Case Study on the Management of Waste Materials in Malaysia

Von Lina Lau

1. Introduction

The management of waste materials is a problem worldwide. In the developing countries, waste management is becoming an acute problem as urbanization and economic development increase leading to larger quantities of waste materials requiring management in these countries.

In Asia¹, the management of waste materials requires immediate attention especially in countries such as China, South Korea and Malaysia which have been categorized as emerging industrialized countries. In 1995, the urban areas of Asia produced about 760,000 tons of municipal solid waste (MSW) or approximately 2.7 million m³ per day [19]. In 2025, this figure is estimated to increase up to 1.8 million tons of waste per day, or 5.2 million m³ per day [19]. Table 1 shows the amount in 2025 by countries and by GNP categories.

Countries with low incomes have the lowest waste generation rates, averaging 0.64 kg per capita per day, while for the middle income countries this rate is averaging 0.73 kg per capita per day in 1995. High income countries such as Korea, Hong Kong, Singapore and Japan, tend to have higher waste generation in comparison to other countries. In Hong Kong, the generation rate is among the highest due to intense construction and demolition within the municipality [19]. The amounts of waste in Japan and Sin-

Table 1: 1995 and 2025 Urban Municipal Solid Waste Generation in Asia

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<tbody>
<tr>
<td>Low income</td>
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<tr>
<td>Nepal</td>
<td>200</td>
<td>360</td>
<td>13.7</td>
<td>34.4</td>
<td>0.50</td>
<td>0.6</td>
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<td>Bangladesh</td>
<td>240</td>
<td>440</td>
<td>18.3</td>
<td>40.0</td>
<td>0.49</td>
<td>0.6</td>
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<tr>
<td>Myanmar</td>
<td>240*</td>
<td>580</td>
<td>26.2</td>
<td>47.3</td>
<td>0.45</td>
<td>0.6</td>
</tr>
<tr>
<td>Vietnam</td>
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<td>20.8</td>
<td>39.0</td>
<td>0.55</td>
<td>0.7</td>
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<td>Mongolia</td>
<td>310</td>
<td>560</td>
<td>60.9</td>
<td>76.5</td>
<td>0.60</td>
<td>0.9</td>
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<tr>
<td>India</td>
<td>340</td>
<td>620</td>
<td>26.8</td>
<td>45.2</td>
<td>0.46</td>
<td>0.7</td>
</tr>
<tr>
<td>Lao PDR</td>
<td>350</td>
<td>850</td>
<td>21.7</td>
<td>44.5</td>
<td>0.69</td>
<td>0.8</td>
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<td>China</td>
<td>620</td>
<td>1,500</td>
<td>30.3</td>
<td>54.5</td>
<td>0.79</td>
<td>0.9</td>
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<tr>
<td>Sri Lanka</td>
<td>700</td>
<td>1,300</td>
<td>22.4</td>
<td>42.6</td>
<td>0.89</td>
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<tr>
<td>Middle income</td>
<td>1,410</td>
<td>3,390</td>
<td>37.6</td>
<td>61.1</td>
<td>0.73</td>
<td>0.8-1.5</td>
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<tr>
<td>Indonesia</td>
<td>980</td>
<td>2,400</td>
<td>35.4</td>
<td>60.7</td>
<td>0.76</td>
<td>1.0</td>
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<td>Philippines</td>
<td>1,050</td>
<td>2,500</td>
<td>54.2</td>
<td>74.3</td>
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<td>0.8</td>
</tr>
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<td>Thailand</td>
<td>2,740</td>
<td>6,650</td>
<td>20.0</td>
<td>39.1</td>
<td>1.10</td>
<td>1.5</td>
</tr>
<tr>
<td>Malaysia</td>
<td>3,890</td>
<td>9,400</td>
<td>53.7</td>
<td>72.7</td>
<td>0.81</td>
<td>1.4</td>
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<tr>
<td>High income</td>
<td>30,990</td>
<td>41,140</td>
<td>79.5</td>
<td>88.2</td>
<td>1.64</td>
<td>1.1-4.5</td>
</tr>
<tr>
<td>Korea, Republic of</td>
<td>9,700</td>
<td>17,600</td>
<td>81.3</td>
<td>93.7</td>
<td>1.59</td>
<td>1.4</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>22,990</td>
<td>31,000</td>
<td>95.0</td>
<td>97.3</td>
<td>5.07</td>
<td>4.5</td>
</tr>
<tr>
<td>Singapore</td>
<td>26,730</td>
<td>36,000</td>
<td>100.0</td>
<td>100.0</td>
<td>1.10</td>
<td>1.1</td>
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<td>Japan</td>
<td>39,640</td>
<td>53,500</td>
<td>77.6</td>
<td>84.9</td>
<td>1.47</td>
<td>1.3</td>
</tr>
</tbody>
</table>

