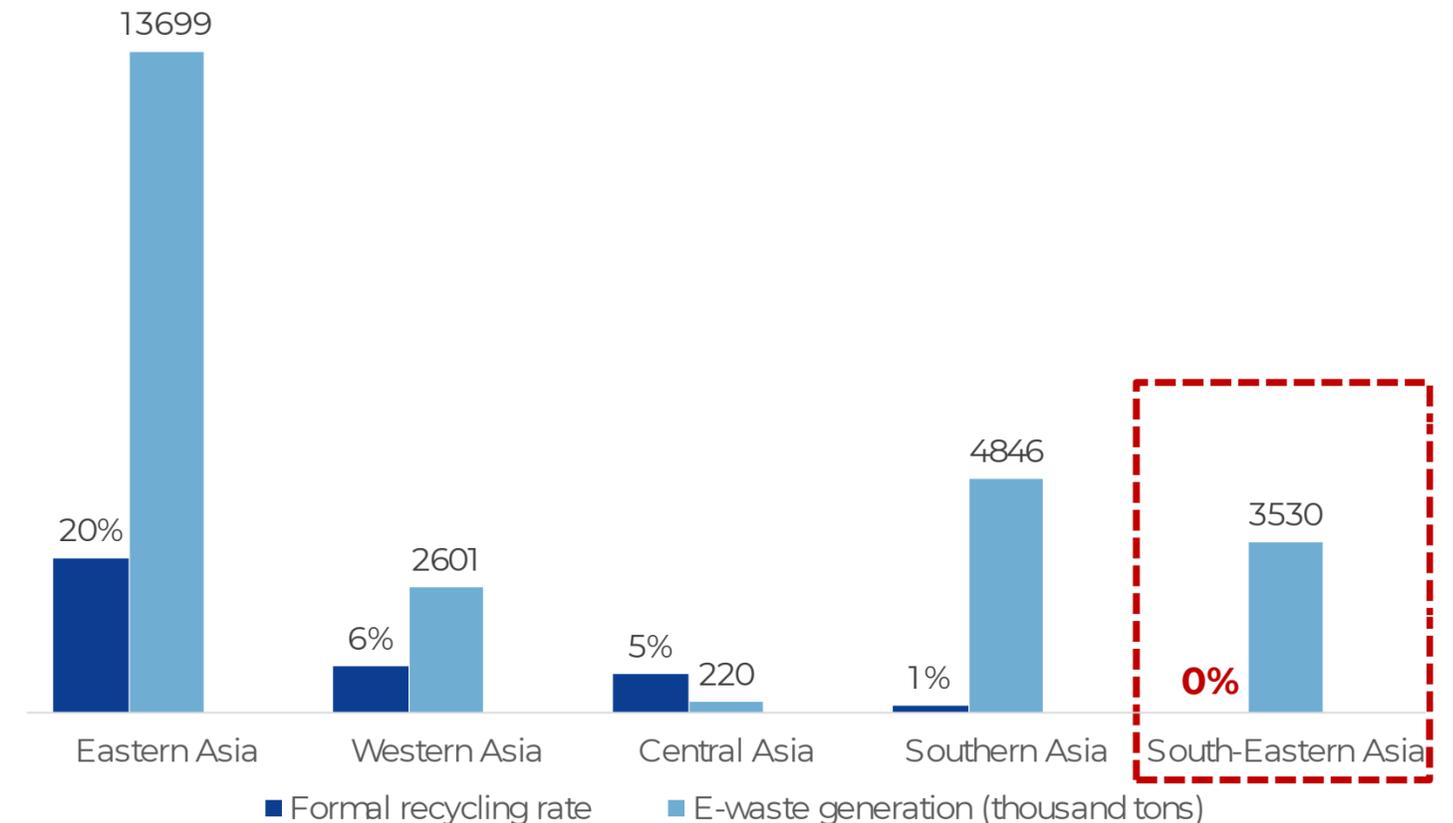


**30% illegal e-waste export** to ASEAN countries annually.



**85%** e-waste management is **dumped** or **burned**.

ASEAN region conducts **no formal recycling**, indicating the worst e-waste management in Asia



