WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Applying Chap Framework to Enhance Solid Waste Management in Mzuzu City, Malawi.

Godfrey B. Msukwa [1], Liberty Mweemba[2] and Lillian Chipatu[3].

[1] Godfrey B. Msukwa, PhD, Development Consultant, Classik Consult
[2] Liberty Mweemba, PhD, Dean, School of Education, University of Zambia
[3] Lillian Chipatu, PhD, Institute of Distance Education, University of Zambia
Email: gmsukwa@gmail.com

ABSTRACT

Ever increasing population coupled with urbanisation is leading to high demand for a wide variety of products and services in developing countries, which result into an increase in solid waste, both organic and non-organic waste. Therefore, with poor management of solid waste, there could be a lot of pollution likely causing health problems which may end up causing diseases such as dysentery, asthma and pneumonia among other diseases. This paper explores how Chap framework can be applied in the management of solid waste, in order to achieve sustainable solid waste management practices in Mzuzu city, Malawi. The study employed a qualitative case study design. The study took place in Mzuzu city and it targeted individuals involved in solid waste management. The study employed expert and homogeneous purposive sampling techniques to select participants and the sample size was eighteen, which was arrived at, after reaching the saturation point. Data was generated through use of semi-structured interviews, focus group discussions and observations. Thematic analysis was used to analyse data. Findings of the study revealed that solid waste management practices in Mzuzu city face several challenges, due to lack of a framework that could be applied in managing solid waste. As such, it was recommended that, Mzuzu city council should try to employ the Chap framework, which was developed during the study, in order to achieve sustainable solid waste management practices in the city.

Keywords: Chap Framework; Sustainable; Solid Waste Management, Waste Management Theory; Functionalism Theory; Mzuzu City Council (MCC)

1.0 Introduction

Globally, solid waste production has tremendously increased due to an increase in population and urbanisation and this has led to poor management of solid waste (UNEP, 2015; US.EPA, 2020; Nwosu and Chukwueloka, 2020; Holm, Chunga, Mallory, Hutchings and Parker, 2021). Wasteaid and ICCM (2020) predicted that global production of municipal solid waste will grow by an average of 70% by 2050, and this will have an undesirable impact on the ecosystem and human health. As such, environmental and other stakeholders are advocating for sustainable ways of managing the environment (Tausova, Mihalikova, Culkova, Stehlikova and Taus, 2020; Wasteaid and ICCM, 2020). In the same vein, the United Nations SDG 12 target 12.4 calls for proper environmental management of chemicals and all wastes by reducing their release into the air, water and soil, in order to minimise their adverse impact on the environment and human health (Kufeoglu, 2022; Mulligan, 2023; Hales and Birdthistle, 2023).

Currently, there is a universal debate going on concerning how humans pollute the environment and the unsustainable strategies used in managing solid waste. Some of the poor strategies used in managing solid waste in developing countries include open dumping and burning (Wasteaid & ICCM, 2020; Holm *et al*, 2021). Despite, challenges faced in promoting sustainable solid waste management practices, it is vital to reduce adverse environmental impacts coming from unused solid waste (Tsai, Bui, Tseng, Lim, Wu & Mashud, 2020). On the other hand, municipal solid waste is a multidimensional issue which involves various stages starting with generation, separation, storage, collection, transportation, processing, recovery and disposal. This implies that more resources are needed for proper management of waste. Therefore, it is critical to involve different stakeholders concerned with solid waste management, which include local authorities, non-governmental organisations and residents to take part in waste management in cities (Goncalves *et al*, 2018; Tausova *et al*, 2020).

It has been observed that many cities in sub-Saharan Africa, have poor solid waste management systems, in that solid waste is noticeable along roadsides, rivers, open and public places (Kubanza & Simatele, 2019). Without a proper framework for managing solid waste, solid waste may end up generating air pollution, bad smell, as well as an increase in disease and contamination vectors in humans (Cetrulo, Centrulo, Dias & Ramos, 2020). Therefore, it is necessary to develop a proper framework for managing solid waste in accordance to SDG 12 target 12.5, that stipulates that good waste management practices should aim at reducing waste generation, recycling and reusing (Ferreira-Lopes *et al*, 2022; Hales & Birdthistle, 2023).