¹ World Bank, 1997b ² United Nations, 1995  * estimated GNP


¹ Asia in this context is limited to China, Japan, Hong Kong, Republic of Korea, Mongolia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand, urban municipal solid waste generation in 1995 and the estimated amount in 2025 by countries and by GNP categories.

gapore are lower but that is also due to the fact that the data do not include all municipal waste generated within these countries.

Local governments in Asia are spending about US$ 25 billion per year on urban solid waste management of which more than 90% in high income countries is spent on the collection of waste. In middle income countries this rate is between 50 to 80% and in low income countries it is 30 to 60% [19]. The characteristics of MSW vary from one country to another and the solid wastes of rural towns in Asia are significantly different from those of large cities, having more organics but few plastics from packaging or food wastes [10]. There are also varying legal definitions of waste leading to differences in what is considered to be waste. In general, waste is defined as any material which is unwanted by the holder and intentionally thrown away for disposal. This does not exclude that certain wastes may eventually become resources valuable to others once they are removed from waste stream [19].

Malaysia, with a population of 24 million, is facing an increase of the generation and accumulation of waste. This development is causing social, economic and environmental problems at a significant level. Individuals, industries, munici-pals, state and federal governments are concerned because improper waste management leads to health problems for local communities. Moreover, poor visual appearance has negative impacts on official visits and tourism. These problems are particularly serious in areas where intensive urbanization and population concentration lead to an increase of solid wastes and to a decrease of available land suitable for disposal.

This paper will provide an overview of waste management in Malaysia, outlining the problems occurred and the challenges and ways to improve the current situation by comparing it with the waste management system of South Korea.

2. Waste Generation in Malaysia

Malaysia, like most of the developing countries, is facing an increase of the generation of waste and of accompanying problems with the disposal of this waste. Overall, the local communities generate 16,000 tons of domestic waste per day and the amounts per capita vary from 0.45 to 1.44 kg per day depending on the economic status of the areas concerned [17]. On average, waste generation is about 1 kg per capita per day [17].

Waste is grouped into three different categories in respect of disposal – solid waste, medical waste and hazardous waste. According to a study by E. Grant Anderson in five states (Kuala Lumpur, Selangor, Pahang, Terengganu and Kelantan) representing 70% of the total amount of waste in the country, the composition of waste is shown in Figure 1. One can observe that 64% of the waste is domestic waste. The share of industrial waste stands at 15%, followed by commercial waste and construction and institution waste.

2.1 The Waste Management System in Malaysia (Collection and Transfer)

Municipal solid waste in Malaysia is under the responsibility of the public sector, although the government has contracted out part of the municipal solid waste management services to private contractors under the privatization program. The municipal solid waste management (MSWM) services account for a high percentage of the municipal budgets as waste management and planning are under municipal responsibility. On average, 50% of the municipal operating budget is spent on MSWM and of this, 70% is spent on the collection of waste [12]. There are three sources of funds for the municipal solid waste operation, namely, municipal taxes, fees charged for services, and subsidies from municipal revenues received from government sources [12]. Cities and towns rely heavily upon municipal taxes in order to provide MSWM services to their communities as the fees charged for collection and transfer services are not covering the costs of these operations. Moreover, there is no standardized procedure for setting fees and debates about this issue are ongoing.

