

Governance Mechanisms for Managing Municipal Solid Waste: A Review

Kachikoti W Banda¹, Bupe G Mwanza², Erastus M Mwananumo³, Ian Nzali Banda⁴
^{1, 2, 3, 4} University of Zambia

Department of Civil and Environmental Engineering
School of Engineering
University of Zambia
Lusaka, Zambia

billkachikoti@gmail.com¹, bupe.mwanza@gmail.com², erastus.m.mwanaumo@gmail.com³
iannzalibanda@gmail.com⁴

Abstract

The rural-urban drift has led to increased population and generation of municipal solid waste. Local governments are unable to cope based on current governance mechanisms resulting into unsustainable management of municipal solid waste. This results into unsustainable management of municipal solid waste thereby threatening both public health and the environment. The solid waste management challenge has been approached with a technical solution overlooking governance mechanisms as can be evident by the persistent municipal solid waste challenges. Governance mechanisms are meant to exercise control of the sector and if enhanced would result into sustainable municipal solid waste management. A literature review was conducted to identify governance mechanisms for managing municipal solid waste in developed and developing countries. The study has shown that developed countries have implemented robust policy and laws and have strong institutions that provide oversight roles for managing municipal solid waste. Zambia has governance mechanisms for managing municipal solid waste. However, the country still faces challenges in managing municipal solid waste and therefore calls for enhanced governance. The results of the study would be useful to policy makers, waste managers, the private sector and international partners in order to achieve sustainable municipal solid waste management.

Keywords

Governance, Mechanisms, Municipal, Solid, Waste

1. Introduction

Solid waste management is one of the most important functions of any Local Authority or city government despite not being given considerable priority (Mwanza 2017). The municipal solid waste management sector has been experiencing several challenges as can be seen from uncollected piles of waste in both urban and peri-urban areas of cities in developing countries. The solid waste management challenge is a worldwide concern at different levels in the various parts of the world especially developing countries. This challenge is confirmed by Nicoll (2017) where she adds that waste has been a major challenge since the industrial revolution. The magnitude of the challenge is driven by the amount of effort put in by different countries to contain the solid waste problem. In the developed countries, solid waste is not as alarming a problem as it is in developing countries. The disparity can be explained by the fact that in developing countries, the rate at which solid waste is generated is not in consonance with the capacity to properly manage it (Liayala 2011). Lemaire et al. (2015) contributes to this debate by adding that waste management is a critical issue for most African cities. The population seems to be leaving the burden of solid waste (that they generate) to the administrative units or authorities. It follows therefore that mechanisms should be created to manage the implementation of legislation and policy (UNEP 2018)

Municipal solid waste management in Zambia is a serious challenge that all cities and towns are facing. Waste is visibly seen in open spaces, drainages etc. while poorly managed final disposal sites is another additional challenge. Despite the potential risk to public health and environment, governance mechanisms for managing solid waste are not well organized. World over, the mandate to manage municipal solid waste has been given to municipalities or local governments with a few countries having such mandates under ministries of environment. Shelton and Kiss (2005) rightly observe that while waste cannot be eliminated, local governments or indeed responsible ministries or agencies can reduce its environmental impact through proper management.

Joseph (2006) posits that sustainable waste management provides a comprehensive interdisciplinary framework. For a sustainable municipal solid waste management system, governance plays a critical role. Governance in this context

constitute laws, policies and strategies that are implemented by local governments through municipalities. Shah (2005) explains that governance refers to the political body responsible for making all policy decisions. According to the United Nations Economic and Social Council (2009), the gap between waste management policy and legislation and actual waste management practices is widening. Shah (2005) further notes that the major objective of the local government sector should be to design an overall governance system that in principle is as closely as possible as in practice. United Nations Economic and Social Council (2009) observe that across Africa, the legal and institutional or administration framework for the environmentally sound management of waste is either lacking or inadequate. While literature reveals that Zambia has policies, legislation and institutional arrangements to govern municipal solid waste, the country is still grappling with challenges in waste management ranging from lack of a stable financial base, collection, transportation and disposal challenges as exhibited by waste being dumped in the drainages, open spaces etc.

According to Sivaramanan (2015), a country's status and reputation is more importantly determined by its cleanliness with sectors such as tourism, financial strength, public health and education all depending on a clean environment. It follows therefore that Joseph (2006) recommends that the involvement and participation of all stakeholders such as the waste generators, waste processors, formal and informal agencies, non-governmental organizations and financial institutional is a key factor for sustainable waste management. Further, UNEP (2018) clearly notes that current governance environment in most African countries is not supportive of sustainable and effective waste management mainly, according to Rodic and Wilson (2017), modern waste management is largely defined as a technical problem which needs a technical solution.

Manga et al (2007) note that there are inefficiencies in the implementation of waste management policy between government agencies and local councils. UNEP (2018) suggests that current waste management systems in Africa will be challenged as populations and economies grow, consumer patterns change and populations move from rural to urban areas. Zambia has not been spared from these factors that give rise to increased waste generation and thus threaten current governance mechanisms for managing municipal solid waste.

