Chapter 13

Location of Recycling Facilities and International Trade of Recyclable Waste

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March 2010

This chapter should be cited as
Kojima, M. (2010), 'Location of Recycling Facilities and International Trade of Recyclable Waste', in Kojima, M. (ed.), *3R Policies for Southeast and East Asia*. ERIA Research Project Report 2009-10, Jakarta: ERIA. pp.309-318.

CHAPTER 13

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Michikazu KOJIMA

1. Introduction

There are many types of recycling facilities. The recycling facilities for some specific items are not located in a country. If there are no recycling facilities for specific items in the country, the collected specific recyclable waste may need to be exported for recycling. For example, paper mill and lead recycling facility are not located in Singapore. All collected use paper and lead acid batteries are sent to other countries for recycling.

This paper reviews the location of recycling facilities for selected recyclable wastes, such as copper scraps, lead scraps, nickel scrap and others. There are no complete lists of recycling facilities in the region. Especially, the location of informal recycling facilities is not well reported. But some lists shows that the facilities are unevenly located. The statistics of international trade for the selected waste are used as complementary resource in searching for information. The trade flow of a specific waste from a country to another country may indicate the lack of the recycling facility in origin, and the existence of the recycling industry in the destination. It is also possible that some recyclable waste are internationally traded because of other reasons, such as the demand and supply gap of recyclable waste, the differences of cost or product price between exporting country and importing country, among others. To identify the reason of international trade, interviews to waste generators and experts were conducted.

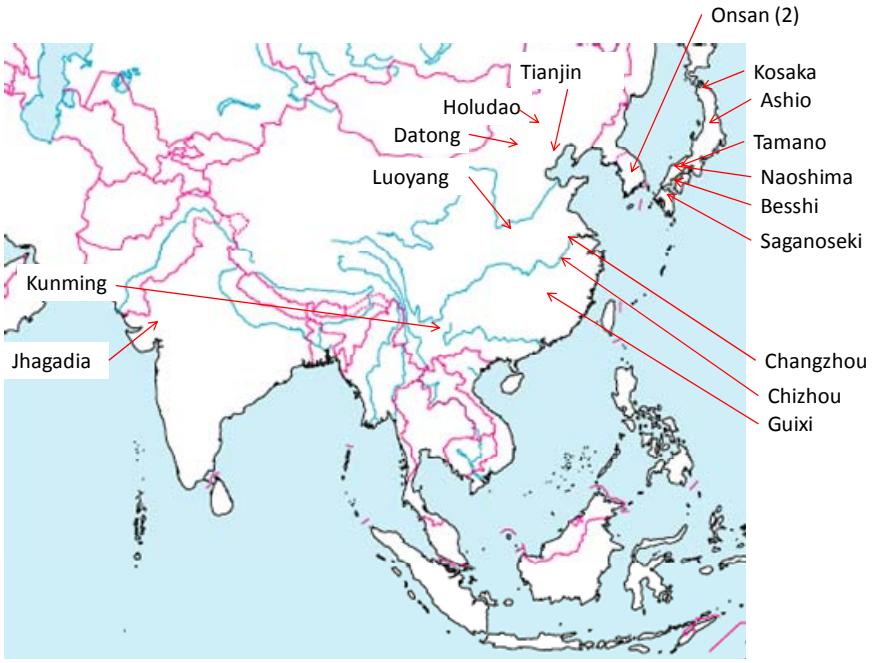
Section 1 shows the case of copper recycling. Section 2 deals with location of lead recycling facilities in Asia. Section 3 shows the trade of waste nickel cadmium and nickel metal hydride batteries. In conclusion, the relationship between location of recycling industries and international trade of recyclable waste is discussed.

2. Recycling Facility for Recovering Copper

Copper is used in various electrical equipment and electronics. It is widely use in cables. Copper waste is recycled and re-used in many places. Especially, copper waste with high concentration rate of cooper is often directly recycled without refinery and electrolysis treatment in developing countries. To recycle copper waste with low concentration of copper, or to use copper in highest grade, the refinery and electrolysis treatment has to be conducted.

Figure 1 shows the location of copper smelter and copper refinery in Asian countries. Based on International Copper Study Group (2009), copper smelter and refinery are basically located in Japan, South Korea, China and India. In Southeast Asian countries, there is no smelter and refinery using copper scrap, while some smelter and refinery using copper ore exist.

