Chapter 12

Policy Challenges and Research Needs for a Sustainable Resource Circulation in East and Southeast Asia

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CHAPTER 12

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1. Introduction

Developing Southeast Asian countries face environmental problems on associated with improper waste management. This paper overviews policy challenges and possibility to facilitate further regional cooperation in waste management and recycling in the region, and discuss the future research topics to formulate regional policies to establish sound waste management and improve resource efficiency.

2. Policy Challenges in Waste Management and Recycling

2.1 Common Problems in the Region

Most of cities in low and middle income East and Southeast Asian countries suffer open dumping and other solid waste problems, due to undeveloped systems of waste collection and treatment. On the other hand, the demand for resource materials in these countries is increasing as the region continues its growth as the "factory of the world" accompanied by rapid urbanization. The escalating rate in materials consumption and solid waste generation increases the potential risk of serious pollution of air, soil and water in the future, aggravated by the absence of an effective regulatory regime, insufficient capacity of the 3Rs on the part of the industry, lack of information and economic fluctuations (ADB and IGES 2008;ADB, IGES and UNEP 2006; MOEJ and IGES 2008).

In terms of a regulatory regime, for instance, the absence of environmental and labor standards has led to the use of strong acid for metals recovery, open burning recycling and waste treatment practices that are inexpensive but with very high environmental risks and are harmful to human health. There are no social or economic incentives that

would induce to practice sound waste management or environment-compatible recycling. Implementation of environmental regulations and the concomitant construction of formal infrastructures and systems for improved waste collection and treatment calls for, as a prerequisite, a consistently high level of regulatory capacity on the part of municipal authorities. This in turn gives rise to the indispensable need for financial support as well as guidance by the central government in terms of indicating policy priorities and direction. The cooperation of citizens is equally important for the achievement of a sound recycling of resource materials.

A strong industrial base is also important to build up a system for a sustainable circulation of resource materials(ADB and IGES 2008). The material flow of e-waste and other waste products that contain rare or precious materials can be both useful and harmful. Industrial waste discharged from manufacturing processes, which accounts for a large majority of total waste generated, is hazardous or harmful; but in many instances this waste can also be potentially useful as resources (recovered as a by-product). However, the treatment of such waste is often beyond the capacity of the waste-generating manufacturer. Thus, there is the need for reliable waste management/recycling contractors. There should also be technologies and facilities that would ensure sound treatment and efficient recovery operations. This translates into the need for policies that would encourage the development of the recycling industry sector on an industrial scale and a solid financial base.

E-waste, end-of-life vehicles and other used products that are made of a complex variety of raw materials and parts contain a large number of substances that are both harmful and useful at the same time (Oyuna and Bengtsson 2009). This duality of material circulation is seldom recognized to the proper extent in the market. The recycling

market looks at the economic value aspect of used products and handles them accordingly. Attention is paid only to the potential usefulness as a resource and not to the potential environmental risks (Wong 2006; Hai 2008; Oyuna and Bengtsson 2009). Lack of information on the hazardous substances contained in used products and recyclable resources and the insufficient knowledge and information required for their appropriate treatment pose a risk to the environment.

One-sided attention to the usefulness of used products and recyclable resources is an incentive to recover costs through the choice of inappropriate and inexpensive treatment methods. At the time of the turbulent ups and down in the international resources market during the latter half of this decade, recycling activities moved away from industrialized countries to developing countries with rising resource prices, and then turned sluggish when the situation reversed (Damanhuri and Padmi 2009). As far as the supply/demand adjustment is left to market forces alone, a sustainable circulation of resource materials is not likely to be achieved in some cases. For example, a case by Honda (2005) showed the market-based incentives of export of low quality plastics. Waste plastics in Japan were bought in 10.3 yen/kg from an emitter and will be bought in 30 yen/kg in China. This counts 20 yen/kg benefit for the waste plastic dealer At the same time, if this waste plastics is recycled in Japan, it will cost more than 31 yen/kg for the emitter. This means that the emitter will save at least 41 yen/kg (31 yen/kg saving plus 10.3 yen/kg by sales) by exporting the plastics waste. However, this buying capacity of China is based on low labor cost as well as low standard in environmental and health standards.

