

Municipal solid waste management in developing economies: A way forward

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ABSTRACT

This conceptual paper identifies how municipal solid waste management (MSWM) is currently being practiced in developing economies from an institutional perspective. Semi-systematic review of 934 peer-reviewed journal articles extracted from the Web of Science database is used as the foundation for this paper. The findings affirm that the current MSWM practices of most developing economies are either ineffective, inefficient, or limited. Hence, they are contributing to environmental, social, and economic negative impacts that can impede sustainable development. Though the literature highlights several remedies that could curtail the negative impacts of current MSWM practices, most developing economies are yet to engage with these due to numerous constraints. Special emphasis is on administrative constraints (or the norms, expectations, and requirements within the specific institutional field where MSWM is practiced in developing economies) that prevents adoption of new MSWM practices in developing economies. In this context, social movements can play a critical role in improving current MSWM practices. This paper makes recommendations for a way forward in which social movements could act as institutional entrepreneurs to change the norms, expectations, and requirements of the institutional field for a sustainable MSWM in developing economies.

1. Introduction

What if your city's landscape is tumbledown by a mountain of garbage or a beach full of debris? Will you be disgusted with the outlook? Or will you be frightened with the potential hazards? These are worthwhile interrogations that you will ask yourself if you are living in a developing economy¹ (refer to the appendix 1 for the list of developing economies). Because this is the situation of most cities in developing economies due to weak and inadequate municipal solid waste management (MSWM) practices, especially in the South Asian and the African regions (Munyai and Nunu, 2020). MSWM involves managing the collection, treatment, and disposal of municipal solid waste (MSW), which includes non-hazardous waste from households and businesses, market yard waste and street sweeping (Rao et al., 2017).

Is MSW a nuisance or a resource? The answer is context specific. Most developing economies engage in simple, convenient, and labour-intensive MSW treatments like open burning, open dumping, and landfilling (Keng et al., 2020; Weligama Thuppahige et al., 2021). These practices differ markedly from those in most developed

economies where MSW is considered strategically and sustainably. It is, for example, a source of energy generation (e.g., complex, and capital-intensive MSW treatments including incineration, gasification, and pyrolysis (Kabir and Khan, 2020). Developed economies like Japan, Switzerland, France, the United Kingdom, and Germany burn 30–80% of their MSW for energy generation (Statista, 2020). Developing economies have much to learn, with few recognising the value of their MSW and the potential it offers to pursue sustainable development (Vassanadumrongdee and Kittipongvises, 2018).

Pursuing sustainable development in an economy involves structuring the economic pillar in such a way that the environmental and social pillars are simultaneously addressed (Brinkmann, 2016). Many current environmental (and other sustainability-related) challenges are attributable to assumptions within traditional business models that pay poor attention to the three pillars of sustainable development simultaneously. The consequences of this poor attention can be witnessed in the experience of issues such as MSWM (Gaspar et al., 2019; Tiseo, 2022). Since, households and businesses are the waste producers contributing to MSW generation (Heidari et al., 2019), more work is

Abbreviations: MSWM, Municipal Solid Waste Management; MSW, Municipal Solid Waste; UN, United Nations; SDGs, Sustainable Development Goals; SSR, Semi-systematic Review; WoS, Web of Science; NIMBY, Not-in-my-back-yard

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required to bring forth the new sustainable business models which achieves the aforementioned balance of sustainable development. Specifically, there is a need for change in how economic, social, and environmental initiatives are managed by businesses (Dhahri and Omri, 2018; Johnson & Schaltegger, 2019) to address the challenge of MSWM – and to make progress towards sustainable development.

For most developing economies, MSW is challenging. By 2050, global MSW generation will reach 3.4 billion tons per year, a 50% increase from the current levels (Tiseo, 2022). More than 50% (53%) of this growth is likely to come from developing economies, largely attributable to poor and limited strategies for waste management (Dangi et al., 2017). MSWM thus represent a significant obstacle to sustainable development in developing economies, and the achievement of the United Nations' (UN) Sustainable Development Goals (SDGs), especially, SDGs 11 (sustainable cities and communities) and 12 (sustainable consumption and production) (Vassanadumrongdee and Kittipongvises, 2018). The rapid urbanization in the South Asian and the African regions could devastate the progress of SDGs 11 and 12 due to their weak and inadequate MSWM practices (Munyai and Nunu, 2020). Accordingly, this conceptual paper responds to the research question: 'how does the literature describe the influence of MSWM in developing economies on sustainable development from an institutional perspective?'. Specifically, the paper outlines the actors, and the institutional pressures that constitutes the field. The paper contributes to the institutional change literature by highlighting the necessity of new norms, expectations, and requirements in MSWM to address the challenge of sustainable development in developing economies.

There are existing reviews of MSWM in developing economies. An example is the recent review which discusses the evolution of waste management in developing countries over the last five decades but proposes a way forward from technical perspectives like establishing statistical databases on waste management, standardization of waste definitions, and using economic instruments to assess the performance of waste management (Maalouf and Agamuthu, 2023). Abarca-Guerrero et al. (2015) had previously outlined several stakeholders in solid waste management and the factors that influence waste management systems, nonetheless they did not provide a way forward for MSWM in developing economies. Similarly, Marshall and Farahbakhsh (2013) had evaluated waste management drivers that includes institutional issues but did not provide a way forward for MSWM in developing economies other than emphasizing the need for contextually grounded mechanism to address the institutional issues in solid waste management. Hence, to the best of authors' knowledge, research to date has not identified the key actors in how MSWM is organised and practiced and proposed a way forward for sustainable MSWM in developing economies from an institutional lens, a gap being addressed by this paper. This paper thus addresses the broader social, cultural, and contextual landscape within which MSWM is practiced by taking an institutional perspective.

2. Methodology

This conceptual paper is based on a semi-systematic review (SSR) methodology. According to Snyder (2019), SSR covers broader and diverse topics to detect progression, themes, perspectives, and issues in a specific discipline and/or to create an agenda for further research.

This paper describes practices, key actors, impacts, constraints, and remedies related to MSWM in developing economies and highlights trends in research and knowledge gaps. It draws from institutional theory to offer a perspective on the way MSWM is currently organised in developing economies. An extensive search of the extant literature was carried out in the Web of Science (WoS) database as it includes the Social Sciences Citation Index which is valuable for a researcher exploring a discipline related to social sciences. WoS has previously been used by Dias et al. (2021), Jafarzadeh-Ghoushchi and Dorosti (2017),

Medina-Mijangos and Seguí-Amórtégui (2020), and Shi et al. (2021) in conducting literature reviews or bibliometric analysis on MSWM.

The search strings included eight different combinations (see Table 1) all of which were derived in relation to the research objectives. The search period was from September 25, 2015, to October 31, 2022. September 25, 2015 was selected as the starting date of the search period, since it was when the United Nations Sustainable Development Summit adopted the 2030 agenda for SDGs (United Nations, n.d.). The release of SDGs triggered global attention towards waste management and specifically SDGs 11 and 12 for the purpose of this paper's scope (i.e., MSWM).

The search resulted in 4787 records which were screened using the Covidence platform (see Fig. 1). Covidence is an online tool for managing reviews by facilitating parallel evaluations of independent reviewers (Kellermeyer et al., 2018). The Covidence has been previously used by Cook et al. (2022), Molla et al. (2021) and Sewak et al. (2021) in conducting reviews on waste management.

There were four inclusion criteria for the screening of the articles. First, the focus of the article had to be on a developing economy. If an article only covered one or more of developed economies or non-geographical territories like cruise ships, then those articles were excluded. Second, the focus of the article should be on MSW. If an article focused on one or a mix of agricultural waste, bio waste, biomass waste, blasting waste, construction and demolition debris, disaster debris, electronic waste, hazardous waste, industrial waste, medical waste, non-municipal organic waste, wastewater, storm water and sludge, then they were eliminated. Third, the article had to refer to MSWM. If an article focused on non-MSWM areas including energy management, urban management, soil management, coronavirus pandemic, economic development, agriculture, dairy production, tourism, extended producer responsibility, infrastructure development, pollution, resource management, circular economy, sustainable development, waste trading, water management etc., then those articles were eliminated. Fourth, it had to be a peer-reviewed journal article. The strict adherence to the peer-reviewed publications guarantees high quality reviews in the dedicated area of research (Johnson and Schaltegger, 2019). Accordingly, 1869 records including books, book chapters, conference papers and secondary publication were excluded during this stage of screening.

Two authors screened the articles based on the inclusion criteria leading to the final number of 934 articles (see Fig. 1) which were used to identify themes in the literature.

To identify the main themes arising from the literature, the 934 articles were uploaded in the NVivo software. As a tool for the analysis of non-quantitative and unstructured data, NVivo provides a quantitative paradigm of the selected articles by forming a word cloud to realize universality and objectivity (see Fig. 2). The NVivo has been previously used by Li et al. (2022), Newaz et al. (2020) and Salsabila et al. (2021) in analysing the contents of the selected literature. After repeated attempts, 15 articles could not be read by the software and hence the word cloud and subsequent themes discussed in the next section are based on the analysis of 919 articles.

Five main themes are emergent from the literature as highlighted by different shapes (see Fig. 2) and these are discussed next.

3. Discussion of findings

This section overviews the five emergent themes (see Fig. 2) from the literature and collectively they identify the use of institutional theory for providing new insights into why and how institutional change could facilitate a sustainable MSWM in developing economies.

The first three emergent themes (current practices; impacts; and remedies, see Fig. 2) provide an overview of how developing economies currently practice MSWM, the impact of those practices on environmental, social, and economic aspects, and how those impacts can be

Table 1
Search strings and results.