In Malawi, Mzuzu city in particular solid waste management poses a challenge due to an increase in waste generation as a result of life style change (Chireshe, 2020; Ndala & Ndala, 2022). In most households, waste is disposed onsides, this is so because the Mzuzu City Council (MCC) does not provide household street collection services and there are limited private sector entrepreneurs, and this limits the MCC to collect only 30% of solid waste generated per day (Holm *et al*, 2021; Chinyepe, Navarro, Makuyana & Derks, 2022). Therefore, coming up with a suitable framework would help in enhancing the management of solid waste, thereby preventing solid waste from causing harm to the environment and human health.

1.1. Theoretical Framework

A theoretical framework is a structure or a platform of a study that is applied to understand a research study at various stages, such as data generation, analysis, interpretation and discussion (Swanson, 2013; Anfara and Mertz, 2015). Therefore, this study employed two theories namely; waste management theory and functionalism theory.

1.1.1 Waste Management Theory

The Waste Management Theory was founded in 2004 by three scholars namely; Eva Pongrácz, Paul Phillips and Riita Keiski. The theory was developed on the premise that waste management must aim at preventing waste from causing harm to the environment and human health and this helps to conserve resources (Pongrácz, Phillips and Keiski, 2004).

The theory stipulates that preventing harm to the environment and human health helps to promote resource use through the use of 3Rs and these are; Reuse, Reduce and Recycle (Pongrácz, 2006). The theory further articulates that waste management should emphasize on preventing waste from being produced and creating useful products and that waste management should focus on turning waste into non-waste (Pongrácz 2006; Beleya, Xin-Ci & Ling-Wen, 2019). As such, sustainable solid waste management practices in Mzuzu city should be guided by this theory, so that when handling solid waste in the city, much effort should be applied in preventing harm. The study also employed the Functionalism Theory, which is articulated below.

1.1.2 Functionalism Theory

The Functionalism Theory was also used in this study to fill the gap left by the Waste Management Theory, which could not address the element of multidimension regarding waste management. Functionalism Theory was developed around 1800s and its main proponents are August Comte, Herbert Spencer, Emile Durkheim, Talcott Parsons and Robert Merton (Parsons, 1951; Castro, 2009; Archibong and Antia, 2014; Potts, 2015; Laluddin, 2016). Functionalism theory is used to explain how society as a system works. The theory stipulates that society is made up of various structures, organisations and institutions and these perform different functions, and such structures include; the family, religion, schools and police just to mention a few that influence and affect each other in order to maintain stability of the whole society (Laluddin, 2016).

Likewise, various stakeholders in Mzuzu city should play different functions in managing solid waste at different stages from collection up to disposal, thereby influencing each other for the betterment of Mzuzu city. This is because, if a certain function is not achieved, the whole systems thus Mzuzu city would be affected. Therefore, the involvement of different stakeholders would ensure proper solid waste management practices, for the benefit of the individual members in Mzuzu city as a whole (Castro, 2009).

Therefore, the two theories highlighted above, augur well with this study in that they are anchored on the premise which promote sustainable solid waste management practices, with the aim of preventing waste from causing harm to the environment and humans.

1.2 Chap Framework.

The Chap Framework was formulated by taking into account, the current solid waste management practices, the role of stakeholders and the challenges faced by MCC and suggested solutions that could be used to address the challenges. This framework takes into consideration five elements, namely:1) the interpretivist paradigm; 2) the relativist ontology; 3) the constructivist epistemology; 4) the two theories applied in this study thus, Waste Management Theory and Functionalism Theory and 5) the SDG 12. The framework focuses at the entire process of solid waste management which includes, waste generation, collection, transportation, treatment and disposal.

2.0 Research Methodology

This study was qualitative in nature and employed a case study design. The case study design enabled the researcher to obtain in-depth data from the participants involved in solid waste management, in their own setting (Ndengu, 2012). This study was conducted in Mzuzu city, Malawi. Mzuzu city, in located in the northern part of Malawi, and it has a total population of 240,00 people and it covers an area of 146 square kilometres (NSO, 2020). The study used a sample size of 18, and the number was determined after reaching a saturation point. The participants involved were selected using homogenous and expert sampling techniques. The sampling technique allowed the researcher to select participants who had practical experience and were involved in solid waste management practices in Mzuzu city (Ndengu, 2012). Data was generated using semi-structured interviews, focus group discussions and observation, and it was analysed thematically. Trustworthiness of the findings was achieved through triangulation of participants, data generation techniques, study sites and theories.