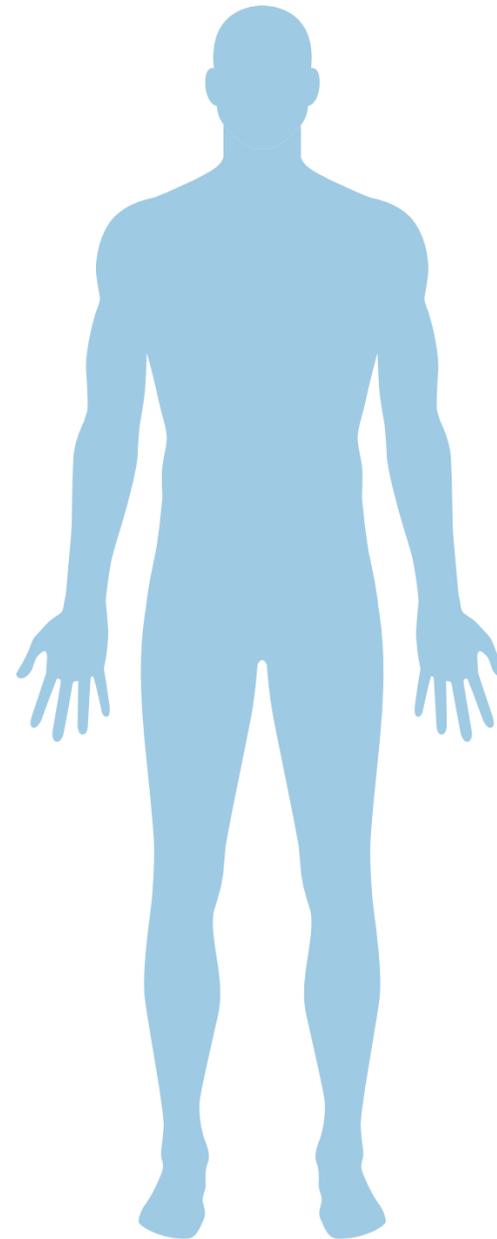
# Finding 4: ASEAN ineffective e-waste management

## ENVIRONMENTAL CONSEQUENCES

- Air pollution
- Soil and water contamination
- Climate change

## HEALTH CONSEQUENCES ON

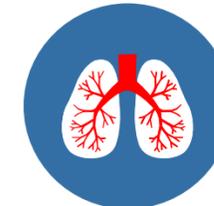
- More than 90% informal collectors
- 75% nearby landfill inhabitants



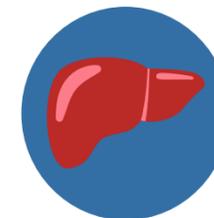
**Arsenic:** Impair Cardiovascular Function



**Lead:** Impair Neurodevelopment and Behaviour



**Copper:** Negatively Impact Lung Function, Respiratory Effects



**Mercury:** Poison Livers, Lungs, Immune System Function

# Executive Summary

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## Dilemma

E-waste in Southeastern-Asia countries substantially increases from both domestic and global scale, coming with huge economic opportunities.