Various collection and container systems are used depending on the areas of waste collection. There is both door-to-door collection and indirect collection, with containers or communal bins placed near markets, in apartment complexes, and in other appropriate locations for haulage to transfer stations and disposal sites by special waste vehicles [6]. Collection and transfer are labor-intensive. Manually and mechani-

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**Figure 1:** Waste Composition (Kuala Lumpur, Selangor, Pahang, Terengganu and Kelantan)

cally loaded compactors are often used in markets and commercial establishments [6]. For areas where collection and transfer services are operated by private waste companies such as Alam Flora Sdn. Bhd. and Kualiti Alam Sdn. Bhd., collection and transfer are more capital-intensive and mechanized. The container sizes are standardized, as are collection vehicles and large-site containers, which may also be fitted with compactors [6].

The collection rates vary from state to state due to differences in efficiency in collection and transfer. In Kuala Lumpur, the capital city of Malaysia, 80% of all waste is collected. In order to improve collection and transfer services and also to overcome the financial constraints of local municipalities, private companies are being invited to bid for privatization-cum-concession agreements for municipal solid waste management services. Private companies are allowed to form joint venture companies with foreign waste management companies that have the financial resources and experience to win collection contracts from municipal authorities, and to design and build transfer stations and landfills, or any final disposal systems [12].

2.2 The Waste Disposal System

Presently, there are three types of waste disposal categories – solid waste disposal and incineration, medical waste incineration and hazardous waste incineration. The disposal of solid waste is done almost solely through landfill [18]. There are 168 disposal sites throughout the country, of which only 7 are sanitary landfills [17]. The rest are open dumps and about 80% of these dumps have been filled up to the brim and have to be closed in 2005 [17]. The federal government had spent RM 20.9 million (≈US$ 5.5 million) to build 9 sanitary landfills and upgrade 27 existing landfills in 34 designated areas. These measures are, however, insufficient to overcome the problem of waste disposal as the waste generation rate is increasing rapidly due to high population growth and urbanization.

Hence, the federal and state governments are now considering to build incinerator plants in major cities and towns. Incineration has the potential to solve the problem of landfilling as the original volume and weight of wastes may be reduced up to 95% and 75% respectively [20]. This will help to prolong the life span of landfill sites up to 10-20 times [20]. In the Seventh Malaysia Plan (1995-2000), the government spent RM 17 million (≈US$ 4.5 million) to purchase 7 mini-incinerators with a capacity of 5 to 20 ton/day to be operated on the resort islands of Langkawi, Labuan, Tioman and Pangkor [17]. The government also introduced a new law on solid waste management where the principal processes options are being classified in a system for integrated waste management. Within this system, there is the following hierarchy: waste minimization, reuse, material recycling, energy recovery and landfill [18]. Beside this, the Malaysian government also launched a recycling campaign in December 2000 which sets the long term target of recycling 22% of the waste generated by 2020 [18].

For clinical waste, the Malaysian government has made it a national policy that all clinical waste must be incinerated [17]. Currently, there are 5 regional medical waste incinerators with capacities of 20 to 500 kg/hour and seven small on-site medical waste incinerators with capacities of 20 to 50 kg/hour [18]. All medical incinerators are built on the premises of the waste generators in order to decrease handling processes and exposure of labor to clinical waste.

In November 1998 the first hazardous waste treatment plant for processing chemical waste was opened which receives all types of hazardous waste except hospital and radioactive waste [18]. Organic waste is burnt in the incineration plant while acidic and basic inorganic fluids are exposed to chemical treatment that neutralize them and remove substances such as chromium and cyanide. The residues from this treatment and solid inorganic waste are bound tightly with lime and cement before being deposited on a double membrane equipped landfill where there should be room for waste residues for up to 20 years [18]. An average of 431,000 tons of scheduled waste was generated per annum from 1995 to 1999 [18]. This hazardous waste treatment plant is operated by Kualiti Alam Sdn. Bhd., a private waste management company, and the waste generators pay for the service on the basis of the polluter pays principle.

