

Introduction

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Many conferences, including the Ministerial Conference on the 3R Initiative (April 2005, Tokyo) and the Asia 3R conference (October 2006 and March 2008, Tokyo) have been held since then Japanese Prime Minister Koizumi proposed the 3R initiative at the 2004 G8 summit. At these conferences, Japanese experiences in the 3Rs were introduced through oral presentations and reports. The Japanese Ministry of the Environment distributed two English-language reports on Japanese experiences in the 3Rs. MoEJ (2006) focused on the history of waste management, recent policy reform on the 3Rs, and Japan's role in establishing an international sound material-cycle society. MoEJ (2007) also compiled the technologies employed to support 3R implementation and proper waste management.

International cooperation programs in the field of the 3Rs have also been introduced. For example, the Japan International Cooperation Agency (JICA) conducted the "Study on National Waste Minimization in Malaysia" from 2004 to 2006, and the "Study on the Recycling Industry Development in the Philippines" from 2006 to 2008, among other programs.

There are several motivations for these activities. The Japanese government, along with Japanese society, has been accelerating numerous efforts in the 3R field to minimize waste and save resources since the 1990s. The Japanese government regards the 3Rs as an effective field in which to make substantial international contribution. Japanese factories located elsewhere in Asia have also been conducting 3R-related activities. However, basic facilities for proper waste management and recycling are still inadequate in many Asian developing countries. Such countries often request the international assistance and cooperation of the Japanese government. The export of recyclable waste is also an issue of concern. If the export of recyclable waste causes pollution problems abroad, the recycling system should be modified to prevent such problems.

Although recent efforts in the 3Rs have been presented to other countries, the methods used may not be appropriate for some Asian countries. It is therefore important to scrutinize the Japanese experience from the view point of prioritization and applicability in developing countries. This report is intended to review the experience of Japanese efforts and compare the Japanese experience with the situation in other Asian countries, in order to clarify which Japanese experience would be of value to developing countries and which would not.

The success of a certain policy depends on social and economic circumstances. Some 3R policies require certain preconditions before implementation. This report also tries to identify such preconditions. This introduction outlines the history of the 3Rs and Waste Management in Japan, the key concepts involved, and the contents of each chapter in this report.

1 History of the 3Rs and Waste Management in Japan: Issues and Policy Development

Waste policy in Japan dates back to 1900, a time when infectious diseases were widespread due to the improper management of sewage and waste. Since then, the major concerns regarding waste policy have changed considerably. This section introduces a brief history of waste management policy in Japan, including the 3Rs.

During World War II, recycling was emphasized due to the lack of resources to wage war. It was a temporary concern. In the postwar era, resource saving did not become dominant concern until the 1970s. In the 1950s and 1960s, the separation of mixed waste types at roadsides resulted in scattered waste and dirty urban environments. Theft pretending to scrap collector was also a major problem. Stolen items were often sold as recyclable waste or reusable items. Preventing theft and preserving the beauty of urban areas were major concerns. In response, local governments introduced a collector registration system. Collection at specific times also started during this period, in order to preserve urban beauty (see Chapter 1).

From the 1960s to the early 1970s, pollution was a major social concern. Recycling industries also contributed to pollution. As the regulation and enforcement of pollution controls were tightened, recycling industries were forced to invest in pollution control facilities or shut down operations. The central government also provided information on pollution control technology and low interest loans, in order to support private companies investing in pollution control (see Chapter 2).

In the early 1970s, opposition to the establishment of an incinerator in Tokyo's Suginami Ward triggered a reaction from the residents of Koto Ward, where the landfill site for the Tokyo urban area was located. Koto Ward residents obstructed the dump truck on its route from Suginami Ward to the landfill. The Governor of Tokyo declared the "Waste War" in 1971, a symbolic statement which made the public aware of the conflict caused by waste.