## Obstacles

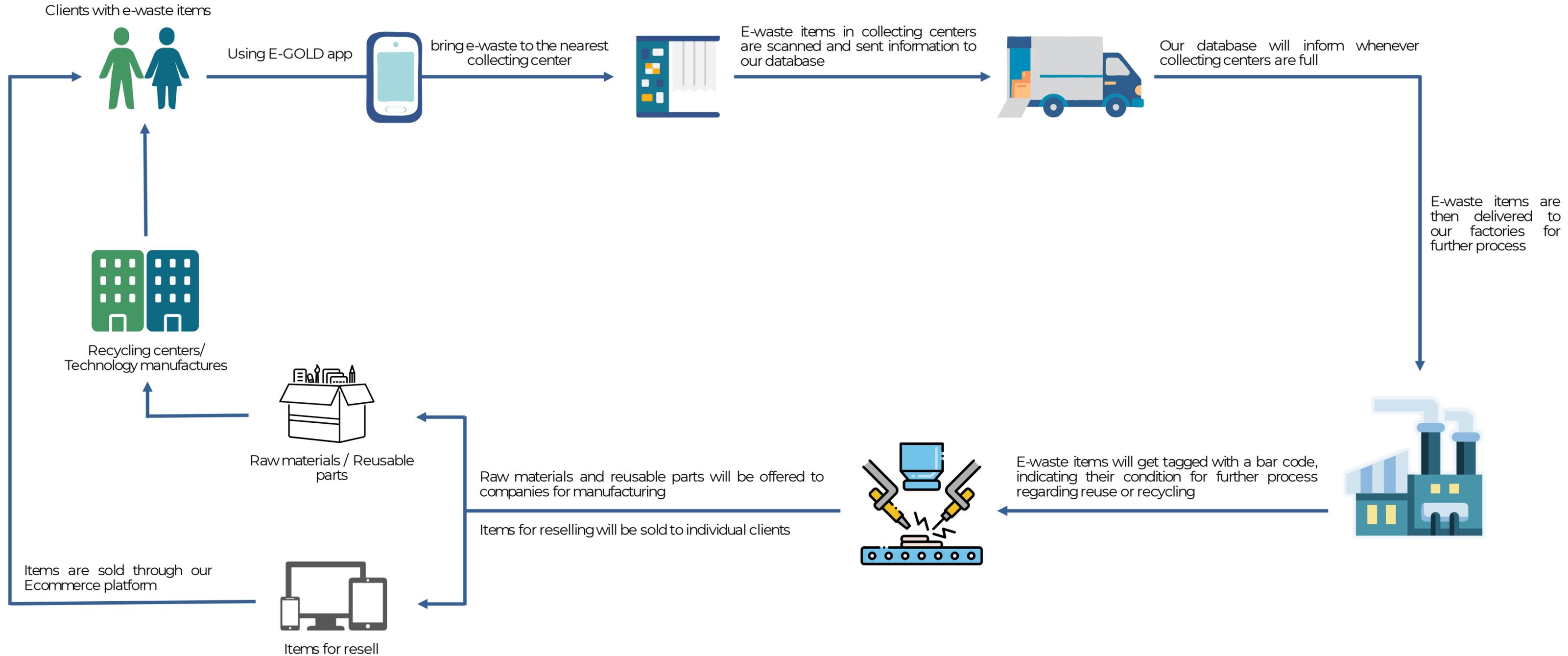
ASEAN unsustainable e-waste management

Lack of control in illegal importation

## Goal

Conducting effective e-waste management and guideline to utilize e-waste resources and transparency in regional data

# Implementation process



**The future for better e-waste management**

**E-GOLD**



**Ensure proper collection and handling of electronic products**

**Express the manufacturers' responsibilities to the environment and community**

# Software Demo



- 1 Collect and track e-waste handling process
- 2 Incentive for e-waste collection
- 3 Ecommerce for secondary products
- 4 Supply and supervise company's e-waste recycling

# Implementation plan

## ACTION

## TARGETS

## VIABILITIES

2023-2024

PHASE

1

PLATFORM TRIAL AND  
IMPLEMENTATION IN  
VIETNAM CITIES

- Import e-waste from informal collectors and individual
- Collaborate with transportation firms
- Trade and inspect tech firms

**PEDDLERS AND  
INDIVIDUALS IN  
VIETNAM**

Database  
Partnership with

**SAP**

2025-2027

PHASE

2

AWARENESS CAMPAIGNS  
AND EXPANSION TO  
ASEAN CITIES

- E-waste knowledge through E-GOLD app and monthly campaigns
- Train informal collectors
- Secondary ecommerce market