2.3 Problems and Challenges of Waste Management in Malaysia

The waste management in Malaysia displays an array of problems, including low collection coverage on average due to the inaccessibility by vehicles of some areas, irregular collection services, inadequate equipment used for waste collection, crude open dumping and burning without air and water pollution control, inadequate legal provisions and resources constraints. These problems are caused by various factors which have an impact on the development of effective waste management systems in Malaysia. Institutional constraints are among these problems. Even though several agencies such as the State Department of the Environment and municipal councils are involved in...
waste management, they often have no clear functions in relation to waste management and there is no single agency designated to coordinate their projects and activities. The lack of coordination among the relevant agencies often results in duplication of efforts in waste management, wasting of resources, and unsustainability of overall waste management programs [15].

The lack of effective legislation for waste management is partially responsible for ill defined functions of the agencies and the lack of coordination among them. This can be clearly seen in the cases of the illegal dumping of 50 drums of toxic waste near a residential area and a golf course in Kelana Jaya, Selangor, on 5 December 2003, and of 500 drums of paint sludge and glue dumped illegally at a ravine in Ijok, Selangor, in November 2003 [21]. Even though there are existing regulations where companies involved in illegal dumping will be punished under Section 34 (b) of the Environmental Quality Act 1974 which carries a maximum fine of RM 500,000 (= US$ 130,000) or a five years’ prison sentence, or both, some companies use the opportunity of ineffective legislation to do illegal dumping as the penalties are usually low. In the case of illegal dumping of the paint sludge, the total waste disposal cost was RM 12 million (= US$ 3.15 million) [21].

Technical constraints are also causing a problem because there is a lack of human resources at both national and local levels with technical expertise necessary for solid waste management planning and operation. Many government officers involved in solid waste management at the local and national level have little or no technical background nor training in engineering or management. Without adequately trained staff, there is only a small possibility that a project initiated by a highly qualified waste management consultant can be carried out effectively. Beside this, there is a lack of overall plans for solid waste management at the local and national levels. As a result, a solid waste technology is often selected without due consideration to its appropriateness in the overall solid waste management system [15].

### 3. Waste Generation in South Korea

South Korea is a major industrial and trading nation. With a population of 48 million in 2001, South Korea’s municipal waste is 48,499 tons per day with a very high percentage of packaging and food waste [1]. The packaging and food waste has increased continuously as a result from the rise in consumption in proportion to the rise in income levels. As can be seen in Table 2, the food waste accounted for 31.6% of the municipal waste in 1995 but it decreased to 27.1% in 1999 [2].

According to the South Korean Ministry of the Environment, 4 million tons of food waste are generated per annum and the associated national expenditure (which includes the disposal and negative environmental impact cost from the food waste) is estimated to be US$ 12.5 billion per year [3]. South Korean Non Governmental Organizations (NGOs) think that the large generation of food waste in South Korea is caused by the Korean food culture that prefers a rich dining table.

An additional of 95,908 tons of waste per day is generated by industrial facilities and another 108,520 tons per day come from construction sites. Table 3 shows the trend of waste generation in South Korea from 1992 to 1999. On average, South Korea’s waste generation rate is 1.01 kg per capita per day [1].

#### 3.1 The Waste Management System in South Korea

The Korean Waste Management Act has classified wastes into two categories according to their sources of origin – municipal waste from households and industrial waste from business sites or large scale factories [2]. Industrial waste is further divided into general industrial waste which consists of slag, ash, dust and construction waste; and specified waste which includes toxic wastes such as acids, alkalis,
spent oils and organic solvent waste [2]. The trend of the generation of these wastes can be seen in Table 3.

In South Korea, waste is being managed through a dual system where local governments are responsible for the final disposal of municipal waste and dischargers are responsible for the final disposal of industrial waste [2]. Municipal solid waste is managed using a Volume-Based Waste Collection System and the Extended Producer Responsibility System (EPR) [1]. The Volume Based Waste Collection System was introduced in 1995 to encourage South Korean citizens to reduce waste by requiring them to pay fees in proportion to the amount of waste discharged [2]. Through the volume-based waste collection system, households or dischargers have to buy a designated plastic bag for waste collection. The five recyclable products which are electronic devices, fluorescent lamps, lubricating oil, tires and packaging material will be separated and collected for free, and the collection of all other waste is charged according to volume [1]. The waste packed in the authorized bags will be collected and sent to incinerators or other disposal areas by municipal vehicles. Recyclable products will be sent to recycling companies. Under this system, waste packed in bags other than the designated bags will not be collected [2].