Search string	Records found
<i>solid* waste* manage* in Title AND develop* econom* in Topic</i>	295
<i>solid* waste* manage* in Title AND emerg* econom* in Topic</i>	31
<i>solid* waste* manage* in Title AND develop* countr* in Topic</i>	334
<i>solid* waste* manage* in Title AND "Sri Lanka" in Topic</i>	8
<i>solid* waste* manage* in Topic AND develop* econom* in Topic</i>	2062
<i>solid* waste* manage* in Topic AND emerg* econom* in Topic</i>	276
<i>solid* waste* manage* in Topic AND develop* countr* in Topic</i>	1725
<i>solid* waste* manage* in Topic AND "Sri Lanka" in Topic</i>	41

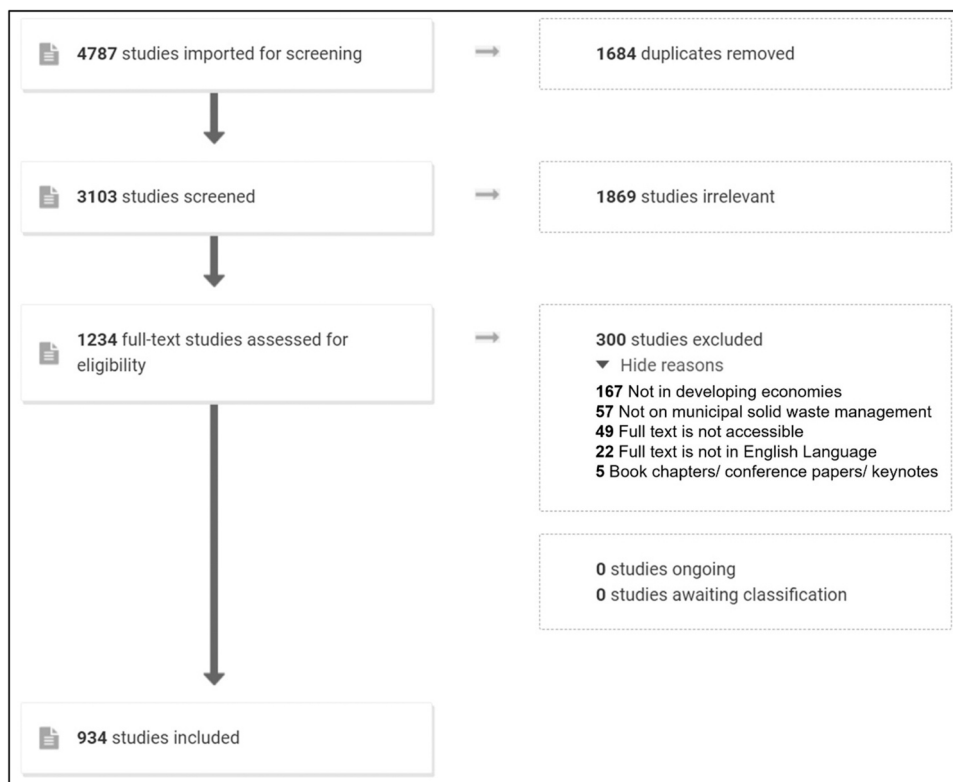


Fig. 1. Covidence screening process.

mitigated to through emerging solutions that are yet to be widely adopted. Hence, this section highlights various questions that the practitioners of MSWM in developing economies may want to ask from themselves and as part of the discussion with their other stakeholders to deliver sustainable outcomes in MSWM.

3.1. Theme 1: current MSWM practices

The wide range of current MSWM practices in developing economies can be clustered into three main areas – strategic, operational, and controlling level practices (see Table 2).

Strategic level practices show the direction for operational level practices while controlling practices act as monitoring and evaluation mechanisms of strategic and operational level practices. An overview of these practices and their status quo in developing economies are presented next.

3.1.1. Strategic MSWM practices

Policy in MSWM is not a single instrument. It is a collection of legislations, mandates, agreements, directions, and principles used by governments to shed light on other MSWM practices (dos Muchangos

et al., 2015; Trinh et al., 2021; Wan et al., 2015). Notably, in many developing economies, MSWM policies are not effectively implemented despite their existence (dos Muchangos et al., 2015; Kala et al., 2020; Trinh et al., 2021; Wong et al., 2020). As a result, a considerable gap between policy and practice of MSWM in most developing economies can be observed (Kala et al., 2020; Lino and Ismail, 2017).

Governance involves decision making related to MSWM (Hettiarachchi et al., 2018). Given the lack of MSWM policy implementation in most developing economies, deficiencies in governance of MSWM are unavoidable. Based on the provisions in MSWM policies, public and/or private sector waste service providers engage in governance of MSWM (Wang et al., 2021). However, in a majority of developing economies, the governance of MSWM is not optimal due to adverse political interference and weak bureaucratic structures in waste service providers (Hettiarachchi et al., 2018; Massoud et al., 2019; Peng et al., 2020; Wang et al., 2021).

Selection of MSW treatment technology is a major decision to be taken by the waste service providers, and it is generally regarded as the backbone of any effective MSWM system (Singhal et al., 2021). Consequently, in most cases, this MSWM practice is a multi-criteria decision in which all aspects including economic, social, and environmental

MSW encompasses recycling which reutilizes the recoverable portion of MSW as secondary materials (Conke, 2018). Both biological processing and recovery treatments are still emerging in most developing economies (Fei et al., 2018; Lino and Ismail, 2017).

As a practitioner of MSWM in a developing economy, at this point it will be value adding to reflect on the following questions to ensure sustainable outcomes in operational level MSWM practices (refer to appendix 2 for pathway for the questions):- 1) Does your company have an efficient separation of MSW? 2) Does your company have an efficient MSW collection? Does your company engage in efficient MSW treatment? 4) How do you find a way forward in the operational level MSWM practices for a sustainable MSWM in developing economies?

3.1.3. Controlling MSWM practices

Controlling practices involve waste charge systems and performance assessment of MSWM. Waste charge systems play a dual role of controlling the waste disposal and generating a revenue for waste service providers (Chu et al., 2019; Nazari et al., 2016; Welivita et al., 2015; Yeung and Chung, 2017). Many developing economies use traditional waste charge systems that contemplate on a flat rate or a fixed fee which makes it more convenient for implementation (Nazari et al., 2016; Welivita et al., 2015). Performance assessment of MSWM involves measuring and monitoring the performance of MSWM practices (Jucá et al., 2020). It provides data for diagnoses of the MSWM system to recognize the needs for improvements and policy changes (Olay-Romero et al., 2020). In most developing economies, the performance assessment of MSWM is focused on ensuring the continuous supply of basic MSWM services for proper collection and disposal of MSW (Olay-Romero et al., 2020). Thus, it neglects the impact of MSWM on economic, social, and environmental spheres. Therefore, as a practitioner of MSWM in a developing economy, it will be useful to raise the following questions in the journey towards sustainable MSWM (refer to appendix 2 for specific questions):- 1) Does your company have a non-traditional waste charge system? 2) Does your company have an unlimited performance assessment of MSWM? 3) How do you find a way forward in controlling MSWM practices for a sustainable MSWM in developing economies?

In summary, many developing economies leverage traditional MSWM practices such as open burning, open dumping, landfills, and traditional waste charge systems. Hence, there is a lack of adoption of superior MSWM practices like incineration, cement kiln co-processing, pyrolysis, gasification, composting, anaerobic digestion, mechanical biological treatment, recycling, and modern waste charge systems. Notably, in most developing economies, strategic level practices are ineffective, operational level practices are inefficient, and controlling practices are limited. Hence, the status quo of MSWM in developing economies not only jeopardizes the urban landscape, but also causes irrevocable negative impacts on people, and planet.

3.2. Theme 2: environmental, social, and economic impact of current MSWM practices

The current MSWM practices in developing economies represent a considerable impediment to achieving sustainable development. Environmentally, gaseous emissions and leachate contamination resulting from inefficient collection of MSW, open burning, open dumping, and landfilling cause excessive air, water, and land pollution (Hemidat et al., 2017; Son and Louati, 2016; Topaloglu et al., 2018; Yalcinkaya and Uzer, 2021; Weligama Thuppahige and Babel, 2021). In addition to this environmental pollution, the inefficiencies and ineffectiveness of current MSWM practices jeopardize the aesthetic value of the urban environment (Chikowore, 2020; Son and Louati, 2016; Yalcinkaya and Uzer, 2021). Further, lack of recycling denotes

excessive consumption of virgin materials and raises concerns for sustainable development (Conke, 2018).

Socially, gaseous emissions from open burning, open dumping and landfills can lead to respiratory illnesses, cancers, and adverse birth outcomes among the population (Das et al., 2018; Krecl et al., 2021; Kumari et al., 2017; Ramaswami et al., 2016; Weligama Thuppahige and Babel, 2021; Weligama Thuppahige et al., 2021). Women, and children, who are the main waste handlers at household level in most developing economies, are likely to be affected by health hazards when MSW is not collected on time (Almazán-Casali et al., 2019).

Further, employees of waste service providers encounter occupational stress due to lack of social recognition and tend to consume alcoholic substances on daily basis due to fatigue and mental distress (Salve and Jungari, 2020). Such behaviours not only risk their health but also cause work and family conflicts. Similarly, waste pickers also suffer from social discrimination and low socioeconomic conditions compels them to live in slums with zero access to basic needs (Kristanto et al., 2021; Omosimua et al., 2020). For example, in India, there is a particular cohort of people who are designated to become waste or sanitation workers due to their low cast (Salve and Jungari, 2020). In addition, children of waste picking families tend to interrupt their education to join their family in waste picking (Kristanto et al., 2021).

From the economic aspect, current MSWM practices are costly for the municipalities (Yalcinkaya and Uzer, 2021). In most cases, collection, and transfer of MSW incur significant costs due to high and unnecessary fuel consumption, maintenance of collection trucks, salaries of collection workers and maintenance of collection bins (Benitez-Bravo et al., 2021; Son and Louati, 2016; Topaloglu et al., 2018; Yalcinkaya and Uzer, 2021). Therefore, it is evident that the current MSWM in developing economies has turned into a man-made crisis that causes environmentally, socially, and economically negative impacts.

As a practitioner in a MSWM company of a developing economy, reflecting and responding to following questions would contribute towards their understanding especially at individual and organizational levels of their company operations on diverse stakeholders. The answers could also become the first step of mapping of stakeholders (who they are, their expectations, extent of powers based on their response) and prioritising of resource allocation when making decisions. Exemplars of questions include (see appendix 2 for additional details on the questions):- 1) Does your current MSWM practices cause negative impacts to the environment, society, and economy? 2) How do you find a way forward in addressing the impact on sustainable development caused by MSWM?

3.3. Theme 3: remedies for current MSWM practices

The literature points to several solutions to mitigate the environmental and social impacts of MSW and to bring about improvements in how it is managed in developing economies. Implementing a participatory approach in the governance of MSWM is one crucial remedy to overcome poor practice (dos Muchangos et al., 2015; Massoud et al., 2019; Shams et al., 2017; Yang et al., 2019). This approach encourages the actors (see Section 3.4.) in MSWM to render their support in effective implementation of MSWM policies and to achieve sustainable outcomes in MSWM.