Hayangah and Oladapo (2016) explains that governance has a dual meaning, one that refers to empirical manifestations of state adaptations to its external environment and the other which denotes a conceptual or theoretical representation of coordination of social systems and for the most part, the role of the state in that process. Palczynski (2002) agrees that any plans to upgrade solid waste management at the country level would do well to first focus on the administrative and organizational systems on which the service ultimately depends. Mwanza (2018) confirms that there is non-existence of adequate waste collection systems in Zambia. Therefore, Governance is crucial for creating an enabling environment for sustainable waste management (Wingqvist and Slunge, 2013 in (UNEP 2018) hence the sustainability of municipal solid waste management depends on the governance mechanisms employed. The rural-urban drift has led to both increased population and generation of municipal solid waste. Local governments are unable to cope based on current governance mechanisms resulting into unsustainable management of municipal solid waste, posing a threat to both public health and the environment in Zambia. Rodic and Wilson (2017) states that governance of solid waste management address the 'How' and 'Who' dimensions of solid waste management. While there are existing governance mechanisms, Zambia still faces challenges in managing municipal solid waste and therefore calls for enhanced governance. This paper therefore, is aimed at reviewing literature on governance mechanisms for managing municipal solid waste.

2. Literature Review

2.1 Waste and Governance

UNEP (1992) defines wastes as substances or objects which are disposed of or are intended to be disposed of or are required to be disposed of by the provisions of national laws. According to Young (1997) the term 'governance' can be understood as the establishment and operation of a set of rules of conduct that define practices, assign roles and guide interaction so as to grapple with collective problems. Municipal solid waste management has several players and actors who need to operate within the guidelines of the laws and policies instituted by those with power, the government. Bevir (2009) describes governance as any pattern of rule that arises either when the state plays little or no role. The effectiveness of any municipal solid waste management system is directly related to the existing governance mechanism and how effective these mechanisms are bearing in mind the existence of players from both the formal and informal sector.

2.2 Sustainable Development and Municipal Solid Waste Governance

The world has recently been actively fostering the concept of sustainable development to ensure prudent utilization of resources among world citizens and subsequently build a society that is conscious of the future as it enjoys the present. According to UNEP and ISWA (2015), governance is not just about responsibility, expressed through various legal and financial obligations, but also through a sense of 'ownership' of waste-related issues, which translates into involvement and care about the cleanliness of the open spaces in the community as well as protection of the broader environment and natural resources. The latter means that good waste governance goes beyond street cleaning and waste handling into the realms of production and consumption. This review focuses on the European Union (EU) and Japan as models for the developed countries with regard to governance mechanisms of municipal solid waste.

The EU is a consortium of 28 member states whose population in 2018 according to the World Bank (2019) was 513,213,363 million across its member states. According to Yolin (2015), the 7th Environment Action Program set the priority targets for waste policy in the EU which includes ensuring full implementation of the waste policy targets in all Member States. The EU through its governance mechanism has promoted sustainable management of municipal solid waste among its states. This has led to application of various treatment methods across EU members so as to achieve set targets in the framework. Governance of municipal solid waste in the EU member states is implemented by the enforcement of the Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives (Waste Framework Directive). The Directive establishes a legal framework for the treatment of waste in the EU. It sets the basic concepts and definitions related to waste management and lays down waste management principles for all other EU legislation related to waste, such as the "polluter pays principle" and the "waste hierarchy" including the Extended Producer's Responsibility (EPR). Clearly, through an enhanced governance mechanism, municipal solid waste can help achieve a circular economy that is centered on the three 'R's of Reduce, Reuse and Recycle and subsequently dispose of a smaller quantity of waste that has no economic value at the landfill which land can eventually be reclaimed and used for play parks or other recreation services.

The other model with regard to municipal solid waste governance in developed countries is Japan. In keeping with global trends, solid waste management mechanisms in high income countries like Japan are being oriented to concentrate on sustainability issues; mainly through the incorporation of 3R (reduce, reuse and recycle) technologies (Shekdar, 2009). Konuma (2019) reveals that Japan developed sector-based laws to deal with environmental, pollution and sanitation challenges. From examples drawn from developed countries, the success in implementing sustainable municipal solid waste management is dependent upon enhanced governance mechanisms for the sector i.e. there are enhanced institutions, legal and policy frameworks that deal with all aspects of waste management. Shekdar (2009) agrees that an integrated approach in the context of national policy and legal frameworks, institutional arrangement, appropriate technology, operational and financial management, and public awareness and participation are of enhanced governance mechanisms.

Osborne (2010) defines governance as a phenomenon that facilitates an understanding of the ways in which power penetrates policy spaces, process and practices, and the formal and informal institutional arrangements which contribute to a matrix of governance, ensemble of norms, patterns of behavior, networks, and other institutions, the power-play between them. Clearly, both Osborne (2010) and Young (1997) highlight the need for practices and behavior in municipal solid waste governance to be guided by established laws and policies by institutions with power over municipal solid waste in a particular area of authority. According to Vergara and Tcobanoglous (2012), globally, waste governance is becoming regionalized and formalized. Sustainable municipal solid waste management cannot be achieved without enhanced governance mechanisms. Figure 1 illustrates governance mechanisms being at the center of sustainable municipal solid waste management for a circular economy.