To eliminate such risk factors,, capacity development of the central and local governments through international cooperation in terms of regulatory framework, industrial base, information availability and stabilization of recyclable resources market

is needed.

2.2 Japan's Experience and Lessons in Policy Development and Reform

Japan has been at the frontline of such efforts by advocating the policy objective of "establishing a sound material-cycle society" since the end of 1990s and by designing and implementing domestic systems to address such problems.

Behind this policy shift, there is a wide-spread notion that waste issues became social structural problems. The Japanese economy of the 1980s has been characterized as a "bubble economy" and as one which resulted in increases in consumption and more and more urbanization of Japanese society. This caused the classic environmental problems of urban life style: waste, lack of waste disposal facilities, water quality, and chemical components in the products of every household, transportation and destruction of natural environment. The life style of modern society itself, such as prevalence of electronic appliances, automobile, package, instant foods, and using of chemicals, has become the source of problem (IGES 2000: 19). For example, in Japan, household waste has increased from 44 million tons in 1980 to 50 million tons in 1990. Industrial waste emissions increased from 292 million tons in 1980 to 395 million tons in 1990 (Environmental Agency, Quality of the environment in Japan 1981, 1991, and 2001). The waste generation amount continued to be in high level every year. At the same time, local governments faced difficulties in constructing final disposal site due to increasing awareness of citizens. Also, there was a rising public criticism to the dioxin pollution from waste incineration facilities in the early to mid 1990s as seen in the case of Tokorozawa city, Saitama, Japan. In the late 1990s, Japanese government responded to face these challenges by reforming waste management and recycling mechanisms

fundamentally along the following principles: Extended Producer Responsibility (EPR), Polluter Pays Principle (PPP), and collaboration of central and local governments.

Through the late 1990s to early 2000s, product-oriented legislation and mechanisms for recycling based on EPR principles, such as Containers and Packaging Recycling Law in 1995; the Law for Recycling of Specified Kinds of Home Appliances (or Home Appliance Recycling Law) in 1998, the Construction Materials Recycling Law in 2000, the Food Recycling Law in 2000 and End of Life Vehicle Recycling Law in 2000, were introduced for aiming to motivate producers to promote design for the environment and recycling activities by shifting burden in waste management and recycling from local authorities to producers. Also, Japan experienced several huge illegal dumping incidents of industrial wastes in the 1990s such as Teshima Island Problem widely known in the early 1990s. For this, polluter pays principle (PPP) was applied to prevent illegal dumping of industrial waste by introducing manifesto to track industrial waste or cost bearing for recovery of situation. These shifts in policy have been promoted through collaboration of central and local governments. For example, central government has financially supported local government to introduce dioxin-free large-scale incineration plant as well as recycling facilities under Eco-town program to construct infrastructures to support this policy shift.

Some of the lessons from Japan's experience of development and reform in waste management and recycling policy for developing Asia can be summarized into the following three points. Firstly, successful policy to promote waste management and recycling involves an aspect of socio-economic reform. Thus it is crucial to identify clear and specific social and economic needs to motivate reform in waste management. Secondly, to establish a comprehensive mechanism, Japan has employed a step-by-step

approach to introduce new legislations along with domestic recycling and waste management capacities. Once, Japan decided to introduce reform in waste management and recycling policy in mid 1990s, it took about 10 years for developing comprehensive mechanism including framework legislation such as fundamental law and plan for establishing a sound material cycle society in 2001 and 2003 or product-specific recycling laws mentioned above started to be introduced in the 1990s. Thirdly, influence of economic globalization reached not only to production chain but also to waste and recycling chain. This will be briefly discussed in the section (4) below.

2.3 Needs for International Cooperation

In addition, China and Korea, in particular, have each given material circulation high priorities in their national policies. Dissemination of experiences of these three countries (plus Taiwan, which is well-known for its advanced initiative in solid waste management) should be considered as an essential element for international cooperation in this sector in Asia.