Figure 1. Copper Smelter and Refinery using Copper Scrap



Source: Compiled from the data in International Copper Study Group (2009), "Directory of Copper Mines and Plants."

International trade statistics support the information of the location of copper smelter and refinery are unevenly located (Table 1). China and India is net importer of copper scrap. Especially, China imports nearly 4 million to 6 million tons of copper scrap. But copper scrap imported by China may include mixed scrap, which contains copper scrap, ferrous scrap and other metal scrap. According to China Environmental Yearbook, copper content is about one third of the total amount. Philippines, Thailand, Singapore and Indonesia are also net exporter of copper scrap, but the import amount is less than ten thousand tons.

South Korea and Japan have both import and export of copper scrap. The quality of imported and exported one is different. The average price of imported copper scrap by Japan is 4.95 US dollar in 2009, while exported one is 2.03 US dollar (calculated from trade statistics. The quality of imported one is higher than imported one. It suggests that even in copper scrap recycling, Japan has comparative advantage to recycle high grade copper scrap.

Table 1 Import and Export of Copper Scrap by Selected Asian Countries, 2008-2009 (Unit: thousand tons)

	Import		Export	
	2008	2009	2008	2009
Japan	138	97	395	359
South Korea	217	163	191	186
China	5,577	3,998	3	2
Philippines	3	4	18	22
Thailand	7	9	76	69
Singapore	4	2	16	8
Indonesia	9	6	40	34
India	103	61(Jan-Oct)	1	1(Jan-Oct)

Note: Export of Singapore is domestic export, not including re-export.

Source: International trade statistics of each country.

In Southeast Asian countries, there are some smelters and refineries to extract copper form copper ore. Copper mines are also being operated in Indonesia, Philippines and other countries. Copper smelters and refineries concentrate on virgin resources rather than scrap, because they have comparative advantage in extracting copper from copper ore. As a result, Southeast Asian countries are net exporter of copper scrap.

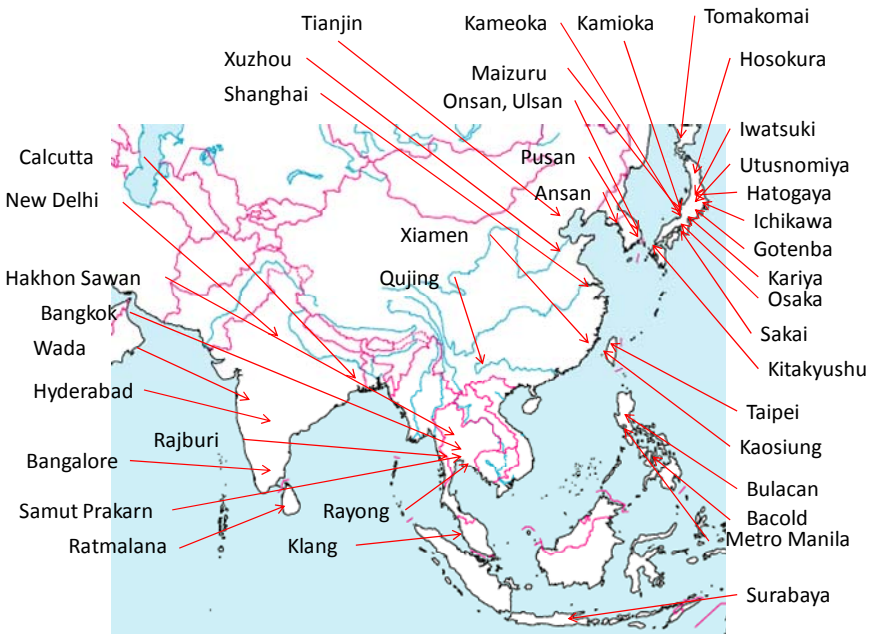
3. Recycling Facility for Recovering Lead

The most demand for lead is for the production of lead acid batteries. Recovered lead is also used for lead acid batteries, mainly. Other minor types of lead usage are for solder, CRT glass, among others. Major input of lead recycling facilities is waste lead acid batteries.