3.0 Results and Discussion

3.1 Solid Waste Management Practices in Mzuzu City

It was established that solid waste management practices in Mzuzu city involve a series of activities and these are; waste collection, storage, transportation and eventually disposal at the main dumping site. Figures 3.1 and 3.2 show solid waste collection and dumping respectively.

Figure 3.1:Man Collecting Solid Waste with a Wheelbarrow

Figure 3.2: Vehicle dumping solid waste at the main dumping site – Msilo

Solid waste collection, transportation and disposal, are some of the solid waste management practices that are done in most cities, both in developing and developed countries, in which tonnes of solid wastes are collected and disposed (Chireshe, 2020). In Mzuzu city, out of 135 tonnes of solid waste generated daily, only 30% was collected, leaving behind more than half of the generated solid waste uncollected (Holm *et al*., 2021; Chinyepe *et al*., 2022). This situation is worrisome, as such there is need for the MCC to devise sustainable strategies that would ensure that all the solid waste that is generated daily is collected.

3.2 Stakeholders in Solid Waste Management

The findings showed that some stakeholders do not take part in solid waste management in Mzuzu city. Some participants highlighted that some stakeholders such as, non-governmental organisations (NGOs) are not willing to help in managing solid waste. One of the participants expressed that:

The NGOs have their offices here in Mzuzu. But they say that they target rural areas, because Mzuzu city is not their catchment area (Participant 4, 19.01.2023).

Apart from NGOs, very few private entrepreneurs take part in the management of waste in Mzuzu city, as evidenced from the citation below:

Indeed, there are entrepreneurs, but the problem is that they [entrepreneurs] are working in wards where there are no markets. They collect solid waste house by house, and they are paid (Participant 1, 10.01.2023).

It is important to involve various stakeholders in managing waste because in the event that MCC is facing some challenges, such as lack of financial resources, stakeholders may come in to rescue the situation (Chireshe, 2020; Breukelman, Krikke & Lohr, 2022). This would enhance sustainability of solid waste management practices in Mzuzu city.

3.3 Human Resource Challenges

Lack of enough workers is one of the challenges faced by the MCC, in managing solid waste. Below are extracts narrated by the participants:

The problem that we face mainly is that, we are few workers. People are dying but no replacement (FDG, 18.02.2023).

Workforce is not enough, there are about 45 workers. Out of 45, you find that some are sick or whatever reason, it means there will be few workers. This affects work performance (Participant 4, 19.01.2023).

This finding concurs with what Breukelman *et al*. (2022) found, that shortage of human resource leads to poor waste management services, in that a lot of solid waste is not properly managed due to high demand of products as a result of an ever-increasing population. This problem requires serious attention, in that human resource is crucial in ensuring efficient waste management services.

3.4 Technical Challenges

Technical challenges such as vehicle breakdown, leads to shortage of waste transportation vehicles, and this hampers efforts to enhance sustainable solid waste management practices in MCC, as explained by the participants below:

There is a problem when a vehicle breaks down, and if the fixing is not done immediately. For example, now it has taken 9 months when the compactor broke down without fixing it (Participant 6, 16.02.2023).

Vehicles, break down frequently every now and then. Like now it broke down in June last year, it was maintained in December. It stayed 6 months without moving. But for 6 months, waste was being generated daily (Participant 4, 19.01.2023).

The shortage of vehicles for collecting and transporting solid waste is indeed a challenge faced by MCC. This is due to lack of financial resources for buying new vehicles and servicing old ones and also for buying fuel for solid waste operation services (Chireshe, 2020; Nuskiya & Sahana, 2021). Shortage of waste transportation vehicles is a common problem to many developing countries (Holm *et al*., 2021; Breukelman *et al*., 2022).

