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Review of municipal solid waste management in Turkey with a particular focus on recycling of plastics

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Abstract

Although there is an established regulatory programme for recycling of solid wastes in developed countries, improper disposal methods are still broadly adapted in developing countries. Turkey, as an economically developing country, has a number of open dumps in operation. This creates a great risk for the environment and also for human health. However, Turkey’s accession to European Union requires compliance with the European Union legislation and therefore there is currently an increasing pressure on the government authorities to develop a sustainable approach to recycling (particularly focusing on plastics) and composting activities and integrate strategies aiming at pursuing sustainable society in Turkey. In this respect, the aim of this paper is to (1) provide a review of existing situation related to municipal waste management system in Turkey and (2) identify the gaps and weaknesses of the system particularly focusing on recycling of plastics. This will aid Turkish cities to form their waste management strategy by promoting recycling activities and also developing countries which are dealing with the similar problems in their waste management mechanism.

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1. Introduction

Disposal of solid wastes is a significant environmental problem in many developing countries as it is in Turkey. Open dumping, which creates environmental risks, is used very commonly in smaller provinces in Turkey. This malpractice not only causes groundwater and air pollution along with blockage problems in sewer system but also creates health risks for the population living nearby. Since these wastes are buried underground with no precautionary measures taken, they carry a high potential of explosion due to the accumulation of methane gas.

One of the promising benefits of robust waste management is reuse of waste material for energy generation as it is anticipated that “waste to energy” conversion could help getting rid of problems of electricity scarcity and waste management together [1–4]. In this respect, recycling has gained an importance as it could help reducing the amount of waste along with decreasing the demand in raw materials. For example, reproducing aluminium from scrap could save up to 35 % of energy compared to production of aluminium from raw sources [5]. Decreasing the amount of wastes could also help in reducing the environmental pollution; for instance, reproducing paper from scrap paper provides a 74–94 % decrease in air pollution [5].

Plastics have become an essential part of our modern lifestyle, and the global plastic production has increased immensely during the past 50 years [1]. Plastics have recently become commonly used materials for packaging purposes as they are light and flexible. This has contributed greatly to the generation of plastic-related waste. Table 1 shows the extent of how recycled plastics could be used in other sectors.

Table 1. Sectors for Reprocessed Plastics [6, 7].

Sector	Material
Agriculture	Greenhouse building material
Automotive	Auxiliary equipment
Infrastructure	Drainpipes
Construction	Binder or joint filter or flooring
Other	Detergent packages, waste bins, toys

After a relatively short service life, most plastic products are discarded and sent to landfill sites, incinerators or recycling facilities [8, 9]. The three methods above along with chemical treatment are the major ways of disposing and treating of solid wastes [10]. Chemical reduction converts plastic waste into chemicals used as feedstock in industrial processes or as fuel [11]. Although there are available options of dealing with discarded plastics [12, 13], landfills are still the most common waste disposal method [14]. For example, in the United States, 32 million tonnes of plastic waste were generated; taking up 12.7 % of total municipal solid waste in 2012 and the overall plastic recycling rate was only 9 % [15].

For these reasons this study was conducted to:

- Provide a review of existing situation related to municipal waste management system in Turkey;
- Identify the gaps and weaknesses of the system particularly focusing on recycling of plastics, which is of generic value to Turkish cities and beyond.

In general, the results and remarks of this study can be used as a basis of future planning and anticipation of the needs for investment in the area of municipal waste management in Turkey.

2. Methodology

This study focuses on Turkey which has become one of the largest urban centres as well as the cultural, economic, and financial centres of the world over a decade. It has a surface area of almost 784 000 km² with 79 million residents [16] (Fig. 1).

The methodology of this study is based on the literature survey regarding the reuse of plastics and municipal waste sector in Turkey and structured interviews along with a questionnaire which consists of ten questions and requires 10–

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