**ASEAN URBAN  
AREAS**

ASEAN Ecommerce



2028-2030

PHASE

3

COMPLETE CIRCULAR  
SYSTEM

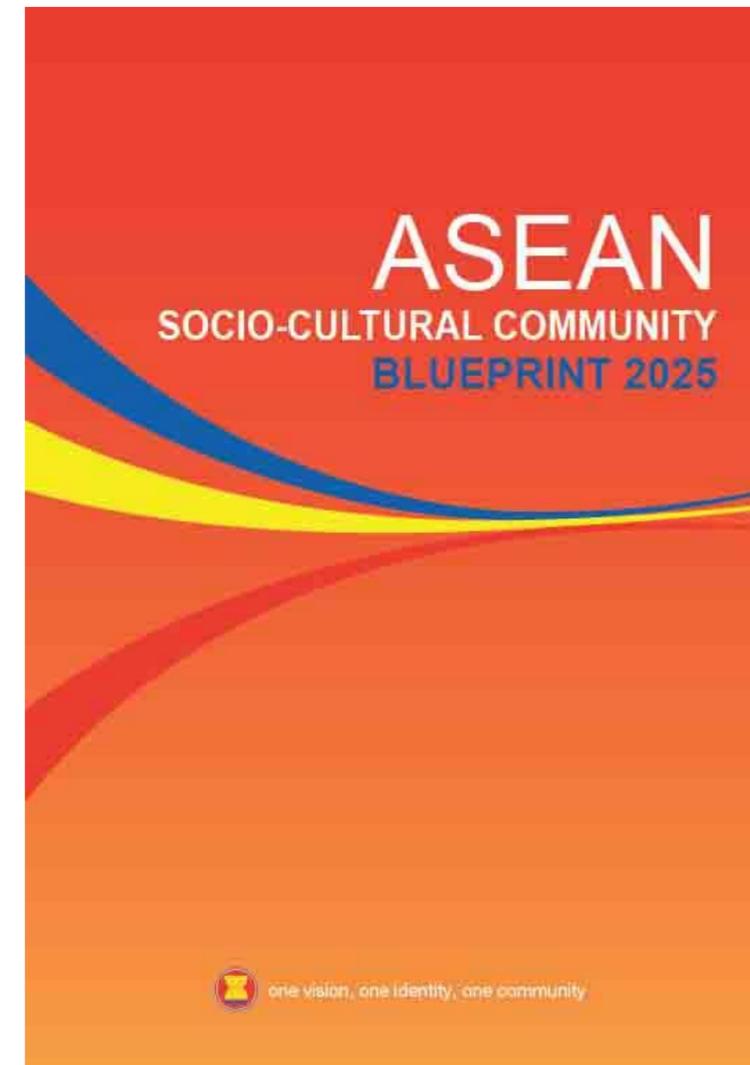
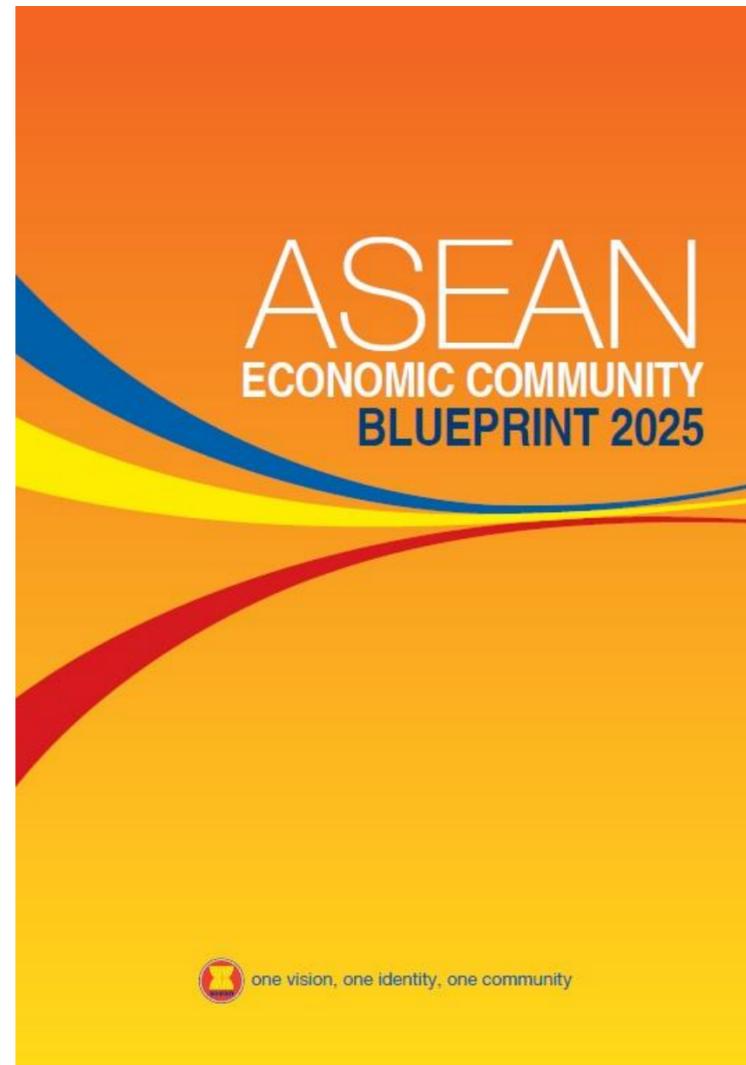
- E-GOLD system enhancement
- Launch E-GOLD in remote areas
- Compulsory e-waste recycling on all levels
- Officially regulate Recycling legislations

