

Chapter 1

Introduction to Solid Waste and Its Management

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ABSTRACT

Municipal Solid Waste (MSW) disposal has become an increasingly serious problem in many parts of the world. In general, greater economic prosperity and a higher percentage of urban population correspond to a greater amount of solid waste produced. However, less effort has been exerted in the proper management of solid wastes produced by urban dwellers, particularly in developing countries. This chapter introduces the basic MSW rules. MSW composition, production, and collection are also highlighted. Furthermore, the concept of landfilling and waste decomposition is discussed in this chapter.

INTRODUCTION

Growing population and industrial development have increased waste generated by urban areas. Municipal solid waste (MSW) can be defined as the wastes arising from domestic, commercial, industrial, and institutional activities in urban areas (Bartone 1990; Ravindra et al., 2015). In developing countries, MSW disposal has become an ever-increasing problem in many parts of the world, especially in the developing countries (Al-Khatib et al., 2014; Caniato et al., 2014). Generally, the greater the economic prosperity and the higher the percentage of urban population, the greater is the amount of solid waste produced. This tremendous increase in the amount of MSW generated is due to changing lifestyles, food habits and living standards of the urban population. Despite this growth, there has been less parallel effort to properly manage the solid wastes produced by the urban dwellers, especially in the developing countries.

MSW are defined by EPA as a waste consisting of everyday items “used and then thrown away, such as product packaging, grass clippings, furniture, clothing, bottles, food scraps, newspapers, appliances, paint, and batteries,” which come from homes, schools, hospitals, and businesses (US EPA, 2013).

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Gershman et al. (1986) described MSW as rubbish from residences, institutions, and commercial establishments and non-hazardous light industrial refuse. McBean et al. (1995) defined MSW as residential solid waste produced from the house, and outdoor activities of a single or multi-family house. Dixon and Jones (2005) defined MSW as a mixture of waste primarily originating from residential and commercial establishments. The Malaysian Solid Waste and Public Cleansing Management Act of 2007 (Act 672) defines MSW as any substance requiring disposal because it is broken, worn out, contaminated, or physically spoiled. The management of MSW that has already been generated can be roughly divided into four methods: recycling, composting, thermal treatment with energy recovery, and landfilling. However, the generation of wastes can be reduced by various means, such as a better design of products and packaging, and therefore “Reduction” is placed at the very top of the waste management hierarchy.

SOLID WASTE PRODUCTION

Solid waste generally refers to unused solid materials generated as a result of human activities. Many of these items can be considered as waste such as domestic rubbish, sewage sludge, wastes from manufacturing activities, packaging items, discarded cars, discarded electronic devices, garden waste, old paint containers etc. Accordingly, all human daily activities can give rise to a large variety of different wastes arising from different sources (Ngoc & Schnitzer, 2009). Based on their sources, solid waste can be classified into various types which include MSW, hazardous waste, agricultural waste and industrial waste (Tchobanoglous et al., 1993). In Malaysia; the generation of MSW has significantly increased in recent years, ranging between 0.5 - 2.5kg per capita per day (or a total of 25000 - 30000 tons per day). More than 70% of the generated wastes are collected using both curbside and communal centers with a collection frequency varying from daily to every two days (Johari et al., 2014).

MSW defined as a waste collected from households, in addition to the commercial waste collected by a municipality but it generally excludes hazardous wastes. Because urbanization and population growth have rapidly increased the rate of MSW production and disposal in many cities of the world, the management of MSW has emerged as a major concern around the world particularly the rapidly developing countries.

According to Tanaka (2006), the generation of solid waste is expected to increase steadily along with economic growth if we continue the lifestyle of mass production, mass consumption and mass disposal (Figure 1).

It has been reported by Chong et al. (2005) that solid waste is one of the biggest environmental problems in Malaysia and the generation rate of solid waste is expected to increase tremendously due to the rapid increase in population and economic growth in the country.

Table 1 illustrates the annual MW generation in tons by weight in South East and East Asian Countries. China has the highest waste generation in the region, followed by South Korea, Japan and Indonesia. Currently, there is no data on municipal waste generation at the national level for Cambodia and Mongolia. But in Phnom Penh, the capital of Cambodia, the amount of municipal waste is observed. Actual statistics of municipal waste generation is illustrated in countries like Brunei Darussalam, Phnom Penh - Cambodia, PR China, Indonesia, Republic of Korea, Lao PDR, Mandalay in Myanmar, Singapore, Thailand and Vietnam. Most of the member countries do not have the data and information on the actual municipal waste generation, so that estimated and/or projected amount of municipal waste generation

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