



Review

Solid waste management transformation and future challenges of source separation and recycling practice in Malaysia



YiingChiee Moh, Latifah Abd Manaf*

Department of Environmental Sciences, Faculty of Environmental Studies, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor, Malaysia

ARTICLE INFO

Article history:

Received 22 April 2016

Received in revised form 6 September 2016

Accepted 8 September 2016

Available online 15 September 2016

Keywords:

Source separation

Recycling

Solid waste management

Policy implementation

Plan strategies

Malaysia

ABSTRACT

The mentality towards cleanliness, the sense of responsibility towards properly managing waste, as well as public concerns on the implications of not separating waste for recycling are critically lacking. Besides widespread of open dumping and illegal dumping, landfill sites in Malaysia are in dire state while source separation for recycling remain minimal despite the dominance of recyclable materials in the waste composition. The historical discussion on the solid waste management policy and plan strategies assesses Malaysian solid waste management needs to set realistic perspective for solid waste management particularly in source separation and recycling. Transformation of primitive solid waste management policy and plan strategies resulted to major changes in the system and rigorous implementation of mandatory source separation through Act 672. A two-pronged strategy of federalization and privatization is formally implemented in eight states of Peninsular Malaysia, Federal Territory of Kuala Lumpur, and Putrajaya. In line with the government's effort to promote sustainable solid waste management services, SWCorp Malaysia implemented SWCorp Strategic Plan 2014–2020, which focuses on (1) mindset, (2) behavior and culture, (3) collaboration and synergy, (4) policy and regulations, (5) organizational capacity, (6) technology system and facilities, (7) law enforcement, and (8) delivery system. One of the most critical challenges in source separation and recycling practice is the public attitude towards making source separation and recycling as a habit. Continuous commitment and participation from the government, private sector, and public are essential to achieve Malaysia's targeted recycling rate of 22% by 2020, with greater advancement towards a zero waste nation.

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* Corresponding author.

E-mail addresses: yiingchiee@hotmail.com (Y. Moh), latifahmanaf@upm.edu.my (L. Abd Manaf).

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1. Introduction

Solid waste management is the biggest environmental issue in Malaysia, highly dependent on landfilling as the main disposal method in managing this continuous increase of solid waste generation annually. The future of solid waste management remains unsure of, even though there are potentials for other methods of managing and minimizing solid waste. The problems associated with the management of solid waste are complex due to various factors such as the amount and composition of waste generated, rapid expansion of urban areas, funding issues, rapid technological advancement, as well as limited energy and raw materials (Tchobanoglous et al., 1993). With the growing population alone, it is not surprising that the amount of land available is becoming scarce. Thus, constructing new landfills is challenging, as with the land scarcity, other possible option for developing landfills would somehow be within the near vicinity of other household areas. A typical solid waste management system in developing countries (such as Malaysia) deals with improper collection services (such as low collection coverage, irregular collection services), unsustainable disposal of waste without air and water pollution control (including open dumping, open burning), consequences of illegal dumping (e.g. breeding of flies and vermin), and scavenging activities (Ogawa, 2000).

Accurate and well-established information of solid waste management and recycling in Malaysia is unfortunately unavailable due to unsystematic analysis and ad-hoc documentation among local authorities and related private organizations (Mohd Nasir et al., 2000). Thus, substantial progress are made by the government, local authorities, and private organizations to establish more comprehensive solid waste management system, source separation and recycling strategies, awareness campaigns, and other projects. However, various issues remain unresolved despite the ongoing efforts as we face lack of public participation and commitment, lack of civic responsibility sense in managing solid waste, public perception towards solid waste as a local municipality problem, undermining the issues in solid waste management, and ineffective education. In fact, with the increasing consumption rate and solid waste generation rate, source separation and recycling practice offers a viable option through effective and concise policy and plan strategies implementation. Separation of recyclables at source is more efficient than recovery of recyclables from mixed waste as source separation produces cleaner and materials of higher quality for recycling (Bennagen et al., 2002; Owusu et al., 2013). Recycling after all, is about separating and placing the right recyclable materials into the right bin.

A historical perspective offers insights of how solid waste are managed over the years (JPSPN, 2013). National development plans and solid waste management plans in Malaysia are gathered to provide a timeline of Malaysia's solid waste management from the late 1970s to the present. Solid waste management reflects complex economic and social factors (Owusu et al., 2013). The presentation of the history of solid waste management policy and plan strategies is mainly based on related publications and available database provided by various governmental agencies that are related to the issue, particularly resources from the Ministry of Urban Wellbeing, Housing and Local Government, National Solid Waste Management Department, and Solid Waste and Public Cleansing Management Cooperation (SWCorp). This paper assesses national solid waste management needs to set realistic perspective for solid waste

management particularly in source separation and recycling in Malaysia. Additionally, one of the main discussions of this paper is the transformation of solid waste management policy and plan strategies in Malaysia, which resulted to rigorous implementation of mandatory source separation among Malaysians. However, despite the planning and implementation of transformative source separation and recycling strategies, there are challenges to the success of source separation and recycling practice towards achieving the national recycling target of 22% by the year 2020.

In general, this paper provides an overview on the current practices and disposal method implemented in Malaysia and the Malaysian history of solid waste management policy and plan strategies to highlight the transformation of its policy and plan strategies over the years. With that, this paper is organized into several sections as follows: The first section on solid waste management practices and disposal in Malaysia provides an overview of the current solid waste generation, collection, waste composition, and disposal options available in Malaysia. The following section provides historical timeline of solid waste management policy and plan strategies - how the management of solid waste changes over the years. Following that, the recent transformative changes of solid waste management policy and plan strategies are discussed. However, it is inevitable that there are also certain challenges following the transformed policy and plan strategies, which are discussed in the final section.

2. Solid waste management practices and disposal in Malaysia

The overall solid waste composition in Malaysia is dominated by municipal solid waste (64%) with the remaining consists of industrial waste, commercial waste, and construction waste (EA-SWMC, 2009). Typically, municipal solid waste include all community waste (Tchobanoglous et al., 1993), which mainly refers to household waste. In 2007, with a population of over 25 million, Malaysian households generate approximately 18,000 tons of household waste on a daily basis (Ong, 2007). The estimated solid waste generation by 2020 is 30,000 tons but in 2012, 33,000 tons per day are generated by Malaysians (Mokhtar, 2013; SWCorp, 2014).

Due to rapid urbanization, the generation of municipal solid waste greatly increases (Murad and Siwar, 2007). With significant advancement of living standards, it is inevitable that solid waste generation increases over the years without any transformation in the attitudes and habits of Malaysians in managing their waste. Solid waste generation increases more than 90% for every 10 years (Abdul Jalil, 2010) with the growing population in Malaysia (Agamuthu and Fauziah, 2011). With the utilization of plastic and paper materials especially in packaging where those materials become dispensable to the consumers, solid waste generation increases at uncontrollable rate (Abdul Jalil, 2010; Malahkahmad et al., 2010).

The least preferred disposal method is landfilling, as waste should be separated and treated (physical, chemical, or biological treatment) but these options are costly and time-consuming (Grodzinska-Jurczak, 2001). Landfills are physical facilities used to dispose waste on land space and ideally, should be considered as the final disposal option for unrecovered waste (Tchobanoglous et al., 1993). However, Malaysia relies heavily on open dumping and landfills, where most of these sites have exceeded its operating capacity, resulting to serious environmental and social threats

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