

Promoting Solid Waste Composting Through Policy Reforms: The Case of Jordan

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Introduction

Solid waste management is a major challenge facing many cities around the world. According to the World Bank estimates, the per capita municipal solid waste (MSW) generation has reached 0.74 kg/day and is expected to increase by another 70% by 2050 (Kaza et al. 2018). Improper management of solid waste may lead to adverse health and environmental impacts. In developing countries, solid waste management still follows traditional linear economy approaches, where most generated waste finds its way to dumpsites and landfills. This is especially true for Jordan, as the country annually generates about 3 million tons of solid waste, where 90% of it is disposed into landfills (Abu Qdais et al., 2019). In addition, the solid waste sector in the country is responsible for about 12% of the emitted greenhouse gases and ranks as the second emitting sector after the energy sector (FNC, 2020). Such practices are neither sustainable nor practical. The situation of the solid waste sector has further deteriorated due to the refugee influxes from nearby Syria (Gibilini et al., 2022).

Realizing such facts, the Jordanian Government has recently decided to move to a more sustainable and integrated approach to solid waste management. Part of this was passing a group of policies and regulations. Among various waste management alternatives, composting has gained attention as it converts organic waste into valuable products with low operating costs and a sustainable manner (Onwosi et al. 2017). Given that organic waste accounts for about 60% of the generated solid waste stream, composting offers a feasible alternative to deal with the increasing amounts of solid waste in Jordan by diverting organics from landfills (Abu Qdais et al., 2019). Therefore, the main objective of this paper is to review the recent developments in the solid waste policy framework and their role in promoting composting as one of the approaches to moving towards a circular economy.

Methodology

To achieve the objectives of the paper, a desk study was conducted to collect the literature on solid waste management in Jordan in general and composting in particular. Regulatory and policy framework documents relevant to solid waste management were also collected. An analysis of the current policy frameworks was conducted, where the enabling policies for promoting composting in the country were identified. Furthermore, key policy issues and technical challenges were addressed. Key stakeholders' roles and responsibilities were identified.

Results and Discussion

Composting is a microbiological process through which the organic fraction of solid waste can be converted into humus-like material that can be utilized as a fertilizer or soil conditioner (Abu Qdais and Al-Widyan, 2016). In contrast to the landfilling of solid waste that emits greenhouse gases, composting can lead to reducing greenhouse gases and is considered a mitigation process for climate change. Despite that 60% of the solid waste stream is organic and more than 90% of the country's territory is classified as arid land (Al-Taani et al., 2013). To date, solid waste composting has not been practiced in the country on a full scale. To move towards a circular economy model, the Jordanian Government has issued an ambitious package of regulations, strategies, and policies to move the country towards a circular economy model. This includes the following:

- National Solid Waste Management Strategy of 2014
- National Green Growth Plan 2021-2025
- Regulation No. 68 for the year 2016 Nuisance Prevention System and Waste Collection Fees
- Jordanian Standards for Organic Fertilizers and Soil Conditioners JS 962:2011
- The Waste Management Framework Law No.16 of 2020

According to the National Solid Waste Management Strategy (NSWMS) of 2014, by 2025, five full-scale composting plants should be operational as shown in Table 1 with a total annual capacity of 371,000 tons

(Ministry of Municipal Affairs, 2014). According to the planned timeframe, the facilities are expected to start operation in 2025 with an initial capacity of 25% of the total production capacity (92,750 tons). The facilities were planned to receive source-separated organics (clean bio-waste). Unfortunately, the proposed plants have not been constructed to date; mainly due to the lack of financial resources. Furthermore, the source segregation of organic waste is not yet practiced due to the absence of policies and incentives that encourage the separation of waste at source. This is a serious challenge for the plants' operation in case they were constructed, which will adversely reflect the quality of the produced compost.

Table 1 Proposed composting facilities by the National Strategy of SWM and their capacities (NSWMS, 2014)

Region	Governorate/ Municipality	Design Capacity (Ton/year)	Initial Starting Amount (Ton/year)	Year of Operation
Northern	Irbid	84 000	21 000	2025
	Mafrq	22 000	5 500	2025
Central	Amman and Zarqa	215 000	53 750	2025
	Salt Greater Municipality	25 000	6 250	2025
Southern	Aqaba	25 000	6 250	2025
Total		371,000	92,750	

Given the fact that Jordan has developed an ambitious solid waste regulatory package to move into the direction of a circular economy, however, such a package still lacks executive tools. One component of such tools is the policy framework that promotes composting. Therefore, there is a pressing need to develop such a framework that includes the following:

1. Develop and enforce clear regulations that mandate the segregation of organic waste at the source. This can be achieved through amendments to existing waste management laws by enforcing the diversion of organic waste from landfills and encouraging an efficient collection system.
2. Introduce the polluter pays policy by restructuring the solid waste tariff system, which is currently based on a flat rate in most municipalities. Furthermore, there is a need to increase the landfilling fees, where municipalities pay 3 US\$ per ton, which is far below the real landfilling cost.
3. Establish policies to encourage the private sector involvement in solid waste management through public-private partnerships, which will leverage the expertise and resources of both sectors.
4. Putting plans for human and institutional capacity building to establish a critical mass of experts that will lead institutions that are structured to adopt circular economy models.
5. Develop awareness and marketing plans to create an active value chain of organic waste in Jordan to promote the compost among potential users like farmers, landscape businesses, nurseries, and municipalities.

On the national level, the Ministry of Environment (MOENV) is in charge of the environment and responsible for policies and legislation including setting waste management policies, regulating the waste sector, and monitoring and enforcing compliance. Thus, in case MOENV developed and enforced the adoption of the mentioned policies to promote composting in Jordan, this will assist the country in meeting its commitments to the international agreements including the Paris Agreement and Global Methane Pledge.

Conclusions

Despite that more than 90% of the territory in Jordan is an arid land that lacks nutrients and suffers from low fertility, compost use, and application are still limited. Regulations and policies could play an important role in promoting composting to become part of a circular economy model in Jordan. Therefore, there is a pressing need to develop and adopt policies that promote organic waste reduction, source segregation, and separate collection. Furthermore, the developed policies should ban organic waste from being disposed into landfills and increase the landfilling fees, as well as the solid waste services fees paid by the generators to increase the cost recovery. Moreover, economic incentives and policy instruments can create an enabling environment for increasing compost production, stimulating innovative and new market opportunities along the organic and food waste value chain. Adopting such policies will enable the country to meet its commitments to international conventions and agreements.

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