**REMOTE AREAS  
AND ASEAN  
REGION**

Public-Private  
Partnership



# E-GOLD project is aligned with



**Section B.8 – AECBP**  
Sustainable Economic  
Development

**Section C.3 – AECBP**  
E-Commerce

**Section A.2 – ASCCBP**  
Empowered People and  
Strengthened Institutions

**Section C.2 – ASCCBP**  
Environmentally  
Sustainable Cities

**Section C.4 – ASCCBP**  
Sustainable Consumption  
and Production

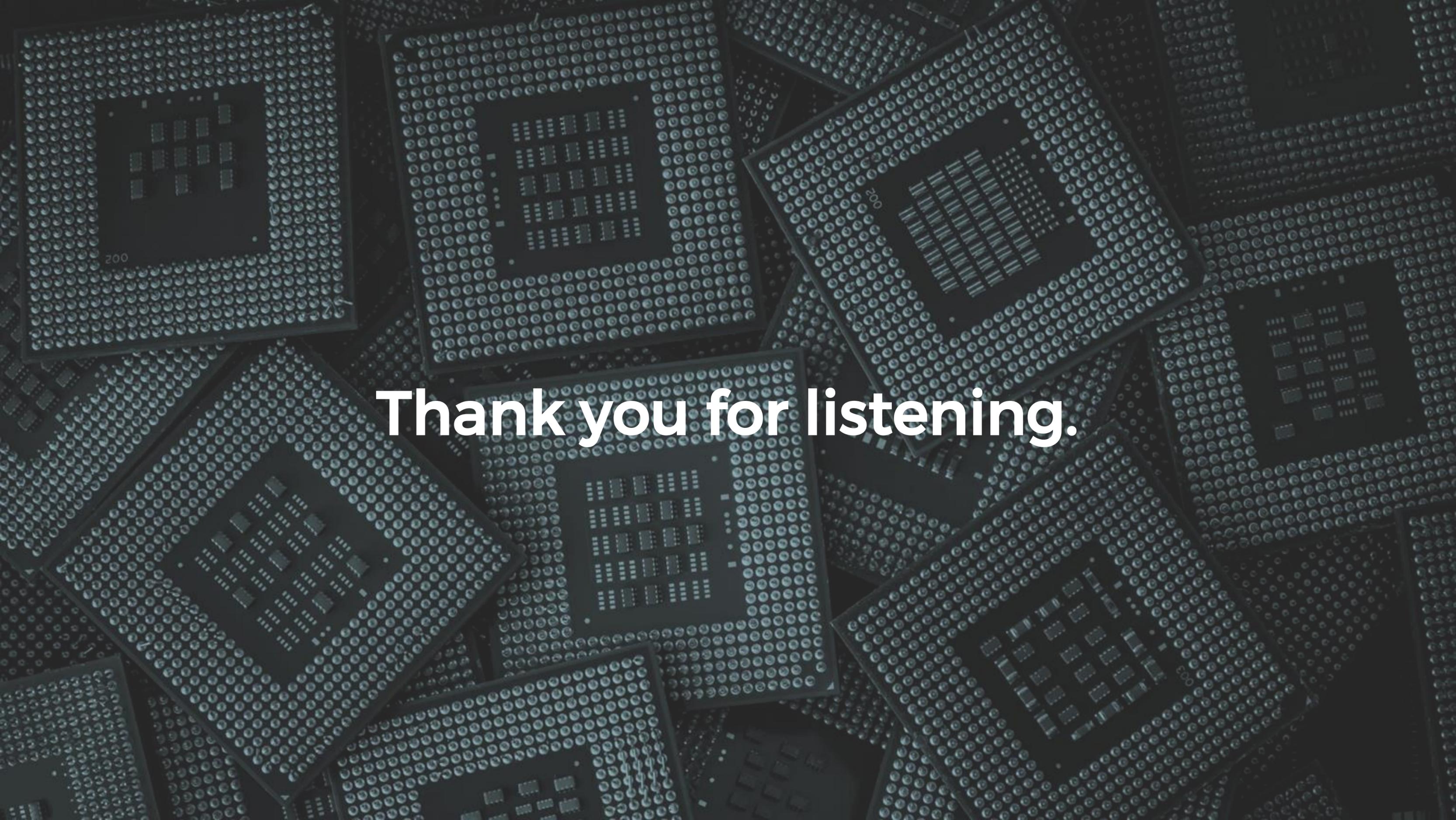
## Our sustainable future goals by 2030



**1.4 million** sustainable jobs for informal e-waste collectors

**26%** of electronic waste generation is formally collected and recycled each year

**\$7 billion** contribute to ASEAN countries' GDP each year.



**Thank you for listening.**

# Appendix 1: Tech Companies With E-waste Recycling

## PROBLEM

The construction and operation of formal e-waste recycling facilities within companies is currently limited due to high capital and maintenance costs, particularly energy, and the complexity and potential hazards of e-wastes, which pose a major financial constraint on companies.

Company	Investment	Amount (MUSD)
Apple	Partnered with companies and governments to invest a combined into the research and development of carbon-free aluminium smelting.	\$144
Microsoft	Investment in Closed Loop Partners' funds to help accelerate the infrastructure, innovation and business models for supply chain digitization, e-waste collection, food waste reduction, and recycling industry products	\$30
Bosch	Investment in environmental protection in Germany	\$53

Figure 1: Large electronics companies' investment in efficient and effective E-waste recycling technologies

## ADVANTAGE

Companies, particularly electronics companies, can obtain considerable advantages with e-waste recycling. Companies can share their efforts with consumers, boosting sustainability profile. Furthermore, using recycled materials cuts down manufacturing costs, concerning rarity of required metals and circumstances of spike price of raw materials.

For instance, Dell has reported to have saved \$2 million dollars through using recycled materials in the five years to 2019.