3.5 Social Challenges

Social challenges occur due to the behaviour of residents. This happens due to the residents' tendency of throwing waste anywhere, neglecting using waste bins. This finding is supported by what one of the participants narrated below:

People throw waste anyhow, which makes flies to follow, and this requires civic education on issues of sanitation (Participant 2, 17.01.2023).

The tendency of throwing away solid waste anyhow, leads to accumulation of solid waste in undesignated places, and this is very common in many African cities (Holm *et al*., 2021; Kubanza &Simatele, 2019). As such, this problem could be best be solved by conducting civic education to the residents, so that they have a mind-set change, in order for the residents to start dumping solid waste in waste bins (Chireshe, 2020).

3.6 Legal Challenges

The findings revealed that the MCC uses archaic laws when punishing those who do not follow appropriate procedures when managing solid waste in the city. One of the participants explained that:

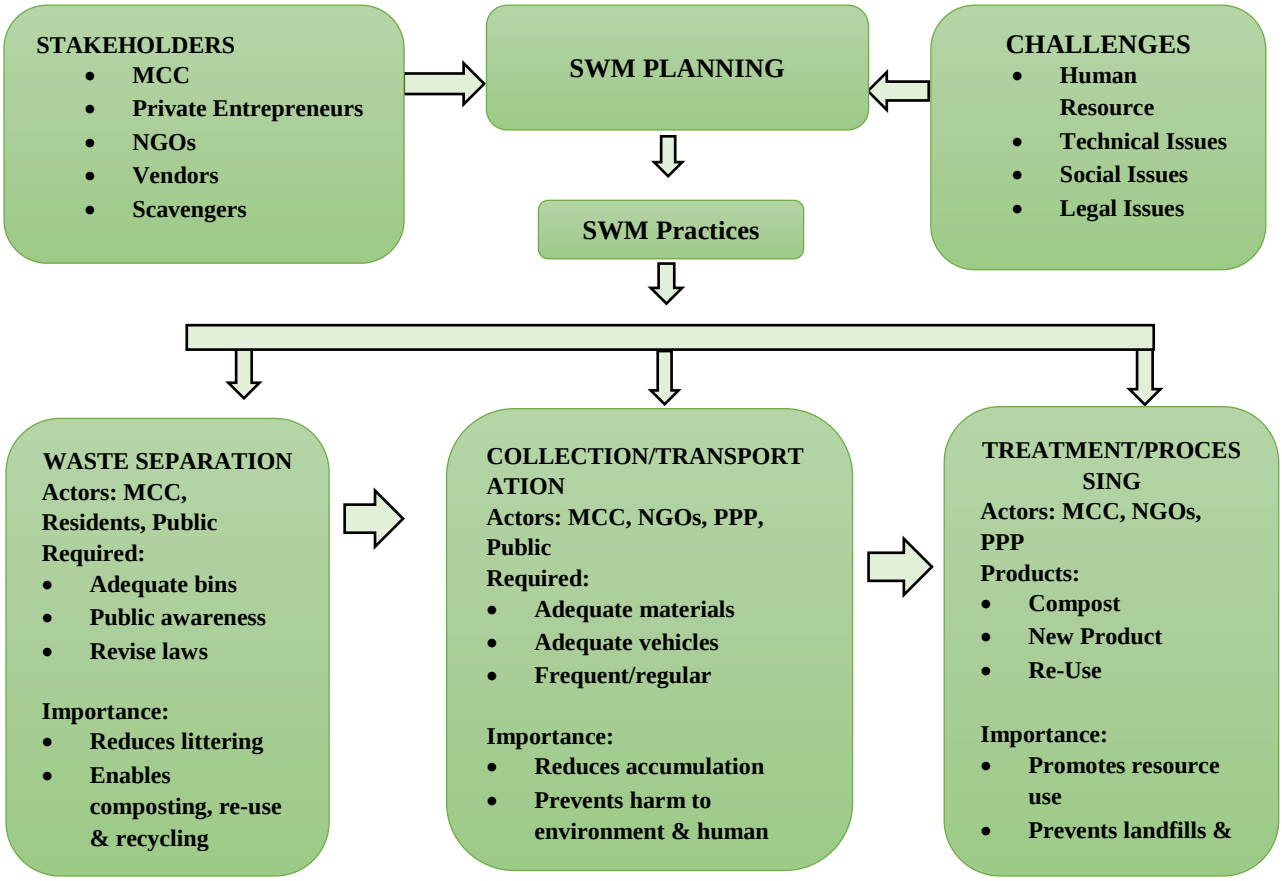
The laws and acts are outdated, they were formulated in 1960s. If you find a person and tell him that your fine is 500 Malawi Kwacha [50 Cents equivalent], *they will pay willingly knowing that tomorrow they will dump again because they know that the amount is small. There is need for reviewing and reinforcement, and the punishment should be applied* (Participant 4, 19.01.2023).