Fostering pro-environmental behaviours (such as reducing the amount of food waste, littering in dedicated bins, active participation in waste management initiatives, talking to others about their waste disposal behaviours, and purchasing products made from recycled materials etc.) among people is another effective remedy to current MSWM issues (Conke, 2018; Kala et al., 2020; Keng et al., 2020; Ramadan et al., 2022; Ramaswami et al., 2016; Roy et al., 2021; Wan et al., 2015; Wong et al., 2020). Fostering pro-environmental behaviours not only

Table 3
Administrative constraints.

Category	Constraints	Supporting Authors
Politically stimulated constraints	Adverse political interference Weak and bureaucratic structures in institutions for MSWM Ineffective regulatory framework	dos Muchangos et al., 2015;Sulemana et al., 2018 dos Muchangos et al., 2015;Hettiarachchi et al., 2018;Wang et al., 2021;Wong et al., 2020 Almazán-Casali et al., 2019;Chikowore, 2020;Conke, 2018;dos Muchangos et al., 2015;Lino and Ismail, 2017;Roy et al., 2021;Salve and Jungari, 2020;Sukholthaman and Sharp, 2016;Valenzuela-Levi et al., 2021;Wong et al., 2020
	Inadequacy of resources	Conke, 2018;Keng et al., 2020;Lino and Ismail, 2017;Melaku and Tiruneh, 2020;Nsimbe et al., 2018;Roy et al., 2021;Trinh et al., 2021;Valenzuela-Levi et al., 2021;Wong et al., 2020
Constraints motivated by stakeholders' perception	Lack of stakeholder involvement Poor public awareness, knowledge, and support	dos Muchangos et al., 2015;Rai et al., 2019;Trinh et al., 2021 Almazán-Casali et al., 2019;Chikowore, 2020;Conke, 2018;Hettiarachchi et al., 2018;Kala et al., 2020;Keng et al., 2020;Krecl et al., 2021;Lino and Ismail, 2017;Nsimbe et al., 2018;Ramadan et al., 2022;Sukholthaman and Sharp, 2016;Vassanadumrongdee and Kittipongvises, 2018;Wan et al., 2015;Wang et al., 2021;Wong et al., 2020
	Strong resistance from the local communities to certain waste treatments due to perceived hazards	Keng et al., 2020;Liu et al., 2019;Nguyen et al., 2021;Roy et al., 2021;Song et al., 2017;Yang et al., 2019

Source: authors

increases public awareness and knowledge, but also generates public support to establish market demand for the resources made from MSW (e.g., recycled materials and composts). When there is a market demand for the resources made from MSW, new revenue opportunities are available for waste service providers to strengthen their financial capacities.

Integrating the informal sector in to the formal MSWM system is another suggested remedy (Al-Khatib et al., 2020; Conke, 2018; Ferronato et al., 2020; Hettiarachchi et al., 2018; Lino and Ismail, 2017; Miranda et al., 2020; Vassanadumrongdee and Kittipongvises, 2018). Integration is likely to support the expansion of the collection coverage, the frequency of MSW collection and accelerate the recycling of MSW.

Technology driven MSW collection and transfer is an emerging solution (Topaloglu et al., 2018). This solution is likely to facilitate timely collection of MSW and reduce the fuel and time consumption. However, the implementation of technology driven MSW collection and transfer is contingent upon the financial capacity of waste service providers.

Enforcing extended producer responsibility is a proactive remedy to curtail the amount of waste produced or disposed (Wong et al., 2020). This is likely to persuade the commercial entities to address the problem of end-of-life products. Thus, extended producer responsibility not only reduces the amount of waste required to be disposed of, but also reduces the burden on waste service providers.

Source separation of MSW is also a proactive remedy to curtail the amount of waste disposed (Krecl et al., 2021; Singhal et al., 2021; Song et al., 2017). This is likely to divert some MSW from open burning, open dumping and landfilling to superior waste treatment technologies. However, clear guidelines for MSW separation and bins for waste storage should be provided to the households for the effective implementation of source separation (Oduro-Kwarteng et al., 2016; Sukholthaman and Sharp, 2016). Further, the adoption of modern waste charge systems that contemplate on a frequency-based, weight-based, or volume-based fee may encourage the households to engage in source separation of MSW (Nazari et al., 2016; Chu et al., 2019; Welivita et al., 2015).

At this juncture, the practitioner of MSWM may find it useful to raise the following questions in implementing the remedies (see appendix 2 for details): - 1) Does your company use participatory governance in MSWM? 2) Does your company foster pro-environmental behaviours among people? 3) Does your company integrate the informal sector for MSWM? 4) Does your company use modern technology for MSWM? 5) Does your company advocate for extended producer responsibility? 6) Does your company promote source separation of MSW? 7) How do you find a way forward in implementing these remedies for a sustainable MSWM?

The other two emergent themes (key actors; and constraints, see Fig. 2) identify the main actors and the issues that constitutes the institutional field of MSWM in developing economies.

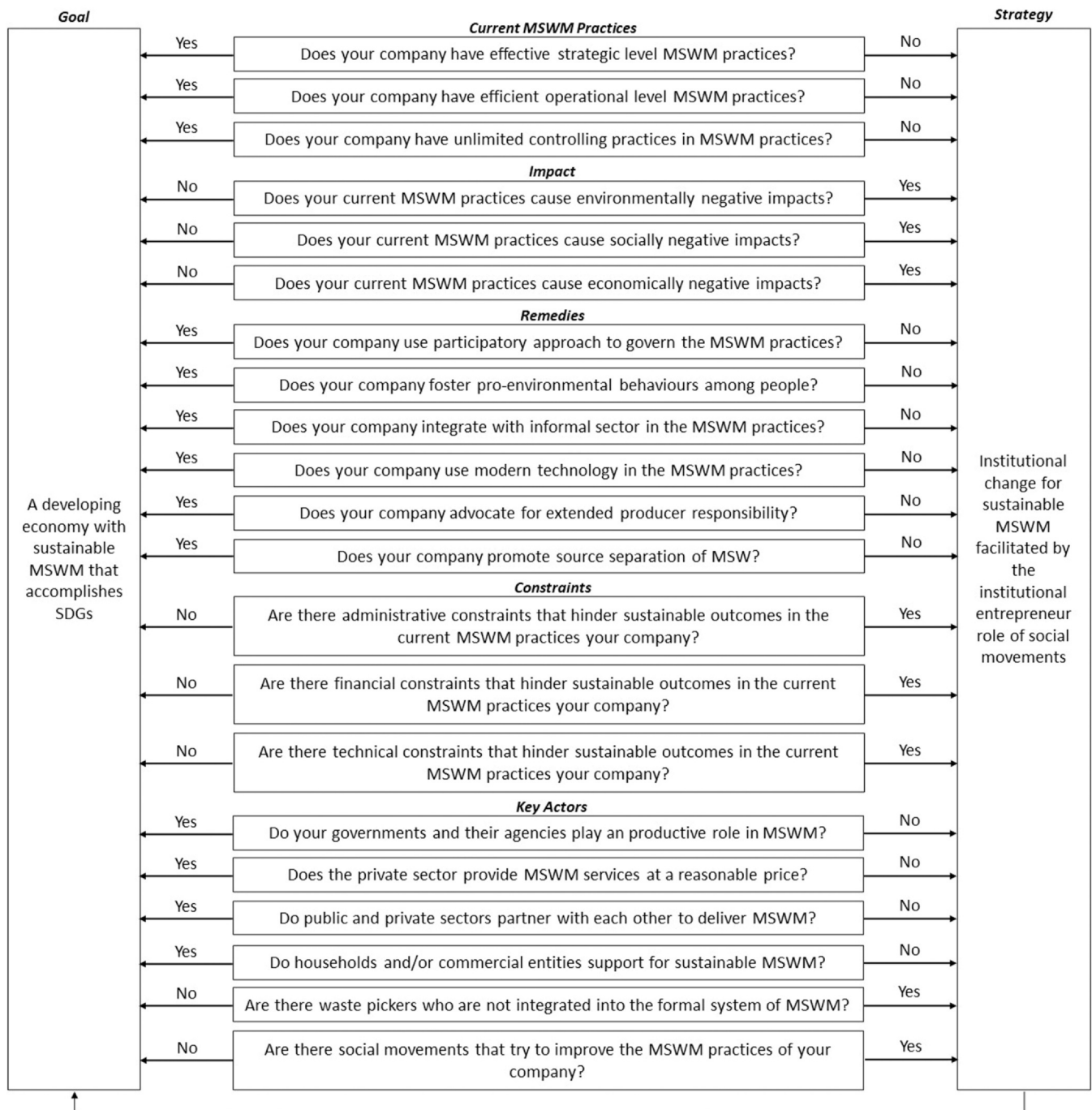
3.4. Theme 4: key actors of MSWM

Reshaping MSWM is likely to depend on the collective efforts of multiple actors, with varying levels of responsibility for its implementation. The national and local governments, and governmental agencies perform a pivotal role in the MSWM field of developing economies (Trinh et al., 2021). They are responsible for policy making and regulating MSWM. In many developing economies, local governments act as the sole provider of waste services (Hettiarachchi et al., 2018; Massoud et al., 2019; Peng et al., 2020). However, the waste services provided by local governments are hampered by budgetary restrictions and unproductive delegation of authority from the national to the local governments (Ishawu et al., 2020). Some developing economies (e.g., Nigeria and Bangladesh) have privatised the provision of waste services. Hence, private sector waste service providers also perform a key role in MSWM (Hettiarachchi et al., 2018; Peng et al., 2020). However, the private waste services incur huge costs on waste producers, especially households (Ishawu et al., 2020).

Another key actor in the field of MSWM is the public-private-partnerships (PPP). PPP is a long-term cooperative relationship between public and private sectors to deliver waste services by providing necessary infrastructure (Ishawu et al., 2020). PPP has a higher demand in some developing economies such as Ghana and Cambodia that lack both technology and human resources to carry out waste services (Pan et al., 2020; Spoann et al., 2019).

MSWM in majority of developing economies is labour-intensive. Many people are employed at waste service providers as waste or sanitation workers (Melaku and Tiruneh, 2020). Consequently, waste workers are another crucial actor in the MSWM field, and they engage in dirty and hazardous work including street cleaning, drain clearing, and door to door garbage collection and transfer (Salve and Jungari, 2020).

The waste producers play a pivotal role in the MSWM field as they are responsible for waste generation. The literature identifies two types of MSW producers – households and business organizations (Heidari et al., 2019). Both these actors are equally important for achieving sustainable MSWM. Households play a crucial role in integrated MSWM by separating, recycling, and composting MSW at individual and household levels (Almazán-Casali et al., 2019; Chikowore, 2020; Zoroufchi Benis et al., 2018), while business organizations are vital for the implementation of extended producer responsibility to reduce waste generation and burden on extant MSWM systems (Wong et al., 2020).



Source: authors

Fig. 3. Checklist of institutional change for sustainable MSWM in developing economies.

Another important actor that dominates the MSWM field are the waste pickers. They represent the informal sector in the field. The waste pickers are involved in picking up recyclable waste items and selling them to earn an income (Al-Khatib et al., 2020; Kristanto et al., 2021; Omosimua et al., 2020). The literature has used various terms to identify waste pickers such as garbage pickers, reclaimers, recyclers, scavengers, and waste salvagers (Al-Khatib et al., 2020). In most developing economies, the waste pickers are not only limited to recycling of MSW but also perform several activities including collection, separation, and transportation of MSW (Kristanto et al., 2021; Omosimua et al., 2020; Vassanadumrongdee and Kittipongvises, 2018).

Not-for-profit organisations, and those that make up social movements, also perform a key role in MSWM in developing economies. First, 'not-in-my-back-yard' (NIMBY) movements which are local community resistance against the potential hazards of MSWM practices carried out by waste service providers (Liu et al., 2019; Nguyen et al., 2021; Song et al., 2017; Yang et al., 2019). Second, the associations of waste pickers that are identified as recycling cooperatives (da Silva and Bolson, 2018). The latter social movements are formed by waste pickers to establish a social recognition for their profession by integrating it with the formal MSWM systems (Godfrey et al., 2017; Miranda et al., 2020).

Hence, a practitioner of MSWM may find it is worthwhile to ask the following questions in embarking towards sustainable MSWM (refer to [appendix 2](#) for specific questions): - 1) Do these key actors play a pivotal role to deliver sustainable outcomes in MSWM? 2) How do you find a way forward among key actors for sustainable MSWM?

3.5. Theme 5: constraints for sustainable MSWM

The practice of MSWM – including its constraints and opportunities – is shaped by three distinct domains: administrative, financial, and technical. These individually, and collectively, drive or impede sustainable outcomes. Administrative constraints relate to weaknesses and challenges in social structures. Some administrative constraints are politically stimulated while others are motivated by stakeholders' perceptions as overviewed in [Table 3](#).

Financial constraints relate to a perceived lack of a profit motive for MSWM. These include for example the lack of financial strategies to ensure financial viability of waste service providers ([Hettiarachchi et al., 2018](#); [Wang et al., 2021](#)), lack of market demand for materials made from recycled MSW to generate adequate revenue ([da Silva and Bolson, 2018](#); [Roy et al., 2021](#); [Sukholthaman and Sharp, 2016](#)), and high operational costs for MSWM practices, especially collection and transfer ([Benitez-Bravo et al., 2021](#); [Liu et al., 2019](#); [Nguyen et al., 2021](#); [Sulemana et al., 2018](#)).

Technical constraints relate to poor operations management in MSWM. The examples of these constraints include untimely execution and inadequate coverage of MSWM practices ([Das et al., 2018](#); [Hemidat et al., 2017](#); [Krecl et al., 2021](#); [Lino and Ismail, 2017](#); [Rai et al., 2019](#); [Son and Louati, 2016](#); [Sulemana et al., 2018](#); [Topaloglu et al., 2018](#); [Yalcinkaya and Uzer, 2021](#)), geographical characteristics like road conditions and road traffic ([Benitez-Bravo et al., 2021](#); [Sulemana et al., 2018](#)), lack of MSWM infrastructure ([Fei et al., 2018](#); [Ramaswami et al., 2016](#)), and poor quality in waste treatment outputs ([Jara-Samaniego et al., 2017](#); [Roy et al., 2021](#)).

Ostensibly, financial, and technical constraints stem from the administrative constraints. For example, lack of financial strategies to ensure financial sovereignty of waste service providers (financial constraint) arise from adverse political interference, and weak and bureaucratic structures in institutions for MSWM (administrative constraint) ([Hettiarachchi et al., 2018](#)). Lack of MSWM infrastructure (technical constraint) result from lack of stakeholder involvement (administrative constraint) ([Rai et al., 2019](#)). Hence, it can be poised that the administrative constraints act as the root causes that trigger financial and technical constraints.

Therefore, practitioners of MSWM in a developing economy will find it is useful to raise the following questions in addressing these constraints to deliver sustainable outcomes in MSWM (see [appendix 2](#) for additional questions):- 1) Are there administrative, financial, and technical constraints that hinder sustainable outcomes in the current MSWM practices of your company? 2) How do you find a way forward to overcome these constraints for sustainable MSWM?

3.6. Future research on MSWM

From theoretical (academic/ researcher) and practical (i.e., industry practitioner) perspectives there are several questions which need to be further addressed for sustainable development to be achieved within MSWM domain and examples include: 1) Based on your stakeholder analysis, who are the actors, who could be impactful in transforming the current MSWM practices to deliver sustainable outcomes? 2) From your perspective (and based on your past experiences) what role could be played by the national and local governments, and governmental agencies to overcome the political interference in governance of MSWM? 3) How can regulators persuade households and business organizations to modify their behaviours for a sustainable MSWM? 4)

How can you as a MSWM company assist the government agencies in this behaviour change? 5) From your perspective what role (if any) could social movements play in changing the current landscape of MSWM? Hence, partnerships between the higher education sector and industry can potentially expedite findings solutions to the aforementioned challenges in a resource efficient manner.

Given the significance of MSWM to sustainable development and particularly SDGs 11 and 12, new ways to address administrative constraints (see [Table 3](#)) are necessary as the latter play a significant role in the way in which MSWM is practiced. Taking an institutional lens, administrative constraints reflect the norms, requirements, and expectations of the field in which MSWM is practiced in developing economies. According to [DiMaggio and Powell \(1983\)](#), an institutional field is the totality of the relevant actors. The institutional field of MSWM in developing economies is the totality of its actors such as national and local governments, governmental agencies, private sector waste service providers, public-private-partnerships, waste workers, households, commercial entities, waste pickers, and social movements (see [Section 3.4.](#)). The specific mix of regulatory, normative, and cognitive institutional pressures that encourage a particular set of behaviours amongst individuals and organizations that limit the achievement of sustainable outcomes.

Accordingly, to move forward, researchers/ academics and practitioners can work towards finding solutions to address different constraints which impede journey toward achieving sustainability by responding to questions such as:- 1) Are there any constraints which are currently missing from the literature? If yes, 2) Which one and why is it a constraint? 3) Which of the need to be addressed first and why? 4) Who are responsible for these constraints? 5) Are any of the constraints interconnected and how? 6) How can you overcome these constraints? 7) Among various actors in the field, who could play a pivotal role in addressing these constraints and how?

To make progress towards sustainable development and to address the poor MSWM in developing economies, institutional change is required. [Scott \(2014\)](#) states that institutional change is facilitated by the 'institutional work' of actors within the institutional field. Central to institutional work to bring about institutional change are social movements actors ([Hiatt et al., 2009](#); [Lounsbury et al., 2021](#); [Scott, 2014](#)). Yet, existing research on social movements and MSWM has focused only on the traditional role of resistance by social movements ([da Silva and Bolson, 2018](#); [Godfrey et al., 2017](#); [Liu et al., 2019](#); [Miranda et al., 2020](#); [Nguyen et al., 2021](#); [Song et al., 2017](#); [Yang et al., 2019](#)), and not on their role as institutional entrepreneurs. Therefore, exploring the role of social movements in bringing about institutional change in how MSW is managed in developing economies is an avenue for further research (see [Fig. 3](#); see also [appendix 2](#)).

The checklist presented in this paper will assist academics and practitioners in developing economies to view MSW as a resource with significant benefits. These include generating electricity to solve energy crises, safeguarding foreign currency reserves by substituting the need for chemical fertilizer with waste-based organic fertilizer, and enhancing gross domestic production and employment through waste-based entrepreneurship ([Potluri and Phani, 2018](#); [Roy et al., 2021](#); [Song et al., 2019](#)). This paper also contributes towards the policy development in developing economies by highlighting the constraints for sustainable MSWM and remedies to improve the current MSWM practices.

The existing research on MSWM in developing economies often has a technical focus. Further, there is a lack of attention to consider the broader social, cultural, and institutional field in which MSWM exists. Thus, approaching to study MSWM from an institutional perspective is timely. As mentioned earlier (see [Section 1.](#)), addressing the predicament of MSWM in developing economies is crucial in accomplishing sustainable development, specifically SDGs 11 and 12 ([Vassanadumrongdee and Kittipongvises, 2018](#)). Establishing sustainable MSWM in developing economies will contribute towards

developing sustainable human settlements by replacing slum dwelling (SDG 11) and changing unsustainable consumption and production by revamping the way that the goods and services are produced and consumed (SDG 12) ([United Nations-Sustainable Development Goals, 2022](#)).

4. Conclusion

The aim of the paper was to set out how MSWM is currently practiced in developing economies and outline actors and constraints that prevent changes in the pursuit of sustainable development. The paper identified five themes – current MSWM practices, impacts, remedies, key actors and constraints – from the literature based on a semi-systematic review methodology. Accordingly, the current MSWM practices were categorized in to three clusters – strategic, operational, and controlling. The strategic level MSWM practices were ineffective in most developing economies. The operational level MSWM practices were inefficient while the controlling MSWM practices were limited to traditional areas in most developing economies. As a result, the current MSWM practices in majority of the developing economies cause environmentally, socially and economically negative impacts. Though the literature mentioned several remedies to curtail these negative impacts and improve the current MSWM practices, the adoption level in most developing economies was questionable. Despite the presence of multiple actors with varying levels of responsibility for MSWM, most developing economies lack collaborative and collective efforts among the key actors. As overviewed in the paper, the field of MSWM is affected by numerous administrative, financial and technical constraints that hinder the delivery of sustainable outcomes in MSWM.

To establish an increased awareness and understanding about the overall picture of MSWM in developing economies, and to plan and implement strategies for sustainable MSWM, this paper provides

reflective questions with a way forward for the practitioners and academics. The checklist (see [Fig. 3](#)) presented in the paper can act as a starting point for the practitioners of MSWM in developing economies to reflect and identify their current processes for adopting different MSWM practices. The [appendix 2](#) presented in the paper provides the practitioners a way forward to transform their existing landscape of MSWM towards sustainable development.

The paper demonstrated that institutional change is necessary to address the administrative, technical, and operational constraints on MSWM practice. By identifying the institutional field of MSWM in developing economies, the findings of this paper provide a foundation for academics and research institutes who are interested in MSWM to incorporate an institutional lens in their future research efforts. The five themes highlight the role that social movements can play in bringing about the necessary institutional changes, and place developing economies on a pathway to sustainable development. Furthermore, from an institutional perspective involving the social movements is likely to accomplish SDG 17 – multi-stakeholder partnerships and voluntary commitments for strengthening the means of implementation and revitalize the global partnership for sustainable development ([United Nations-Sustainable Development Goals, 2022](#)).

Data Availability

Data will be made available on request.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix 1. - List of Developing Economies

1. Afghanistan
2. Algeria
3. American Samoa
4. Angola
5. Anguilla
6. Antigua and Barbuda
7. Argentina
8. Armenia
9. Aruba
10. Azerbaijan
11. Bahamas
12. Bahrain
13. Bangladesh
14. Barbados
15. Belize
16. Benin
17. Bhutan
18. Bolivia
19. Bonaire
20. Botswana
21. Brazil
22. British Indian Ocean Territory
23. British Virgin Islands
24. Brunei
25. Burkina Faso
26. Burundi
27. Cabo Verde
28. Cambodia
29. Cameroon
30. Cayman Islands
31. Central African Republic

32. Chad
33. Chile
34. China
35. Colombia
36. Comoros
37. Congo
38. Cook Islands
39. Costa Rica
40. Côte d'Ivoire
41. Cuba
42. Curaçao
43. Djibouti
44. Dominica
45. Dominican Republic
46. Ecuador
47. Egypt
48. El Salvador
49. Equatorial Guinea
50. Eritrea
51. Eswatini
52. Ethiopia
53. Falkland Islands
54. Fiji
55. French Polynesia
56. French Southern Territories
57. Gabon
58. Gambia
59. Georgia
60. Ghana
61. Grenada
62. Guam
63. Guatemala
64. Guinea
65. Guinea-Bissau
66. Guyana
67. Haiti
68. Honduras
69. Hong Kong
70. India
71. Indonesia
72. Iran
73. Iraq
74. Jamaica
75. Jordan
76. Kazakhstan
77. Kenya
78. Kiribati
79. Kuwait
80. Kyrgyzstan
81. Laos
82. Lebanon
83. Lesotho
84. Liberia
85. Libya
86. Macao
87. Madagascar
88. Malawi
89. Malaysia
90. Maldives
91. Mali
92. Marshall Islands
93. Mauritania
94. Mauritius
95. Mexico
96. Micronesia
97. Mongolia

98. Montserrat
99. Morocco
100. Mozambique
101. Myanmar
102. Namibia
103. Nauru
104. Nepal
105. New Caledonia
106. Nicaragua
107. Niger
108. Nigeria
109. Niue
110. North Korea
111. Northern Mariana Islands
112. Oman
113. Pakistan
114. Palau
115. Panama
116. Papua New Guinea
117. Paraguay
118. Peru
119. Philippines
120. Pitcairn
121. Qatar
122. Rwanda
123. Saba
124. Saint Barthélemy
125. Saint Helena
126. Saint Kitts and Nevis
127. Saint Lucia
128. Saint Martin
129. Saint Vincent and the Grenadines
130. Samoa
131. Sao Tome and Principe
132. Saudi Arabia
133. Senegal
134. Seychelles
135. Sierra Leone
136. Singapore
137. Sint Eustatius
138. Sint Maarten
139. Solomon Islands
140. Somalia
141. South Africa
142. South Georgia and South Sandwich Islands
143. South Sudan
144. Sri Lanka
145. State of Palestine
146. Sudan
147. Suriname
148. Syria
149. Taiwan
150. Tajikistan
151. Tanzania
152. Thailand
153. Timor-Leste
154. Togo
155. Tokelau
156. Tonga
157. Trinidad and Tobago
158. Tunisia
159. Türkiye
160. Turkmenistan
161. Turks and Caicos Islands
162. Tuvalu
163. Uganda

- 164. United Arab Emirates
- 165. Uruguay
- 166. Uzbekistan
- 167. Vanuatu
- 168. Venezuela
- 169. Viet Nam
- 170. Wallis and Futuna Islands
- 171. Western Sahara
- 172. Yemen
- 173. Zambia
- 174. Zimbabwe

Appendix 2. – Way forward for practitioners of MSWM to deliver sustainable outcomes

Key Result Area	Reflective Question	Way Forward
Strategic MSWM practices	Does your company have an effective MSWM policy?	If yes: <ul style="list-style-type: none"> • When was the policy written? • What were the drivers for writing the policy? • Who was involved in writing the policy? If no: <ul style="list-style-type: none"> • Are you thinking about writing a policy and why/not?
	Does your company have an effective governance of MSWM?	If yes: <ul style="list-style-type: none"> • How do you define the scope of governance of MSWM in your company? • Who oversees the governance process in your company? • Is the governance of MSWM in your company influenced in any manner (and how) with political interference? If no: <ul style="list-style-type: none"> • What plans (if any) are in place to establish an effective governance structure and process for your company?
	Does your company make effective selection of MSW treatment technology?	If yes: <ul style="list-style-type: none"> • When were the current MSW treatment techniques implemented? • What criteria were considered to select the current MSW treatment technology? • How are you researching about potential costs and benefits associated with different MSWM treatment technologies? If no: <ul style="list-style-type: none"> • How would you choose a technology that delivers sustainable outcomes?
Operational MSWM Practices	Does your company have an efficient separation of MSW?	If yes: <ul style="list-style-type: none"> • How do your customers and employees collaborate in separation of MSW? • How do you provide any awareness and/or education campaigns to the general community (some of whom may be your customers whose waste you collect) in benefits of correctly separating waste types? If no: <ul style="list-style-type: none"> • Are you thinking of introducing source separation of MSW and why/not?
	Does your company have an efficient MSW collection?	If yes: <ul style="list-style-type: none"> • How often does your company collect and transfer MSW to treatment and disposal facilities? • What are the reasons for your current collection frequency? • Does your company have dedicated collection trucks to cater different types of MSW? • Based on a cost-benefit analysis, what are the pros and cons of having dedicated collection trucks? If no: <ul style="list-style-type: none"> • Are you planning to have dedicated collection trucks and why/ not?
	Does your company engage in efficient MSW treatment?	If yes: <ul style="list-style-type: none"> • How efficient are they? • Does your company engage in MSW treatments that are similar to those in most developed economies? If no: <ul style="list-style-type: none"> • Are your treatment options ahead or behind the latest technological development? • Are you thinking of using biological processing and recovery treatments in near future and why/not?

Controlling MSWM Practices	<p>Does your company have a non-traditional waste charge system?</p> <p>Does your company have an unlimited performance assessment in MSWM?</p>	<p>If yes:</p> <ul style="list-style-type: none"> • How efficient it is in curtailing the amount of MSW disposed daily? <p>If no:</p> <ul style="list-style-type: none"> • Are you thinking of introducing a non-traditional waste charge system and why/not? <p>If yes:</p> <ul style="list-style-type: none"> • Do you identify assess and record the impact (positive and/or negative) to economic, social, and environmental dimensions and why/not? • If impact is identified and recorded, is it communicated in any manner with any of external stakeholders (e.g., government, peers, customers) via media such as annual reports, company websites and why/not? <p>If no:</p> <ul style="list-style-type: none"> • Are you planning to establish an unlimited performance assessment system for MSWM and why/not?
Impact on Sustainable Development	Does your current MSWM practices cause negative impacts to the environment, society, and economy?	<p>If yes:</p> <ul style="list-style-type: none"> • What are they? • How can they be addressed to reduce or completely remove the negative impacts? • What resources are required to address the negative impacts? • How would you collaborate with your peers and/or government and/or community to address the negative impacts? <p>If no:</p> <ul style="list-style-type: none"> • How do you communicate your progress with the external stakeholders?
Participatory Governance	Does your company use participatory governance in MSWM?	<p>If yes:</p> <ul style="list-style-type: none"> • Who are the actors that support your company to deliver sustainable outcomes in MSWM? • How do you obtain their support in planning and/ or implementing MSWM in your company? <p>If no:</p> <ul style="list-style-type: none"> • Are you thinking of using participatory governance in future and why/not?
Pro-environmental Behaviours	Does your company foster pro-environmental behaviours among people?	<p>If yes:</p> <ul style="list-style-type: none"> • How do you foster pro-environmental behaviour amongst your immediate stakeholders (e.g., company employees, contractors, community members)? • Who else assist and foster pro-environmental behaviours among different actors? • How do you respond to actors' queries with respect to pro-environmental behaviours? • How do you overcome people's resistance to adopt pro-environmental behaviours? <p>If no:</p> <ul style="list-style-type: none"> • Are you thinking of fostering pro-environmental behaviours among people in future and why/not?
Integrating Informal Sector	Does your company integrate the informal sector for MSWM?	<p>If yes:</p> <ul style="list-style-type: none"> • Who are involved in the informal sector? • What are the challenges you faced in integrating the informal sector representatives into the formal system? • How do you maintain collaboration with informal sectors for MSWM at your company? <p>If no:</p> <ul style="list-style-type: none"> • Are you thinking of integrating the informal sector for MSWM in future and why/not?
Technology-driven MSWM	Does your company use modern technology for MSWM?	<p>If yes:</p> <ul style="list-style-type: none"> • How do they affect your bottom line? <p>If no:</p> <ul style="list-style-type: none"> • What are the MSWM practices that you need to adopt modern technology? • What are the financial sources that you could use to access modern technology?
Extended Producer Responsibility	Does your company advocate for extended producer responsibility?	<p>If yes:</p> <ul style="list-style-type: none"> • What is the response from the government? • How efficient it has been in reducing the amount of waste produced or disposed by the commercial entities? <p>If no:</p> <ul style="list-style-type: none"> • Are you thinking of persuading the government to enforce extended producer responsibility and why/not?
Source Separation	Does your company promote source separation of MSW?	<p>If yes:</p> <ul style="list-style-type: none"> • What is your mechanism for source separation? • How do you link source separation with a modern waste charge? <p>If no:</p> <ul style="list-style-type: none"> • Are you thinking of introducing a source separation mechanism and why/not?
Key Actors	Do the key actors play a pivotal role to deliver sustainable outcomes in MSWM?	<p>If yes:</p> <ul style="list-style-type: none"> • Who are those actors? • How do regulators persuade households and commercial entities to modify their behaviours for a sustainable MSWM? • How do you as a MSWM company assist the governments and their agencies to deliver sustainable outcomes in MSWM? • How do social movements change the current landscape of MSWM? <p>If no:</p> <ul style="list-style-type: none"> • Who could be impactful in transforming the current landscape of MSWM to deliver sustainable outcomes? • How could they transform the current landscape of MSWM to deliver sustainable outcomes?

Constraints	Are there administrative, financial, and technical constraints that hinder sustainable outcomes in the current MSWM practices of your company?	<p>If yes:</p> <ul style="list-style-type: none"> • What are those constraints? • Which of them need to be addressed first and why? • Who are responsible for these constraints? • Are any of the constraints interconnected and how? • How can you overcome these constraints? • Among various actors in the field, who could play a pivotal role in addressing these constraints and how? <p>If no:</p> <ul style="list-style-type: none"> • How did you establish a constraint-free atmosphere for your company? • Among various actors in the field, who played a pivotal role in establishing a constraint-free atmosphere?
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References

- Abarca-Guerrero, L., Maas, G.G., Hogland, W., 2015. Solid waste management challenges for cities in developing countries. *Waste Manag.* 33 (1), 220–232. <https://doi.org/10.1016/j.wasman.2012.09.008>
- Abdeljaber, A., Zannerni, R., Masoud, W., Abdallah, M., Rocha-Meneses, L., 2022. Eco-efficiency analysis of integrated waste management strategies based on gasification and mechanical biological treatment. *Sustainability* 14 (7), 3899. <https://doi.org/10.3390/su14073899>
- Alam, O., Qiao, X., 2020. An in-depth review on municipal solid waste management, treatment, and disposal in Bangladesh. *Sustain. Cities Soc.* 52, 101775. <https://doi.org/10.1016/j.scs.2019.101775>
- Al-Khatib, I.A., Al-Sari, M.I., Kontogianni, S., 2020. Scavengers' contribution in solid waste management sector in Gaza Strip, Palestine. *Environ. Monit. Assess.* 192 (6). <https://doi.org/10.1007/s10661-020-08341-y>
- Almazán-Casali, S., Alfaro, J.F., Sikra, S., 2019. Exploring household willingness to participate in solid waste collection services in Liberia. *Habitat Int.* 84, 57–64. <https://doi.org/10.1016/j.habitatint.2019.01.001>
- Arıkan, E., Şimşit-Kalender, Z.T., Vayvay, Z., 2017. Solid waste disposal methodology selection using multi-criteria decision-making methods and an application in Turkey. *J. Clean. Prod.* 142, 403–412. <https://doi.org/10.1016/j.jclepro.2015.10.054>
- Benitez-Bravo, R., Gomez-González, R., Rivas-García, P., Botello-Álvarez, J.E., Huerta-Guevara, O.F., García-León, A.M., Rueda-Avellaneda, J.F., 2021. Optimization of municipal solid waste collection routes in a Latin-American context. *J. Air Waste Manag. Assoc.* 71 (11), 1415–1427. <https://doi.org/10.1080/10962247.2021.1957040>
- Brinkmann, R., 2016. *Introduction to Sustainability*, first ed. Wiley-Blackwell.
- Chand Malav, L., Yadav, K.K., Gupta, N., Kumar, S., Sharma, G.K., Krishnan, S., Rezanian, S., Kamyab, H., Pham, Q.B., Yadav, S., Bhattacharyya, S., Yadav, V.K., Bach, Q.V., 2020. A review on municipal solid waste as a renewable source for waste-to-energy project in India: Current practices, challenges, and future opportunities. *J. Clean. Prod.* 277, 123227. <https://doi.org/10.1016/j.jclepro.2020.123227>
- Chikowore, N., 2020. Factors influencing household waste management practices in Zimbabwe. *J. Mater. Cycles Waste Manag.* 23 (1), 386–393. <https://doi.org/10.1007/s10163-020-01129-9>
- Chu, Z., Wang, W., Zhou, A., Huang, W.C., 2019. Charging for municipal solid waste disposal in Beijing. *Waste Manag.* 94, 85–94. <https://doi.org/10.1016/j.wasman.2019.05.051>
- Conke, L.S., 2018. Barriers to waste recycling development: evidence from Brazil. *Resour., Conserv. Recycl.* 134, 129–135. <https://doi.org/10.1016/j.resconrec.2018.03.007>
- Cook, N., Goodwin, D., Porter, J., Collins, J., 2022. Food and food-related waste management strategies in hospital food services: a systematic review. *Nutr. Diet.* <https://doi.org/10.1111/1747-0080.12768>
- da Silva, C., Bolson, C., 2018. Public policy for solid waste and the organization of waste pickers: potentials and limitations to promote social inclusion in Brazil. *Recycling* 3 (3), 40. <https://doi.org/10.3390/recycling3030040>
- Dangi, M.B., Schoenberger, E., Boland, J.J., 2017. Assessment of environmental policy implementation in solid waste management in Kathmandu, Nepal. *Waste Manag. Res.: J. a Sustain. Circ. Econ.* 35 (6), 618–626. <https://doi.org/10.1177/0734242x17699683>
- Das, B., Bhawe, P.V., Sapkota, A., Byanju, R.M., 2018. Estimating emissions from open burning of municipal solid waste in municipalities of Nepal. *Waste Manag.* 79, 481–490. <https://doi.org/10.1016/j.wasman.2018.08.013>
- Dhahri, S., Omri, A., 2018. Entrepreneurship contribution to the three pillars of sustainable development: what does the evidence really say. *World Dev.* 106, 64–77. <https://doi.org/10.1016/j.worlddev.2018.01.008>
- Dias, J.L., Sott, M.K., Ferrão, C.C., Furtado, J.C., Moraes, J.A.R., 2021. Data mining and knowledge discovery in databases for urban solid waste management: A scientific literature review. *Waste Manag. Res.: J. a Sustain. Circ. Econ.* 39 (11), 1331–1340. <https://doi.org/10.1177/0734242x211042276>
- DiMaggio, P.J., Powell, W.W., 1983. The iron cage revisited: institutional isomorphism and collective rationality in organizational fields. *Am. Sociol. Rev.* 48, 147–160.
- Dladla, I., Machete, F., Shale, K., 2016. A review of factors associated with indiscriminate dumping of waste in eleven African countries. *Afr. J. Sci., Technol., Innov. Dev.* 8 (5–6), 475–481. <https://doi.org/10.1080/20421338.2016.1224613>
- dos Muchangos, L.S., Tokai, A., Hanashima, A., 2015. Analyzing the structure of barriers to municipal solid waste management policy planning in Maputo city, Mozambique. *Environ. Dev.* 16, 76–89. <https://doi.org/10.1016/j.envdev.2015.07.002>
- Fei, X., Jia, W., Chen, T., Ling, Y., 2021. Life-cycle assessment of two food waste disposal processes based on anaerobic digestion in China. *J. Clean. Prod.* 293, 126113. <https://doi.org/10.1016/j.jclepro.2021.126113>
- Fei, F., Wen, Z., Huang, S., de Clercq, D., 2018. *Mechanical Biological Treatment of Municipal Solid Waste: Energy Efficiency, Environmental Impact and Economic Feasibility Analysis*. *Journal of Cleaner Production* 178, 731–739.
- Ferronato, N., Preziosi, G., Gorrity Portillo, M.A., Guisbert Lizarazu, E.G., Torretta, V., 2020. Assessment of municipal solid waste selective collection scenarios with geographic information systems in Bolivia. *Waste Manag.* 102, 919–931. <https://doi.org/10.1016/j.wasman.2019.12.010>
- Feyzi, S., Khanmohammadi, M., Abedinzadeh, N., Aalipour, M., 2019. Multi-criteria decision analysis FANP based on GIS for siting municipal solid waste incineration power plant in the north of Iran. *Sustain. Cities Soc.* 47, 101513. <https://doi.org/10.1016/j.scs.2019.101513>
- Gasper, D., Shah, A., Tankha, S., 2019. The framing of sustainable consumption and production in SDG 12. *Glob. Policy* 10 (S1), 83–95. <https://doi.org/10.1111/1758-5899.12592>
- Godfrey, L., Muswema, A., Strydom, W., Mamafa, T., Mapako, M., 2017. Co-operatives as a development mechanism to support job creation and sustainable waste management in South Africa. *Sustain. Sci.* 12 (5), 799–812. <https://doi.org/10.1007/s11625-017-0442-4>
- Govind Kharat, M., Murthy, S., Jaisingh Kamble, S., Raut, R.D., Kamble, S.S., Govind Kharat, M., 2019. Fuzzy multi-criteria decision analysis for environmentally conscious solid waste treatment and disposal technology selection. *Technol. Soc.* 57, 20–29. <https://doi.org/10.1016/j.techsoc.2018.12.005>
- Heidari, R., Yazdanparast, R., Jabbarzadeh, A., 2019. Sustainable design of a municipal solid waste management system considering waste separators: a real-world application. *Sustain. Cities Soc.* 47, 101457. <https://doi.org/10.1016/j.scs.2019.101457>
- Hemidat, S., Oelgemöller, D., Nassour, A., Nelles, M., 2017. Evaluation of key indicators of waste collection using GIS techniques as a planning and control tool for route optimization. *Waste Biomass-- Valoriz.* 8 (5), 1533–1554. <https://doi.org/10.1007/s12649-017-9938-5>
- Hettiarachchi, H., Ryu, S., Caucci, S., Silva, R., 2018. Municipal solid waste management in Latin America and the Caribbean: issues and potential solutions from the governance perspective. *Recycling* 3 (2), 19. <https://doi.org/10.3390/recycling3020019>
- Hiatt, S.R., Sine, W.D., Tolbert, P.S., 2009. From pabst to pepsi: the deinstitutionalization of social practices and the creation of entrepreneurial opportunities. *Adm. Sci. Q.* 54 (4), 635–667. <https://doi.org/10.2189/asqu.2009.54.4.635>
- Ishawu, M., Guangyu, C., Adzimah, E.D., Mohammed Aminu, A., 2020. Achieving value for money in waste management projects: determining the effectiveness of public-private partnership in Ghana. *Int. J. Manag. Proj. Bus.* 13 (6), 1283–1309. <https://doi.org/10.1108/ijmpb-02-2020-0060>
- Jafarzadeh-Ghouschi, S., Dorosti, S., 2017. Effects of exposure to a variety of waste on human health - a review. *J. Liaquat Univ. Med. Health Sci.* 16 (01), 03–09. <https://doi.org/10.22442/jlumhs.171610497>
- Jara-Samaniego, J., Pérez-Murcia, M., Bustamante, M., Pérez-Espinosa, A., Paredes, C., López, M., López-Lluch, D., Gavilanes-Terán, I., Moral, R., 2017. Composting as sustainable strategy for municipal solid waste management in the Chimborazo Region, Ecuador: suitability of the obtained composts for seedling production. *J. Clean. Prod.* 141, 1349–1358. <https://doi.org/10.1016/j.jclepro.2016.09.178>
- Johnson, M.P., Schaltegger, S., 2019. Entrepreneurship for sustainable development: a review and multilevel causal mechanism framework. *Entrep. Theory Pract.* 44 (6), 1141–1173. <https://doi.org/10.1177/1042258719885368>
- Jucá, J.F.T., Barbosa, K.R.M., Sobral, M.C., 2020. Sustainability indicators for municipal solid waste management: a case study of the Recife Metropolitan Region, Brazil. *Waste Manag. Res.: J. a Sustain. Circ. Econ.* 38 (12), 1450–1454. <https://doi.org/10.1177/0734242x20941088>
- Kabir, Z., Khan, I., 2020. Environmental impact assessment of waste to energy projects in developing countries: general guidelines in the context of Bangladesh. *Sustain. Energy Technol. Assess.* 37, 100619. <https://doi.org/10.1016/j.seta.2019.100619>
- Kala, K., Bolia, N.B., Sushil, 2020. Waste management communication policy for effective citizen awareness. *J. Policy Model.* 42 (3), 661–678. <https://doi.org/10.1016/j.jpolmod.2020.01.012>
- Kellermeyer, L., Harnke, B., Knight, S., 2018. Covidence and Rayyan. *Journal of the Medical Library Association: JMLA* 106, 580–583. <https://doi.org/10.5195/jmla.2018.513>
- Keng, Z.X., Chong, S., Ng, C.G., Ridzuan, N.I., Hanson, S., Pan, G.T., Lau, P.L., Supramaniam, C.V., Singh, A., Chin, C.F., Lam, H.L., 2020. Community-scale composting for food waste: a life-cycle assessment-supported case study. *J. Clean. Prod.* 261, 121220. <https://doi.org/10.1016/j.jclepro.2020.121220>