# Appendix 2: Implementing costs

\*Estimated cost in Vietnam

Fixed Costs	USD	
App Building	\$7,000	
Machine	\$250,000	
Collecting Centers	\$10,000	
Factory	\$15,000	3000m <sup>2</sup> , \$5/m <sup>2</sup> /month
<b>Total</b>	<b>\$282,000</b>	

Variable Costs	USD	
App and Machine Maintenance	\$12,850	5% of initial cost
Logistics	\$3,000	
Personnel	\$3,000	12 people, \$250/person/month
Electricity and Water	\$2,000	
<b>Total</b>	<b>\$20,850</b>	

Estimated Break-even Point in Vietnam: **2 years**

Estimated Cost for Phase 1 in Vietnam: **\$7.5 million** (applying in 25 cities and each processing of at least 1000kg e-waste per day)

# Appendix 3: Estimated economic gains of e-waste in ASEAN

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The global e-waste management market size was valued at \$49,880 million in 2020, and is projected to reach \$143,870 million by 2028, registering a CAGR of 14.3% from 2021 to 2028.

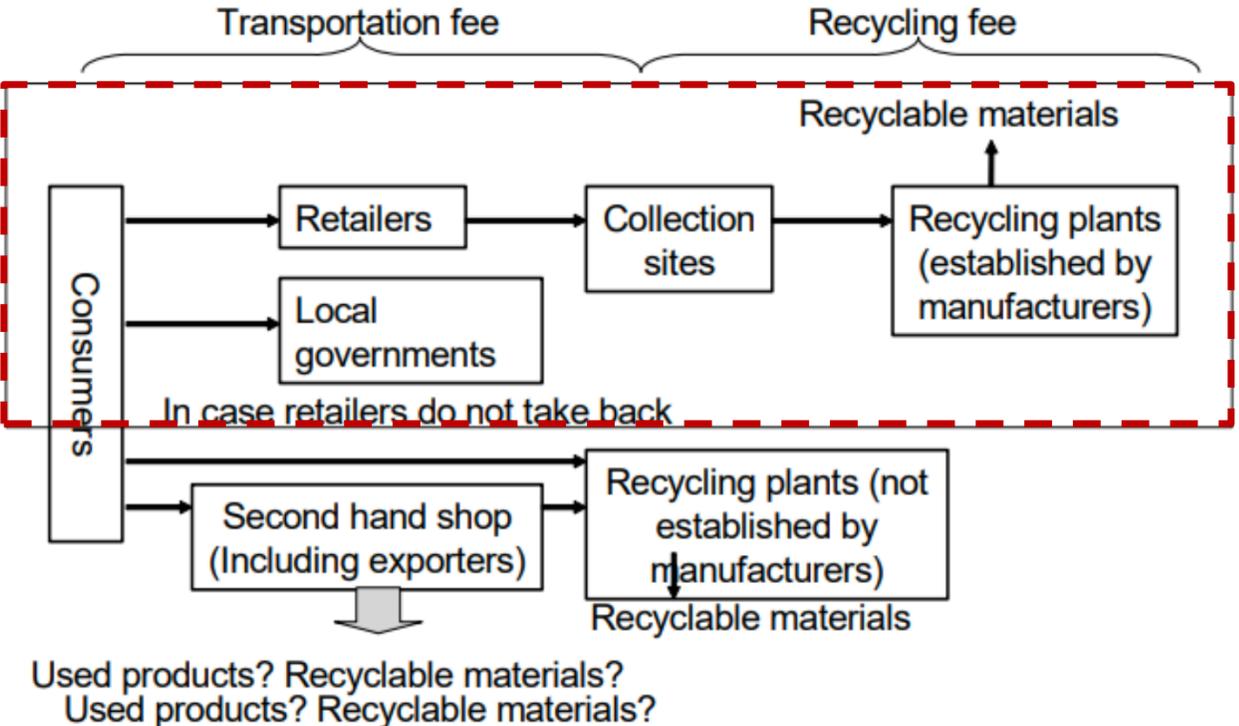
According to Forti et al. (2020), one ton of e-waste can generate **\$1,063.4328** value of raw materials. Hence, regarding our goals to recycle **26%** of 3530 thousand tons of e-waste in ASEAN by 2030, expected value of raw materials can be obtained is **976,018,623 USD**

# Appendix 4: ASEAN's e-waste legislations

COUNTRIES	LEGAL FRAMEWORK	COLLECTION MECHANISM	PROCESSING INFRASTRUCTURE	ENVIRONMENT, HEALTH AND SAFETY STANDARD
SINGAPORE	LOW	MEDIUM	MEDIUM	HIGH
THAILAND	LOW	LOW	LOW	LOW
THE PHILLIPINES	MEDIUM	LOW	LOW	LOW
VIETNAM	MEDIUM	LOW	MEDIUM	LOW
MALAYSIA	MEDIUM	LOW	MEDIUM	LOW
INDONESIA	MEDIUM	LOW	MEDIUM	LOW
MYANMAR	LOW	LOW	MEDIUM	LOW
CAMBODIA	MEDIUM	LOW	MEDIUM	LOW