The Extended Producer Responsibility System (EPR) obliges manufacturers and importers to recycle a certain percentage of their products that are being discarded. Presently, electronic devices (such as televisions, refrigerators, washing machines, audio equipment, air conditioners, computers and cellular phones), fluorescent lamps, lubricating oil, tires and packaging material (such as plastics, bottles and cans) are subjected to the EPR System [1]. If manufacturers and importers do not fulfill this obligation, a penalty of 1.1 to 1.3 times of the actual cost of recycling will be imposed on the manufacturers and importers [1].

### 3.2 Waste Disposal in South Korea

The solid waste treatment methods used in South Korea are landfill, dumping at sea, incineration and recycling. As shown in the Table 4, the quantity of municipal waste in South Korea has decreased since 1996 due to the South Korean government’s policy to reduce solid municipal waste through recycling programs [2].

Table 4 shows the treatment of municipal, general industrial and specified waste through landfilling, incineration, recycling and dumping at sea. The last method of dumping human waste and waste sludge at sea is seen as convenient due to its low cost in comparison with other treatment options. But it also has its problems. For example, in 2002 the South Korean Ministry of Maritime Affairs and Fisheries stated that the amount of illegal dumping of solid waste into the coast of Busan, the country’s largest port city, was estimated to be over 10 thousand tons [3].

Since the introduction of incineration equipment in the early 1990s, the amount of incinerated waste is increasing. Incineration is seen as the best way to handle non-recyclable wastes, given the limited land space to landfill waste in South Korea. In 1995, it accounted for only 4% of solid waste treatment but in 2000 the rate was 12% [3]. Local governments receive 20 to 30% support from the central government for building the incinerators [2]. They have to cover the working expenses of the plant but the operation and management activities are

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### Table 3: Disposal of waste in South Korea

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<tbody>
<tr>
<td>Municipal waste</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>62,940</td>
<td>58,118</td>
<td>47,774</td>
<td>49,925</td>
<td>47,895</td>
<td>44,583</td>
<td>45,614</td>
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<tr>
<td>Landfill</td>
<td>54,227</td>
<td>47,116</td>
<td>34,563</td>
<td>34,116</td>
<td>30,579</td>
<td>25,074</td>
<td>23,545</td>
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<tr>
<td>Incineration</td>
<td>1,480</td>
<td>2,025</td>
<td>1,922</td>
<td>2,725</td>
<td>3,409</td>
<td>3,943</td>
<td>4,675</td>
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<tr>
<td>Recycling</td>
<td>7,233</td>
<td>8,927</td>
<td>11,306</td>
<td>13,084</td>
<td>13,907</td>
<td>15,566</td>
<td>17,394</td>
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</table>

General Industrial Waste

<table>
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<tr>
<th>Total</th>
<th>55,969</th>
<th>85,229</th>
<th>95,823</th>
<th>124,099</th>
<th>141,305</th>
<th>140,406</th>
<th>166,114</th>
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<tbody>
<tr>
<td>Landfill</td>
<td>17,573</td>
<td>29,109</td>
<td>31,203</td>
<td>35,730</td>
<td>43,480</td>
<td>35,401</td>
<td>29,856</td>
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<tr>
<td>Incineration</td>
<td>1,045</td>
<td>3,912</td>
<td>5,691</td>
<td>6,503</td>
<td>6,884</td>
<td>7,260</td>
<td>7,616</td>
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<tr>
<td>Recycling</td>
<td>37,351</td>
<td>52,208</td>
<td>58,929</td>
<td>83,176</td>
<td>90,941</td>
<td>93,529</td>
<td>122,231</td>
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</table>