Contrary to copper, lead recycling facilities are located in most of Asian

countries. Figure 2 shows the locations of lead recycling facilities, which are formal recycling facilities and relatively big one. In China it is said that more than 300 lead recycling facilities exists. Informal lead recycling facility which has no pollution control equipment has been observed also in some Asian countries. For example, in Figure 1, although no recycling facility is mapped in Vietnam, but several small-scale lead recycling factories are located in Hung Yen province.

Figure 2 Location of Lead Recycling Facility



Source: Made from the data in International Lead and Zinc Study Group (2007) World Directory 2006; Primary and Secondary Plants.

Most of lead containing wastes, such as waste lead acid battery is regarded as hazardous waste under the Basel Convention. The parties of the Convention should follow the prior notice and consent procedure defined in the Convention. Table 1 shows the international trade of lead scrap, based on the national reporting to the

secretariat of the Basel Convention by each country.

China basically prohibits import of hazardous waste. Although there are many lead recycling facilities in China, lead recycling factories cannot import lead waste in national reporting. Japan also has many lead recycling facilities, but they do not have comparative advantage in lead recycling. Export of lead scrap to South Korea has been increasing recently. In Asia, South Korea and Philippines are major importers of lead waste. Imported lead scrap fills the growing demand of lead in domestic market and export demand of final goods.

Table 1 International Trade of Lead Scrap for 2005

Import Export	South Korea	Philippines	Singapore	Belgium
Japan	5757 (64000)			954
Taiwan	(600)			
Philippine	1000 (3000)		120	
Thailand		(870)	(120)	
Singapore	100 (7000)	6913 (10000)		
Sir Lanka	(18500)			
Others	(60500)	(18720)		

Notes: Without ( ) : Report from exporting countries

With ( ) : Report from importing countries

Source: Based on the data of national reporting to the Secretariat of the Basel Convention for 2005*r.*

It is not clear the reason of differences between statistics of importing and exporting countries. One of the possibilities is the gap between the actual volume of trade and the permitted maximum volume. Based on the interview with Ministry of Environment in South Korea, South Korean government reports permitted amount of hazardous waste export and import in national reporting.

4. Waste Ni-Cd and Ni-Mh Batteries

International trade of waste Nickel Cadmium (Ni-Cd) battery and Nickel Metal hydrid (Ni-Mh) batteries are reported in national reporting of the Basel Convention. Since Cadmium is a hazardous substance, Ni-Cd battery is regulated under the Basel Convention. In Asia, Japan and South Korea are major importers; and China, Taiwan and Indonesia are major exporters.

Based on the interviews to recyclers in Japan, nickel recovering facilities are located in Japan and South Korea. On the other hand, China and Indonesia are production center of Ni-Cd and Ni-Mh batteries. For example, China exports 739 thousand unit of Ni-Cd battery. Indonesia also exports 60 thousand unit of Ni-Cd battery. Based on the interviews to waste generator and recycler, the waste Ni-Cd and Ni-Mh batteris traded can be regarded as factory waste from Ni-Cd and Ni-Mh batteries.

Table 2 International Trade of Waste Ni-Cd and Ni-Mh Batteries in 2006

Import Export	Japan	South Korea
China	(1404)	28 (1530)
Hong Kong		(60)
Indonesia	150 (85)	
Malaysia		(150)
Australia		(150)
New Zealand		(100)

Notes: Without ( ) : Report from exporting countries

With ( ) : Report from importing countries

Sources: Based on the National reporting to the Secretariat of the Basel Convention for 2006

5. Conclusion

Scale economy can be observed in many production processes, including recycling process. If the size of a national economy is small, a recycling plant cannot collect enough waste to operate. As shown in Sections 1 and 3, recycling plants for specific waste are unevenly located in Asian countries. In such cases, international trade is inevitable to recycled specific waste.

Even there are many recycling facilities across the region, as shown in the case of lead recycling in Section 2, international trade occurs due to the gap between supply and demand, and comparative advantage in recycling process and final product. On the other hand, transboundary movement of hazardous waste may cause pollution in importing country (Center for Investigative Reporting and Bill Moyers(1990), Basel Action Network(2002)). Thus, international trade of hazardous waste should be regulated to prevent pollution from informal recycling. On the other hand, international trade of hazardous waste by formal recyclers with environmentally sound technology should not be prohibited. Based on the location of recycling facilities, the demand and supply gap, the existence of informal recycling, appropriate policies on international trade of recyclables waste should be identified.

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