- Kosajan, V., Wen, Z., Fei, F., Doh Dinga, C., Wang, Z., Zhan, J., 2020. The feasibility analysis of cement kiln as an MSW treatment infrastructure: from a life cycle environmental impact perspective. *J. Clean. Prod.* 267, 122113. <https://doi.org/10.1016/j.jclepro.2020.122113>
- Krecl, P., de Lima, C.H., dal Bosco, T.C., Targino, A.C., Hashimoto, E.M., Oukawa, G.Y., 2021. Open waste burning causes fast and sharp changes in particulate concentrations in peripheral neighborhoods. *Sci. Total Environ.* 765, 142736. <https://doi.org/10.1016/j.scitotenv.2020.142736>
- Kristanto, G.A., Kemala, D., Nandhita, P.A., 2021. Challenges confronting waste pickers in Indonesia: an on-field analysis. *Waste Manag. Res.: J. a Sustain. Circ. Econ.* 40 (9), 1381–1389. <https://doi.org/10.1177/0734242x211029181>
- Kumari, K., Kumar, S., Rajagopal, V., Khare, A., Kumar, R., 2017. Emission from open burning of municipal solid waste in India. *Environ. Technol.* 40 (17), 2201–2214. <https://doi.org/10.1080/09593330.2017.1351489>
- Li, J., Sun, X., Dai, X., Zhang, J., Liu, B., 2022. Policy analysis on recycling of solid waste resources in china—content analysis method of CNKI literature based on NVivo. *Int. J. Environ. Res. Public Health* 19 (13), 7919. <https://doi.org/10.3390/ijerph19137919>
- Lino, F., Ismail, K., 2017. Incineration and recycling for MSW treatment: case study of Campinas, Brazil. *Sustain. Cities Soc.* 35, 752–757. <https://doi.org/10.1016/j.scs.2017.09.028>
- Liu, Y., Ge, Y., Xia, B., Cui, C., Jiang, X., Skitmore, M., 2019. Enhancing public acceptance towards waste-to-energy incineration projects: lessons learned from a case study in China. *Sustain. Cities Soc.* 48, 101582. <https://doi.org/10.1016/j.scs.2019.101582>
- Lounsbury, M., Steele, C.W., Wang, M.S., Toubiana, M., 2021. New directions in the study of institutional logics: from tools to phenomena. *Annu. Rev. Sociol.* 47 (1), 261–280. <https://doi.org/10.1146/annurev-soc-090320-111734>
- Luo, C., Ju, Y., Giannakis, M., Dong, P., Wang, A., 2021. A novel methodology to select sustainable municipal solid waste management scenarios from three-way decisions perspective. *J. Clean. Prod.* 280, 124312. <https://doi.org/10.1016/j.jclepro.2020.124312>
- Maalouf, A., Agamuthu, P., 2023. Waste management evolution in the last five decades in developing countries – a review. *Waste Manag. Res.* 1 (15). <https://doi.org/10.1177/0734242x231160099>
- Marshall, R.E., Farahbakhsh, K., 2013. Systems approaches to integrated solid waste management in developing countries. *Waste Manag.* 33 (4), 988–1003. <https://doi.org/10.1016/j.wasman.2012.12.023>
- Massoud, M.A., Mokbel, M., Alawieh, S., Yassin, N., 2019. Towards improved governance for sustainable solid waste management in Lebanon: Centralised vs decentralised approaches. *Waste Manag. Res.* 37 (7), 686–697. <https://doi.org/10.1177/0734242x19836705>
- Medina-Mijangos, R., Seguí-Amórtegui, L., 2020. Research trends in the economic analysis of municipal solid waste management systems: a bibliometric analysis from 1980 to 2019. *Sustainability* 12 (20), 8509. <https://doi.org/10.3390/su12208509>
- Melaku, H.S., Tiruneh, M.A., 2020. Occupational health conditions and associated factors among municipal solid waste collectors in Addis Ababa, Ethiopia. *Risk Manag. Healthc. Policy* 13, 2415–2423. <https://doi.org/10.2147/rmhps.s276790>
- Miranda, I.T.P., Fidelis, R., de Souza Fidelis, D.A., Pilatti, L.A., Picinin, C.T., 2020. The integration of recycling cooperatives in the formal management of municipal solid waste as a strategy for the circular economy—the case of Londrina, Brazil. *Sustainability* 12 (24), 10513. <https://doi.org/10.3390/su122410513>
- Molla, A.S., Tang, P., Sher, W., Bekele, D.N., 2021. Chemicals of concern in construction and demolition waste fine residues: a systematic literature review. *J. Environ. Manag.* 299, 113654. <https://doi.org/10.1016/j.jenvman.2021.113654>
- Munyai, O., Nunu, W.N., 2020. Health effects associated with proximity to waste collection points in Beitbridge Municipality, Zimbabwe. *Waste Manag.* 105, 501–510. <https://doi.org/10.1016/j.wasman.2020.02.041>
- Nazari, M.R., Kalantari, K., Ghasemi, I., Jalili Ghazizade, M., 2016. A charge model for household waste management services: a case study of Tehran municipality. *J. Mater. Cycles Waste Manag.* 19 (4), 1468–1478. <https://doi.org/10.1007/s10163-016-0542-8>
- Newaz, M.T., Davis, P., Sher, W., Simon, L., 2020. Factors affecting construction waste management streams in Australia. *Int. J. Constr. Manag.* 22 (13), 2625–2633. <https://doi.org/10.1080/15623599.2020.1815122>
- Nguyen, T.D., Kawai, K., Nakakubo, T., 2021. Drivers and constraints of waste-to-energy incineration for sustainable municipal solid waste management in developing countries. *J. Mater. Cycles Waste Manag.* 23 (4), 1688–1697. <https://doi.org/10.1007/s10163-021-01227-2>
- Nsimbe, P., Mendoza, H., Wafala, S.T., Ndejjo, R., 2018. Factors associated with composting of solid waste at household level in masaka municipality, central Uganda. *J. Environ. Public Health* 2018, 1–7. <https://doi.org/10.1155/2018/1284234>
- Oduro-Kwarteng, S., Anarfi, K.P., Essandoh, H.M., 2016. Source separation and recycling potential of municipal solid waste in Ghana. *Environ. Qual.: Int. J.* 27 (2), 210–226. <https://doi.org/10.1108/meq-03-2015-0038>
- Olay-Romero, E., Turcott-Cervantes, D.E., Hernández-Berriel, M.D.C., Lobo-García De Cortázar, A., Cuartas-Hernández, M., de la Rosa-Gómez, I., 2020. Technical indicators to improve municipal solid waste management in developing countries: a case in Mexico. *Waste Manag.* 107, 201–210. <https://doi.org/10.1016/j.wasman.2020.03.039>
- Omosimua, I.J., Oluranti, O.I., Obindah, G., Busayo, A., 2020. Working conditions and career aspirations of waste pickers in lagos state. *Recycling* 6 (1), 1. <https://doi.org/10.3390/recycling6010001>
- Pan, D., Chen, H., Zhou, G., Kong, F., 2020. Determinants of public-private partnership adoption in solid waste management in Rural China. *Int. J. Environ. Res. Public Health* 17 (15), 5350. <https://doi.org/10.3390/ijerph17155350>
- Peng, L., Gu, M., Peng, Z., 2020. Study on the optimized mode of waste governance with sustainable urban development—case from China's urban waste classified collection. *Sustainability* 12 (9), 3706. <https://doi.org/10.3390/su12093706>
- Potluri, S., Phani, B.V., 2018. Waste-preneurship: a model of Environmental benefit. *J. Asia Entrep. Sustain.* 14 (2), 117–164.
- Rai, R.K., Bhattarai, D., Neupane, S., 2019. Designing solid waste collection strategy in small municipalities of developing countries using choice experiment. *J. Urban Manag.* 8 (3), 386–395. <https://doi.org/10.1016/j.jum.2018.12.008>
- Ramadan, B.S., Rachman, I., Ikhlas, N., Kurniawan, S.B., Miftahadi, M.F., Matsumoto, T., 2022. A comprehensive review of domestic-open waste burning: recent trends, methodology comparison, and factors assessment. *J. Mater. Cycles Waste Manag.* <https://doi.org/10.1007/s10163-022-01430-9>
- Ramaswami, A., Baidwan, N.K., Nagpure, A.S., 2016. Exploring social and infrastructural factors affecting open burning of municipal solid waste (MSW) in Indian cities: a comparative case study of three neighborhoods of Delhi. *Waste Manag. Res.: J. a Sustain. Circ. Econ.* 34 (11), 1164–1172. <https://doi.org/10.1177/0734242x16659924>
- Rao, M., Sultana, R., Kota, S.H., 2017. Municipal solid waste. *Solid Hazard. Waste Manag.* 3–120. <https://doi.org/10.1016/b978-0-12-809734-2.00002-x>
- Roy, E.D., Esham, M., Jayathilake, N., Otoo, M., Koliba, C., Wijethunga, I.B., Fein-Cole, M.J., 2021. Compost quality and markets are pivotal for sustainability in circular food-nutrient systems: a case study of Sri Lanka. *Front. Sustain. Food Syst.* 5. <https://doi.org/10.3389/fsufs.2021.748391>
- Salsabila, L., Purnomo, E.P., Jovita, H.D., 2021. The importance of public participation in sustainable solid waste management. *J. Gov. Public Policy* 8 (2). <https://doi.org/10.18196/jgpp.v8i2.11519>
- Salve, P.S., Jungari, S., 2020. Sanitation workers at the frontline: work and vulnerability in response to COVID-19. *Local Environ.* 25 (8), 627–630. <https://doi.org/10.1080/13549839.2020.1792430>
- Scott, R.W., 2014. *Institutions and organizations: ideas, interests, and identities* (Fourth). SAGE Publications, Inc.
- Sewak, A., Kim, J., Rundle-Thiele, S., Deshpande, S., 2021. Influencing household-level waste-sorting and composting behaviour: What works? A systematic review (1995–2020) of waste management interventions. *Waste Manag. Res.: J. a Sustain. Circ. Econ.* 39 (7), 892–909. <https://doi.org/10.1177/0734242x20985608>
- Shams, S., Sahu, J., Rahman, S.S., Ahsan, A., 2017. Sustainable waste management policy in Bangladesh for reduction of greenhouse gases. *Sustain. Cities Soc.* 33, 18–26. <https://doi.org/10.1016/j.scs.2017.05.008>
- Shi, K., Zhou, Y., Zhang, Z., 2021. Mapping the research trends of household waste recycling: a bibliometric analysis. *Sustainability* 13 (11), 6029. <https://doi.org/10.3390/su13116029>
- Singhal, A., Gupta, A.K., Dubey, B., Ghangrekar, M.M., 2021. Seasonal characterization of municipal solid waste for selecting feasible waste treatment technology for Guwahati city, India. *J. Air Waste Manag. Assoc.* 72 (2), 147–160. <https://doi.org/10.1080/10962247.2021.1980450>
- Snyder, H., 2019. Literature review as a research methodology: an overview and guidelines. *J. Bus. Res.* 104, 333–339. <https://doi.org/10.1016/j.jbusres.2019.07.039>
- Son, L.H., Louati, A., 2016. Modeling municipal solid waste collection: a generalized vehicle routing model with multiple transfer stations, gather sites and in-homogeneous vehicles in time windows. *Waste Manag.* 52, 34–49. <https://doi.org/10.1016/j.wasman.2016.03.041>
- Song, J., Sun, Y., Jin, L., 2017. PESTEL analysis of the development of the waste-to-energy incineration industry in China. *Renew. Sustain. Energy Rev.* 80, 276–289. <https://doi.org/10.1016/j.rser.2017.05.066>
- Song, Q., Zhao, S., Lam, I., Zhu, L., Yuan, W., Wang, C., 2019. Understanding residents and enterprises' perceptions, behaviors, and their willing to pay for resources recycling in Macau. *Waste Manag.* 95, 129–138. <https://doi.org/10.1016/j.wasman.2019.06.009>
- Soroudi, M., Omrani, G., Moataar, F., Jozi, S.A., 2018. A comprehensive multi-criteria decision making-based land capability assessment for municipal solid waste landfill siting. *Environ. Sci. Pollut. Res.* 25 (28), 27877–27889. <https://doi.org/10.1007/s11356-018-2765-9>
- Spoann, V., Fujiwara, T., Seng, B., Lay, C., Yim, M., 2019. Assessment of public-private partnership in municipal solid waste management in Phnom Penh, Cambodia. *Sustainability* 11 (5), 1228. <https://doi.org/10.3390/su11051228>
- Statista. (2020). Global share of MSW burned with energy recovery by country 2016. Retrieved September 12, 2022, from <https://www.statista.com/statistics/1097083/share-msw-burned-energy-recovery-globally-by-country/>.
- Sukholthaman, P., Sharp, A., 2016. A system dynamics model to evaluate effects of source separation of municipal solid waste management: a case of Bangkok, Thailand. *Waste Manag.* 52, 50–61. <https://doi.org/10.1016/j.wasman.2016.03.026>
- Sulemana, A., Donkor, E.A., Forkuo, E.K., Oduro-Kwarteng, S., 2018. Optimal routing of solid waste collection trucks: a review of methods. *J. Eng.* 2018, 1–12. <https://doi.org/10.1155/2018/4586376>
- Tiseo, I. (2022). Global waste generation - statistics & facts. Statista. Retrieved October 5, 2022, from <https://www.statista.com/topics/4983/waste-generation-worldwide/>.
- Topaloglu, M., Yarkin, F., Kaya, T., 2018. Solid waste collection system selection for smart cities based on a type-2 fuzzy multi-criteria decision technique. *Soft Comput.* 22 (15), 4879–4890. <https://doi.org/10.1007/s00500-018-3232-8>
- Torkayesh, A.E., Malmir, B., Rajabi Asadabadi, M., 2021. Sustainable waste disposal technology selection: the stratified best-worst multi-criteria decision-making method. *Waste Manag.* 122, 100–112. <https://doi.org/10.1016/j.wasman.2020.12.040>
- Trinh, L.T.K., Hu, A.H., Pham Phu, S.T., 2021. Situation, challenges, and solutions of policy implementation on municipal waste management in vietnam toward sustainability. *Sustainability* 13 (6), 3517. <https://doi.org/10.3390/su13063517>
- United Nations Conference on Trade and Development. (2021). Country Classification. https://unctadstat.unctad.org/EN/Classifications/DimCountries_All_Hierarchy.pdf.
- United Nations-Sustainable Development Goals. (2022). The Sustainable Development