Specified Waste

<table>
<thead>
<tr>
<th>Total</th>
<th>4,389</th>
<th>5,238</th>
<th>6,074</th>
<th>5,266</th>
<th>7,488</th>
</tr>
</thead>
<tbody>
<tr>
<td>Landfill</td>
<td>2,140</td>
<td>2,433</td>
<td>3,110</td>
<td>2,822</td>
<td>3,759</td>
</tr>
<tr>
<td>Incineration</td>
<td>690</td>
<td>704</td>
<td>1,071</td>
<td>967</td>
<td>1,277</td>
</tr>
<tr>
<td>Others</td>
<td>1,340</td>
<td>1,721</td>
<td>1,301</td>
<td>1,011</td>
<td>1,734</td>
</tr>
</tbody>
</table>

even though incineration helped to solve the problem of limited landfill spaces, it causes a secondary health-related problem through the emissions of dioxins. At the end of the 1990s, the Waste Management Act set a limit value for emissions of dioxins emitted by municipal and industrial waste incinerators as a result of citizen campaigns against incineration [2]. A case study was done in 2002 regarding the content of dioxins in the blood of residents living near an industrial waste incineration facility that started to operate in 1984. The result shows that the average reading taken from 10 measurements was 53.4 ppt I-TEQ lipid, which is much higher than the average of normal citizens reported internationally [1]. In 1997, the dioxin emission regulation was implemented for large municipal incinerators with capacities over 50 tons/day [2]. Tables 5 and 6 show the standard dioxin emissions for incinerators in South Korea.

In South Korea, recycling is a preferable method for waste disposal due to its efficiency in waste reduction. The recycling business in South Korea has grown sharply from US$ 1.2 billion in 1998 to US$ 3.2 billion in 2002, with 2,500 recycling businesses established throughout the country [3]. Through the implementation of the Extended Producer Responsibility System (EPR), the South Korean government has managed to reduce total waste generation, as already shown in Table 4.

4. Comparison of Existing Waste Management Systems in Malaysia and South Korea

<table>
<thead>
<tr>
<th>Country</th>
<th>Malaysia</th>
<th>South Korea</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>24,014,200 in 2003</td>
<td>48,262,000 in 2001</td>
</tr>
<tr>
<td>GNP per capita 2002 (US$)*</td>
<td>3,540</td>
<td>9,930</td>
</tr>
<tr>
<td>Approximated waste generation rate (kg/capita/day)</td>
<td>1.00</td>
<td>1.01</td>
</tr>
<tr>
<td>Percentage of waste classification**</td>
<td>- Domestic waste – 64%</td>
<td>Municipal waste – 21%</td>
</tr>
<tr>
<td></td>
<td>- Industrial waste – 25%</td>
<td>Industrial waste – 79%</td>
</tr>
<tr>
<td></td>
<td>- Commercial waste – 8%</td>
<td>General waste – 95%</td>
</tr>
<tr>
<td></td>
<td>- Construction and institution waste – 3%</td>
<td>Specified waste – 5%</td>
</tr>
<tr>
<td>Waste categories</td>
<td>Solid waste</td>
<td>Municipal waste</td>
</tr>
<tr>
<td></td>
<td>Medical waste</td>
<td>Industrial waste</td>
</tr>
<tr>
<td></td>
<td>Hazardous waste</td>
<td>General industrial waste</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Specified waste</td>
</tr>
<tr>
<td>Waste management planning</td>
<td>The Ministry of the Environment</td>
<td>The Ministry of the Environment</td>
</tr>
<tr>
<td>Waste management legislation, regulations and guideline</td>
<td>- Legislation on hazardous waste (not inclusive hospital and radioactive waste)</td>
<td>- Korean Waste Management Act, 1992</td>
</tr>
<tr>
<td></td>
<td>- Environment Quality Act, 1974</td>
<td></td>
</tr>
<tr>
<td>Responsible parties/agencies</td>
<td>City or local government</td>
<td>Dual system:</td>
</tr>
<tr>
<td></td>
<td>- Private sector (such as Kualiti Alam Sdn. Bhd. and Alam Flora Sdn. Bhd.)</td>
<td>Local government</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Discharger</td>
</tr>
<tr>
<td>Waste avoidance and resource recovery activities</td>
<td>New law on solid waste management where the principal process options are classified in a hierarchy for integrated waste management (waste minimization, reuse, material recycling, energy recovery and landfill)</td>
<td>Volume-Based Waste Collection System Extended Producer Responsibility System Recycling program</td>
</tr>
<tr>
<td></td>
<td>Recycling program</td>
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</tr>
<tr>
<td>Waste collection arrangements</td>
<td>Door-to-door collection</td>
<td>Collection of waste packed in designated plastic bags by municipal vehicles</td>
</tr>
<tr>
<td></td>
<td>Indirect collection with containers or communal bins</td>
<td></td>
</tr>
<tr>
<td>Type of treatment</td>
<td>Landfill</td>
<td>Landfill</td>
</tr>
<tr>
<td></td>
<td>Incineration</td>
<td>Dumping at sea</td>
</tr>
<tr>
<td></td>
<td>Recycling</td>
<td>Recycling</td>
</tr>
</tbody>
</table>
Waste classification for Malaysia is based on statistics from 5 states (Kuala Lumpur, Selangor, Pahang, Terengganu and Kelantan) because there is a lack of clear guidelines. Its policy seems to be less efficient through its own recycling programs, and there are both private and state-owned hazardous waste treatment facilities. The South Korean government has given a clear guidance on waste avoidance and resource recovery through the Volume-Based Waste Collection System and the Extended Producer Responsibility System. Both factors seem to be effective since waste generation in Korea shows a declining trend. As explained in the case study South Korea uses the Volume-Based Waste Collection System and Extended Producer Responsibility System in order to reduce waste through reduction, re-use and recycling. The South Korean government has made it an obligation for all manufacturers and importers to recycle a certain percentage of their products that are being discarded under the Extended Producer Responsibility System. Moreover, there are both private and state-owned hazardous waste treatment facilities. In this way, the government is in a position to obtain practical experience in the field, which is important for establishing a good regulatory system.

