

# A Review of Municipal Solid Waste Management in Saudi Arabia Environmental, Economical, and Social Perspective

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## Introduction

Municipal Solid Waste (MSW) management is currently receiving attention world-wide. The Saudi Arabian government and decision-makers are increasingly concerned about waste management and practices in the country. As a result, a dedicated center for managing waste was established, the National Centre for Waste Management (MWAN), in 2019.

The Saudi authorities consider municipal solid waste management a serious matter, due to the negative impact they have both the environment and economy, in addition to the current waste management practices in Saudi Arabia (e.g., simple dumping in landfill) that are primitive and associated with social and human health problems. Such negative impact could be avoided, or at least, reduced by using the waste into energy (WtE) approaches. Shifting to the approaches that focus on resource recovery can not only be beneficial to the environment but also valuable to the economy in terms of energy and value-added products.

In Saudi Arabia, significant increases in MSW, of about 12 million tons per year, were associated with the increase in the population rate and the changing lifestyle of the citizens in the country. The generation of MSW in the capital city alone, Riyadh, was about 8 million tons, the highest in the country, and it is still primarily handled using landfill disposal and incineration.

The large cities in Saudi Arabia are among the fastest developing in the Middle East, more waste is generated continuously as a result, and the need to build a sustainable waste system to manage and control such volumes and diversity of MSW is a necessity. Unfortunately, the country lacks a system to manage the waste and they solely depend on traditional approaches such as landfill dumping and incineration.

This review aims to cover the current state of the art and the current state of practice regarding solid waste management in Saudi Arabia over the past 10 years (2012-2022). In addition, it is to investigate what technologies are in use for treatment and their pros and cons.

## Material and methods

The analysis and evaluation methodology of this review starts with a bibliometric analysis of Saudi Arabia waste-related academic research papers. Followed by literature review that covers both academic research papers and public governmental reports over the last 10 years.

The bibliometric analysis is carried out by using specific keywords combinations over a specific period (last 10 years) in three different research databases: Web of Science, Dimensions, and Scopus. The keywords we are using in this research is: "Municipal solid waste" AND ("treatment" OR "Management") AND "Saudi Arabia".

**Table 1. Database and the published papers.**

Database	Number of papers
Web of science	29
dimensions	31
Scopus	41

According to Table1, the database with the largest number of papers is115. Thus, we will use their results in our review.

## Research Data

**Table 2. Selected related research paper.**

Paper title	Date	Author
Solid waste management in Saudi Arabia: A review	2016	R. Miandad, M. Anjum, M. Anjum, M. Waqas, M. Waqas, and others
A Review of Municipal Solid Waste Management Practices in Saudi	2020	Labib Ossama, and others
Municipal Solid Waste Management Practices and Opportunities in Saudi Arabia	2019	N. Radwan and S. A. Mangi
Sustainability Assessment of Municipal Solid Waste in Riyadh, Saudi Arabia, in the Framework of Circular Economy Transition	2022	Zaid M. Aldhfeeri and Hatem Alhazmi

**Table 3. Selected related public/government reports.**

Report title	Date	Authority
Comprehensive Waste Management Strategy for Arriyah City (Riyadh Sustainability) Strategic Master Plan	2016	The Royal commission of Riyadh (Riyadh environment)
Annual Report	2022	National Center for Waste Management (MWAN)
Waste management project	2021	National Center for Environmental Compliance
HRH the Crown Prince and Chairman of the RCRC Launched Riyadh Sustainability Strategy	2020	Ministry of Environment, Water and Agriculture
	2021	The Royal Commission for Riyadh City (RCRC)

## Results and discussion

As table 1 shows, the database with the largest number of publications is 41, thus it is considered for this work. We have downloaded the related paper from the Web of science, Dimensions, and Scopus and discussed them in the literature review. According to the bibliometric analysis in 3 scientific datasets that are; Web of Knowledge, Dimensions, and Scopus, there are a total of only 29 published papers about solid waste treatment in Saudi Arabia over the last ten years. The number is small unfortunately. The governmental reports, we found only 4 reports.

## Conclusions

In order to comprehend the current situation and make recommendations for the future, this review specifically focuses on the municipal solid waste (MSW) in Saudi Arabia. It discusses the various MSW management and treatment used currently in the country, including recycling, environmental education, and landfilling, as well as the new plans/strategies to minimize environmental issues while maximizing the technical and financial aspects of waste. Additionally, the bibliometric analysis and literature review result emphasize the importance of finding a relevant and sustainable strategy for waste in the country and negative consequences if not treated systematically and sustainability.

## References

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