

Solid Waste Management (Thematic Seminar)

General situation of solid waste management

The objective of solid waste management is to provide a solution for a wide range of problems including the outbreak of insects and harmful pests that transmit diseases including plague, cholera, and dysentery; hygienic issues such as health issues that stem from the pollution of groundwater and soil due to wastewater discharge from garbage; issues regarding the living environment of the city, such as notable impact on scenery, odour, natural disasters such as floods due to waste obstructing rivers; and disasters such as the generation of methane gas from waste and fires. In developed countries, the main purpose of solid waste countermeasures is also the protection of resources.

Central governments of many countries carry out the management of environmental problems such as air and water pollution, with municipal governments mainly addressing solid waste issues. Cities in Asia are witnessing a rapid rise in the generation of waste in line with increases in population and rapid modernisation of consumer activities, and are considering solutions to cope with various issues. The following table classifies the cities that participated in this first thematic seminar into three groups according to economic levels (country GDP, city GDP for Macao and Chongqing) and provides a comparison of the state of solid waste treatment.

Table-1 Comparison of solid waste management in cities

	Group A	Group B	Group C
City	Dhaka, Kathmandu, Ulaanbaatar, Bhopal, Yangon	Cebu, Nonthaburi, Chongqing, Surabaya	Fukuoka, Kitakyushu, Macao
GDP (USD)	1000 to 3000	3000 to 10000	Over 10000
Waste generation (kg/person · day)	0.3 to 0.6	0.7 to 1.1	1.4 to 1.5
Collection rate (%)	Less than 70	80-90	Approximately 100
Treatment fees (USD/Person · Year)	Less than 1	1-3	38-220
Rate of expenditure in total budget (%)	15.4 to 38	6 to 23.2	1.6 to 5
Recycling	Informal (Metal, grass, plastic, composting)	Formal + Informal (Metal, grass, plastic, composting)	Formal (Metal, grass, plastic, furniture, clothing)
Incineration treatment rate (implementing cities / total cities)	0 / 5	1 / 4	3 / 3

There is a clear increase in waste generation with the advance of economic development.

Waste in Group C is mostly comprised of paper, compared to the high rate of organic waste in Group A and B (over 50%). In winter, there are differences in the composition of waste, such as increases in waste ash, as a result of changes in lifestyles. Plastic bags used for wrapping and paper are on the increase in all cities; in China, this is referred to as “white pollution”.

Collection rates and treatment costs correlate to GNP and are on the rise. The scale of municipal budgets in Group A are small, however, the rate of expenditure for treatment fees in the overall budget is extremely large. In Groups A and B, informal collection is mainly carried out by scavengers; in Group C, collection is carried out by the municipal government.

Incineration is carried out by cities in Group C, as well as Chongqing in Group B. Incineration is an effective method to inoculate and reduce waste however, initial costs for the construction of facilities are high. Running costs are high when waste with high water content is generated, such as kitchen waste, and air pollution countermeasures for dioxins and soot and dust are necessary. If there are no economic reserves, the introduction of this type of treatment method can be difficult. However, incineration is a relatively safe and simple method of treatment for waste that should be separated and inoculated such as medical waste.

Issues and measures in collection

In Group A, a large number of people can be found who dispose of waste in streets, open yards, and drains. As a result, the employment of necessary personnel and percentage of the budget to address this issue are high, due to the use of street sweeping as a central part of collection activities. Additionally, collection rates are low due to an insufficient number of personnel and collection vehicles, as well as difficulties in entering narrow streets.

In Surabaya, door-to-door collection is carried out by the communities directly. Transfer points are well positioned and an effective collection system has been developed. In Dhaka, a private organisation has implemented door-to-door collection on a pilot basis and achievements have been obtained. However, there are difficulties in collecting fees from many residents, and obstacles remain in expanding the activity to other areas of the city.

Kathmandu has overcome this issue through the identification and implementation of ideal public participation. A solid waste management proposal submitted to Kathmandu by a foreign company was opposed by employees due to potential job losses. However, the municipal government included the participation of residents and businesses from the very first stage of the plan and made effective use of existing human resources and equipment, thereby developing a new method for waste collection through public-private cooperation.

Issues and measures in the promotion of recycling

In such cases as Ulaanbaatar and Surabaya, scavengers make a major contribution to the reduction of waste. However, scavengers who rummage in waste bins and scatter garbage expose and are exposed to environmental and hygienic problems. As pointed out by Bhopal, the problem is one that needs to be addressed, as a large number of scavengers are poor and include women and children.

In Cebu, scavengers are organised into independent groups and conduct organised fee-based collection and recycling together in collaboration with the municipal government. Advantages include lessening the impact on the health of scavengers as well as the surrounding environment, creation of new jobs, solutions for financial problems, and the first step towards the development of recycling businesses.

The most effective method to increase recycling rates is separation in households. Nonthaburi is successfully addressing this issue in a pilot activity to increase recycling rates and decrease waste by promoting separation at source.