For effective implementation of policies, it is not sufficient to establish well-designed legislative and regulatory frameworks and physical infrastructures such as advanced sorting or recycling facilities, but it is also needed to develop an extensive capacity and multi-lateral cooperation in addition to bilateral partnerships. A response to meet this challenge is for developing countries to share their experiences with each other, as an increasing number of countries are shifting to the status of emerging economies (Hotta et. al. 2009). There are no textbook solutions in waste management and recycling; the process of learning from each other through exchange of experiences both success and failures is the key.

2.4 Internationalization of Downstream Resource Circulation

In industrialized countries, on the other hand, waste management and recycling policies have been established, and mechanisms for domestic circulation of resource materials are in place; but recyclable resources are flowing out to other countries because of the high costs of collection and treatment and the increased demand for resources in developing countries (Terazono et. al. 2004; Kojima 2005; Hotta and Elder 2009). This flow, although meeting the need for such resources in developing countries, has given rise to environmental concerns over inappropriate treatment and residues (Wong 2006). In short, problems associated with waste management and recycling have acquired international dimensions (Hotta and Kojima 2008, Hotta and Elder 2008, Hotta and Elder 2009). It is also expected that the domestic generation of e-waste and other hard-to-treat waste and recyclable resources will increase rapidly in developing countries as well.

With economic integration making steady progress in East and Southeast Asia and the resulting rise in demand for resource materials, it is very important that sustainable material circulation flows be ensured through regional cooperation. Implementation and enforcement of adequate regulatory measures and building of policy development capacities in developing Asian countries are called for to ensure a smooth flow of recyclable materials through appropriate treatment routes and healthy markets.

If the issue of international resource circulation is essential trade-and-environment issue, regional cooperation should also be considered from the perspective of filling the inevitable gaps in the policies of national governments.

3. Current situation of International Cooperation in East and Southeast Asia Toward Sustainable Resource Circulation

Previous section shows international information sharing and cooperation are imports to bring about sustainable resource circulation in Asia. International assistance and cooperation in terms of capacity building for policy development and networking of stakeholders should be promoted in addition to technical assistance (ADB and IGES 2008, IGES, UNCRD, and UNEP/RRCAP 2009). International cooperation for environmentally sound international circulation should be strengthened.In East and Southeast Asia, various international cooperation initiatives have been taken in response to the need for the internationalization of waste management and recycling issues and for the capacity building of the countries concerned. At the core of such efforts are the policy dialogues and international cooperation programs that were triggered by the 3R Initiative launched in 2005 (ADB, IGES, and UNEP 2006, ADB and IGES 2008, MOEJ and IGES 2008). Asian countries have been engaged in ongoing discussions on waste management and recycling issues as well as resource efficiency questions from the Asian regional perspective. In 2008, the Kobe 3R Action Plan was adopted as one of the agreement documents of the G8 Environment Ministers Meeting in Kobe. The Action Plan emphasized “that an international point of view for efficient use of resources through the promotion of the 3Rs is required to respond to the advancing interdependence of the world economy, expansion of trade in materials and products, and resource constraints due to increasing demands,” (Kobe 3R Action Plan, *G8 Environmental Ministers Meeting 2008, Kobe, Japan, 24-26 May 2008*: P. 2) and went on to declare that the G8 environment ministers

will “collaborate to improve 3R capacity in developing countries by helping to develop databases, information sharing and monitoring mechanisms, 3R-related institutional design and policy planning, and supporting the formation of development projects, by utilizing frameworks and initiatives of multilateral cooperation in an effective manner, and capacity and expert knowledge of international organizations.”(*ibid.* P. 6)

Some major examples of such international collaboration are listed in Table 1.

Table 1. Examples of Multi-lateral Collaboration on Waste Management and Recycling in Asia and the Pacific

Regional 3R Forum in Asia	Inaugurated in November 2009, this Forum promotes policy dialogues and facilitates 3R project implementation in alliance with international aid organizations and in cooperation with 3R research network.
TEMM and policy dialogue on 3R and circular economy	Following the agreement of the Seventh Tripartite Environmental Ministers Meeting (TEMM) between Japan, China and Korea in October 2005, annual seminars on waste management and recycling, 3R and the circular economy, as well as bilateral policy dialogues are held, promoting information exchange and sharing among the working-level officials of the three countries.
The Asian Network for Prevention of Illegal Transboundary Movement of Hazardous Wastes	Operating since 2004, this Network provides a forum for officials in charge of the Basel Convention in Asian countries to get together and share pertinent information.
The Asia Pacific E-waste Project	With the Secretariat of the Basel Convention as the main driving engine, activities such as the development of an E-waste inventory in Asian countries, training and regional workshops have been established since November 2005. In addition, pilot projects on E-waste management have been implemented.

Thematic Working Group on Solid and Hazardous Waste of the Regional Forum on Environment and Health in Southeast and East Asian Countries	As part of the Regional Forum on Environment and Health in Southeast and Asian Countries for which the World Health Organization (WHO) and the United Nations Environment Programme (UNEP) function as secretariat, government officials and experts gather together and review best practices and challenges in the management of municipal waste and medical waste. This working group was established in February 2008.
UNEP International Panel for Sustainable Resource Management	This international panel was launched by UNEP in November 2007, inviting world-renowned scientists and experts. The panel gathers the latest information and builds a knowledge base regarding the utilization of natural resources and environmental impacts. It also makes policy recommendations.

4. Directions of International Cooperation Toward Sustainable Resource Circulation in East and Southeast Asia

Today, more and more Asian countries are working to create 3R systems, circular economies and sound material-cycle societies. In addition to international frameworks which are shown in previous section, bilateral collaboration is actively promoted in this direction. For example, between China and Japan, collaboration between eco-towns and ecological industrial zones is taking place in the form of the partnership of Kitakyushu with Qingdao and Tianjin and that of Kawasaki with Shenyang (Liu et. al. 2008, Matsumoto and Liu 2008), that promote city-level and enterprise-level sharing of experiences under the auspices of national research institutes and governments. With the outcomes of such partnerships and collaboration, Asian countries and international organizations should be able to share their mutual experiences in this sector, which in turn will be reflected in international cooperation projects and initiatives in East and Southeast Asia (Hotta and Elder 2008).

Asian countries have begun to enact specific recycling laws and build pertinent recycling mechanisms into their own structures, based on the principle of extended producer responsibility (EPR) and through a mix of regulatory, economic and information-based policy tools (Hotta et. al. 2009). It is hoped that the experiences gained by each country will be shared through the Regional 3R Forum in Asia and other frameworks such as the ERIA 3R Working Group, and facilitate the construction of mechanisms for proper reflection of resource utilization costs at the upstream sectors and equitable allocation of necessary treatment costs(UNESCAP and IGES 2006).

For the development of industrial capacity for resource circulation at the national level, a proper infrastructure should be built, adequate technologies should be transferred and mechanisms for technological innovation that link regulatory regimes with infrastructure should be developed (ADB and IGES 2008). In this respect, Asia has accumulated experiences in the forms of a Japanese eco-town (a recycling industry complex) and Chinese ecological industrial zone that are being developed, building upon the concept of industrial ecology. There have been active exchanges at the local government, business and academic levels. There is also a need in Asia to formally organize the informal waste sector.

For the construction of appropriate resource circulation systems, the need for information sharing, particularly the information and data relating to the properties of waste (on its potential usefulness and harmfulness) has increased against the background of increased concern over environmental contamination in developing

countries and the stronger interest in metals recovery(Mori et. al.2009). In view of the growing transboundary movement of products, it would be necessary to explore mechanisms for communicating product environmental information and data in Asia, while paying attention to differences in national stances on this issue(Mori et. al. 2009). This is another area in which international cooperation in Asia would be able to play an important role.

International collaboration is believed to have the important function of communicating experiences of pioneer efforts (not only success stories but also lessons learned in terms of hurdles and obstructions) in a multilateral context beyond the conventional one-way transfers. Such international collaboration is expected to make positive contributions rather in the upstream challenges of energy efficiency, resource saving and other forms of sustainable resource utilization as well as resource efficiency or reductions, than in the downstream issues of waste management and recycling

5. Research Needs for Sustainable Resource Circulation in Asia

As discussed above, challenges to be overcome to achieve sustainable resource circulation is not only technical ones but also more fundamental institutional challenges which needs proper policy implementation. Especially, there is a rising needs for policy research on how to improve governance and implementation of resource circulation policy in Asia. For example, more careful analysis is needed on different policy tools/measures, which were successful for improving unit-level improvement in eco-efficiency in Organization for Economic Co-operation and Development (OECD) countries in the context of developing Asia. Also, more research shall be conducted on

how to improve coordination between infrastructure, financial mechanisms, human resource development, and technology transfer required for a sustainable resource circulation. Another aspect that needs to be studied is how the different types of governance, or role sharing among central and local government affects efficiency in resource circulation and waste management.

In East and Southeast Asia, a further increase in waste generation and resource consumption is expected due to the progress in economic development and urbanization. Therefore, it is crucial to expand and prioritize 3R and resource circulation policies in these regions. Therefore, the policy perspective to improve resource productivity is needed in addition to improving waste management. This needs for developing indicators in assessing resource circulation in these countries. In the context of rapidly developing Asia and the rising concerns on global sustainable resource management, such indicators may be different from those of OECD countries to meet the needs of policy makers in developing Asia.

Also, for policy discussions on international resource circulation, introduction of researcher's view is desirable for balanced and constructive discussions among policy makers. Considering the efficient allocation of strategic materials needed for low carbon society, the international resource circulation may not be limited in the issue of transboundary movement of wastes and used products.

From the above perspectives, it shows that there is a continuous and rising need for policy research on how to achieve sustainable resource circulations and to improve

3R policies in Asia to support international cooperation.

6. Conclusion

This paper first overviewed the potential risks which can severally worsen waste and recycling-related challenges faced by developing Asia. By doing so, the paper discussed the necessary policy approaches, international cooperation, and relevant policy research to eliminate such risks. Especially, since waste and recycling-related challenges are now internationalized along globalized material flows, the paper emphasized the needs for closer international collaboration among Asian countries. Along the rising awareness on the needs for 3R approaches among policy makers, it is desirable to share useful knowledge and experience for effective policy implementation. Towards these ends, it is important to analyze experiences of different countries with proper understanding of economic and social backgrounds. In addition, to establish sustainable resource circulation in Asia, the indicators and methods to evaluate effectiveness of policies shall be established in these countries. Regarding international resource circulation, common understanding of the current situation should be generated by further studies.

References

Asia Development Bank and IGES. 2008. *Toward Resource Efficient Economies in Asia and the Pacific*. Manila. ADB, IGES.

ADB, IGES and UNEP. 2006. "Synthesis Report of 3R South Asia Expert Workshop," In *Promoting Reduce,Reuse, and Recycle in South Asia*. Kathmandu, Nepal: Manila, ADB.

Damanhuri, E., and Padmi, T. 2009. "Current situation of waste recycling in Indonesia," in Kojima, M. and Damanhuri, E. eds. *3R Policies for Southeast and East Asia: ERIA Research Project Report 2008 No, 6-1*.pp. (cite pages): ERIA, Jakarta.

Hai, H.T. 2008. Viet Nam National Study on E-Waste. In *The Final Workshop of the RISPO II*. Yokohama.

Hashi, T., and H. Mori. 2005. Networking International Recycling Zones in Asia-Towards improvement of resource efficiency and solutions for environmental problems in developing countries. In *IGES Policy Brief #1*. Hayama, Japan: Institute for Global Environmental Strategies.

Honda, D. 2005. Frontier of International Reycling: Possibility of International Cycle Business, *IGES-KFACE seminar "International Relations from Waste Perspective"October 15, 2005*. Yokohama, Japan.

Hotta, Y. and Elder, M. 2008. "Strategic options for sound material cycle society in Asia". *OECD-UNEP Conference on Resource Efficiency*, 23-25 April 2008. Paris.