Figure 1: Sustainable Municipal Solid Waste Management. Source: Author (2020)

2.3 Municipal Solid Waste Governance in Developing Countries

Many countries around the globe have introduced governance mechanisms encompassing policy, legislation and institutions to govern municipal solid waste. In developing countries, the governance aspects such as inclusivity of both users and service providers, achieving some form of financial sustainability and strengthening institutions to perform their public tasks is becoming an accepted paradigm. Wilson et al (2013) note that there are numerous examples where ‘proven’ technologies have failed in developing countries because sufficient attention was not paid to the ‘soft’ governance aspects and addressing both sets of factors is essential for a locally sustainable solution. One of the developing countries of particular attention is the People’s Republic of China.

According to Li (2015) China produces about 300 million tons of waste per year much of which comes from urban cities. This enormous amount of waste produced calls for enhanced governance mechanisms to address the challenges that come with municipal solid waste management. As a developing country, China has put in relevant policies and legislation to manage waste despite continued challenges of waste management due to its high population. The World Economic Situation and Prospects (WESP) (2014) a division of the United Nations, categorized China as a developing country and whose population was 1.4 billion in 2018 (World Bank 2018). However, China is one of the developing countries with environmental and public health problems related to solid waste management. Li (2015) explains that poor waste collection infrastructure, investment and enforcement are some of the factors leading to these challenges. Mwanza (2018) clearly notes that many developing countries have the mandate to manage the whole value chain of solid waste but the Local Authorities in these countries are failing to provide this service due to several challenges.

2.4 Municipal Solid Waste Governance in Zambia

Solid waste management involves inclusivity of different stakeholders i.e. providers, users and Local Authorities (Mwanza 2017). According United Nations Economic and Social Council (2009), waste management problems in Africa are varied and complex with infrastructure, political, technical, social or economic, and organizational or management, regulatory and legal issues and challenges to be addressed. On the other hand, Yoshida (2018) reveals that the condition of the municipal solid waste management of Africa is critical such that the public authority capacity to implement the municipal SWM service in each country is limited. Zambia as a country has not been spared.

According to Palczynski (2002) administration is one of the major weaknesses of waste management systems in Africa. This entails that the governance mechanisms exists and the weakness in administering it leads to these challenges. To sustainably address municipal solid waste management problems in African countries and Zambia in particular, there is need to enhance the existing governance mechanisms. Prakash and Hart (1999) writes that in governance, formal organizations are often permitted or required to establish, monitor, and enforce rules, as well as resolve disputes. In Zambia, governance mechanism exists and needs enhancement to resolve most of the challenges the country is facing regarding municipal solid waste management.

According to Adipah and Kwame (2019), municipal authorities implement measures to ensure an effective and efficient way to manage municipal solid waste. This state of affairs noted by Adipah and Kwame depends on an enhanced governance mechanism of which the lack of it results into challenges municipalities are facing today in managing municipal solid waste. The Government of Zambia has made municipal solid waste management a top priority because of its impact on public health and environmental management. The existing governance framework for municipal solid waste management in Zambia includes the following;

2.4.1 Policy Framework

The governance of municipal solid waste management in Zambia involves a number of policy documents or instruments. The following are some of the policies;

Agenda 2063-The Africa We Want: Agenda 2063 is a blueprint document highlighting the aspirations of the African continent by the year 2063. The policy document enlists a pan African vision of an integrated, prosperous and peaceful Africa that is driven by its own citizens and representing a dynamic force in the international arena with sustainable development at the core. The realization of the aspirations in the agenda 2063 cannot be achieved without carefully implementing enhanced governance mechanisms for municipal solid waste management in African countries to sustainably solve the existing challenges of municipal solid waste.

Sustainable Development Goals (SDGs): Zambia is a member of the United Nations (UN) and as such is mandated to implement the SDGs which are also known as Global Goals by the year 2030. These SDGs are consistent with the Zambia Vision 2030 which is an ambitious document that seeks to propel the country into a prosperous middle income by the year 2030. Rodic and Wilson (2017) affirms that twelve (12) of the seventeen (17) SDGs can be directly linked to solid waste management.

The Vision 2030: The Zambia Vision 2030 is an ambitious policy document that outlines Zambia's anticipated path to attaining a middle-income status by the year 2030. In relation to municipal solid waste management, the policy document envisions to achieve and sustain efficiency and effectiveness in the delivery of Public Services; and also attract and retain quality technical, professional and managerial staff in the Public Service. It further seeks a productive environment and well conserved natural resources for sustainable socioeconomic development by 2030 through the achievement of the target or goal for 80 percent of waste to be collected and transported to designated disposal sites. The achievement of such a target is dependent on enhanced mechanisms for municipal solid waste management.

The Seventh National Development (SNDP) 2017-2021: The Seventh National Development (SNDP) for the period 2017-2021 was developed to ensure an integrated development approach in the country and it also outlines the desired outcomes from such developments. The plan aimed at contributing to Zambia becoming a prosperous middle income country by the year 2030 and thus recognizes that inadequate waste management is a threat to such projected achievement. The Eighth National Development Plan is currently being developed.

The National Solid Waste Management Strategy (NSWMS) 2004: The NSWMS came into effect in 2004 and was aimed at integrating solid waste management approaches in socio-economic sectors so as to address the public and environmental challenges that may arise from poor management of solid waste in the country. However, Zambia continues to grapple with the challenges associated with governance in the sector. Furthermore, the NSWMS has not been revised since it came in effect in 2004 to address contemporary issues.

Other policy documents include; **The National Policy on Environment (NPE) 2007** which was developed to ensure sustainable management of the environment and natural resources in Zambia. The policy has not yet been revised too to address current challenges that may affect the sustainable management of the environment and natural resources in Zambia such as municipal solid waste. **The National Health Policy, 2012** which seeks to achieve health for all. Municipal solid waste management sector employs and involves a large number of workers who are directly involved in the day to day activities from collection, transportation and disposal. In this regards, the National Health Policy recognizes that occupational injuries and hazards have a significant effect on the productivity

and socio-economic well-being of workers. **The National Fire and Rescue Services Policy:** It is evident that municipal solid waste management poses a serious risk to fire outbreaks that may cause loss of life and property and further pollute the environment from fumes. While the policy places an obligation on Local Authorities to provide fire services, it falls short of integrating waste-related fire risks. **National Policy on Science and Technology, 1996:** Sciences play a critical role especially in research and development of the waste management sector as new knowledge can only be harnessed through research. However, not much research has been done in the municipal solid waste management sector especially in governance issues that contribute to the current waste management challenges.

2.4.2 Legal Framework

The following is the legislative framework that governs municipal solid waste in Zambia;

The Constitution of Zambia Cap 1 of 2016: The responsibility of Local Authorities with regards to municipal solid waste management has been provided for in the Constitution under Annex C where it highlights all exclusive functions to be performed by Local Authorities i.e. refuse removal, refuse dumps and solid waste disposal receptively. Further, Article 256 places a responsibility on a person to cooperate with state organs, state institutions and other persons in order to (a) maintain a clean, safe and healthy environment; (c) respect, protect and safeguard the environment and lastly, (d) prevent, or discontinue an act which is harmful to the environment.

The Solid Waste Regulation & Management Act No. 20 of 2018: The Solid Waste Regulation and Management Act No. 20 of 2018 is meant to provide the legislative framework for sustainable waste management. For example, the Act identifies waste as a resource and also makes the separation of waste for the purposes of implementing recycling, reuse and reduce strategies respectively. The Act repeals all provisions related to waste management in the related pieces of legislation such as the Environmental Management Act of 2011, the Public Health Act Cap 295, etc.

The Public Health Act Cap 295: The Public Health Act Cap 295 of the Laws of Zambia is a principle guiding law for all public health matters in the country. It aims at promoting health, preventing diseases and protecting public health. A list of nuisances that may affect public health among them waste management nuisances are highlighted. These provisions are now repealed with the advent of the Solid Waste Regulation and Management Act of 2018.

The Local Government Act No.2 of 2019: The Act provides for the formulation of municipal by-laws for the purposes of good governance and effective service delivery within the boundaries of a particular municipality. Effective and efficient waste management service delivery or the lack of it affects the performance of Local Authorities with regards to protecting public health, preventing diseases and promoting health within its boundaries. For example, Part (a) of Section seven (7) of the First Schedule (Section 16 Subsection 2) provides for the functions of Local Authorities and states that a local authority shall, in relation to public health, establish and environmental health services. In relation to municipal solid waste management, Section Eleven (11) of the same schedule specifies that a Local Authority shall also manage refuse removal, refuse dumps and solid waste respectively. This is in tandem of the provisions of the Republican Constitution.

The Environmental Management Act of 2011: The Environmental Management Act of 2011 is the principle law in Zambia that provides for environmental protection in all sectors of the economy. It repealed and replaced the Environmental Pollution, Prevention and Control Act (EPPCA) of 1990 and created the Zambia Environmental Management Agency (ZEMA), a state environmental regulatory body.

Statutory Instrument No.10 of 2018, the Local Government (Street Vending and Nuisances) Amendment Regulations: Pursuant to Section 84 of the Local Government Act Cap 281 then, the Minister of Local Government issued a Statutory Instrument No 10 of 2018 to address a number of issues including waste management.

2.4.3 Institutional Framework

The existing governance mechanism for municipal solid waste management in Zambia includes the following institutions;

The Ministry of Local Government: The ministry is the custodian of the Local Government Act and oversees all Local Authorities in Zambia and thus formulates policy and strategies in the implementation of municipal solid waste management through the Local Authorities. The Ministry is also responsible for finance mobilization and also the engagement of the donor community for support to the sector.

The Ministry of Health: The Ministry's main role is to improve the health status of the citizenry which could contribute to the socio-economic development of the country. Ineffective and non-efficient municipal solid waste management services threaten the public health of the citizenry and subtracts from the gains the country could have made.

The Ministry of Water Development, Sanitation and Environmental Protection: The Ministry of Water Development, Sanitation and Environmental Protection (MWDSEP) is responsible for policy guidance on the management of water resources, provision of sanitation services and well as environmental management. The

Ministry networks with the Ministry of Local Government to ensure that municipal solid waste management does not negatively affect these services.

The Zambia Environmental Management Agency (ZEMA): ZEMA is a statutory agency under the Ministry of Water Development, Sanitation and Environmental Protection. Municipal solid waste management has a direct impact on the environmental outlook of any country as it may affect all the three spheres of the environment of air, land and water negatively.

Non-Governmental Organizations: For a long time, international community and other non-governmental organizations provided support to other sectors such the health sector, education, labor and social security, etc. leaving out municipal solid waste management. However, in the recent past, there has been a growing interest in the non-governmental organizations to provide support ranging from financial, community awareness, technical and advocacy for increased uptake of municipal solid waste management services. Such organizations include the Japan International Cooperation Agency (JICA), Water Aid Zambia, Adventist Relief Agency (ADRA), Care International etc. such organizations provide a component of the sector depending on their interests.

The participation of the non-governmental organizations provides a good input to the governance of municipal solid waste management services in Zambia. Figure 2 depicts the existing governance framework for municipal solid waste management in Zambia

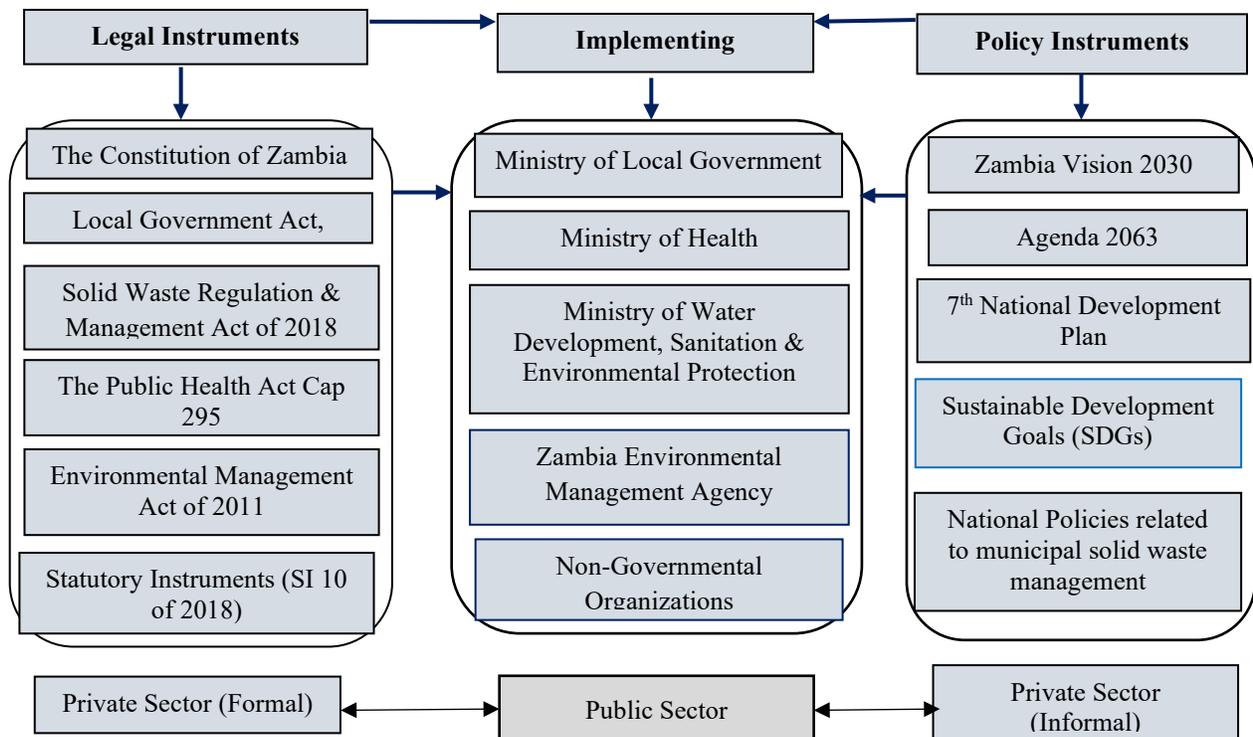


Figure 2: Existing Governance Framework for Municipal Solid Waste Management in Zambia. Source: Author (2019)

As depicted in figure 2, the governance mechanisms for municipal solid waste management in Zambia exists despite challenges of solid waste management in the country. The World Bank (2018) notes that mismanagement of waste is harming human health and local environments while adding to climate change. Several studies have been undertaken in developing countries and particularly Zambia on issues to do with municipal solid waste management, service delivery and its sustainability. These studies have been coupled with calls to incorporate use of technology in municipal solid waste management. Godfrey (2007) observes that technology solutions to waste management problems only offer part of the solution to sustainable waste management services. One area of study that has not been undertaken is the issue of governance of municipal solid waste management in Zambia. Manga et al. (2007) add that several factors including inadequate financial resources, low levels of enforcement of regulations and poor governance often lead to poor solid waste management services. Diaz (2010) further adds that lack of rules and

regulations to solid waste is among other challenges in solid waste management. This review of literature therefore, aims to assess governance mechanisms that once employed shall enhance the efficiency and effectiveness of solid waste management service delivery and thus bridge the gap that exists between governance and sustainable municipal solid waste management in Zambia. Table 1 shows the summary of some studies that have been conducted on governance of municipal solid waste management.