- Agenda. United Nations Sustainable Development Goals. Retrieved October 4, 2022, from <https://www.un.org/sustainabledevelopment/development-agenda/#:~:text=The%2017%20Goals%20were%20adopted,plan%20to%20achieve%20the%20Goals>.
- Valenzuela-Levi, N., Araya-Córdova, P.J., Dávila, S., Vásquez, S.C., 2021. Promoting adoption of recycling by municipalities in developing countries: Increasing or redistributing existing resources. *Resour., Conserv. Recycl.* 164, 105173. <https://doi.org/10.1016/j.resconrec.2020.105173>
- Vassanadumrongdee, S., Kittipongvises, S., 2018. Factors influencing source separation intention and willingness to pay for improving waste management in Bangkok, Thailand. *Sustain. Environ. Res.* 28 (2), 90–99. <https://doi.org/10.1016/j.serj.2017.11.003>
- Wan, C., Shen, G.Q., Yu, A., 2015. Key determinants of willingness to support policy measures on recycling: a case study in Hong Kong. *Environ. Sci. Policy* 54, 409–418. <https://doi.org/10.1016/j.envsci.2015.06.023>
- Wang, K.C.M., Lee, K.E., Mokhtar, M., 2021. Solid waste management in small tourism islands: an evolutionary governance approach. *Sustainability* 13 (11), 5896. <https://doi.org/10.3390/su13115896>
- Weligama Thuppahige, R.T., Babel, S., 2021. Environmental impact assessment of organic fraction of municipal solid waste treatment by anaerobic digestion in Sri Lanka. *Waste Manag. Res.: J. a Sustain. Circ. Econ.* 40 (2), 236–243. <https://doi.org/10.1177/0734242x211013405>
- Weligama Thuppahige, R.T., Gheewala, S.H., Babel, S., 2021. Environmental impact of organic fraction of municipal solid waste treatment by composting in Sri Lanka. *J. Mater. Cycles Waste Manag.* 24 (1), 189–199. <https://doi.org/10.1007/s10163-021-01305-5>
- Welivita, I., Wattage, P., Gunawardena, P., 2015. Review of household solid waste charges for developing countries – a focus on quantity-based charge methods. *Waste Manag.* 46, 637–645. <https://doi.org/10.1016/j.wasman.2015.08.018>
- Wong, S., Mah, A.X.Y., Nordin, A.H., Nyakuma, B.B., Ngadi, N., Mat, R., Amin, N.A.S., Ho, W.S., Lee, T.H., 2020. Emerging trends in municipal solid waste incineration ashes research: a bibliometric analysis from 1994 to 2018. *Environ. Sci. Pollut. Res.* 27 (8), 7757–7784. <https://doi.org/10.1007/s11356-020-07933-y>
- Yalcinkaya, S., Uzer, S., 2021. A GIS-based multi-criteria decision support model for planning municipal solid waste collection points: a case study of Çağdaş Neighbourhood, Çiğli District, Izmir, Turkey. *Waste Manag. Res.: J. a Sustain. Circ. Econ.* 40 (8), 1297–1310. <https://doi.org/10.1177/0734242x211063733>
- Yang, Q., Zhu, Y., Liu, X., Fu, L., Guo, Q., 2019. Bayesian-based NIMBY crisis transformation path discovery for municipal solid waste incineration in China. *Sustainability* 11 (8), 2364. <https://doi.org/10.3390/su11082364>
- Yeung, I.M.H., Chung, W., 2017. Factors that affect the willingness of residents to pay for solid waste management in Hong Kong. *Environ. Sci. Pollut. Res.* 25 (8), 7504–7517. <https://doi.org/10.1007/s11356-017-1009-8>
- Zoroufchi Benis, K., Safaiyan, A., Farajzadeh, D., Khalili Nadji, F., Shakerkhatibi, M., Harati, H., Safari, G.H., Sarbazan, M.H., 2018. Municipal solid waste characterization and household waste behaviors in a megacity in the northwest of Iran. *Int. J. Environ. Sci. Technol.* 16 (8), 4863–4872. <https://doi.org/10.1007/s13762-018-1902-9>