The MCC applies laws which were formed sometime back in 1960s, as such they are outdated. If one is found guilty for not following waste management laws, they pay a very small amount of money as penalty. To this effect, it is paramount for the MCC to revise the laws, especially regarding penalties to deter those that deliberately break laws by not following proper practices of managing solid waste.

3.7 Chap Framework for Sustainable Solid Waste Management

The Chap framework consists of four main stages namely; solid waste generation, separation, collection/transportation and treatment/processing and also the SDG 12. This framework would help in enhancing sustainable solid waste management (SSWM) practices, in order to prevent solid waste from causing harm to the environment and human health.

Figure 3.3: Chap Framework for SSWM



4. Conclusion and Recommendation

The study findings revealed that solid waste management in Mzuzu city involves solid waste collection, transportation and disposal. The findings further revealed that some stakeholders are not involved in the management of solid waste in Mzuzu city. It was also established that MCC is facing several challenges in managing solid waste and the challenges include; inadequate workers, shortage of transportation vehicles, behaviour problems and use of archaic laws. The findings of the study helped to develop a Chap framework that could help in enhancing sustainable solid waste management practices in Mzuzu city, so as to prevent waste from causing harm to the environment and human health, as anchored by the Waste Management theory and the Functionalism Theory and SDG 12. Therefore, it is recommended that MCC should involve all stakeholders in waste management. In addition, the MCC and all solid waste management actors should consider applying the Chap framework in managing solid waste. This could help to enhance SSWM practices in the city, in order to prevent solid waste from causing harm to the environment and human health, thereby keeping Mzuzu city clean and health.

References

Anfara, V.A and Mertz, N.T. (2015). *Theoretical Framework in Qualitative Research* (2nd ed).

Thousand Oaks, CA: Sage.

Archibong, E.P. and Antia, C. (2014). Structural-Functionalism: Its Relevance to Medical Profession. *International Journal of Education and Research*, 2 (5), 349-356.

Beleya, P., Xin-Ci, C. and Ling-Wen, C. (2019). Challenges in Enhancing Solid Waste Management towards Sustainable Environment: Local Council Perspectives. *Journal of Advanced Research in Business and Management Studies*, 16(1), 44-59.

Breukelman, H., Krikke, H. and Lohr, A. (2022). Root Cause of Underperforming Urban Waste Services in Developing Countries: Designing A Diagnostic Tool, Based on Literature Review and Qualitative System Dynamics. *Waste Management and Research*, 00(0), 1-90.

Castro, J. (2009). Functionalism (Including Structural] Functionalism). In Kitchin, R. (Ed). *International Encyclopaedia of Human Geography*. London: Elsevier, 227-282.

Cetrulo, N.M., Centrulo, T.B., Dias, F.G. and Ramos, T.B. (2020). Solid Waste Indicators in Local Sustainability Assessment: A Literature Review. *Ambiente & Sociedade São Paulo*, 23, 1-31.

Chinyepe, A., Navarro, N.M., Makuyana, C.M. and Derks, M. (2022). *Developing A Waste Stream-Specific Roadmap for Circular Economy of Malawi*. Available online: www.tno.nl

Chireshe, A. (2020). *Evaluation of Municipal Solid Waste Illegal Disposal in Masvingo City, Zimbabwe: Towards A Sustainable Solid Waste Management Model*. PhD Thesis, University of South Africa.