Table 1: Summary of some studies on Governance of Municipal Solid Waste Management

SN	Title	Authors	Journal	Methods	Emerging issues in the article
1	Analysis of the strategies for incorporating the informal waste collectors	Bupe G Mwanza, Charles Mbolwa, Arnesh Telukdarie	proceedings of the International Conference on Industrial Engineering, Bogota, Colombia, October 25-26, 201	Review	incorporating the informal waste collectors into formal waste collection systems
2	Types of Waste That Can Be Turned Into Energy	David Nicoll	Journal; September 26, 2017	Review	Waste to energy
3	The Governance of Urban Service Delivery In Developing Countries	Harry Jones, Ben Clench and Dan Harris	Report on odi.org Shaping policy for development	Literature Review	Challenges with the delivery of service in urban areas with attention to solid waste management water and sanitation and transport services. Governance and economic factors are vital in public service delivery.
4	Handbook on the Theories of Governance	Christopher Ausell	Book 2016, ISBN 97817825484	Book Review	Governance theories on new strategies of governing the increasingly complex fragmented and dynamic society
5	Key Concepts in Governance	Mark Bevir	Book 2008, SAGE	Review	Technical Concept and policies of contemporary governance
6	Solid Waste Management in Developing Countries	L.F. Diaz	Book 2011	Review	Lack of legislation and policies for realistic, long-term planning use of in appropriate technology and equipment in waste management
7	Good Governance. A Panacea to Urban Solid Waste Management Problem	Dr. Rosemary Awuorh Hayangan and Oke Juluis Oladapo	International journal of science environment and technology 2015	Review	Role of good governance in solving solid waste management problem
8	Stakeholder participation for sustainable waste management	Kurian Joseph	Journal 2005	Review	Involvement of stakeholders such as waste generators, waste processors, formal and informal agencies, non-governmental organizations and financing institutions is a key factor for the sustainable waste management

9	The New Public Governance?	Stephen P. Osborne	Book 2010	Review	New public governance
10	An African Reverse Logistics Model for Plastics and solid Wastes	Bupe Gertrude Mwanza	PhD Thesis university of Johannesburg 2018	Research	strategies that can optimize the recovery and recycling of PSWs from the stakeholders perspectives
11	Globalization and Governance	Prakash A. and Hart A.J. Ed	Book 1999	Review	Successful collective action enables actors to cooperate in pursuing individual and communal goals
12	Sustainable Solid Waste Management: An Integrated Approach for Asian Countries	Ashok V. Shekdar	Waste Management Journal, volume 29, issue4 April 2009 pg 1438-1448	Review	sustainable solid waste management in the context of national policy and legal frameworks, institutional arrangements, appropriate technology, operational, financial management, public awareness and participation
13	Study on Solid Waste Management Options for Africa	Richard J. Palczynski Wolfville	Project Report, final draft Version. July, 2002	Review	Solid waste management options for Africa

3.0 Research Gap

Following the review of literature on solid waste management, several studies have been undertaken on the characterization, collection, transport and disposal of municipal solid waste among other research themes. These studies have addressed problems of solid waste management with a focus on offering technical solutions because the problems have been identified as such. However, literature review by the researcher has not established any study that has been conducted in Zambia on governance mechanisms for managing municipal solid waste. The identified the research gap is the continued non-existence of enhanced governance mechanisms stifle (impede) sustainable municipal solid waste management in Zambia.

4.0 Lessons Learnt

The followings lessons have been drawn from the review; to achieve sustainable municipal solid waste management, governance mechanisms play a critical role. These mechanisms are meant to exercise a level of control on the sector and must be enforceable. Further, it has been learnt that robust institutions that implement policy and law must be established and allowed to operate without interference. Sustainable municipal solid waste management in Zambia can only be achieve if the existing governance mechanisms are enhanced to make them more enforceable and clear to the general public who are the waste generators. Implementing institutions should also incorporate public corporation and have clearly defined roles and responsibilities.

5.0 Conclusion

Sustainable municipal solid waste management is a result of several factors at play. One of the critical factors that need to be considered besides all technical and engineering solutions is the issue of governance i.e. the 'how' and 'who' aspects of solid waste management should be well spelled out especially in developing countries who are still grappling with management of municipal solid waste. Governance mechanisms for developed countries have resulted into progressive, effective and efficient municipal solid waste management, driven by both national and local governments. The private sector has been identified as a strategic partner in managing municipal solid waste and as such, it has to adhere to governance mechanisms employed by authorities.

Governance mechanisms for managing municipal solid waste are aimed at formal systems in the waste management sector thereby leaving out critical stakeholders, the informal waste collectors. This part of municipal solid waste is equally important as informal waste collectors, systems or activities plays a critical role and contribution in

managing municipal solid waste or the lack of it especially in developing countries. The informal sector somewhat helps in reducing the waste management challenge while at the same time may exacerbate it. It is therefore important that governance mechanisms for managing municipal solid waste incorporate the informal sector in the waste management value chain. The existing governance mechanisms were identified encompassing policy, law and implementing institutions in Zambia. However, the country still faces challenges of municipal solid waste and therefore calls for enhanced governance mechanisms that would address all the challenges in municipal solid waste management.