As municipalities put more effort in waste management, they faced the challenge of dealing with "waste unsuitable for treatment," which included tires, home appliances, plastics and others. The technological capability of local governments to handle such waste was limited at the time. Local governments considered the possibility of passing the responsibility for reclaiming such waste onto the producers of the products.

The idea of "waste unsuitable for treatment" received strong opposition from industries. At the same time, it also triggered the voluntary efforts of industries. Resource inflation triggered by the 1973 oil shock pushed industries to place more concern on recycling. The Ministry of International Trade and Industry (MITI) formed a committee to consider policy on waste utilization in 1973. An interim report was compiled in 1974, which emphasized the importance of recycling in saving resources (MITI 1974). The report reviewed the current situation and future direction of waste items such as waste paper, end-of-life vehicles, plastics, waste oil, waste tires, waste steel cans, waste aluminum cans, waste home appliances and so forth. It identified the technologies needing to be developed and the roles of stakeholders. Arguments on the roles of stakeholders arose in reaction to the idea of "waste unsuitable for treatment." The Industrial Structure Council set up a subcommittee on waste utilization, which compiled a report on recycling policy in 1977. These efforts were the first initiatives to formulate industrial policy on recycling.

In the same period, several major industrial associations specializing in recycling, such as the Paper Recycling Promotion Center and the Clean Japan Center, were established. These establishments implemented measures to support the actions of MITI. The Paper Recycling Promotion Center provided collateral for member companies which tried to modernize their facilities and establish standards for waste paper collection (Chapter 4). The Aluminum Can Recycling Association conducted a pilot collection program of aluminum cans.

In the latter half of the 1970s and into the 1980s, local governments initiated a number of efforts in recycling. Numazu City started the source separation and collection of waste classified into three categories: waste for incineration, waste for landfill and waste to be recycled. Although source separation for recycling was conducted during World War II, this was not continued after the war. Although some cities possessing incinerators had conducted source separation programs before Numazu City, their purpose was to protect the incinerator. Numazu City's program on the other hand was the first source separation for recycling since World War II (see Chapter 1). Other local governments have gradually introduced similar programs. The number of waste categories has also increased. The report by MITI (1974) proposed the development of technology for handling municipal waste, namely, shredding and sorting the waste by machine. However, instead of such hard technology, the soft technology of source separation and collection has been widely employed in Japan.

A waste exchange program was also initiated by Oita prefecture in the late 1970s. This program links industrial waste generators and users in order to promote recycling. Similar programs have been introduced by other prefectures. The Clean Japan Center supported some local governments in initiating similar programs and coordinated links between programs, facilitating waste information exchange in the wider area.

The rising quality of life in the 1970s and 80s due to economic growth and yen appreciation impacted negatively on the demand for secondhand and low quality goods made from recyclable waste. The domestic supply of recyclable waste also increased during this period. The Japanese shipbreaking industry lost its competitive advantage, with Taiwan becoming a major importer of ships for dismantling (see Chapter 3).

In the late 80s and early 90s, the Japanese economy flourished in the height of the bubble. During this period, the volume of waste produced increased rapidly and illegal dumping became a major problem. In particular, the case of illegal dumping on Teshima, a small island in the Seto Island Sea, had a great impact on waste management policy. More than 500,000 tons of industrial waste, including shredded automobile parts, had been dumped on Teshima. The waste was burned without any pollution control. Leachate from the dump site also contaminated the local ground water and coastal areas.

The Teshima incident and other illegal dumping cases served to revitalize efforts in recycling. In the 1990s, the central government introduced several laws relating to recycling. The first was the Act on the Promotion of the Effective Utilization of Resources, enacted in 1991. Subsequently, the Law for the Promotion of Sorted Collection and Recycling Containers and Packaging was enacted in 1995, followed by the Law for the Recycling of Specified Kinds of Home Appliances in 1998 (see Chapter 6). The Eco-town program, supported by the Ministry of Economy, Trade and Industry and the Ministry of the Environment, began in 1997. Under the Eco-town program, eco-industrial parks where recycling industries had been established were developed in dozens of regions.

The year 2000 was called as “the first year of the Sound Material-Cycle Society” in Japan, due to the enactment of several laws on the 3Rs, including the Fundamental Law for Establishing a Sound Material-Cycle Society. This law prioritizes the 3Rs as follows: first “reduce,” second “reuse,” and third “recycle.” Other recycling laws, such as the Law for the Promotion of Recycling and Related Activities of Cyclical Food Resources, the Construction Material Recycling Law and the Green Purchasing Law were also enacted in 2000. Two years later, the Law for the Recycling of End-of-Life Vehicles was enacted and fully implemented in 2005 (see Chapter 5).

Although domestic recycling systems have been established, increases of exports of recyclables and secondhand goods have shaken these systems. The export of major categories of recyclable waste, such as steel scrap, copper scrap, waste plastic and waste paper, is growing fast. International trade in recyclable waste has become a major issue in the recycling industry and among policy makers in recent years (see Chapter 7).

Thus, the major focus in waste management and the 3Rs has changed over time. In order to solve the main problems at a particular time, a number of measures have been introduced. For example, a fixed-time collection system has been introduced to keep urban areas clean. Low interest rate loans have been provided to enhance investment in pollution control. Appropriate policy measures differ according to the problem.

2 Some Key Concepts

Although policy details vary, some common key concepts exist. In this section some key concepts are discussed.

(1) Utilizing crises as opportunities to change policies and raise awareness

As mentioned in the previous section, waste management in Japan has undergone numerous problems and crises. Central and local governments investigated the problems each time and found reasonable measures to solve or mitigate these problems. However, such policies were not panaceas. As economic and social conditions changed, new problems arose.

Current social issues presented opportunities to raise the awareness of all stakeholders, including consumers. The mass media frequently reported on social issues, further raising awareness. Central and local governments also conducted intensive public campaigns. These activities created the basis for the implementation of voluntary actions such as source separation.

(2) Formalizing and modernizing the recycling industry

In cases where a collector or a recycler faced a problem, measures to formalize and modernize collectors and recyclers were taken. Several policy measures have commonly been observed: research and development in recycling technology, low interest loans for investment in pollution control, the establishment of associations for sharing information, subsidies for investment in new technology, and so on. Registration was also a key measure for formalizing relevant sectors. For example, regarding the issue of theft of waste in the 1950s, the registration of collectors and dealers was implemented to prevent trade in stolen items.

(3) Responsibilities of stakeholders

Stakeholders' responsibilities have changed over time. Regarding municipal solid waste, local governments bear the chief responsibility for their collection and treatment. However, the importance of producer responsibility has been recognized since around 1970. At that time, the major concern was “waste unsuitable for treatment,” which was difficult for local governments to treat using conventional technology. Although local government requested producers to reclaim their waste products, this policy was not institutionalized. Nevertheless, pressure from local governments led to voluntary actions on the industry side, supported by the Ministry of International Trade and Industry.

Since the 1990s, extended producer responsibility has been incorporated in the Law for the Promotion of Sorted Collection and Recycling of Containers and Packaging, the Law for the Recycling of Specified Kinds of Home Appliances, and the Law for the Recycling of End-of-Life Vehicles. Under these laws, producers bear financial and/or physical responsibility for recycling.

The responsibilities of waste generators are also important. Industrial waste generators have the responsibility of disposing their waste properly. Cases of illegal dumping of industrial waste led the amendment of the Waste Disposal and Public Cleansing Law, to place more responsibility on the waste generator. Even if a commissioned waste treatment company is guilty of illegal dumping, the waste generator may still be required to bear the cost of clean up and proper treatment if the waste generator did not enter into a proper contract with the waste treatment company or did not check the manifest. In the case of municipal solid waste, some local governments impose fees based on waste volume on waste generators. Volume-based fees create an incentive for reducing waste.

In recent 3R-related efforts, the responsibilities of waste generators to recycle have also been enforced. The Law for the Promotion of Recycling and Related Activities of Cyclical Food Resources requires that specified food waste generators such as food processors, retailers and restaurants recycle 20% of their waste. In particular, waste generators which dispose more than 100 tons of food waste may be punished if they do not reach this target. Final users of specified home appliances are required to pay the recycling fee when they dispose such appliances.

Thus, in order to promote the 3Rs, it is important to define the responsibilities of stakeholders must be clearly defined.

(4) Coordination and arrangement among stakeholders

Many stakeholders are involved in the social system of recycling: waste generators, collectors, aggregators and consolidators, recyclers, manufacturers using recycled materials, and consumers of recycled goods. Coordination and information sharing among these stakeholders is crucial.

Products made from recycled materials may be inferior in quality to products made from virgin raw materials. Standards ensuring the quality of recycled goods may afford consumers trust in such goods.

A material recycler needs a certain level of recyclable waste in order to operate. If other types of waste are mixed with the recyclable waste, it may become difficult for the recycler to operate their machines. The material recycler often applies standards and pretreatment procedures before feeding recyclable waste into machines. On the other hand, the collector or ag-

gregator has an incentive to put non-valuable waste in sellable waste, especially if payment is based on weight. Therefore, there needs to be collective action on enforcing standards for recyclable waste, in order to facilitate transactions in such materials.

A manifest system for the recycling of industrial waste and specified home appliances is a tool for ensuring the traceability of waste management processes. It enables waste generators to check who treats or recycles their waste.

3 Contents of the Report

There are too many 3R-related issues to be dealt with in a single chapter. Therefore, each chapter of this report has its own focus.

Chapter 1 deals with source separation. In Japan, source separation for recycling was introduced at the end of the 1970s. Before source separation was introduced, the number of waste pickers had already decreased drastically. The lack of waste pickers was a precondition for the smooth transition to source separation in Japan. Based on the experiences of the JICA project in introducing source separation to Thailand, the author stresses the needs to introduce participatory measures and change the public collection system.

Chapter 2 focuses on the problem of pollution from the recycling industry. In developing countries, recycling industries cause pollution. India is a typical example of a country where small and medium scale recycling industries such as metal recycling create pollution. Japan also faced a pollution problem in its recycling industries around 1970. But the problem was smoothly solved through government measures and strict enforcement of pollution regulations. If regulations are insufficient to eliminate dirty recycling industries, formal recycling industries with environmentally sound technologies cannot collect recyclable waste, because dirty recycling industries are able to collect recyclable waste at higher prices than formal recycling industries. Pollution control in recycling industries is an essential precondition to formulating the environmentally sound management of recyclable waste.

The shipbreaking industry was formerly considered to be a source of pollution in Japan. However, due to comparative advantage, the shipbreaking industry moved to Taiwan and other countries in the 1970s. Chapter 3 compares the economic conditions of shipbreaking in Japan and Taiwan in the 1970s, and reviews the development of the shipbreaking industry and metal scrap recovery related industries in Taiwan.

Chapter 4 compares stakeholders' relationships in the Philippines and Japan. Japan has put much effort into fostering stakeholders' collective and/or collaborated actions. Industrial associations specializing in recycling have made standards for the collection of recyclable waste, which indicate how to separate recyclable waste from other waste as well as possible risk factors. Standards for recycled products have been defined in Japanese industrial standards. Recycling laws in Japan also define the responsibilities of each stakeholder. On the other hand, such measures are limited in the Philippines. The unstable relationship between stakeholders is an obstacle to formulating an effective recycling system in the Philippines.

Chapter 5 focuses on the automobile recycling system, which is formalized by Automobile Recycling Law in Japan. The major background to establishing a new system was the "Te-shima incident," one of the most infamous cases of illegal dumping, which involved the dumping of shredded automobile parts. The author cautions that the same system may not be applicable to other countries.