Ferreira-Lopes, S., Van Rompay-Bartels I., Bezanilla, M.J., Elexpuru-Albizuri, I. (2022). Integrating SDG 12 into Business Studies through Intercultural Virtual Collaboration. *Sustainability*, 14, 9024. https://doi.org/10.3390/su14159024

Gonçalves, A.T.T., Moraes, F.F., Marques, G., Lima, F. G., J. and Lima, J.P. (2018). Urban Solid Waste Challenges in the BRICS Countries: A Systematic Literature Review. *Revista Ambiente & Água*, 13(2).

Hales, R. and Birdthistle, N. (2023). *Attaining The 2023 Sustainable Development Goal of Responsible Consumption and Production: Family Business on A Mission).* Emerald Publishing Ltd, Leeds, pp1-10.

Holm, R.H., Chunga, B.A., Mallory, A., Hutchings, P. and Parker, A. (2021). A Qualitative Study of NIMBYism for Waste in Smaller Urban Areas of a Low-Income Country, Mzuzu, Malawi. *Environmental Health Insights*, 15, 1-11.

Kubanza, N. S., & Simatele, M. D. (2019). Sustainable Solid Waste Management in Developing Countries: A Study of Institutional Strengthening for Solid Waste Management in Johannesburg, South Africa. *Journal of Environmental Planning and Management*. doi:10.1080/09640568.2019.1576510

Kufeoglu, S. (2022). *SDG-12: Responsible Consumption and Production. In Emerging Technologies. Sustainable Development Goals Series*. Springer, Cham. https://doi.org/10.1007/978-3-031-07127-0-14

Laluddin, H. (2016). A Review of Three Major Sociological Theories and an Islamic Perspective. *International Journal of Islamic Thought*, 10, https://doi.org/10.24035/ijit.10.2016.002.

Mulligan, S. (2023). The UNS SDG 12 And Oral Healthcare Provision: Responsible Consumption and Production. *British Dental Journal*, 235, 928-929.

National Statistical Office (NSO) (2020). *City Population: Statistics Maps and Charts*. Zomba: National Statistical Office.

Nwosu, A.O. and Chukwueloka, H.E. (2020). A Review of Solid Waste Management Strategies in Nigeria. *Journal of Environment and Earth Sciences*, 10(6), 132-143.

Parsons, T. (1951). *The Social System*. London: Routledge.

Pongrácz E, Phillips P.S. & Keiski R.L. (2004) *Evolving the Theory of Waste Management – Waste Minimization*. In: Pongrácz E. (Ed.): Proc. Waste Minimization and Resources Use Optimization Conference. June 10, 2004, University of Oulu, Finland. Oulu University Press: Oulu. p.61-67.

Pongrácz E, (2006). Progress in Industrial Ecology – *An International Journal*, 3(1), 2.

Potts, R.M. (2015). *Exploring the Usefulness of Structural-Functional Approaches to Systematically Assess the Functionality of Governance Arrangements for Natural Resource Management Planning in Two Australian Case Studies.* PhD Thesis, Queensland University of Technology.

Swanson, R. (2013). *Theory Building in Applied Disciplines*. San Francisco: Berrett-Koehler Publishers.

Taušová, M., Mihalikova, E., Culkova, K., Stehlikova, B., and Taus, P. (2020). Analysis of Municipal Waste Development and Management in Self-Governing Regions of Slovakia. *Sustainability*, 12, 5818. doi:10.3390/su12145818.

Tsai, F.M., Bui, T.D., Tseng, M.L., Lim, M., Wu, K.J. and Mashud, A.H.M. (2020). Assessing a Hierarchical Sustainable Solid Waste Management Structure with Qualitative Information: Policy and Regulations Drive Social Impacts and Stakeholder Participation. *Resources, Conservation and Recycling*, 168, 105285. https://dx.doi.org/10.1016/j.resconrec.2020.105285.

UNEP (2015). *Global Waste Management Outlook.* Vienna: ISWA.

US.EPA, (2020). *Best Practices for Solid Waste Management: A Guide for Decision-Makers in Developing Countries.* EPA 530-R-20-002.

Wasteaid and ICCM (2020). *Community Waste Management in Malawi: A Feasibility Study for Improving Community Waste Management in Malawi.* Malawi.