With an overall objective of decreasing waste, recycling must address issues such as the understanding and cooperation of residents, enlarging the market for recycled materials, and the construction and development of fully equipped recycling facilities. In targeting the intermediate layer that possesses an awareness of environmental problems, various measures have been successful, such as the distribution of cash or coupons to residents that have collected recyclable materials.

Most cities carry out composting. There are a number of cases that demonstrate the use of waste from markets as materials for composting, as well as active participation and cooperation among the municipal government, NGOs, and businesses. In this issue, problems arise from difficulties in selling the compost. Compost contains high nitrogen levels and is suitable as fertilizer for cultivating vegetables. Compost is less expensive than chemical fertilizers and has less of an impact on the soil. In Cebu, there are discussions on the use of compost at the city markets. If profits rise due to high sales, it would be indispensable to endeavour to open markets and improve technology to cultivate effective and top quality compost.

The introduction of new recycling technologies is continuing. With the cooperation of universities, Cebu has commenced the conversion of biogas using animal waste from the city abattoir. Ulaanbaatar is reusing coal and ash from power plants as construction materials. Tires, which are a problem in Macao, are shredded into small rubber pieces in Japan and are used as fuel for cement firing and power generation, as well as materials for iron manufacturing, in addition to reuse as road pavement and slabs. Many cities understand the necessity of introducing appropriate recycling methods and technology, as well as promoting recycling business. There are number of cases that can act as reference.

Issues and measures regarding landfills

Cities such as Macao and Cebu are unable to secure land due to insufficient land area; Chongqing is mountainous and the investment for the development of landfill sites is higher than other cities. In Kathmandu, there is opposition from residents (NIMBY). Numerous measures have been taken to address this issue, including the development of a technical plan by Chongqing that outlines the separation and decomposition of difficult-to-burn waste, to decrease the amount of leakage. Semi-aerobic landfills proposed by Fukuoka are "low cost, low technology, and less pollution". This method is being implemented in other countries and the transfer of technology to other regions can be expected.

Issues and measures in financing

Cities in Group C outlay treatment expenses for household waste from the general budget and promote economic incentives to reduce waste. On the other hand, for cities in Group A and B, the rate for waste treatment fees in the general budget is high, and because there is a lack of finances, there are a number of cases where fees are levied in order to cover treatment costs.

One method to increase cost effectiveness is the creation of partnerships with residents and the private sector. Some examples of reference include Kathmandu, where a business charges fees and conducts door-to-door collection, and Macao, where the private sector carries out collection. With commissions to private businesses, collection efficiency rates increase due to competition between businesses; however, the role of the local government in management and inspection is important.

Cities such as Chongqing place expectations on private funding for solid waste treatment, in particular refuse-burning power generation. In contrast with the large amount of funding necessary for first stage investment and operation costs, there are numerous issues to be faced in the privatisation of waste treatment, such as low energy recovery and difficulties in cost recovery. In this regard, there are few cases, other than countries such as Malaysia, where privatisation is implemented. The actions by cities in China, such as Chongqing, may have an impact on future public-private partnerships and cooperation.

With regard to cost recovery, the practice of Surabaya in which fees are levied together with water supply fees is sound. Kitakyushu employs a method to collect solid waste through the sale and use of “fee-based designated bags”, where garbage is not collected unless placed in the bag. However, if the fees are too high, the chance of illegal disposal is increased. In this way, the setting of fees is a difficult issue.

Issues and measures in solid waste management administration

A number of cities have indicated that the necessary points for effective solid waste management are: (1) Systematic and organised management; (2) Understanding and cooperation of residents; and (3) Increasing administration capacity and introduction of appropriate technology.

In general, countries in Asia have strong centralised governments. The authority of local governments is weak, as the authority and budgets necessary for management are not transferred to the cities. Because solid waste management is an area in which the local authority has responsibility, regulations and systems lag behind, as compared with air and water pollution measures that are directly managed by the central government. Guidance by the central government and transfer of authority for solid waste management must be promoted.

Understanding and cooperation of residents is a most essential element in solid waste management. As indicated by Bhopal and Surabaya, waste is the “responsibility of all”, and everyone has an “equal share of responsibility”. If the number of people that dispose of waste improperly decrease, the burden for activities such as street sweeping can be lessened. If waste can be separated at source, recycling rates can increase and waste decrease. In order to enhance understanding and awareness of residents, campaigns and education on the issues, as well as concrete actions that can be taken by the individual, are necessary. At the same time, with the direct participation of residents, costs for cleanup will decrease, and support and contributions of residents to environmental sanitation will rise. Two cases that could be of reference in this regard could be dialogue carried out with residents to implement new measures (Kitakyushu) and campaigns (Nonthaburi).

Most cities in the Asian region have a deep understanding of the problems they face. However, cities are searching for ideas on the planning and implementation of concrete measures in order to minimize health and environmental impacts from solid waste; in other words, the most appropriate treatment methods to address each specific situation within financial, human resource and technological limitations. In this regard, ownership and capacity building of local governments is essential. Participation in training courses carried out by support organisations and dispatch of experts, as well as independent study groups are effective. Towards this end, active participation in intercity networks such as the Kitakyushu Initiative and international seminars, as well as use of databanks for successful practices would be of benefit.