

Applicability of soft systems modelling of food waste management in the Philippines in the context of circular economy

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1.3 billion tons of food waste is generated per year globally and is expected to increase 44% by year 2025 (Thi et al. 2015). Food waste management is being explored because of the increase in food waste generations and its environmental impact. European countries and other developing countries have already implemented policies on food waste reduction and treatment which include waste segregation, composting, waste incineration, and anaerobic digestion. Meanwhile in the Philippines, no specific policy is implemented on food waste management; all typed of waste are under the RA 9003 or the Solid Waste Management Act. Despite the existence of such law, the current design of the system is a linear economy. People take resources, make something out of them and dump them when they are no longer useful. Waste are collected regardless of type and source and disposed to landfills and dumpsite. Under the proposed policy, food surplus is collected and evaluated whether it can be directed into food bank or it can be processed as food waste. This proposed policy contributes to the circular economy through the principles of designing out waste and pollution and keeping products and materials in use (Ellen MacArthur Foundation, 2019). However, there is no model yet on the food waste management system in the country. This paper aimed to evaluate the methods used by various studies on food waste management and to propose the soft systems that may be used for the food waste management modelling.

Different treatment methods and the type of evaluation used in summarized on Table 1. While there are evaluation methods that may be used, system dynamics is a suitable tool for analysis of policy. This tool can analyse a complex system and multi-criteria decision analysis may be used afterwards to structure the problem and organize the information obtained from system dynamics.

Table 1. Waste treatment method and evaluation method

Treatment Method	Location	Evaluation Method	Findings	Source
Composting	EU	BioGrace tool and IPCC methodology	Application of compost has higher carbon sequestered and lower GHG Emissions Balance	Unger & Razza (2018)
Anaerobic digestion (AD)	Amsterdam	LCA with MCDA	AD is the most capable of improving the overall sustainability.	Tanini et al. (2020)
Anaerobic digestion (AD)	Rio de Janeiro	LCA with MCDA	Optimal scenario: 50 % segregation at source + AD	Angelo et al. (2017)
Organic Waste Treatment Facility (OWTF)	Hong Kong, China	System Dynamics	OWTF alone will not be enough to reach the goal of the policy on landfill waste reduction.	Lee et al. (2018)
Windrow composting, Forced-air static composting and dehydrators.	Fort Hood, USA	Windrow composting, Forced-air static composting and dehydrators.	The objective with the highest weight was natural capital for food waste management technology in military installations	Chadderton et al. (2017)

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