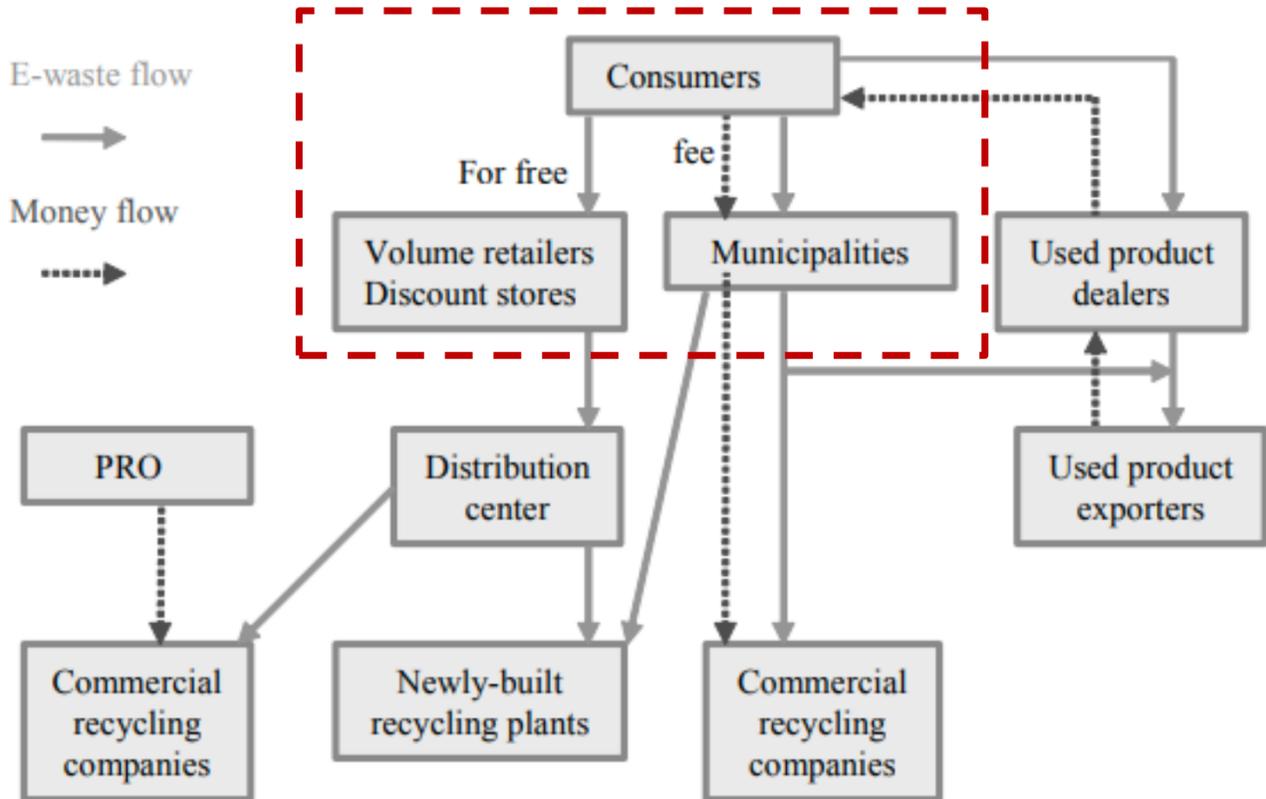
Source: United Nations University and the Japanese Ministry of the Environment 2016.

# Appendix 5: Japan and Korea's Recycling System Case



*In Japan,* consumers are not charged with transportation and recycling fee but those would be sent to retailers or manufacturers

*In Korea,* consumers are compulsory to recycle e-waste but also be charged fees on every e-waste kilogram by the government, similarly to manufacturers' side



Source: Chung and Suzuki 2008.

# Appendix 6: Competitors



**Vietnam Recycles** is an alliance of electronics manufacturers was founded by **HP** and **Apple**, aiming to:

- Sustainability
- Set up a network of collection points
- Provide a professional collection process
- Ensure a safely self-contained process, and environmentally-friendly recycling
- Raise public awareness on the proper collection and handling of electronic products



**MyEwaste** is an application on e-waste management developed by **Department of Environment Malaysia**, aiming to:

- facilitate public in providing information
- assist in sending their e-waste and identify the nearest collection centers
- advocate awareness among public on the importance of managing e-waste in an environmentally sound management