References

- Adipah, S and Kwame, N.O (2019). A Novel Introduction of Municipal Solid Waste Management. *Journal of Environmental Science and Public Health*. Volume 3, Issue 2.
- Ansell C. and Torfing, J (Eds) (2016) *Handbook on Theories of Governance*, Edward Elgar Publishing, ISBN: 978 1 78254 849 2
- Bevir, M (2009). *Key Concepts in Governance*. SAGE Publications Ltd.
- Diaz, F.L (2010). Solid Waste Management in Developing Countries: Status, Perspectives and Capacity Building. *Intergovernmental Preparatory Meeting for CSD-19* United Nations Headquarters New York, USA -March 3, 2011. Recovery, Inc. Concord, California USA
- Godfrey, L. and Oelofse, S.H.H., (2007). Towards Improved Waste Management Services by Local Government-A Waste Governance Perspective. *Natural Resources and Environment*, CSIR, Pretoria, Republic of South Africa.
- Government of Zambia (2006). *Zambia Vision 2030*, Republic of Zambia.
- Hayangah, A. R. and Oladapo, J.O, (2016). Good Governance: A Panacea to Urban Solid Waste Management Problem. *International Journal of Science, Environment and Technology*, Vol. 5, No 5, 3528 – 3538.
- Joseph, K (2006). Stakeholder Participation for Sustainable Waste Management. *Habitat International*, Volume 30, Issue 4 Pages 863-871[Online] available at www.sciencedirect.com. Accessed on 28.10.2020 at 10:49pm
- Konuma, N. (2019). Overview of Solid Waste Management in Japan. *Proceedings of the Sustainable Solid Waste Management Training for African Countries, 5th August 2019 Yokohama, Japan*.
- Lemaire, X; Bawakyillenuo, S and Agbelie, I.K.S (2015). Waste to Energy: African Cities Can Transform Their Energy Landscape. *Energy, Waste Management / African Cities*, Ghana [Online] available at www.urbanafrica.net. Accessed on 21.10.2020 at 11:25pm
- Li, J. (2015). Ways Forward from China's Urban Waste Problem available at <https://www.thenatureofcities.com/2015/02/01/ways-forward-from-chinas-urban-waste-problem/accessed-on-14/08/2019> at 3:16pm
- Liyala, C.M. (2011) Modernising Solid Waste Management at Municipal Level: Institutional Arrangements in Urban Centres of East Africa. *Ph.D. Thesis*, Environmental Policy Series, Wageningen University, Wageningen.
- Manga, E.V., Forton, O.T. and Red, A.D (2007). Waste Management in Cameroon: A New Perspective? *Resource, Conservation and recycling*. Elsevier.
- Mwanza, B. G (2017). Analysis of the strategies for incorporating the Informal Waste Collectors' into formalized systems: Engineering Management Perspective. *Proceedings of the International Conference on Industrial Engineering and Operations Management. Bogota, Colombia, October 25-26, 2017*. IEOM Society International.
- Mwanza, B. G (2018). An African Model Reverse Logistics Model for Plastic Solid Wastes, [Unpublished] *PhD Thesis*: University of Johannesburg. Retrieved from

<http://ujcontent.uj.ac.za/vital/access/manager/index?sitename=research%20Output>. Accessed on 13/08/2020 at 9:12am

- Nicoll, D (2017). Types of Waste That Can Be Turned in to Energy. *Green Journal* [Online] available at www.greenjournal.co.uk. Accessed on 20.10.2020 at 10.19pm
- Osborne, P.S., (2010). *The New Public Governance? Emerging Perspective on the Theory and Practice of Public Governance*. Routledge.
- Palczynski, R. J (2002) Study on Solid Waste Management Options for Africa. *African Development Bank Project Report Final Draft Version*, African Development Bank Sustainable Development & Poverty Reduction Unit.
- Prakash, A and Hart. A.J. Ed. (1999) *Globalization and Governance*, Routledge. London and New York.
- Rodic, L and Wilson C.D (2017). Resolving Governance Issues to Achieve Priority Sustainable Development Goals Related to Solid Waste Management In Developing Countries. [Online]. Available at www.mdpi.com. Accessed on 13.12.2020 at 5; 15pm
- Shah, A (2005). Public Services Delivery. *Public Sector Governance and Accountability*. Washington, DC: World Bank [Online] available at <https://openknowledge.worldbank.org/handle/10986/7424>. Accessed on 8/07/2020
- Shekdar, A.V. (2009). Sustainable Solid Waste Management: An Integrated Approach for Asian Countries. *Journal of Waste Management*, Volume 29, Issue 4, Pages 1438-1448.
- Shelton, D. and Kiss A., (2005). Solid and Hazardous Waste, *Judicial Handbook on Environmental Law*, United Nations Environment Programme, ISBN: 92-807- 2555-6
- Sivaramanan, S (2015). *Principles of Waste Management Techniques*. Central Environmental Authority (Sri Lanka) [Online] available at www.researchgate.net. Accessed on 4/01/2021 at 4:10am.
- The World Bank (2018). Global Waste to Grow by 70 Percent Unless Urgent Action Is Taken: *World Bank Report*.
- The World Bank (2018). Municipal Solid Waste Management. A Road Map for Reform for Policy Makers. *Tokyo Development Learning Center* [Online] available at www.jointokyo.org. Accessed on 29.10.2020 at 9:45am
- UNEP (2018). *Africa Waste Management Outlook*. United Nations Environments Programme, Nairobi, Kenya.
- UNEP and ISWA (2015). *Global Waste Management Goals and their relation to the SDGs*. United Nations Environment Program (UNEP).
- United Nations Economic and Social Council (2009). Economic Commission for Africa, *Sixth Session of The Committee On Food Security And Sustainable Development(CFSSD- 6)/Regional Implementation Meeting (RIM) FOR CSD-18, Addis Abba, Ethiopia, 27-30 October, 2009*.
- United Nations Environment Program (UNEP) (1992). *The Basel Convention*.
- Wilson, D. C., Velis, C. A. and Rodic, L., (2013). Integrated Sustainable Waste Management in Developing Countries. *Proceedings of the Institution of Civil Engineers: Waste and Resource Management*, 166 (2). 52 - 68. ISSN 1747-6526
- Young, O.R., (1997). *Global Governance: Drawing Insights from the Environmental Experience*. MIT Press.
- Zhang, D.Q., Tan, K.S and Gersberg, M.R (2010). Municipal Solid Waste Management in China: Status, Problems and Challenges. *Journal of Environmental Management*, Volume 91, Issue 8. Pages 1623-1633.

Biographies

Kachikoti Banda is a PhD student at the University of Zambia. He works as Cleansing Manager (Solid Waste Management and Pest Control) in the Public Health Department at Lusaka City Council in Lusaka, Zambia. He holds a Diploma in Environmental Health (Incorporating Meat and Other Foods Inspections) from Evelyn Hone College in Lusaka, Bachelor of Environmental Studies, Mulungushi University in Kabwe, Master of Engineering in Environmental Engineering, University of Zambia. He is both a registered Environmental Health Officer and a Registered Engineer. His research interests are in solid waste management and engineering, environmental management, systems engineering, operations management and sustainability. His undergraduate quantitative study was on Lead Contamination in Soils, Water and Vegetables in Chowa Township, Kabwe. His master's thesis was titled Occupational Health, Safety and Environment for Municipal Solid Waste Workers in Southern Province of Zambia. He has undertaken several professional development courses, trainings and workshops including Sustainable Solid Waste Management for African Countries, Japan, 2019; Landfill Diversion and Separation at Source, Republic of South Africa, August 2018 and Green Economy for Sustainable Livelihoods, Namibia, 2013.

Bupe Getrude Mwanza has over 10 years of experience in the Higher Education Sector. She has practical experience in teaching and learning, academic administration and research, and quality assurance in the Higher Education Sector. Bupe has teaching and learning experience in Zambia, Zimbabwe and South Africa. She has experience in Quality Assurance in the Manufacturing Sector. She worked for Best Oil Products and Konkola Copper Mines where she was designated in the Quality Assurance Departments. Bupe has a Bachelor of Science in Production Management, Master of Engineering in Manufacturing Systems and Operations Management and PhD in Engineering Management. Bupe has published a number of papers on Waste Management, Operations Management, Manufacturing Systems and Engineering Management. She has presented in countries such as Zambia, Zimbabwe, South Africa, Ghana, Colombia, Singapore, Malaysia, Indonesia, Macao, Thailand and India. She has contributed to the Research Output of the University of Johannesburg, University of Zambia, Copperbelt University, Cavendish University Zambia and Harare Institute of Technology. Because of her passion in research, Bupe has won best paper awards in Zambia, Zimbabwe, South Africa and Malaysia. Her profile has been used to mentor young ladies pursuing their careers in Science, Technology, Engineering and Mathematics (STEM) programmes.

Erastus Mishengu Mwanaumo is a Doctor in Engineering Management has a multi-disciplinary background with practical professional, academic and research experience in infrastructure development and investment, engineering management, construction health and safety, quantity surveying, and construction management. He is a Director in the Southern Africa Business Development Forum and a Managing Director of the Zambia Flying Labs - Zambian Drones and robotics knowledge hub. He consults for the World Bank in research, evaluating loans and programs performance funded by the Bank. He serves on the Editorial Board of the Journal of Sustainable Human Settlement and Development, a reviewer of the CRC Press/Taylor and Francis Book publishers, Journal of Construction, The Journal of Construction Business and Management (JCBM) and the Journal of Construction Project Management and Innovation (JCPMI). International Conferences Peer Review panels include the Built Environment Conference, International Conference on Infrastructure Development in Africa (ICIDA), South Africa Quantity Surveyor Research Conference, Construction Industry Development Board (CIDB) Post Graduate Research Conference, Association of Schools of Construction in Southern African - Built Environment Conference, West Africa Built Environment Research Conference (WABER) and one of the founders of the International Conference on Infrastructure Development and Investment Strategies for Africa.

Ian Nzali Banda holds a Doctor of Philosophy in Engineering from University of Cape Town, Masters in Civil and Environmental Engineering and Bachelor of Civil Engineering both from the University of Zambia. He is a Fellow of the Engineering Institution of Zambia. Ian has more than 35 years of experience in the public water supply, public sanitation, roads, and general public service infrastructure (e.g. education and health) in the Southern African region. He has a valuable working knowledge of the Policy, Legal, Institutional and Regulatory Frameworks that oversee the water supply and sanitation sector in Zambia and a strong understanding of the entire urban water and sanitation reform process for the water sector in Zambia and other SADC countries. From 2012 to date, Ian has been a Development Consultant and University Lecturer in Civil and Environmental Engineering at the University of Zambia. He has more than 20 publications and conference paper presentations. He was the Principal Author and Lead Consultant for the Project Implementation Manual for the Lusaka Sanitation Project, for Lusaka Water and Sewerage Company Ltd funded by the World Bank (2015 to 2016).