Hotta, Y. and Elder, M. 2009. "Internationalization of Waste and Recycling Related Issues and Its Implications for EPR-based Recycling Policy," In *Extended Producer Responsibility Policy in East Asia - in Consideration of International Resource Circulation* –pp. 115-130. Hayama. Institute for Global Environmental Strategies.

Hotta, Y., Elder, M., Mori, H., and Tanaka, M. 2008. Policy Considerations For Establishing An Environmentally-Sound Regional Material Flow In East Asia. *The Journal of Environment & Development*, March 2008.

Hotta, Y., Hayashi, S., Bengtsson, M., and Mori, H. (eds.) 2009. *Extended Producer Responsibility Policy in East Asia – in Consideration of International Resource Circulation-*, Hayama. IGES.

Hotta, Y., and Kojima, S. 2008.“Estimation of Environmental Impacts of Regional Economic Integration in East Asia: Implications for Waste and Recycling Policy”. *IGES WMR Working Paper Series*,Hayama. IGES.

IGES. 2006. 3Rs in Asia; APFED Policy Dialogue Working Paper Series No.2. Hayama, Japan: IGES.

IGES, UNCRD and UNEP.RRCAP. 2009. *National 3R Strategy Development: A progress report on seven countries in Asia from 2005 to 2009.*

Kojima, Michikazu. 2005. *International Trade of Recyclable Resources in Asia*. Chiba, Japan: Institute of Developing Economies, Japan External Trade Organization.

Liu, J., Matsumoto, T., Won, Y-E., Zhang, P., Ji, Y., Qi, Y., Soo, K.and Hyuok, L. 2008. “Study on comparison of eco-industrial parks between Japan, China and Korea,” *Journal of Global Environment Engineering*, 13:.21-38.

Matsumoto, T. and Liu, J. 2008. Investigation of the Development of eco-town projects in Asian Countries and Research on the Possibility of the transformation of the Experience from Japan. Kitakyushu University.

MOEJ and IGES (2008), *3R Issues paper- The 2nd Asia 3R Conference: March 18-19*, MOEJ Tokyo and IGES Hayama.

Mori, H, Koyanagi, H., Ogihara, A., Hotta, Y., Yu, J., Ori, A., Bengtsson, M., Hayashi, S., Aoki, C., Totoki, Y., and Tsydenove, O. (2009), 「適正な国際資源循環を目指した製品中の有用物質および有害物質の管理のあり方に関する研究」、『平成20年度廃棄物処理等科学研究費補助金研究報告書（K2016）』.(“Research on management of valuables and hazardous materials in products aiming for environmentally sound international resource circulation”, *FY2008 Waste Management Research Grant Report(K2016)*)

Oyuna, T. and Bengtsson, M. 2009. *Environmental and Human Health Risks Associated with the End-Of-Life Treatment of Electrical and Electronic Equipment.* IGES Working Paper. Hayama, Japan: IGES.

Shen, X., X. Mao, and T. Wei. 2008. Regional Economic Integration and E-Waste Management in China. In *The Final Workshop of the RISPO II*. Yokohama.

Terazono, A., S. Sakai, Y. Moriguchi, I. Bulent, K.Suzuki, Y. Yamamoto, and K. Hanaki. 2004. *Asia Chiiki ni okeru Shigen Junkan Haiki no Kouzou Kaiseki (Analysis*

of Structure of Resource Circulation and Waste Disposal in Asian Region), Heisei 15-nendo Haikibutsu Shori nado Kakagaku Kenkyu Kenkyu Houkoku-sho (Research Report of Waste Management Scientific Research Grant in Aid in FY 2003. Tokyo: MOEJ.

UNESCAP, and IGES. 2006. Discussion points for the internationally-harmonized EPR systems. In *Asia 3R Conference*. Tokyo, Japan.

Wang, Xuejun. 2007. China's Social and Economic Needs for Circular Economy and EPR mechanisms. In *IGES UNESCAP Workshop on EPR and International Material Flow*. Manila, Philippines: IGES, .

Wong, M.H. 2006. Sources, Fates and Environmental and Health Effects of Persistent Toxic Substances from E-waste Recycling. In *South Asia 3R Expert Workshop*. Katmandu, Nepal.