Even though the Malaysian government has tried to reduce waste through its own recycling programs, its policy seems to be less efficient because there is a lack of clear guidance. Many households in Malaysia have insufficient knowledge about waste separation. Beside this, funding arrangements are still under debate as it is unclear who should pay for the management of waste. Using tax money instead of fees for waste management seems not to set incentives for reducing waste. Hence, it appears that the current policy and system are more resulting from reacting to the problem of increasing waste, in particular in urban areas, and less from taking a proactive stand in respect of tackling the problem at its root. Setting clear guidelines about the objectives of waste management and adopting certain principles would allow for such a proactive stand. The case of South Korea shows that this may lead to steady improvements.

5. Conclusions and Recommendations

The comparative table above shows that the waste management system of Malaysia is less effective and transparent than South Korea’s waste management system. The South Korean government has given a clear guidance on waste avoidance and resource recovery through the Volume-Based Waste Collection System and the Extended Producer Responsibility System. Both factors seem to be effective since waste generation in Korea shows a declining trend. As explained in the case study South Korea uses the Volume-Based Waste Collection System and Extended Producer Responsibility System in order to reduce waste through reduction, re-use and recycling. The South Korean government has made it an obligation for all manufacturers and importers to recycle a certain percentage of their products that are being discarded under the Extended Producer Responsibility System. Moreover, there are both private and state-owned hazardous waste treatment facilities. In this way, the government is in a position to obtain practical experience in the field, which is important for establishing a good regulatory system.

Even though the Malaysian government has tried to reduce waste through its own recycling programs, its policy seems to be less efficient because there is a lack of clear guidance. Many households in Malaysia have insufficient knowledge about waste separation. Beside this, funding arrangements are still under debate as it is unclear who should pay for the management of waste. Using tax money instead of fees for waste management seems not to set incentives for reducing waste. Hence, it appears that the current policy and system are more resulting from reacting to the problem of increasing waste, in particular in urban areas, and less from taking a proactive stand in respect of tackling the problem at its root. Setting clear guidelines about the objectives of waste management and adopting certain principles would allow for such a proactive stand. The case of South Korea shows that this may lead to steady improvements.

6. References


**Waste classification for Malaysia is based on statistics from 5 states (Kuala Lumpur, Selangor, Pahang, Terengganu and Kelantan) which represent 70 % of the country’s waste generation.
Umweltmanagementsystem der BigBurger GmbH

Von Robert Theisen

Einleitende Bekanntmachung: