Korea-Vietnam International Cooperation for support on development of metal recycling technology from E-waste

Jinki JEONG
Korea Institute of Geoscience and Mineral Resources

Fukuoka, 9/2015

OUTLINE

1. **E-waste in Vietnam**
2. **E-waste Recycling in Vietnam**
3. ***Korea-Vietnam* Project for E-waste**
4. **Conclusion Remarks**

I. E-WASTE IN VIETNAM

The properties of e-waste in Vietnam

- Does include electronic and electrical waste
- Does not classified by law yet
- Is considered as valuable things rather than waste by public
- Is considered as hazardous wastes by law
- Is related to the transboundary flow (legal and illegal)
- There is no official data or statistic index considering the amount of e-waste.
- Have high increasing rate

Number of discarded appliances

Year	TV	PC	Refrigerator	Air conditioner	Washing machine
2002	190,445	62,771	112,402	17,778	184,140
2003	222,977	77,845	140,916	24,706	214,271
2004					
2005	308,076	110,123	194,570	39,157	287,910
2006	364,684	131,536	230,856	49,782	327,649
2007	433,651	153,360	268,682	61,302	368,786
2008	517,523	174,305	305,063	72,676	415,526
2009	619,269	195,514	346,036	86,548	472,631
2010	742,509	217,189	397,972	107,519	542,918
2011	891,804	270,874	467,037	128,000	636,569
2012	1,072,933	369,061	546,733	132,607	775,838
2013	1,293,110	420,850	689,466	209,548	937,420
2014	1,561,087	486,752	825,410	313,336	1,083,151
2015	1,887,138	644,208	1,026,974	318,143	1,247,801
2016	2,282,966	736,993	1,190,945	409,545	1,444,845
2017	2,761,651	869,512	1,392,355	495,011	1,672,279
2018	3,337,803	1,028,052	1,634,982	598,020	1,939,401
2019	4,028,063	1,217,478	1,923,584	722,566	2,254,210
2020	4,852,039	1,444,038	2,267,318	873,163	2,625,882
Percentage increase from 2006-2020	1230%	1000%	880%	1650%	700%

Unit: piece, URENCO, 2007

KIGAM

II. E-WASTE RECYCLING IN VIETNAM

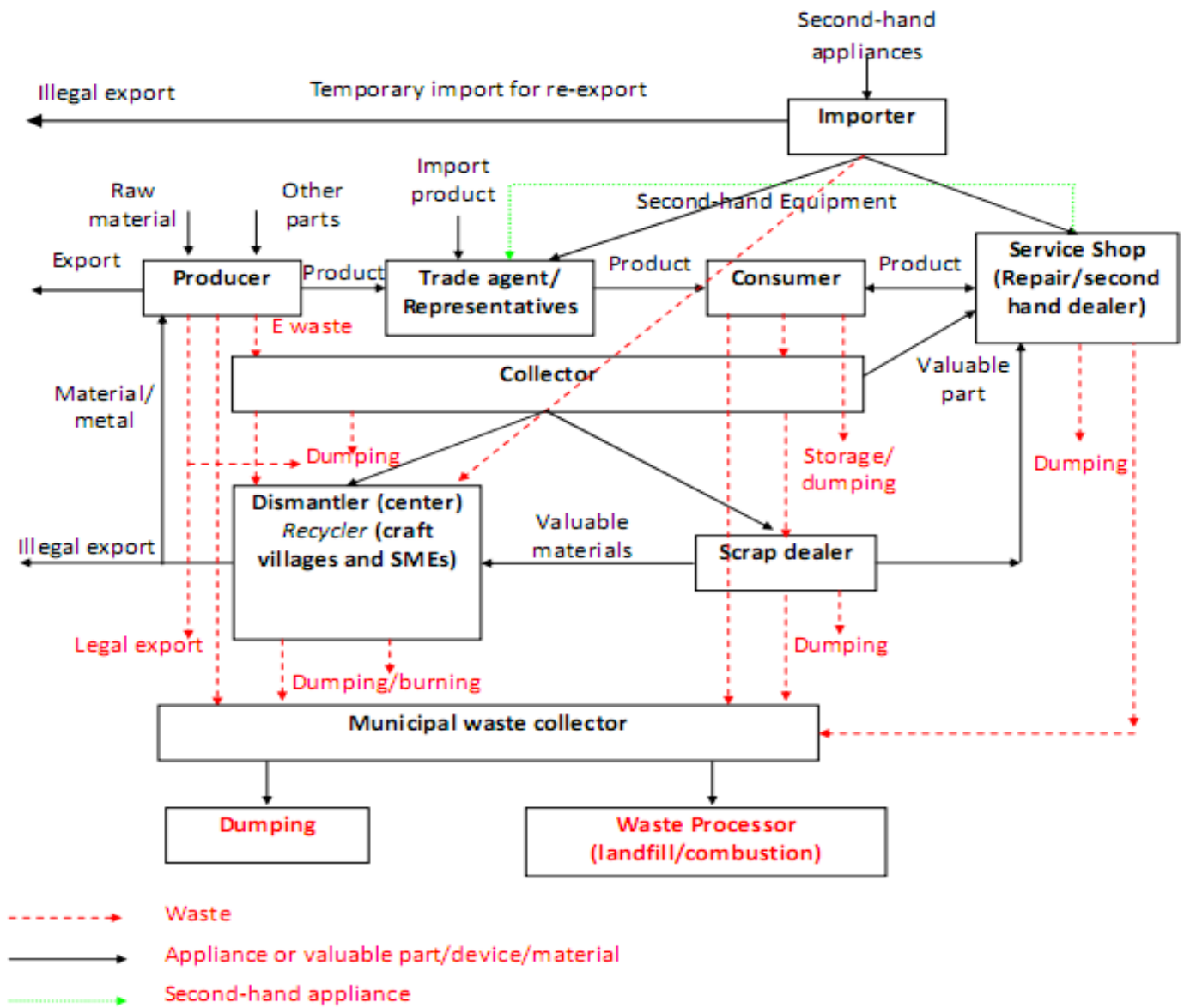


Fig 1. The flow of electronic home appliance and electronic waste in Vietnam

2014,QUANG

KIGAM

Disposal

Major manners:

- Sell/give to next user (REUSE)
- Sell to the collector or service shop
- Keep at home
- Open dumping/disposing with domestic waste (for small)

collection

Disposal

Collection by private collector

Private collector and collection agent
Service shop
Sell agent (by program)
URENCO(Urban Environment Company)

… and agent

Dismantling

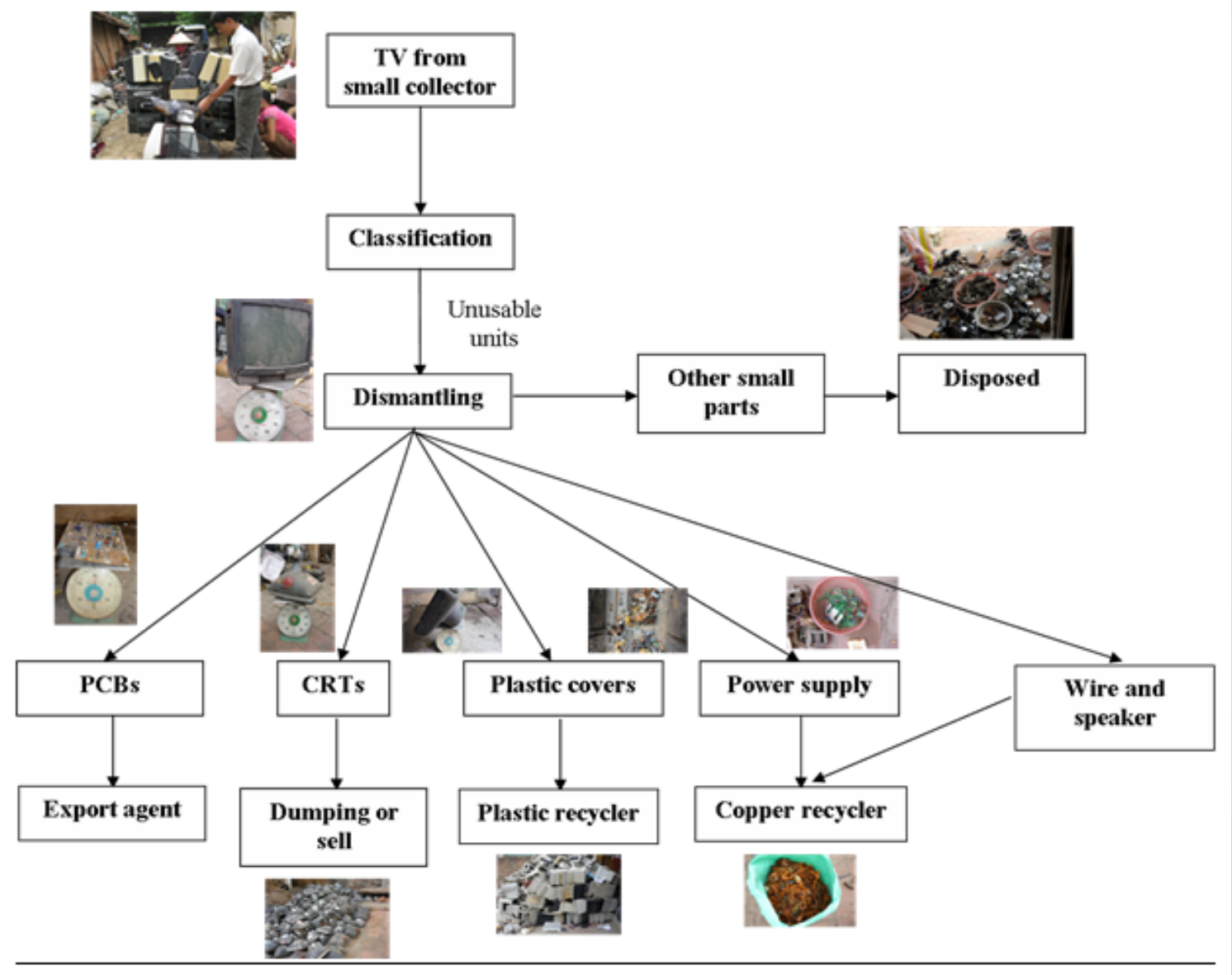
- Conducted to recover some basic materials (ferrous copper, aluminum, plastic, lead-free glass, part/device)
- Conducted in some dismantling centers (Trang Minh, HP; Bui Dau, Phan Boi, HY, Te Lo, VP, Văn Môn, BN, v.v.) and the service shop
- Is considered as the major recycling activitiy of e-waste

Dismantling

2014,QUANG

KIGAM

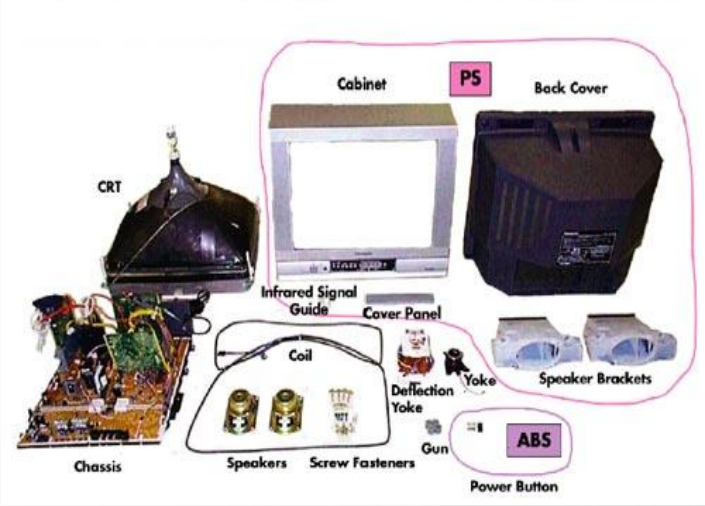
The common dismantling process of TV



2014,QUANG

Television (TV)

- Valuable recycling materia l : ~ 0.3 - 0.5 kg/unit copper, < 1 kg steel and aluminum, fr ont cover (vary)
- CRT is dumped or exported



- Back cover, PCB and a part of whole CRT are exported
- Other small parts can be reused or disposed to landfill
- Rate of recycling is about 20% weight

Recycling

- ❖Conducted by the craft village (private sector) and some producers that used e-waste as the secondary material source
- ❖Conducted by informal and back-dated technology and equipment, which is effected to environment and public health, and produced low quality products
- ❖It is lacked of research and research development for e-waste recycling
- ❖Out of number of the licensed companies for e-waste treatment, there are only 3 companies have the possessi ng e-waste treatment line

Properties of Recycling system

❖Dismantling is major activities:

- Based on the private sector:
- The use of backward technology and rudimentary equipment;
- The employment of manual labor;
- Only treat the ordinary material

❖The lack of proper environmental protection, which are considered as the cause of harmful effect on environment and public health.

❖Separated with the science research

- Expert and Equipment are necessary

International cooperation

Due to that, the K-V project is necessary for both of technical and management fields, and is expected to play an important role for the development of waste recycling industry in Vietnam, through:

- The enhancement of research capacity
- The development of proper recycling technology for e-waste

1’st project (2005-2010)

Title: Establishment and operation of Korea- Vietnam resource recycling center

Partner:

KOREA :KIGAM (Korea Institute of Geoscience and Mineral Resources)

Vietnam :HUST(Hanoi University of Science and Technology), INEST (Institute for Environmental Science and Technology)

BUDGET: 0.50million $, supported by MOE(Korea Ministry of Education)

1’st project (2005-2010)

-Establish joint research lab. in Vietnam
-Technology promotion in Vietnam
-Technology seminar in Vietnam-3 times
-Research personnel training in KIGAM

Short term: 10 days-10 person 4 times
Middle term: 3 month-1 person
Long term : 2 year-3 person

Establish joint research lab. (2005)

technology promotion in Vietnam

1’st project (2005-2010)

seminar

Training

2’nd project (2013-2016)

Title: project for Research Capacity Building, Waste Recycling Technology Development and Transfer in Vietnam

Partner:

KOREA :KIGAM (Korea Institute of Geoscience and Mineral Resources)

Vietnam :HUST(Hanoi University of Science and Technology), INEST (Institute for Environmental Science and Technology)

BUDGET: 1.50million $ (software: 0.80M$, hardware 0.8 M$), support by KOICA

Project content

Target Waste: E-waste Target field: Recycling

Part 1: Establishment of waste recycling laboratory
- Rooms: 90 m^2, setup all the facilities
- Equipment and Materials

Part 2: On-the-job Training
(technology transfer)
- Training course for policy-making
- Training course for practical research

Part 3: Organization of Joint Research Team on E-waste recycling to carry out 3 joint researches:
- Research on the global trends for the management and recycling of E-waste
- Control and development of E-waste recycling technology in Vietnam
- Development of metal extraction technology from PCBs

Part 4: Establishment of the Waste Recycling Research Center

List of equipment and materials

No.	Item	Quant.
1.	Preliminary treatment equipment (shredder)	1set
2.	Preliminary treatment equipment (cutting mill)	1set
3.	Preliminary treatment equipment (Ball and rod mills)	1set
4.	Air separation equipment	1 set
5.	Magnetic separation equipment	1 set
6.	Electrostatic separation equipment	1 set
7.	Power supplier and accessories for Electrolysis equipment	1 set
8.	Extraction shaker	1 set
9.	Electric furnaces	1 set
10.	Thermo gravimetric analyzer (differential thermal analyzer)	1 set
11.	Electrochemical workstation	1 set
12.	High pressure reactor system (autoclave)	1 set
13.	pH meter	2
14.	Shaking water bath	2
15.	Fume Hood	1

No.	Item	Quant.
16.	Laboratory workbench and furniture	1
17.	**Leaching system, including**	
	Heating mantles	1
	Heating mantles	1
	Digital temperature controller with thermocouple probe	2
	Mixers with accessories and stands	2
18.	Stirring hot plate	2
19.	Furnace	1
20.	Ultrapure water purifier	1
21.	Centrifuge	1
22.	Oven	1
23.	UV-Vis Spectrophotometer	1
24	Office equipment (computers, telephones, fax, photocopy, …)	
25	Materials and glassware	

IV. CONCLUSION REMARKS

E-waste is rising as emerge issue in Vietnam, due to its increasing r ate and environmental impacts, and the co-benefits obtained from it s treatment

The project for research capacity building, waste recycling technolo gy development and transfer in Vietnam is considered as necessary and effective step to contribute to the development of sustainable w aste recycling industry

Thank You