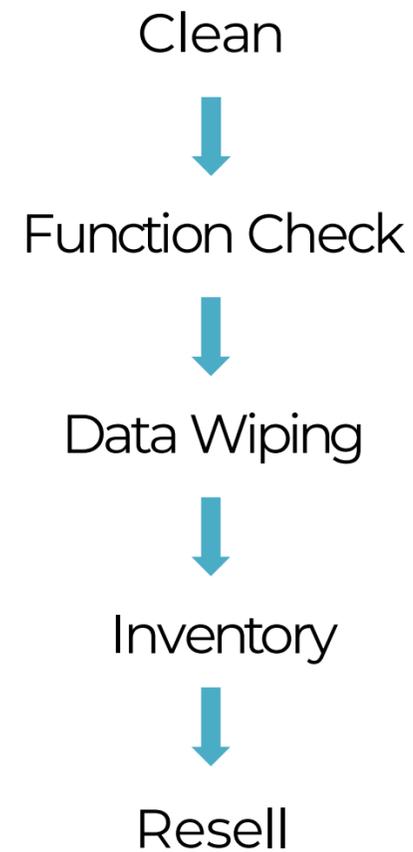
**Ewaste project** in Thailand is initiated by AIS, aiming to:

- educate people on the effects of improper disposal
- collect e-waste for proper and sustainable disposal for a better environment and less residual electronic waste

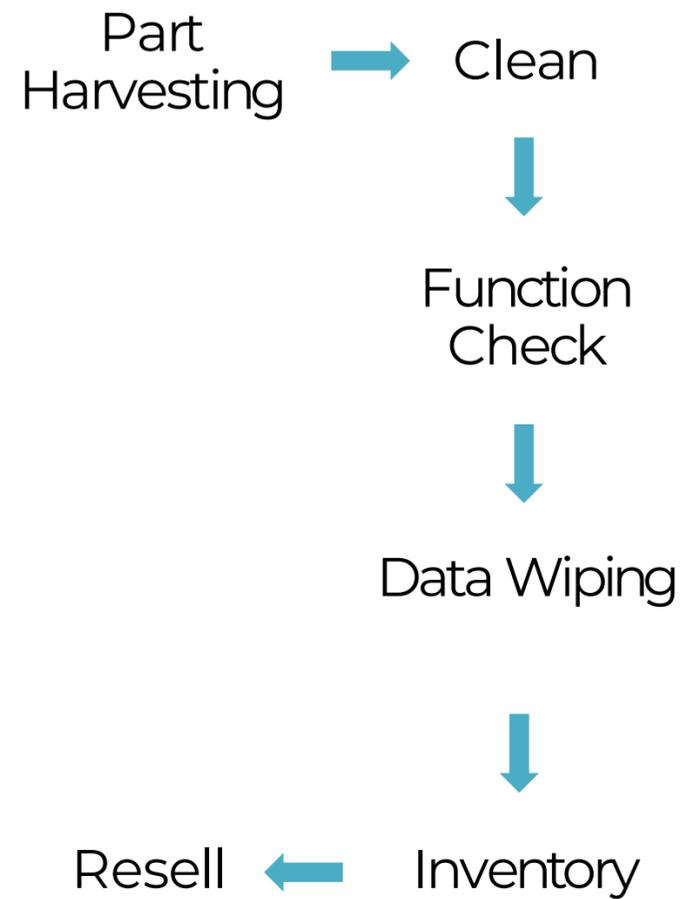
# Appendix 7: Process

Reuse, Repurpose, Re-engineer

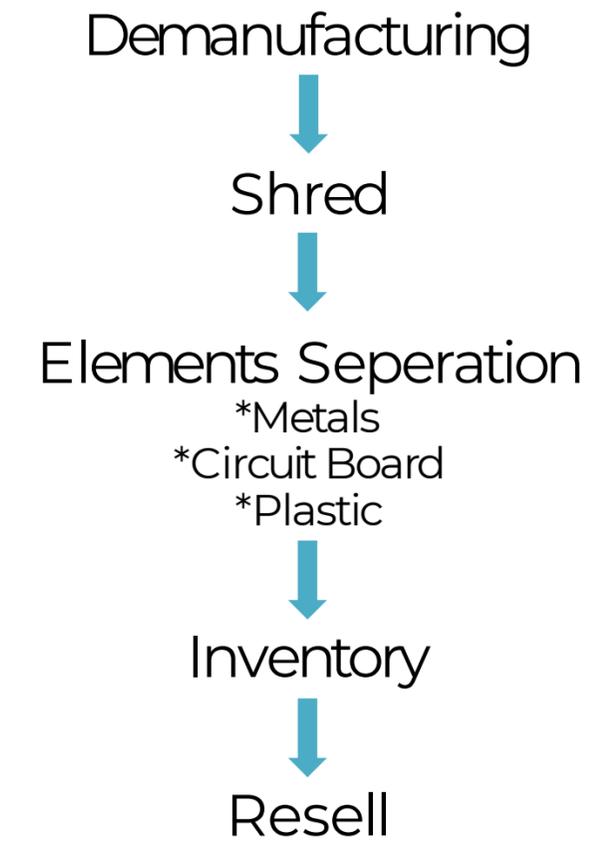
## RESELL



## REUSE



## RECYCLE



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