The recycling systems for e-waste in Japan, South Korea and Taiwan are compared in chapter 6. The systems differ among the three countries, each having been developed to solve problems at a particular time and place. Due to differing social and economic conditions, it is difficult to say which system is the best. A recycling system should be designed based on a clear understanding of the material flow of e-waste, and the problems of e-waste management.

Chapter 7 focuses on efforts to manage the transboundary movement of hazardous waste and nonhazardous recyclable waste. Japan ratified the Basel Convention in 1993. After the disclosure of a case of illegal exportation of hazardous waste in 1999, the Japanese government has gradually increased efforts in enforcing regulations. Since exports of recyclable waste have increased, various efforts to prevent illegal export have been conducted in collaboration with the governments of importing countries.

In the conclusion, the lessons from the experiences of Japan and other countries are summarized. It is stressed that Japanese regulations may not be easily transferred directly to other countries. The process of formulating policy, such as identifying problems and using societal problems as opportunities to raise environmental awareness and reform social systems is important in developing countries. The limitations of the Japanese experience are the weaknesses of waste reduction and reuse policies. Furthermore, the globalization of recycling presents new challenges.

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Appendix Table History of the 3Rs in Japan

	Background / Event	Policy
1900	<ul style="list-style-type: none"> - <i>Infectious disease</i> partially due to waste - War - <i>Opposition to incinerator saving resource</i> 	<p>Waste Cleansing Law (00)</p> <p>Sorted collection in Tokyo</p>
1945	<ul style="list-style-type: none"> - Postwar period - <i>Theft, urban beauty</i> - Tokyo Olympics (64) - <i>Pollution</i> from recycling industries (60s to 70s) 	<p>Registration of shops dealing with recyclable waste (50s)</p> <p>Public Cleansing Law (54)</p> <p>Curbside collection</p> <p>Low interest loans for pollution control</p>
1970	<ul style="list-style-type: none"> - <i>Conflict</i> between community near landfill and waste generator - <i>“Waste unsuitable for treatment”</i> - <i>Oil shock</i> - <i>Saving resources and energy</i> - Efforts by local governments - <i>Increase of waste</i> during “bubble economy” and <i>shortage of landfill</i> (late 80s to early 90s) 	<p>Waste Disposal and Public Cleansing Law (70)</p> <p>Declaration of “Waste War” by Tokyo governor (71)</p> <p>“Treat your own waste in your own district”</p> <p>Interim report of committee for waste utilization by MITI (74)</p> <p>Major associations for recycling established (Plastic Waste Management Institute (71), Paper Recycling Promotion Center (74), Clean Japan Center (75))</p> <p>Numazu City starts “sorted collection” to reduce waste (3 categories) (75)</p> <p>“Industrial Waste Exchange Program” started in Oita (76)</p> <p>Eco-mark (Type I eco-labeling) (89)</p>
1990	<ul style="list-style-type: none"> - <i>Illegal dumping</i> in Teshima disclosed - <i>Opposition to new landfill</i> at Fujimae tidal area 	<p>Act on the Promotion of Effective Utilization of Resources (91)</p> <p>Law for the Control of Export, Import and Others of Specified Hazardous Wastes and Other Wastes (92)</p> <p>Law for the Promotion of Sorted Collection and Recycling Containers and Packaging (95)</p> <p>Eco-town program (97 onward)</p> <p>Law for the Recycling of Specified Kinds of Home Appliances (98)</p>
2000	<ul style="list-style-type: none"> - <i>“The first year of a sound material-cycle society”</i> - <i>Export of recyclable waste</i> increases rapidly 	<p>Fundamental Law for Establishing a Sound Material-Cycle Society (00)</p> <p>Law for the Promotion of Recycling and Related Activities of Cyclical Food Resources (00)</p> <p>Construction Material Recycling Law (00)</p> <p>Green Purchasing Law (00)</p> <p>Law for the Recycling of End-of-Life Vehicles (02)</p> <p>“3R Initiative” proposed to G8 (04)</p>

Source: Compiled from various sources.

Note: *Items in italics* indicate major problems or concerns at the time.