



**Small and Medium-Sized Enterprises' Drivers and Constraints in
Compliance with Municipality Solid Waste Management
Regulations: Insights from Zimbabwe**

Chengetai Mashiringwane

**A Thesis Submitted in Fulfillment of the Requirements for the Degree of Doctor
of Philosophy in Environmental Management (International Program)**

Prince of Songkla University

2024

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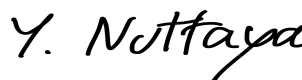

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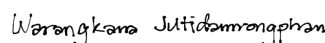

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ABSTRACT

The study explores the reorientation of Zimbabwean MSWM regulations toward SMEs' sustainable management. A case study from Glenview Area 8, Siyaso, and Gazaland was used for an in-depth study of MSWM regulations and sustainable SME waste management. Questionnaires, interviews, and focus group discussions were the research instruments used to collect data. The survey confirmed that waste management presents myriad challenges resulting from inadequate waste receivers, irregular waste collection, poor waste disposal, and insufficient resources to handle these processes altogether. The result of the perception survey indicates a generally high awareness of MSWM regulations but reveals gaps in actual participation. The survey showed a range of challenges and inadequacies in both requirements placed on SMEs and the support they receive from authorities in waste management pertaining to infrastructure, waste minimization, waste collection services, and the effectiveness of penalties as a compliance tool.

What drives SMEs towards compliance is that regulations have brought significant opportunities. Implementing MSWM regulations has resulted in waste minimization, promoted and improved a company's image, produced goods and services efficiently, helped increase sales, had a good reputation that will attract investment, and is environmentally effective. While there is recognition of the regulations' environmental and cost-effective aspects, there are concerns about top-down approaches, lack of clarity, and inadequate enforcement measures. However, financial constraints, shortage of resources, and budget limitations present challenges in implementing these regulations. The feeling that MSWM regulations are burdensome hinders their willingness to comply, leading to inefficient waste

management. SMEs' lack of knowledge of MSWM's legal aspects and low education, awareness, and understanding of environmental impact make it challenging to implement MSWM regulations.

A comparative analysis was done between European MSWM regulations and Zimbabwean MSWM regulations. The European Union has shown remarkable progress, whilst Zimbabwean waste policies have slowed their progress. The key differences between EU and Zimbabwean regulations are waste coverage, approach targets, law enforcement and penalties, cleaner production, legislative frameworks, policies, capacity building, and levels of education.

The suggested recommendations for improved MSWM regulations compliance include strengthening penalties, high levels of awareness, SME involvement, frequent inspections and monitoring by regulatory bodies, promoting recycling, providing sufficient resources, regular waste collection, and giving incentives for compliance.

Keywords: *Compliance, Non-compliance, Regulations, Sustainable, Zimbabwe, SMEs, Municipal solid waste*

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LIST OF ABBREVIATIONS

Abbreviation	Explanation
CEAP	Circular Economy Action Plan
CP	Cleaner Production
EC	European Community
EEC	European Economic Community
EIA	Environmental Impact Assessment
EHO	Environmental Health Officers
EAP	Environmental Action Plan
EMA	Environmental Management Act
EMAg	Environmental Management Agency
EPR	Extended Producer Responsibility
EU	European Union
FDG	Focus Group Discussions
GDP	Gross Domestic Product
IPPC	Integrated Pollution Prevention and Control
ISO	International Organisation for Standardization
ISWM	Integrated Solid Waste Management
MDG	Millennium Development Goal
MSWM	Municipal Solid Waste Management
OECD	Organization for Economic Cooperation and Development
PAYT	Pay As You Throw
PCB	Polychlorinated Biphenyls
PCT	Polychlorinated Terphenyls
PHAB	Public Health Accreditation Board
PPP	Polluter Pays Principle
SDG	Sustainable Development Goal
SI	Statutory Instrument
SME	Small to Medium Enterprises
TARSC	Training And Research Support Centre
UK	United Kingdom

UNDP	United Nations Development Program
UNEP	United Nations Environment Program
WEEE	Waste Electrical and Electronic Equipment
WFD	Waste Framework Directive
WHO	World Health Organization

CHAPTER 1

INTRODUCTION

1.1 The Rationale of the Study

Small and medium enterprises (SMEs) comprise the majority of industries and are the engines for survival in many countries. In the OECD countries, SMEs account for almost 99% of all business enterprises, yielding two-thirds of employment (Calogirou et al., 2018). In Sub-Saharan Africa, they constitute 97 to 99% of the sector (Gibson et al., 2013), while in Zimbabwe, SMEs constitute more than 70% of all businesses, employing over 60% of the country's workforce and contributing 50% to the country's GDP (Majukwa, 2019). Despite being a source of economic growth, SMEs also contribute to environmental pollution. Despite the minor effect given by small businesses, the potential in their aggregate effect is quite noticeable (OECD, 2018). For example, in Europe alone, 60-70% of industrial pollution is emitted by SMEs (OECD, 2007). In Zimbabwe, the proliferation of SMEs has seen vast and enormous waste generated by small industries and resulted in unintended environmental impacts, causing humans to be exposed to many diseases and health calamities. Dumped wastes from the small industries of Mbare and Highfields in Harare have resulted in choking smells, smoke, and rodents, thereby compromising population health and safety (Jerie, 2013). This observation ignites several questions on the effectiveness of Zimbabwe's Municipal Solid Waste Management (MSWM) regulations and the sustainability of SMEs.

The central role of MSWM regulations is controlling, managing, and prescribing the best practices of waste management activities to prevent compromising environmental quality (Jerie, 2013). However, regulations have brought varying responses from the SME sector, and these regulations often have been resisted due to the perceived impact on profits, ignorance of existing environmental policy, and inability to deduce its effects on them (Walker et al., 2011)

MSWM regulations in Zimbabwe can be traced back to colonial times. Literature surveys point to Zimbabwe as having well-documented and comprehensive

legislation, which, if effectively implemented, can stimulate sustainable MSWM (Jerie, 2013). Despite the enabling legislative environment in Zimbabwe, there are deficiencies in operationalization and enforcement (Nhubu et al., 2017). Literature shows policy and implementation deficiencies with gaps between legal and institutional mandates. Although the laws state that anyone who generates waste must provide a method to revert or minimize waste by treatment, reclamation, and recycling, this is not what happens with small businesses. Waste is usually randomly dumped, resulting in the occurrence of diseases like typhoid and cholera (Nhubu et al., 2017). The provisions of the Acts state that waste should be disposed of in engineered landfills. However, engineered landfills are unaffordable and thus cannot be used in practice (Taher et al., 2021). The SMES' low levels of awareness make it challenging to implement MSWM regulations because of the little knowledge of their impacts on the environment (McAllister, 2015). Less knowledge is less likely to change perceptions and behavior, hence non-compliance. Most city councils dispose of waste at undesignated places without licenses, which has resulted in all forms of pollution. What is in practice differs from the mandates of the regulations as reflected by policies and regulations that are not implemented or enforced or organizations that cannot deliver their mandate.

More importantly, the MSWM regulations mainly emphasize end-of-pipe solutions to the waste management crisis. The present regulations are also silent on SMEs' implementation and effectiveness of cleaner production (CP). Cleaner production's objective is waste minimization: removal of dangerous material as well as reduction of toxicity from gases. This intention must seriously involve the SMEs for the CP to be successful. It requires product modification regarding product improvement to pollute less, product design improvement, and package and product changes. To achieve this goal, laws and regulations must be strengthened for the CP option to be implemented strictly. Although waste recycling is argued to be the most effective way of reducing waste, it is not prioritized in developing countries. The recycling rate is low as a result of inadequate policies. Recycling lacks monitoring by the state (Jerin et al., 2022). Another obvious outdated fact is that the terms used in Zimbabwean legislation, such as refuse collection and disposal, are out of sync with all SDGs, particularly SDGs 11 and 12.

The SME manager asserts that the waste law implemented by the Extended Producer Responsibility (EPR) policy does not consider SMEs' operating characteristics. The adverse conditions diminish the possibility of adopting a waste hierarchy in the different stages of the SME supply chain (Hirpe & Yeom, 2021). The questions that seek attention are: is there a need to know the level of compliance by SMEs to MSWM regulations? What are the causes of conformity and non-conformity? How can we infuse cleaner production options into waste management regulations?

Therefore, there is a need for prompt research to blend the SDGs into Zimbabwean waste management regulations, particularly a fusion of CP options in MSWM regulations. It is a necessity that the MSWM regulations must be reoriented to focus more on the sustainability aspect. Thus, this research aims to cover the gap mentioned earlier. Therefore, the research seeks to investigate several questions raised in the literature review:

1. What are the drivers and constraints for MSWM compliance in SMEs? In other words, what factors influence the MSWM compliance of SMEs in Zimbabwe?

1.1) What are the requirements for SMEs in MSWM?

1.2) How do SMEs perceive MSWM regulation?

1.3) What are the reasons for compliance and non-compliance by Zimbabwean SMEs?

1.4) To what extent do SMEs comply with MSWM regulations?

1.5) What suggestions do SMEs have on MSWM regulations and compliance?

2. How do Zimbabwean SMEs' MSWM regulations compare with those of European Union (EU) countries, focusing mainly on SDGs 11 and 12?

2.1) What is the availability of MSWM regulations in EU countries?

2.2) What is the effectiveness of MSWM regulations in different countries?

2.3) What are the differences between the regulations for Zimbabwe and other countries?

2.4) To what extent has cleaner production been included in MSWM regulations for other countries?

3. What are the recommendations to improve MSWM regulations to serve the SMEs for cleaner production?

1.2 Research Objectives

1. To assess the drivers and constraints for MSWM compliance by SMEs.
2. To compare the Zimbabwean MSWM regulations with those of EU countries.
3. To construct a framework of recommendations for improved MSWM regulations to foster sustainability by SMEs.

1.3 Significance of the Study

1. Understanding the drivers and constraints for MSWM compliance by SMEs will add more value to the knowledge base of SMEs. SMEs will benefit by putting waste management systems in line with the regulatory framework and ensuring compliance with legislative requirements. The SMEs will continually improve environmental performance and offer themselves opportunities to achieve long-term sustainability. The improvement will help them increase sales, gain significant market share, and obtain a better public image and a good reputation.

2. The comparison analysis of the MSWM regulations with EU countries will help regulatory bodies identify areas that need improvement in Zimbabwean MSWM regulations to promote effectiveness. Regulatory bodies will have knowledge of the availability and effectiveness of regulations in EU countries. This will help regulatory bodies know how much cleaner production has been included in MSWM Regulations for European countries. The Ministry of Natural Resources and Ministry of Health and Child Care will identify areas of conflict between regulatory bodies and SMEs, and it will help policymakers and regulatory authorities to amend policies and procedures relating to environmental management.

3. Constructing recommendations and guidelines will foster sustainability by SMEs because they will now have more inclusive policies. SMEs will be able to eliminate the nature of waste produced and minimize expenses. It will help the regulatory bodies and the industries (SMEs) work harmoniously. SMEs can take considerable mitigatory measures to overcome MSWM regulation challenges that may

arise. It will help SMEs, regulatory bodies, and the community embrace cleaner production options to foster industry sustainability.

1.4 Scope of the Study

1) The study area: The survey will be conducted in Harare, the capital city of Zimbabwe. The research will be conducted at Glenview area 8 furniture complex, Mbare (SiyasoMagaba), and Gaza land in Highfields.

2) The population: The population were SMEs from the three complexes, residents from Glenview, Highfields, Mbare, and government officers.

3) The contents: The study will focus on the drivers and constraints for MSWM compliance of SMEs, the benchmark for MSWM laws, and the formulation of a framework of recommendations for improved MSWM regulations.

4) The study's time frame: Primary data will be collected in 2023, whereas secondary data will be covered from 2014 to 2021 because the study areas were most hit by unending diseases starting from 2014 when most authors wrote about poor waste management in Harare.

1.5 Definition of Key Terms

Reorienting is the act of figuring out one's position in relation to a phenomenon under study to pick the right direction. It is a process of figuring out what is wrong and how it can be corrected to do the right thing. In this study, reorientation is about rethinking and reformulating MSWM regulations to approach solid waste management sustainably and sustainably (Munir et al., 2023).

Municipality solid waste management (MSWM) regulations are national or town-level laws focused on controlling the disposal of waste generated by the community, including various businesses. One such business is SMEs.

Wastes are materials that are thrown away or intended to be thrown away or expected to be thrown off according to the national law dictates (INTOSAI, 2016).

Municipal Waste is the waste caused by people's activities at homes, workplaces, or public buildings. It can also come from commercial businesses, resorts, or leisure places where the amount and composition of waste do not prevent its application together with household waste (Maseva, 2005).

Cleaner production means continuously applying integrated prohibitive strategies to production and services to maximize production and reduce environmental risk (Diego, 2013).

SMEs are small businesses whose personal numbers fall below certain limits, and the number of employees in SMEs varies from industry to industry (Jalal Al-Herwi, 2019). They are non-subsidiary, independent firms that employ fewer than a given number of employees.

Sustainable waste management means an approach to waste management for future generations that ensures the protection of human health, the environment, and the scarcity of resources on earth (Adipah & Kwame, 2019).

Integrated solid waste management (ISWM) is a combination of various management strategies interlinked to deal with solid waste holistically (Puorideme, 2010).

Effectiveness means the ability of an approach to solving a particular issue (Kutting, 2000).

1.6 Research Limitation

During data collection, the available SMEs could not match the statistics on record; the number of SMEs had dropped, which could be a function of dropouts and other changes. For example, some of the SMEs at Glenview Area 8 had transferred to other areas due to recurring fire breakouts, and most of them are often criminalized because they will be operating in illegal places, and some might have closed down due to economic challenges. Some of them had moved out of the areas to look for markets.

The document analysis we used for the comparative study of the regulations has also posed some limitations. In the current study, some documents in the literature

review lack detailed explanations of regulations, hindering a comprehensive comparison. Although past literature studies identified policy gaps in implementing and enforcing the Zimbabwean MSWM regulations, limited sources compared Zimbabwean MSWM regulations and the EU, making the study have some gaps in the literature review. This meticulous approach demanded significant time and effort to generate meaningful comparisons, especially given the limited literature comparing the two contexts.

1.7 Thesis Structure

The thesis is divided into six chapters.

Chapter 1 gives the rationale of the study and provides the background of why this study was carried out.

Chapter 2, Literature Review, focuses on synthesized related literature to the aim and objectives of this study. The main focus is on the effectiveness of regulations, challenges, and opportunities for SMEs in implementing MSWM regulations, SMEs' compliance, and non-compliance.

Chapter 3, Research Methodology, focuses on the research design, steps and methods, population and study sample, sampling method and procedure, data collection and instrumentation, and data analysis.

Chapter 4, Results (1), presents the results and discussion derived from the study in relation to the objective 1. It starts with the descriptive statistics of the SMEs who responded to the questionnaire survey and the drivers and constraints of their compliance with MSWM.

Chapter 5, Results (2), compares the European Union (EU) and the Zimbabwean MSWM regulations. Similarities and differences in terms of MSWM regulations in both contexts were carefully explored.

Chapter 6, Conclusion, highlights the implication of the results in the previous two chapters. Drawing from the discussion, it then outlines recommendations for stakeholders regarding SME waste management. It closes with the conclusion and recommendations for future research to be carried out based on this study's findings.

CHAPTER 2

LITERATURE REVIEWS

This chapter reviews Zimbabwean regulatory frameworks and their weaknesses to lay the groundwork for examining their effectiveness for SME waste management. On the SME side, we will look at the present literature on why SMEs are non-compliant and the opportunities and challenges they face to comply with the MSWM regulations. The chapter will also present related research, gaps, and frameworks.

2.1 MSWM Regulatory Framework in Zimbabwe

This section presents the availability of MSWM regulations currently governing MSWM in SMEs and their provisions. In Zimbabwe, several acts of parliament and regulations have been enacted to deal with waste management. The acts are administered by different ministries, but the Ministry of Environment and Natural Resources is responsible and accountable (Mafume et al., 2016). Most local authorities have by-laws that they have employed to complement the acts of parliament and policies on MSWM in areas under their jurisdiction (Mafume et al., 2016). The Environmental Management Act [Chapter 20:27], the Public Health Act [Chapter 15:09], the Urban Councils Act, and the Harare City By-laws are the principal statutes governing MSWM in Zimbabwe (Jerie, 2013). This section will focus on these MSWM regulations guiding SMEs in Zimbabwe.

2.1.1 The Environmental Management Act 2002 [Chapter 20:27]

The Environmental Management Act [Chapter 20:27] (EMA) is the supreme environmental law of the country (Makwara & Magudu, 2013). Consisted of 143 sections and 16 parts, it was enacted in 2002 to become the principal law that harmonized the scattered legislation pieces. It ensures sustainable management, preservation, conservation, and protection of natural resources and prevents environmental degradation. The EMA provides for the establishment of the Environmental Agency, board, and committee; the formulation of environmental quality standards and plans; environmental impact assessment and monitoring; and any issues relating to environmental management and conservation (Government of

Zimbabwe, 2002). Five sections of the EMA are related to the MSWM, in particular. Sections related to the EMA are shown in Table 2.1.

Table 2.1

Sections Related to the EMA

Section	Detail
Section 4 (under Part II: General Principles of Environmental Management and Functions of Minister)	states that every citizen has a right to a clean environment, access to environmental information, and preserve the environment. It also outlines environmental management principles that apply to all people and agencies' actions, such as inter-relational environment characteristics, environmental education, minimizing environmental pollution, global responsibilities, and concerns for vulnerable ecosystems. It also embraces the polluter pays principle (Jerie, 2013), which advocates for pollution offenders to meet the cost of remedying the pollution (Government of Zimbabwe, 2002).
Section 9 (under Part IV: Environmental Management Agency)	provides for establishing the Environmental Management Agency, whose mandate is to formulate quality standards and assist in environmental management. In MSWM, the Agency's function is to monitor and regulate and monitor waste management activities. The other endorsement of the Agency is the formulation of model by-laws, which should be responsible for establishing mitigation measures to ensure the protection of the environment in areas under their jurisdiction. The councils are to undertake and ensure that desirable measures to protect the environment are in place (Government of Zimbabwe, 2002).
Section 36 (under Part VI: Staff of the Agency)	states that the Director-General, inspectors, and other officers shall ensure the promotion of a healthy, clean, and safe environment through monitoring (Government of Zimbabwe, 2002). Environmental management plans are to be implemented in accordance with the requirements. Pollution and degradation of land, air, and water should be minimized, managed, or regulated. Waste should be recycled, reused, and disposed of in a responsible manner (Government of Zimbabwe, 2002). The policies and programs pertaining to all forms of pollution are to be coordinated and complied with (Government of Zimbabwe, 2002).
Section 70 (under Part IX: Environmental)	mandates every person or group to desist from disposing of waste that will affect the well-being of people. (Muchandiona, 2013). Anyone who generates such waste must provide a method to revert or minimize waste by treatment, reclamation, and recycling.

Section	Detail
Quality Standards)	
Section 83 (under Part IX: Environmental Quality Standards)	provides for every person to dispose of waste in containers designated for that purpose. It prohibits persons from indiscriminately dumping waste in undesignated places.

The EMA enforces waste management regulations through statutory instruments (SI): SI 6 of 2007 and SI 10 of 2007 (Government of Zimbabwe, 2002).

SI 6 of 2007 uses the polluter pays principle (PPP) to regulate solid waste and effluent. Industries are to pay for their environmental violations. Section 14 of SI 6 of 2007 requires local authorities to designate suitable waste disposal sites and collect the waste regularly, limiting waste decomposition before collection (Government of Zimbabwe, 2007).

SI 10 of 2007 advocates for all generators and handlers of waste to obtain licenses. Every person wishing to store, transport, collect, sell, and dispose of waste should apply and submit an application for licenses, which shall be issued depending on the categories. Waste generators and handlers must obtain licenses for waste storage, use, recycling, and treatment. Section 3(5) states that if a waste disposal facility disposes of both non-hazardous and hazardous waste, the disposal facility shall be deemed hazardous unless waste streams are separated. Section 13(1b) advocates for waste generators to prepare yearly waste management plans with a particular focus on the safe transportation and disposal of waste that may not be prevented or recycled, the adoption of cleaner production methods, and the adoption of environmentally sound management of waste (Government of Zimbabwe, 2007). Local authorities are to prepare waste management plans for the regulations no later than the 31st of December.

The introduction of EMA was of paramount importance in MSWM. It has harmonized all issues concerning environmental management (Maria & Gobbi, 2020). Before EMA, environmental regulations were scattered in different ministries. In cases

where other pieces of legislation conflict with EMA, its provisions will override all others. (Jerie, 2013). The Act's provisions, particularly the environmental rights enshrined in section 4, have provided the basis for environmental management. Every citizen has been given the right to a safe environment for their health and well-being (Jerie, 2013). Any person who causes environmental pollution or degradation shall meet the cost of remedying such pollution (Jerie, 2013); this resulted in EMA embracing the Polluter Pays Principle, which is widely used to deter non-compliance. However, the poor implementation of the Act, weak enforcement, unclear roles and responsibilities, and poor stakeholder involvement are some of the reasons why the Act fails to achieve sustainable waste management (De Gobbi, 2020), as shall be presented in section 2.2.

2.1.2 The Public Health Act [Chapter 15:09]

The Public Health Act was enacted in 1924 and commenced in 1925. The Act was adopted from the English law on Public Health, aiming to create the legal framework for protecting public health in Zimbabwe (Training and Research Support Centre: TARSC, Ministry of Health: MoH & Public Health Accreditation Board: PHAB, 2014). The administration of the Act is assigned to the Ministry of Health and Child Welfare. It aims to prevent diseases and health risks and control activities that pose health problems (Government of Zimbabwe, 2002). Sections related to the PHA are listed in Table 2.2.

Table 2.2

Sections Related to the PHA

Section	Detail
Section 83	This section makes it mandatory for the local authorities to take legal and practical measures to keep their districts clean all the time and other areas under their jurisdiction clean and safe to prevent the accumulation of waste, which may be hazardous to people's health (Government of Zimbabwe, 2002). The local authorities are to remedy or prevent any nuisance or condition that negatively

Section	Detail
	affects people's health, and legal proceedings will be taken against the persons responsible for perpetuating the condition (Government of Zimbabwe, 2002).
Section 68(1)b	This section provides for the Minister of Health and Child Welfare to come up with restrictive regulations to prevent and stop the construction of dwellings, factories, and domestic animal dwellings with the potential to cause water and also to restrict deposition in the vicinity or to drain of manure, filthy or noxious or offensive things onto water bodies and the environment (Government of Zimbabwe, 2002). There should be prevention of pollution that endangers the health of any water supply to the public. Drinking water and other water used for domestic purposes should be purified (Government of Zimbabwe, 2002).
Sections 87 and 88	These sections stipulate penalties to be paid by persons for failing to adhere to notifications regarding removing nuisances.

2.1.3 The Urban Councils Act [Chapter 29:15]

The Urban Councils Act (UCA) dates back to the colonial period (1891) when the Salisbury Sanitary Board was formed (Wekwete, 1989, as cited in Mapuva, 2010). Subsequently, several amendments were made to the Act. After independence amendments to the Urban Councils Act 1973, Chapter 14 removed racial discrimination on tenure and representation in urban areas. The involvement of former local governments has seen the enactment of the Urban Councils Act in 1980, which was amended several times (Mapuva, 2010). The Act regulates waste management in urban areas (Table 2.3).

Table 2.3

Sections Related to the UCA

Section	Detail
Section 218 (b)	advocates for a fee for waste removal in areas where the service has to be rendered. (Government of Zimbabwe, 2002).
Section 23 subsection (1)	gives power to urban councils to ensure waste removal and treatment in their jurisdiction's areas (Government of Zimbabwe, 2002).

The major shortcoming of the Act is that there is no mention of waste minimization strategies: Reduce, Recycle, and Reuse Principles. The Act does not mention procedures to be taken when councils fail to collect the refuse, and there is also no mention of what to do with the collected waste. The example is seen in the case of the Glenview 8 complex in Harare; the local authorities have failed to provide regular refuse removal. The Act also lacks provision for the refuse money levies to be channeled back to support waste management services since the councils typically face financial challenges (Batista et al., 2021).

2.1.4 Harare Waste Management By-Laws

The Harare Waste By-laws originated before independence in 1948 as the Salisbury Sanitary and Refuse By-laws of 1948. The act was amended eight times between 1953 and 1978. It was then repelled by the Salisbury By-laws of 1979 to deal with the regular removal of domestic and industrial waste (Jerie, 2013). The laws mandate the local authorities or its contractors to be responsible for providing adequate standard waste receptacles to citizens and regular refuse removal of domestic waste from all premises deemed to be part of Harare city (Maseva, 2005).

The City of Harare also has the By-Laws of 1986, which prohibits people from depositing and abandoning waste in public places, except only in receptacles provided. The council supplies standard containers to residents, and domestic waste should be collected weekly. Paragraph five of section five of the Harare Waste Management By-Laws states that any person who contravenes these By-Laws shall be served with a written notice from the Zimbabwe Republic Police, and payment of a fine is made (Jerie, 2013).

2.1.5 Summary

The presence of different MSWM regulations in Zimbabwe shows that Zimbabwe has a comprehensive and enabling legislative environment pertaining to solid waste governance. The Acts' provisions provide the basis for environmental management. As discussed above, the primary role of MSWM regulations is controlling, managing, and prescribing the best practices of waste management activities to prevent compromising environmental quality (Jerie, 2013). According to

the Acts, waste management in Zimbabwe is the responsibility of local authorities. Local authorities must take reasonable steps to keep areas under their jurisdiction clean and safe to prevent waste accumulation. Local authorities shall designate disposal sites and ensure adequate receptacles and waste shall be collected regularly. The Acts advocate that no person shall dispose of waste in a manner that will pollute the environment and in designated places provided for that purpose (Muchandiona, 2013). The regulations generally deal with regular refuse removal of solid waste, supplying standard waste receptacles, and prohibiting people from depositing litter in public places (Maseva, 2005). The Acts also stipulate the consequences for not complying. Although the Acts are helpful, their enforcement and implementation are a cause for concern.

2.2 MSWM Regulations Ineffectiveness

For MSWM Regulations to be effective, there have to be specific characteristics and a strong positive correlation between MSWM regulations and practices. However, despite the well-intended regulations to guide MSWM, the above-discussed laws remain with some significant drawbacks. This section reviews those weaknesses that make the Zimbabwean MSWM regulations ineffective. From the available literature to date, the ineffectiveness of the regulations can be attributed to two main categories: the regulations' drawbacks and the EHO and local authorities' limited capacity. These drawbacks will be discussed in this section.

2.2.1 Drawbacks of the Regulations

The regulations' drawbacks were identified and grouped from the literature review. One major weakness of the EMA is its inability to define waste standards clearly. Although section 69 of the EMA provides for the Standards and Enforcement Committee to recommend standards for disposal methods and measures for handling, storage, and transportation (Government of Zimbabwe, 2002), there are no clearly defined waste standards. As enshrined in the EMA, the waste policy states that pollution is an offense punishable by the law. The violation penalty may be in the form of a fine, imprisonment, or both. However, the fines are too low to secure compliance; pollution has been exacerbated. The penalties are not sufficiently deterrent. The citizens find no

harm in polluting; to them, paying is better than complying. Higher penalties and sentences will help deter the offenders (Makwara & Magudu, 2013).

Some of the environmental regulations do not clearly define the legal conditions. The Public Health Act, for instance, prohibits the public from polluting their premises, but it does not mention premises on which they do not reside. It failed to consider other people's premises, implying they can pollute (Batista et al., 2021). Therefore, this indirectly allows people to cause problems in areas they do not own and get away with it.

Most by-laws address waste removal issues in a command and control approach without outlining the actual practical steps needed in city waste management. The SMEs' lack of voices in the regulation-making process further exacerbates their resistance to the regulations, resulting in waste dumping in undesignated areas. This causes dilapidation of the living environments and filthy habitats in urban areas (Makwara & Magudu, 2013).

Despite useful provisions in the regulations, they do not consider essential aspects of MSWM, that is, the separation and sorting of waste at the source (Batista et al., 2021). They do not address the vital areas or have no clear standards for reducing, recycling, reusing, recovering, and safely handling particular hazardous waste (Park, 2020). There are no recommendations for minimizing waste at the source. No solutions have been provided to minimize waste generation.

2.2.2 EHO and Local Authorities' Operational Monitoring Challenges

Monitoring, inspections, and enforcement are the essential and central means to pursue compliance. These strategies are necessary to secure regulatory quality, influence positive behavior, increase business productivity, and improve risk assessments. However, monitoring and inspections are met with challenges, especially for the environmental health officers (EHO) who execute their duties. While inspections are essential in protecting the public from health and environmental risks, many business operators perceive them as heavy-handed, inefficient, overly prescriptive, and culturally risky (OECD, 2012). Enforcement and inspections are primarily the responsibility of the local governments, national agencies, and regulatory

bodies. They report directly to the central body (Blanc, 2012). It is the duty of these environmental health inspectors to cover all the critical areas of regulatory enforcement and inspections. In MSWM, the EHOs and local authorities have been met with an array of challenges.

The lack of clear guidance by EHOs on what is expected from the SMEs will make them refrain from complying with regulations. SMEs, in particular, do not know what to do, why or how to do it, what to expect from inspectors, their requirements, what they will pay attention to, and how they will react (Blanc, 2012). SMEs need to understand how the regulations impact their businesses to identify compliant means (Blanc, 2012). They also need to know how the regulators will assess compliance to be guided appropriately. Failure to recognize the method of assessment will result in non-compliance. EHOs are supposed to provide complete information on assessment methods, visit dates, and expectations for the desired outcomes to be actualized. There is a need for consistency and transparency in how inspections are carried out to make governance and accountability more transparent. Efficient and effective enforcement is firmly hinged upon well-functioning monitoring and control systems. This can also be achieved by sanctioning those not adhering to regulations (INTOSAI, 2016).

The shortage of resources hinders the operations of environmental health inspectors. Resources are needed to ensure that laws and regulations are adequately enforced. Resource inadequacy and poor waste management and disposal infrastructure remain difficult obstacles to sound waste disposal. EHOs should be fully capacitated to instigate waste policies and make regulations obligatory if there is to be an efficient waste reduction (INTOSAI, 2016). Resource shortages also include personnel. The lack of EHOs is a challenge as far as inspectors are concerned. The few EHOs are loaded with too many responsibilities. They must attend to administrative tasks, take field inspections, compile reports, and prepare feedback for the business operators. Because of their small numbers, some business operators sneak the inspections, taking advantage of fewer EHOs. This then compromises the whole process and its intended objectives.

Local authorities have encountered severe technical inadequacies in meeting refuse collection (Makwara & Magudu, 2013). Most city councils lack the capacity to

remove waste regularly, particularly adequate refuse trucks. The Harare City Council Waste Management Department has poor equipment to properly manage domestic refuse. Reports from the amenities department say that Harare requires not less than three trucks per ward for effective waste collection in two days; surprisingly, the 46 wards are served by 47 vehicles.

Inadequate financial resources have hampered the effectiveness of solid waste management regulations. The cost of complying with laws is quite expensive for SMEs. They cannot fund legal requirements like Environmental Impacts Assessments (EIA) and regular refuse removal since their primary goals are to survive through employment creation and income generation (De Gobbi, 2020). The SI 6 of 2007 states that local authorities should provide adequate receptacles, but some working premises and residential areas, especially high-density areas, do not have waste receptacles. Some use plastic containers, while others pile the garbage on undesignated sites or burn it, which causes air pollution (Mafume et al., 2016). Financial challenges also cripple municipalities with skilled and specialized human resources (Musademba et al., 2011)

The EHOs' lack of expertise is another challenge the inspectorate faces. The lack of qualified and competent persons responsible for implementing the environmental standards hampers compliance with regulations. In a study by Massoud et al. (2017), some respondents explained that if they were more experienced and qualified inspectors, enforcement of regulations would be more effective. Some EHOs lack technical training in waste management and often have difficulties handling assigned complex issues; hence, the basis on which they may receive technical assistance can be limited (JICA, 2003). This contributes to non-compliance with regulations and a lack of faith in the inspectorate, making the whole system questionable. Therefore, EHOs must possess a code of ethics that guides them as it regulates the behavior of individuals to prevent conflicts of interest and corruption and protect the interests of regulated individuals (OECD, 2012).

For MSWM regulations to be effective, there has to be political goodwill. A lack of political will results in a lack of prioritization and thus will compromise waste management despite the regulations stipulating that the local authorities and municipalities should provide the needed resources. The rampant breakdown of refuse

vehicles and the little attention given clearly show that waste management is not a priority (Jerie, 2013). Furthermore, the change in political hands has affected the running of municipalities, with the leadership neglecting waste management budgets. This resulted in non-compliance with regulations, resulting in the throw-where-you-like attitude developing in citizens. When political parties change in a country, it also results in the municipality's leadership changing. This results in a lack of continuity and compromises MSWM policies, creating non-adherence (De Gobbi, 2020). In Zimbabwe, the political moves have led to the compromising of waste management. In a move to gain political mileage, some political parties neglected their duties and responsibilities. In most cases, political parties tend to favor options that are popular with people and leave out some that are not (Feiock, 2001). The responsibility of political parties in waste management is to fund and ensure that dumpsites and landfills are controlled. Yet most dumpsites are not controlled and monitored. Uncontrolled disposal sites emit greenhouse gases, which in turn lead to global warming. This is evidence by the case in Jordan in 2010, where 10% of the country's total greenhouse gas emissions were reported to be contributed from the waste management sector, of which about 90% of the greenhouse gas emissions were generated from the disposal sites (Taher et al., 2021). Russeifa landfill in Jordan was officially closed in 2019 because of contamination by the Amman-Zarqa water basin through uncontrolled leachates (Taher et al., 2021). Most cities in Zimbabwe are characterized by poorly managed dump sites, especially in Harare. Poorly maintained waste dumps and illegally deposited solid waste have jeopardized Harare's water supply and have been identified as the primary source of disease outbreaks (Tsiko & Togarepi, 2012). Uncontrolled dumpsites produce gases that react, causing fires and explosions, which are risky to nearby communities (Taher et al., 2021).

It has been widely accepted that the traditional command and control, top-down, and confrontational approaches to pursuing compliance are not desirable (Gray et al., 2010). The regulators' command and control approach to small business operations can exacerbate conflicts with stakeholders who feel abused and pressured by regulations imposed on them. It makes the EHOs' work to be further complicated. A responsive and involving approach will make the regulated positive about the whole process.

Resistance from the micro-business operators is yet another challenge faced by EHOs. Negative attitudes toward the inspectorate result in resistance to complying with the standards. This resistance to changing their behavior may be found in older individuals than younger individuals (Massoud et al., 2017). In addition, anxiety emanating from the many expected responsibilities from the SMEs makes them resistant. Similarly, pressure from the loaded array of responsibilities and the fear of failure leads small business operators to resist and be tracked. Another reason for resistance from the stakeholders was a lack of communication with the Ministry of Environment on new laws and requirements. They expressed that they would only know about these new laws and requirements when a catastrophe struck (Massoud et al., 2017). If inspection authorities act independently and do not work to share their rationale for intervention, decisions and the judgments behind them lead to inconsistency and wasted effort (OECD, 2012).

Section 4 of EMA states that every citizen has the right to access environmental information, protect the environment for sustainable development, and participate in implementing regulations, policies, and other measures that minimize environmental degradation (Government of Zimbabwe, 2002). However, a lack of knowledge about the dangers of improper waste disposal is attributed to poor disposal systems and inappropriate litter disposal in rural and urban areas (McAllister, 2015). The low levels of awareness make it challenging to implement MSWM regulations because of the lack of knowledge of their impacts on the environment (McAllister, 2015). Less knowledge is less likely to change perceptions and behavior.

In short, although the MSWM regulations are available, as presented earlier, most solid waste management acts are not effectively enforced. They are presented with lacking general standards, loopholes, municipalities' weak capacity to provide adequate waste management resources, financial challenges, low levels of engagement and awareness, and lack of political will. These regulation shortcomings remain a challenge for waste management practices (Hemidat et al., 2022). These drawbacks lead to improper waste collection (Nhubu et al., 2017). According to estimates, the amount of urban waste collected in small and large municipalities has decreased from at least 80% to as low as 30% (Makwara & Magudu, 2013). The significant impacts of non-

compliance include the outbreak of diseases, all forms of pollution, blight environments, destruction of biotic and abiotic environments, reduced crop production, and reduced GDP. It can be seen that the MSWM regulations are not proficiently effective, and this ineffectiveness significantly contributes to the citizen's non-compliance, including the SMEs'.

2.3 SME's Non-Compliance

From SMEs' point of view, complying is quite expensive. The compliance problem is worsened due to a lack of community involvement. SMEs lack voices in the regulation-making process (Gray & Shimshack, 2011); hence, they resist adhering to the regulations. Besides, there is usually a gap between regulators and the community. SMEs lack knowledge of MSWM legal aspects, coupled with low awareness and understanding of environmental impact, making it challenging to implement MSWM regulations (McAllister, 2015). However, there remain great opportunities for SMEs to implement MSWM regulations, particularly regarding solid competitive performance. Competitive performance relates to the ability to sustain profitability and productivity. This implies that companies can produce goods and services efficiently and compensate their workers by providing lucrative profits to the managers (Stewart, 1992, as cited in Iraldo et al., 2010). Competitiveness will help small businesses identify opportunities for better resource management and cost savings. Furthermore, implementing MSWM regulations promotes and improves a company's image, which will help a firm increase its sales and gain a significant market share (Starkey, 1998). A better public image will also bring about a prominent company placement in markets. A good reputation is necessary for SMEs to attract investment to necessitate Zimbabwe's open-for-business mantra.

2.4 Opportunities for SMEs in Implementing MSWM Regulations

This section focuses on how literature describes opportunities to bring benefits and advantages to SMEs to comply and help them realize the importance of compliance with regulations.

Compliance with regulations promotes and improves a company's image. Improving the public's image will help a firm increase its sales and gain a significant market share (Starkey, 1998). A better public image will also bring about a prominent company placement in markets. For instance, Loudwater, a small company in the UK, boasted that it was winning customers because of its compliance with environmental regulations (OECD, 2007). A good reputation is necessary for SMEs to attract investment, necessitating Zimbabwe's open-for-business mantra. Some SMEs have noticed improved relationships with the community and public sector, increasing their desire to enhance their ties with customers and suppliers (Purwandani & Michaud, 2021). Certification to ISO standards also gives companies a better public image. ISO certification in China was able to bring a good reputation for the company and environmental competitiveness (Iraldo et al., 2010).

Compliance with regulations brings a solid competitive performance. Competitiveness relates to the ability to sustain profitability and productivity. It also implies that companies can produce goods and services efficiently, compensate their employees, and provide superior returns to the owners (Stewart, 1993, as cited in Iraldo et al., 2010). Competitiveness will help small businesses identify opportunities for better resource management and cost savings, and they can get competitive advantages and differentiation by greening their actions. However, this can occur only when the regulations are flexible (Hirpe & Yeom, 2021). From a survey done in the UK on this issue, more than two-thirds of SMEs were satisfied with their returns on their investments in resource efficiency and improvements, whilst a third experienced reductions in production costs (Hillary & Burr, 2011, as cited in Rizos et al., 2015). In Zimbabwe, it will help the operators to improve their production. Most of these SMEs face financial difficulties in Zimbabwe; hence, implementing these regulations will market them to survive.

When SMEs implement the regulations, this promotes waste reduction (World Bank, 2018), and there will be no leakage of such waste into streams, oceans, and rivers. It then reduces adverse impacts on the local environment, minimizing resource depletion. Due to competent MSWM regulations, several developed countries are witnessing reduced landfilled wastes (Njoku, 2015).

Adopting MSWM regulations by SMEs can provide opportunities for a vulnerable group of people, such as waste pickers. Waste management activities are typically performed by vulnerable low-income earners, particularly women. By enhancing autonomy and recognizing the people involved, these activities can have substantial positive economic and social benefits (UNEP, 2013).

Implementing MSWM regulations in small businesses helps improve economic resource extraction by decreasing the amount of money required for solid waste collection, treatment, and disposal and by creating markets for the recyclables (UNEP, 2013). Additionally, adopting the regulations aids in minimizing or eradicating the detrimental effects on health. This improves the well-being of the community's poorest members in terms of better human settlements, social amenities, sources of employment, and poverty alleviation (UNEP, 2013). Implementing MSWM regulations in SMEs also delivers benefits to future generations. These advantages include a cleaner environment, a more inclusive society, and a more dynamic economy, resulting in sustainable waste management that benefits communities. Hence, carefully planned and well-implemented regulations contribute to all three pillars of sustainable development that is social, economic, and environmental.

By implementing MSWM regulations, SMEs reduce production costs and increase productivity (OECD, 2018). This is through resource efficiency, which is supported by access to information, technology transfer, and access to finance. SMEs benefit through environmental improvements such as tax cuts and government subsidies (OECD, 2007). Although green business practices entail additional expenses, they frequently have observable advantages like decreased material prices and higher earnings (Čekanavičius et al., 2014).

SMEs can enter into circular economy activities such as remanufacturing, recycling, and energy production. The circular economy links waste management with production and the general policy framework (Didier, 2015). This waste sector no longer considers waste a threat but a source of future valuable resources. In Zimbabwe, MSWM regulations, if embraced by SMEs, would raise awareness of the advantages of resource efficiency and increased productivity and competitiveness due to the circular

economy (OECD, 2018). Small businesses can generate more benefits from waste, such as energy generation.

Implementing MSWM regulations in SMEs has commercial benefits, for example, new customers who are satisfied, competitive market advantages, and an excellent environmental profile (OECD, 2007). This can promote donor assistance to SMEs.

2.5 Challenges for SMEs in Implementing MSWM Regulations

Despite opportunities realized by SMEs in implementing MSWM regulations, challenges are also inevitable. The following are some challenges derived from the review.

Small businesses have different behavioral characteristics compared to large enterprises concerning regulation compliances. These perceptions prevent them from implementing MSWM regulation because they think management will not provide them with the chance to generate competitive advantages.

SMEs are affected by their incompetence, limited skills, and ability to implement MSWM regulation approaches (OECD, 2007). They also lack knowledge about managerial and technical solutions for improved environmental performance. They lack the technical expertise and skills in environmental management (OECD, 2007), contributing to SMEs' skepticism. To them, what cannot be measured cannot be managed (OECD, 2007). Many SMEs lack the technical skills to identify, assess, and implement modern, advanced technology options to reduce environmental costs (Rizos et al., 2015). Although SMEs know the possibilities for increasing competitiveness, lacking skills and knowledge inhibits them from seizing new chances (OECD, 2018). SMEs have little confidence in general formalization procedures, instructions, and protocols. Furthermore, they do not realise their environmental impacts, so they will be neither prone nor able to make decisions (Iraldo et al., 2010). Thus, it prevents them from implementing proper MSWM regulations.

SMEs lack knowledge of the benefits of implementing regulations; hence, their participation is low. Environmental programs rely on the massive participation of

employees, but it becomes problematic when they lack the knowledge to participate (Pinkse & Dommisse, 2009). This lack of specific expertise and capacity to comply with the requirement causes them to rely on external consultants, resulting in a significant extra cost (Calogirou et al., 2010). Also, because they consider enhancing resource efficiency as expensive for their business, SMEs who are unaware of the benefits of the circular economy may overlook the financial gains from doing so (Rademaekers et al., 2011).

SMEs lack the funds to invest in technical solutions that would help them run more environmentally sustainable operations (OECD 2007). A survey revealed that SMEs lack the financial resources to establish and manage recycling schemes (Rademaekers et al., 2011) because it does not require only direct financial costs but indirect financial costs such as time and human resources needed for environmental improvements (Klinkajon, 2020). The indirect costs challenge implementing regulations (Iraldo et al., 2010). The lack of resources is worsened by the high demands for documentation, which demotivates the employees as they spend most of the time on documentation instead of production. So, to them, regulations are a cost without any benefits.

According to the SME manager's perspective, the regulations do not consider SMEs' reality, characteristics, conditions, and limitations. Hence, SMEs do not have incentives in waste regulations to stimulate their actions and refrain from implementing them. Small firms frequently complain that staying current with environmental requirements is difficult. SMEs feel they do not have support, yet they are expected to perform like the big enterprises (OECD, 2015).

This section has identified numerous advantages to SMEs implementing MSWM rules, including financial, organizational, commercial, human, resource, and environmental benefits. In order to promote environmental compliance, sufficient knowledge of environmental impacts, increased resource base management capability, and improved stakeholder communication. Challenges facing SMEs in implementing MSWM regulations include lack of capital to invest in environmental initiatives, lack of knowledge, limited competence level, and capacity to adopt environmentally sustainable waste practices approach.

2.6 Recent Related Research on Zimbabwean SMEs' Waste Management

Solid waste management remains a challenge in Zimbabwean SMEs. It is the mandate of local authorities and city, town, and rural district councils to manage solid waste in areas under their jurisdiction. The spontaneous and indiscriminate disposal of solid wastes along streets, on open vacant land, storm drains, and open dumps characterize small businesses (Mangundu et al., 2013). The severity of solid waste management is clearly manifested in the prevalence of erratic waste collections and poor waste disposal methods (Mahamba, 2015). Open dumping is the most common method for solid waste disposal by Zimbabwean SMEs (Jerie & Tevera, 2014). Research has alluded to the problems faced by SMEs in solid waste management as limited budgets, operational inefficiencies, lack of expertise, lack of capacity, lack of political goodwill, poor prioritization, and misappropriation of funds (Mandeverere & Jerie, 2020). The current situation is that waste is mostly disposed of through traditional and unsustainable ways like open dumping, burning, burying waste, illegal dumps, and landfilling (Mafume et al., 2016).

The prominent studies were those of Jerie (2013), Jerie and Tevera (2014), Hove-sibanda et al. (2018), Mafume et al. (2016), Makwara (2013), Mangundu et al. (2013), Nhubu et al. (2017), Nhubu and Muzenda (2019), Nyathi and Togo (2020), and Tambura & Mapuva (2019). The significant findings can be summarised as follows;

In spite of the existence of legal laws both nationally and locally, waste management has been compromised, especially in urban areas (Jerie, 2013). In a study of home industries done by Jerie in Gweru, it was revealed that there was an inadequate waste collection, as evidenced by heaps of uncollected solid waste at Kombayi and Kudzanayi. The few bins provided as receptacles for collection do not match the vast amounts of waste generated and have left the enterprise operators no other alternatives but to throw waste on any vacant land.

According to Tambura and Mapuva (2019), most flea markets did not provide waste containers, compelling them to dispose of waste in open fields and pits. The irregular waste collection was another complaint made by shop owners. The city

authorities where the SMEs operate have failed the waste collection system. This has been manifested by the small business operators. One of them highlighted that they were forced to dispose of organic garbage in open pits or locations where it can decompose since they had no other choice because the local administration was not doing its job of the regular collection, unlike their competitors, the supermarkets and other retail dealers, who can burn their waste (Tambura & Mapuva, 2019).

In the home industries of Siyaso in Mbare and Gazaland in Highfields, about 58% of respondents regarded the waste collection rate as erratic (Jerie, 2013); this resulted in waste being dumped in skips, although some of the waste was being illegally dumped along the Mukuvisi River. Makwara and Magudu (2013) alluded that unregistered vending points are the reasons for a surge of non-formal solid waste disposal sites. Waste management has collapsed and triggered residents' health at great risk (Makwara & Magudu, 2013).

In the Gweru marketplaces of Kudzanayi and Kombayi, operators do not have designated points for waste disposal; they have resorted to open dumping. According to Jerie and Tevera (2014), open dumping occurs due to a lack of urgency in addressing the waste management problem by central and local governments. The lack of a waste policy that sets guidelines for waste management operations and its lax enforcement are factors contributing to inadequate waste disposal by firms (Jerie & Tevera, 2014). According to Nhuhu et al. (2017), waste generators are compelled to prepare plans and targets for waste management, but this is far from practice. Despite this obvious problem, which everyone can see, not much is being done to replace the severely unsustainable current waste management system (Nhuhu et al., 2017).

Hove-sibanda et al. (2018) state that many SMEs have limited business sustainability and upward mobility because of harsh economic conditions. Thus, most SMEs in Zimbabwe are classified as operating in a survivalist mode, hence non-compliance. Failure by SMEs to adopt green practices can be attributed to a lack of commitment or managerial support. Managers who are void of sacrifice to embrace green practices will, as a result, obscure such a tendency transferred to workers (Hove-sibanda et al., 2018). A study carried out by Nyahunzvi (2014) amongst SMEs in

Gweru revealed that the enterprises lacked formal environmental policies and environmental awareness (Hove-sibanda et al., 2018).

Apart from the entrepreneurial role SMEs play in Zimbabwe through employment creation and poverty eradication, SMEs assume a passive role in environmental management (Hove-sibanda et al., 2018) because their concern is mainly cost advantages. They concentrate on daily survival, which prevents adopting green practices regarding environmental compliance. SMEs mainly perceive their activities as causing negligible impact in relation to big businesses. They lag in adopting green practices (Battisti & Perry, 2011).

Studies have shown that the amount of solid waste is rising because Zimbabwe fails to render consistent waste collection and disposal effectively. Other studies have recommended waste reduction at the source by actively including all key players in waste management (Nhubu et al., 2017). Alternatives for sorting waste at the point of generation have also been made. Other researchers have advocated for solid waste management in businesses and towns to adopt an integrated approach to waste prevention, reuse, recycling, and reduction (Nhubu et al., 2017). The scenario calls for a paradigm shift from the current waste management era to one where local authorities and the community can join hands as critical players to improve the situation. Ministries involved in management must urge private businesses to manufacture harmless products to reduce waste and its impacts (Nyathi & Togo, 2020).

Despite the fact that the Zimbabwean government has established legislation and laws to be abreast with international norms, there is no link between policy and practice. The generation, collection, and transportation of solid waste in Zimbabwe are unsustainable (Chikowore, 2021). Because of this infrequent waste collection, residents and businesses respond by promoting unwanted dumpsites and burning in the backyard (Chikowore, 2021).

Although research provides information about solid waste management in Zimbabwean SMEs, they also point out some research gaps. Few studies have been conducted to determine the most probable ISWM with the most minor environmental effects. Such a study will help guide the decision-making and policies of MSWM

(Nhubu & Muzenda, 2019). Waste management should focus on waste reduction and prevention through reuse, recycling, and recovering waste rather than on end-of-pipe solutions only (Nhubu et al., 2017). There is a need for stakeholder involvement to develop a solid and sound environmental policy that is inclusive. Additionally, research developing sustainable waste management strategies must move from recommendation-based studies to simulations and laboratory-based pilot experiments (Nhubu et al., 2017). Although research on waste management has focused on domestic and industrial waste management, not much comprehensive study has been done to analyze the management practices and compliance with legislative requirements in small business enterprises (Nhubu & Muzenda, 2019).

In summary, researchers have revealed that waste management by Zimbabwean SMEs is highly unsustainable (Nhubu et al., 2017). Zimbabwean SMEs use five primary methods for solid waste disposal because of inadequate waste collection. These are open dumping, burning, incineration, burying, and landfilling. Open dumping is the dominant method used to dispose of waste. According to Bere (2020), the underlying issue with MSWM in Zimbabwe is managerial and not financial or technological. This means that only an integrated strategy can produce long-lasting answers.

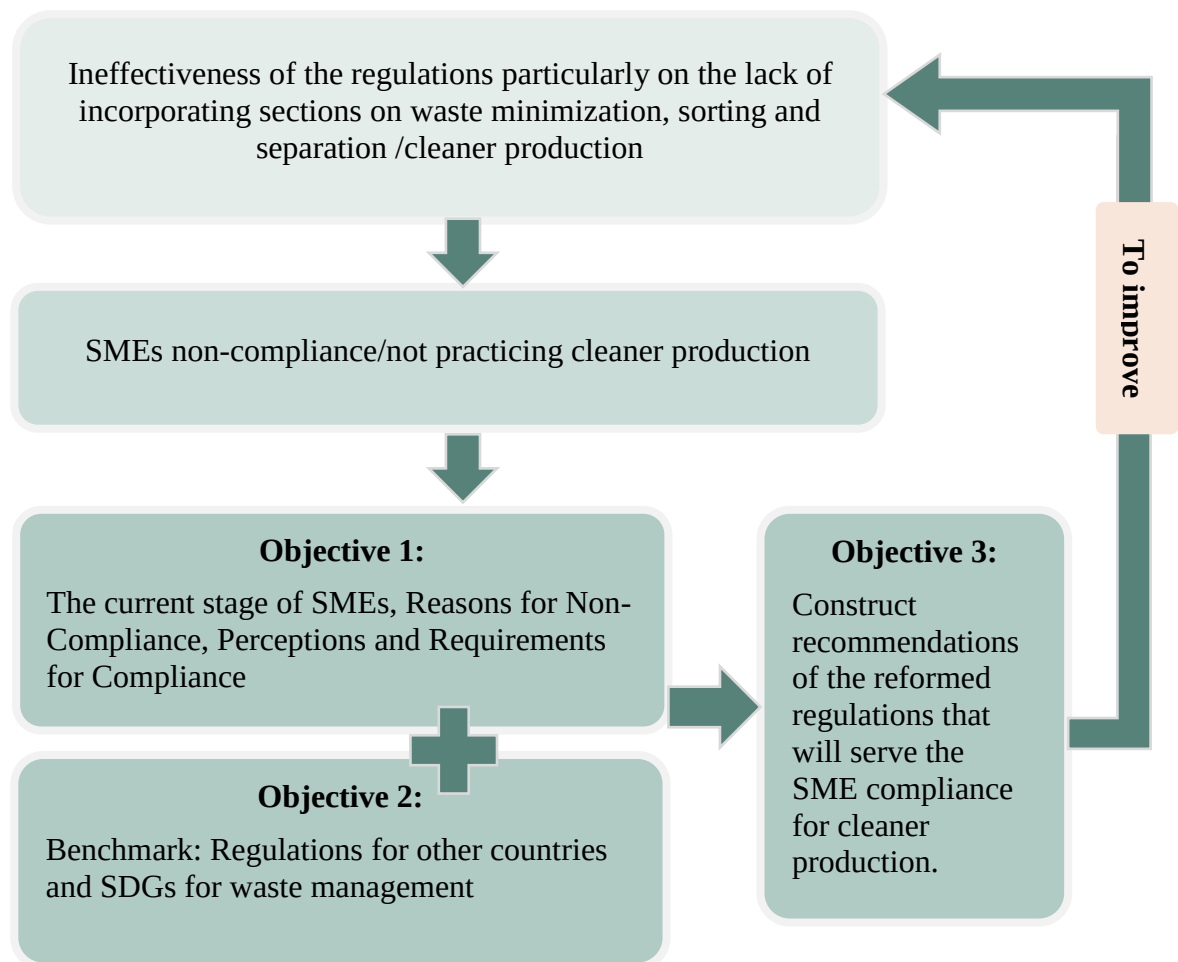
2.7 Research Gaps

Despite several waste management laws in Zimbabwe, waste management has proven challenging for the nation. It was observed that the MSWM laws mainly emphasize end-of-pipe solutions for waste management. The literature recognizes that current laws have failed to recommend cleaner production technologies to curb industrial waste management problems. It does not offer anything regarding the implementation and the success of the CP on SMEs. The law must ensure that SMEs form signages to provide recycling, reuse, recovery, and waste treatment. A few studies have said that laws can be promoted and implemented to have more uses, such that further introspection of facts and methods is a necessity. Therefore, there is a need to bring about a revolutionary change in waste management. There is a need for prompt research to blend the SDGs into Zimbabwean waste management regulations to gravitate the laws toward enforcing Agenda 2030. There is a need to find the interlinked

ages between MSWM strategies and legislation and how these interlinked ages can bring about sustainable waste management. Literature is silent on an in-depth analysis of the causes of weak enforcement of regulations; therefore, further studies can be done to establish a comprehensive guide on the causes of poor and weak enforcement of MSWM regulations.

2.8 Research Framework

The research framework is based on the premise that the reviewed literature has identified the problem as the ineffectiveness of regulations, particularly waste minimization, the regulations lacking waste minimization, such as sorting and separating waste at the source, and SMEs having no cleaner production options. The research then proposes to investigate the status of SMEs in MSWM and the level of SMEs' compliance with MSWM regulations. Questions that seek answers are, for example, the severity of the situation, the gap between the laws and practice, the SMEs' perceptions on this issue, the compliance level and reasons, and the requirements they need to improve compliance. Additionally, the research will seek to learn from other countries, in this case, the European Union countries, the availability and effectiveness of MSWM regulations, particularly cleaner production and sustainability. After the current situation and the benchmark MSWM are established, the research aims to construct the appropriate guidelines of the reformed regulations that will serve the SMEs for cleaner production and SDG for MSWM in Zimbabwe. Figure 1 below shows the framework that the research will follow.

Figure 2.1*The Framework of the Research*

CHAPTER 3

METHODOLOGY

This section focuses on research methodology to focus on research objectives and contribute theoretical and practical information on reorienting Zimbabwean MSWM Regulations towards SMEs' sustainable management. Details are outlined on the research design, steps, study site selection, population and samples, data collection, and MSWM regulations will be reviewed to establish the vital reorientations required to gravitate toward SMEs' sustainable management. The investigations will be done through document studies, questionnaires, semi-structured interviews, and focus group discussions based on identified indicators.

3.1 Research Design

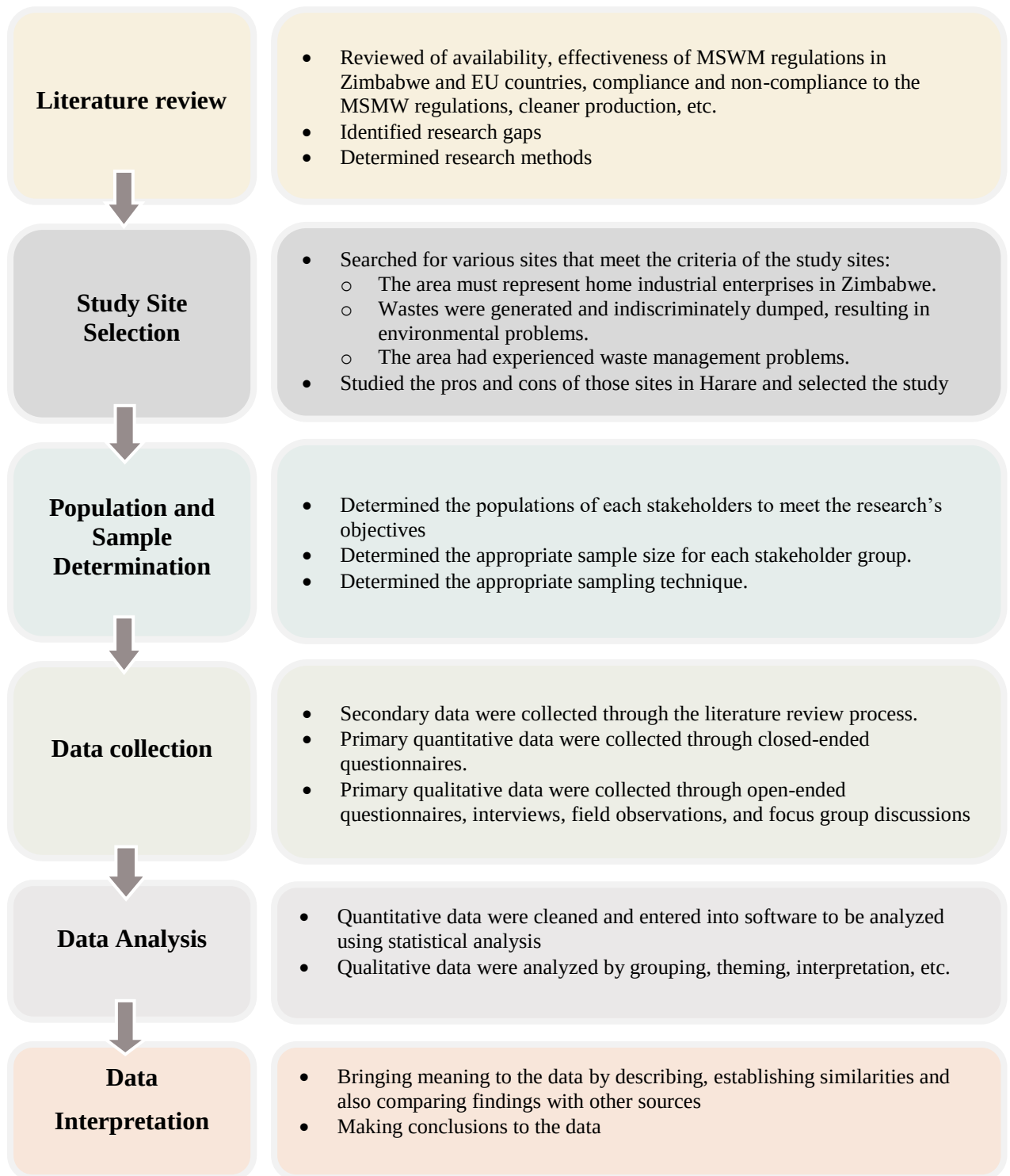
The study adopted a mixed methods research design to collect, mix, and integrate data quantitatively and qualitatively. A mixed methods research design neutralizes each data form's weakness (Creswell, 2014). In a mixed methods research design, qualitative data tend to be open-ended without predetermined responses, while quantitative data usually involve closed-ended responses. The design was considered since the two are complementary, helping to bring out the advantages and disadvantages. The choice of mixed methods is hinged on the belief that problems can be best solved through multiple sources because of the multiplicity and legitimacy of the sources of knowledge (Creswell, 2011).

The case study of SMEs was used particularly to gain knowledge of MSW regulations for SMEs' compliance, non-compliance, sustainability challenges, and authorities' challenges in Zimbabwe through the use of quantitative and qualitative methods. The quantitative approach was used to collect data, for example, the levels of SMEs' perceptions and compliance, rating scales of waste management behavior, and difficulties or challenges in waste management. The qualitative methods were complementarily used to understand the research problems' definite reasons, opinions, and incentives (Wyse, 2011). These methods provided an apt, clear description of issues and solutions in words or pictures, for example, the SMEs' constraints and suggestions for better compliance, authorities' challenges, and the document study of requirements,

regulations, and sustainability. Data collection methods in qualitative research included a document study, interviews, observation, and focus group discussions.

3.2 Research Steps and Methods

The research steps are shown in Figure 3.1.

Figure 3.1*The Research Steps*

3.3 Study Site Selection

The study was carried out in Glenview Area 8, SiyasoMagaba, and Gazaland in Harare, the capital city of Zimbabwe (Figure 3.2). Harare is located in northeastern Zimbabwe in the country's Mashonaland region and on the geographic coordinates - 17.824858 and 31.053028, with an estimated population of 1.6 million (Masimba, 2021). Harare is Zimbabwe's seat of government, commercial, and industrial center. The city lies on a watershed plateau between two major rivers, the Limpopo and the Zambezi Rivers. Harare is the country's cultural, industrial, commercial, and agricultural center, with plenty of companies producing a wide variety of products. The city has many diverse SMEs operating compared with other cities. The deregulation of industrial laws resulted in the sprouting of SMEs. The city has eight industrial areas for both heavy and light industries (Muswere & Rodic-Wiersma, 2017).

The researcher utilized a purposive sampling technique in selecting the three SMEs. The selection was hinged on the fact that the said SMEs

i) were the most significant three concentrations of SMEs in Harare, generating a lot of indiscriminately dumped wastes and affected by waste management problems such as land, air, water, noise pollution, rodents, foul odors, and the outbreak of diseases (Jerie, 2013);

ii) had become an eyesore, with uncollected waste being a common sight in open spaces and along streets. The areas had often been reported to have subjected people to unending environmental calamities, such as an outbreak of diseases and contamination of water sources (Zinyemba & Changamire, 2014) and

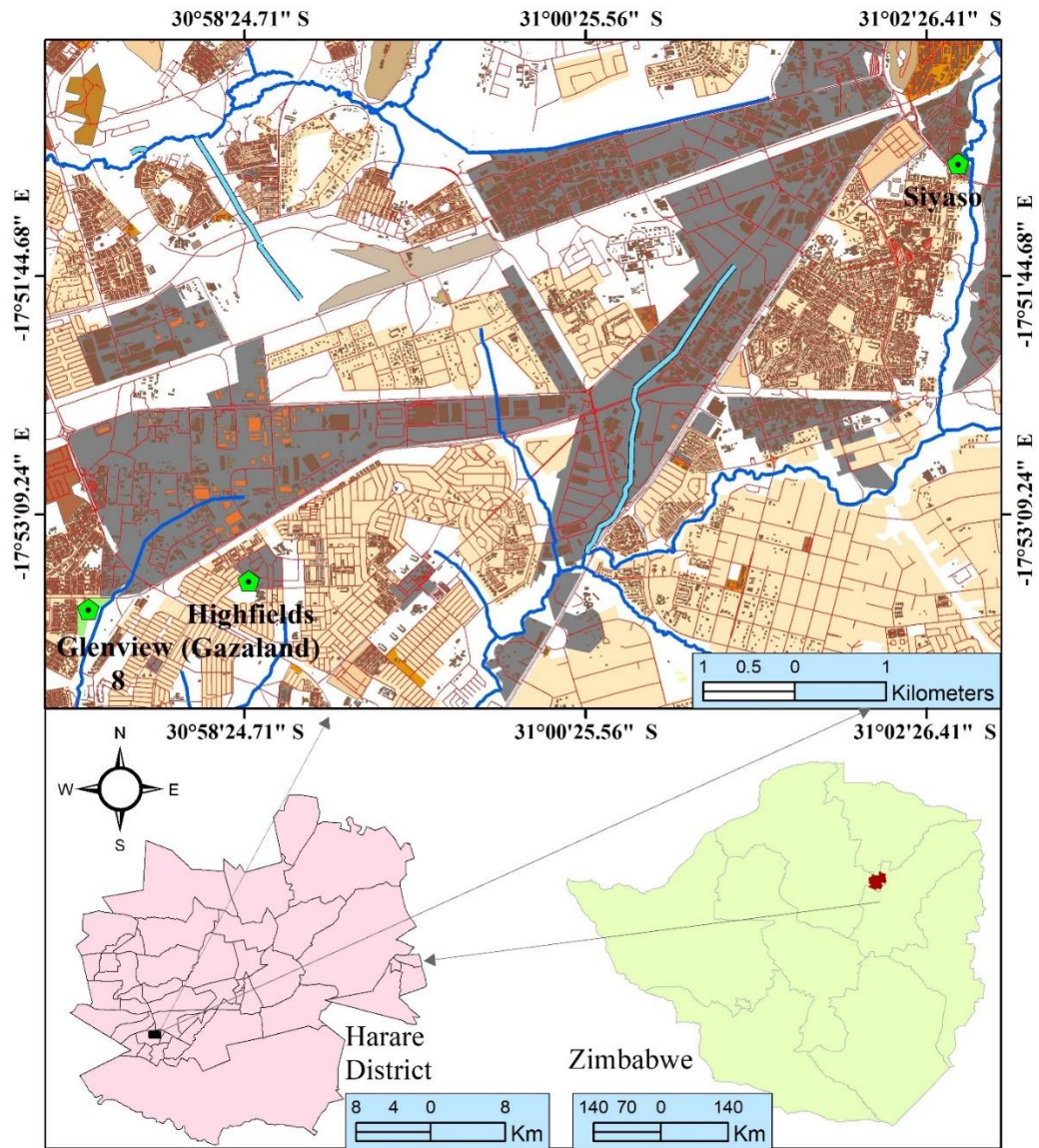
iii) were diverse in their operations; they engaged in different productions, generating various types of waste.

Siyaso is the largest commercial complex stretching from Mbare township to the Central Business District (CBD), with over 1,000 entrepreneurs who are engaged in welding, mechanical repairs, selling of building materials, catering, and laundry. These have resulted in waste generation (Zinyemba & Changamire, 2014) and disease outbreaks. Indiscriminate waste dumping in Mbare (Siyaso) has resulted in groundwater pollution. Mbare has been an epicenter of epidemics of cholera and

typhoid since the 1990s. The major cholera outbreak was between 2008 and 2009, which resulted in deaths. Ever since, cholera and typhoid outbreaks were experienced in 2010, 2011, 2012, 2016, and 2017 (Takavada et al., 2022). As a result of diverse economic activity, groundwater sources have been impacted due to waste leachates (Misi et al., 2018). In Gazaland, there are problems with odors and air pollution due to wood shavings and tires that are burnt timeously. Waste is illegally dumped in the Mukuvisi river; the land is no longer appropriate for agricultural purposes due to ground and surface water pollution (Jerie, 2013). In Glenview Area 8, waste is disposed in illegal streams, along roads, open spaces and in the drains. Ground water pollution is experienced due to seepage.

Figure 3.2

Map of the Study Area

**Legend**

- | | | |
|-------------|------------------|-----------------------|
| Road | Building | Harare District wards |
| River | Residential area | Harare Province |
| Storm drain | Retail area | Zimbabwe provinces |
| | Industrial area | |

3.4 Populations and Samples

3.4.1 Population and Sample Sizes

This study had three primary stakeholder groups: the SMEs, the relevant government officials, and the residents.

1) The SMEs. The study population consisted of SMEs from Glenview Area 8, SiyasoMagaba, and Gazaland. The total number of SMEs was derived from the chairperson of the Association of SMEs recorded in Siyaso, Gazaland, and Glenview 8 was 1,595 (T. Mbeva, personal communication, July 2, 2023). The sample size calculation using Yamane's formula (Ismail, Pernadi, & Febriyanti, 2022) was 321, but data from only 232 respondents could be collected for several reasons. Respondent-related challenges included participant inaccessibility. For instance, it was hard to reach some of the SMEs due to their locations. Some were located at thieving hotspots, while some could not be found because of their irregular working hours. Some respondents refused to participate because they thought it was political since some campaigns were taking place nearby for general elections. In addition, SMEs frequently change their locations and jobs, so they are not found. Limited by financial resources and time, the researcher could not proceed to collect 321 questionnaires as planned.

However, according to Hair et al. (2018), the sample size was still considered sufficient, as they mentioned that a preferred sample should be larger than 100 or larger for exploratory research. Besides, considering the minimum sample-to-variable ratio of 5:1, as suggested by the same author, this sample size was considered sufficient.

Additionally, purposive sampling was used to select 21 SME participants for focus group discussions (FGDs). One group of seven participants each was chosen from the three SME clusters.

2) The relevant government officials, as the key informants, were targeted because they were involved in implementing, supervising, and financing waste management activities. A total of sixteen (16) key informants were drawn from:

- The Ministry of Health and Child Care (2),
- The EMA (6),

- The Ministry of SMEs (2) and
- The City Council (6).

Purposive sampling was used to select 16 key informants: the directors from the City of Harare who deal with waste management, officials from the regulatory bodies, officials from the government, and officials from the Ministry of Health and Child Welfare. These key informants were selected because of their role, responsibility, and knowledge of the MSWM situation.

3) Residents. The residents to be chosen for this study were those who were most affected by poor waste management. These were the people of Mbare, Glenview, and Highfields residents. These have been identified by asking the Municipality of Harare and local authorities (Mtema, 2014). The three areas were chosen by purposive sampling since the areas were the operational zones of the SMEs, and there had been reports that the residents had been exposed to an outbreak of diseases and other environmental impacts (Zinyemba & Changamire, 2014). Data were collected from them using the FGDs method. The participants in the FGDs were selected through purposive sampling. Three FDGs were carried out, one in each residential area, with seven participants each.

3.4.2 Sampling Method and Procedure

Although initially planned to use a stratified sampling technique, due to the SMEs' irregular working hours and unstable timetables, convenience sampling was used since the SMES had no timetable; they reported working anytime, any day. Additionally, there was no map of types of SME locations from which a researcher could select systematically. Traveling to various SMEs with no exact data became a major limitation for the researcher that prevented the researcher from freely selecting them systematically. Other reasons also contributed to the inability to use a more random sampling method. These reasons are already given in 3.4.1.

Purposive sampling was used to select a sample of representatives for FGDs from the residential areas. Ward Committee members were chosen since they are the custodians of the different wards. The Ward Committee was a duly elected body representing the community's interests, opinions, and issues affecting their lives. They were the rightful respondents since they were the link between the community, the councilor, and the local government communication channels between communities and municipalities. Moreover, they were well aware of the status quo of the residents in terms of their social, economic, and administrative welfare, the industrial operations of the SMEs, waste management, benefits, and environmental impacts by the SMEs.

3.5 Data Collection and Instrumentation

This research incorporated both primary and secondary data. Primary data were taken from SMEs, key informants, and Mbare, Glenview, and Highfields residents. The primary data were collected using questionnaires, interviews, field observations, and focus group discussions. Secondary data were collected from government departments, the Ministry of Health and Child Welfare, and the town municipalities, as well as from regulatory bodies such as the Ministry of Environment and Natural Resources, the Ministry of Local Government and National Housing, other environmental institutions in Harare, and the EMAg. The secondary data were collected later after the primary data collection. Comparing MSWM regulations for Zimbabwean SMEs was mainly done through secondary data sources.

The following are secondary data sources:

- a) Use of reports from regulatory bodies such as prosecution and reports
- b) Compliance and non-compliance reports from regulatory bodies
- c) Waste management reports in Harare from the authorities
- d) Books, papers, and other documents related to waste management regulations
- e) Use different acts to gain a deep insight into the MSWM regulations for European countries.

The following data collection methods were used in this study.

3.5.1 Desktop Sources (Document study)

Desktop sources for this study include EMA fining registers, different statutory instruments, waste management yearly plans from EMAG and SMEs, and waste management reports from City councils and SMEs.

3.5.2 Questionnaires

Three sets of questionnaires were used as a research instrument to be administered to the SMEs. The structure of the questionnaires comprises four sections: 1) background information of the respondent and the SME business, 2) SME waste management, 3) perceptions of MSWM regulations, and 4) other concerns and suggestions (see Appendix A). Sections 1 and 2 employ multiple choices to collect data, whereas section 3 utilizes Likert-type statements to solicit opinions. Lastly, section 4 is an open-ended question that welcomes any suggestions or concerns the respondents may have.

For perceptions about MSWM regulations, data were collected using a Likert-type scale of questions/statements, a summated rating scale where an individual's score is a sum or average of the individual's responses to the multiple items on the instrument (Warmbrod, 2014). A five-point Likert-type scale, ranging from Strongly Disagree (=1) to Strongly Agree (= 5), was used for all statement items. Nine measurements (or variables) were included (Table 3.2). A summary of measurement scales used for each variable is provided in Appendix D.

Reliability tests. Reliability tests were done using Cronbach's Alpha. Cronbach's Alpha values ranged between 0.7 and 0.9, with the decision rule indicating 'Good Acceptable and Excellent' internal consistency for all constructs. The findings suggest a high degree of internal consistency for all nine constructs within the survey instrument. This indicates that the items within each construct are measuring the same underlying concept in a reliable manner (Warmbrod, 2014).

Table 3.1*Perception Variables and Reliability Test Results*

Variable	Number of items	Crobach's Alpha	Decision
Awareness of the MSWM Regulations	5	0.828	Good
Monitoring and Enforcement of MSWM Regulations	4	0.842	Good
Requirements of SMEs and support from the Authorities	11	0.797	Acceptable
Motivations for compliance	9	0.74	Acceptable
Reasons for Non-compliance	7	0.716	Acceptable
Compliance with MSWM regulations	6	0.712	Acceptable
Perceptions of MSWM regulations and their effectiveness	18	0.819	Good
Perceptions of cleaner production	8	0.705	Acceptable
MSWM Regulations and SDGs	5	0.907	Excellent

3.5.3 Interviews

The researcher conducted face-to-face interviews with EMAg officials, City of Harare authorities, Ministry of Health and Child Care officials, SMEs, Glenview Area 8, Mbare, and Highfields residents, with the help of structured and semi-structured interviews (see Appendix B for interview guidelines with the authorities).

3.5.4 Field Observation

In this study, physical data on waste collection, transportation, and disposal was observed and recorded. The researcher observed roughly the amount and type of waste being generated and how the waste is disposed of and collected. The researcher also conducted a site survey around the premises to check for illegal dumping. The appropriateness of the dumping was observed in some chosen areas with dumps. The nature and amount of waste disposed was observed at the dumpsites. The observation was aided by using an observation checklist to record what was transpiring correctly.

3.5.5 Focus Group Discussions

In order to understand the causes of compliance and non-compliance to MSWM regulations by SMEs, this study conducted FGDs of participating and non-participating SMEs. Three resident areas' FGDs were also drawn from Mbare, Glenview 8, and Highfield residents. FGDs enabled the exploration of underlying reasons, motives, and opinions from several individuals. Permission to conduct FGDs was sought from the responsible authorities. Discussions were undertaken on different days for 1 to 2 hours. See Appendix C for FGD question guides).

3.6 Data Analysis

3.6.1 Quantitative Data Analysis

3.6.1.1 *The Respondents' Demographic Analysis*

Descriptive analysis. The principal statistical analysis included descriptive analysis to generate overview information of the sample, presented through graphs and tables. The collected primary data were subjected to error checking and entered into the SPSS statistical package (Version 26). The data were analyzed and presented using

descriptive statistics and graphs. These data include the socio-economic characteristics of the respondents, SME business characteristics, and SME waste management (Table 3.3).

Table 3.2

Variables on Characteristic Data

Characteristic Variable	Code	Detail
Socio-economic characteristics of the respondents	• Gender	• Gender of the respondent
	• Age	• Age of the respondent
	• Education_level	• The highest education level of the respondent
	• Working_years	• Working length in this company
	• Position	• Present position in the business
SME Business Characteristics	• Number_of_employees	• Number of employees
	• Business-type	• Type of Business
	• Form_of_business	• Form of Business
SME waste management	• Waste_disposal	• Business Waste disposal
	• Waste_collection_points	• Number of waste collection points
	• EMA_visits	• Frequency of EMA Visits
	• Effects	• Impact of waste on the premise

3.6.1.2 Perception Analysis

The Likert-type items were intended to capture the degree to which a respondent agrees or disagrees with the statement. The statistics for each item on the scale indicate the subject matter of the construct and the route and intensity of a particular item's contribution to the summated overall score or subscale score.

Interpretation criteria. A mean item summated score was computed to calculate a composite for each individual. The added score for an individual was divided by the number of items making up the scale or subscale, creating an average item score for each individual falling within the range of values (Lindner & Lindner, 2014). When calculating a mean or summated score, the items making up the scale or subscale are presumed to have the exact weighting. The summated score included five items to describe a research participant's level of agreement with a particular statement. The following vague quantifiers were used for interpretation (Table 3.4) (Lindner & Lindner, 2014).

Table 3.3*Vague Quantifiers Used for Interpretation of the Results*

Perception level	Scale	Score interval (Mean)	Vague Quantifiers
Strongly Disagree	1	1.00 -1.50	Very Low
Disagree	2	1.51 -2.50	Low
Moderate	3	2.51 -3.50	Medium
Agree	4	3.51 -4.50	High
Strongly Agree	5	4.51 -5.00	Very High

Source: Lindner and Lindner (2014)

3.6.1.3 Determining Association between Variables

Relationships between variables were determined to understand more deeply the nature of the problems investigated and to be able to apply them to real-world situations. Each association test has its requirements to meet before performing the tests, which will, in turn, also determine which analysis should be performed to get the correct interpretation, depending on the type of variables and the requirement of each statistical test. Thus, the tests of normality and homogeneity were performed, as these two requirements were assumed for particular tests.

1) Tests of normality. Normality is the requirement for ANOVA. Thus, the researcher performed the normality test, using Shapiro-Wilk as their decision criteria, stating that the significant value of the Shapiro-Wilk Test greater than .05 means the data is normally distributed (Lard, 2024). Results are shown Appendix D. The Shapiro-Wilk's p -value of all characteristic variables shows that the data are not normally distributed ($p < .05$), except the MeanofMSWMRegulations. The non-normal distribution of these variables determines which tests to perform, as will be presented in the relevant sections.

2) Tests of homogeneity. Homogeneity of variance is one of the assumptions that needs to be met when comparing three or more independent samples. The homogeneity tests were performed to obtain Levene's Test for Equality of Variances. The p -value $>.05$ means the homogeneity is accepted, whereas the p -value $< .05$ violates the assumptions. Non-parametric tests would need to be performed in such a case.

The results of each variable test are detailed in Appendix D. In short, all 19 variables were either non-normally distributed or violated homogeneity assumptions. Thus, the non-parametric tests were conducted for the analysis.

3) Variable relationships determination. After checking the assumptions required for parametric or non-parametric analysis, including considering the nature of the variables (i.e., the type of variables), the tests to be performed were determined. Two types of tests were appropriate in these contexts: the test of association and the test of differences. A summary of the tests to be performed, with its associated statistical analysis, is presented in Table 3.5.

The Chi-Square tests were conducted to assess the association between two categorical variables (Singhal & Rana, 2015) and how well a sample fits the distribution of a known population (Franke et al., 2011). The Chi-Square tests were performed because of the ordinal and categorical nature of the data. Furthermore, according to McHugh (2013), the Chi-Square test does not require equality of variances among study groups, a characteristic of the data tested. The null and alternative hypotheses were calculated. The null hypothesis shows no association between the variables, while the alternative hypothesis shows an association between the variables (McHugh, 2013). For example, testing the association between the level of education and waste disposal methods used. Cramer's V tests were also employed to retrieve the strength between each significant association (IBM, 2024). The criteria for the strength of the relationship were used following Akoglu (2018) and Stat Writer (2023) for the tests containing a degree of freedom higher than 5 (Table 3.6).

Mann-Whitney U and Kruskal-Willis Tests were used to compare two and three or more independent samples, respectively, on a continuous outcome. These tests are done to determine whether there are any statistically significance differences between groups. The impact of each factor on the dependent variable was understood. The null hypothesis (H0) assumes no significant difference among the samples, whereas the alternative hypothesis (H1) states that there is no statistically significant difference among the samples. The statements of H1 are implied to each variable tested (Heidel, 2024).

Table 3.4*Summary of the Tests Performed*

Association Tests between Business Characteristics Variables and SME Waste Management Variables		
1. Number of employees (Ordinal variable)	1. Business Waste disposal (Categorical variables)	
2. Type of Business (Categorical variable)	2. Number of waste collection points (Ordinal variable)	Cramer's V and
3. Form of Business (Categorical variable)	3. Frequency of EMA Visits (Ordinal variable)	Chi-Square
	4. Impact of waste on the premise (Categorical variables)	
Tests of differences between The respondent's socio-economic variables and perceptions variables		
Socio-economic of the respondent variables (5)		
1. Gender (Categorical variable)		
2. Age of the respondent (Ordinal variable)		
3. Education level of the respondent (Ordinal variable)		
4. Working length in this company (Ordinal variable)		
5. Present position in the business (Categorical variable)		
Business characteristics variables (3)		
6. Number of employees (Ordinal variable)		
7. Type of Business (Categorical variable)		
8. Form of Business (Categorical variable)		
Waste management variables (4)		
9. Business Waste disposal (Categorical variables)		
10. Number of waste collection points (Ordinal variable)		
11. Frequency of EMA Visits (Ordinal variable)		
12. Impact of waste on the premise (Categorical variables)		
	Perception variables (Interval variables)	
	1. SME Awareness of MSWM regulations	
	2. Monitoring and Enforcement of MSWM Regulations	Mann-Witney U
	3. Requirements of SMEs and support from the Authorities	Tests of
	4. Motivations for compliance	Differences for
	5. Reasons for Non-compliance	two samples and
	6. Compliance with MSWM regulations	Kruskal-Willis
	7. Perceptions of MSWM regulations and their effectiveness	Tests for K
	8. Perceptions of Cleaner production	samples
	9. MSWM Regulations and SDGs	

Table 3.5*Criteria for Interpretation of Phi and Cramer's V*

Phi and Cramer's V	Interpretation
>0.25	Very strong
>0.15	Strong
>0.10	Moderate
>0.05	Weak
>0	No or very weak

Source: Akoglu (2018)

3.6.2 Qualitative Data Analysis

Data from open-ended questions, interviews, and FGDs. The interview and open-ended questionnaire data were coded. The researcher used the content analysis method, which involved using questions as a guide for analyzing the data. The researcher first transcribed the data collected and arranged it systematically. The data were exported into a spreadsheet and organized by coding and validating the data. Qualitative analysis of the findings from questionnaires, interviews, focus group discussions, and observations allowed conclusions about the drivers and constraints of MSWM regulations, the effectiveness of MSWM regulations, SMEs' compliance with regulations, SMEs' perceptions, and recommendations.

Document analysis for comparing regulations. After selecting the relevant documents, the researchers read through the documents to identify key themes and patterns (Bowen 2009) (Table 3.7). Regulations were categorized using a coding system based on parameters such as waste coverage, legislative frameworks, policies, enforcement mechanisms, penalties, cleaner production initiatives, capacity building, and educational aspects. The data was then analyzed and compared, and conclusions were drawn.

Table 3.6*Coding Indicators*

Policy Comparison	Details on comparison	Coding indicators
Waste coverage	• To what extent do the regulations cover waste management • Types of waste that are covered	– Waste coverage – Types of waste
Form of policies	• Are the policies clearly spelled out? • Are records and statistics available to track waste management? • What form of policies are used?	– Availability of policies – Records and statistics – Form of policies
Capacity building	• Do the frameworks direct the local authorities to provide adequate refuse trucks, bins, funds for the workers, and expert labor? • Do the regulatory bodies have adequate resources to implement waste management regulations?	– Availability of resources – Adequacy of resources. – Resource provision in the implementation of waste management regulations – Is there any grant funding available to support project preparation and implementation?
Law enforcement and penalties	• What is the nature of penalties given for non-compliance? • Are the penalties sufficiently deterring?	– Nature of penalties – Deterrence of penalties
Cleaner production	• To what extent has cleaner production included in the EU and Zimbabwean regulations • What are the requirements for cleaner production?	– Cleaner production initiative and inclusion
Approaches targets	• What are the approach targets in the two contexts? • Which principles are the targets based on? • Who is responsible for waste generation?	– Principles of the targets, such as circularity and waste reduction – Generation of waste
Education and Awareness	• How many times do they carry out the campaigns in the two contexts? • Who is responsible for educating the citizens about waste management? • Are the private players involved?	– Frequency of education – Inclusion of private players in waste management

The summary of each research step is presented in Table 3.8.

Table 3.7*Summary of the Research Steps*

Research steps	Data needed	Data sources	Data collection method	Data analysis
1. Literature review	• Level of compliance of SMEs in other countries • Variations of MSWM regulation between Zimbabwe and EU countries • Recommendations for improved MSWM regulations	Secondary sources: • Reports • Journal Articles, books, documents • Government statistical data	• Literature survey	• Summary • Comparative analysis
2. Study site Selection	• Total number of SMEs in each area in Harare City • Their associate data on waste produced, waste management problems, and the pros and cons of each area.	• Statistical records from the municipalities • Reports • Estimated data	• Literature survey • Observations checklist • Interviews	• Comparing the pros and cons of each candidate's sites • Considering which site meets the selection criteria
3. Population and sample determination	• The target population of each stakeholder group • Sampling techniques	• Statistical records from the municipalities	• Literature survey • Interview the municipalities	• Calculation of the sample sizes • Consulting the literature concerning the sample selection
4. Data Collection	• The level of compliance • SME's perceptions • Effectiveness of regulations • Gaps in MSWM regulations • Strengths of regulations • Recommendations for improved MSWM regulations	• Primary data sources From SMEs, Government officers, and Residents	• Questionnaires • Interviews • Observations • Focus group discussions	• Data checking and cleaning • Data entering
5. Data Analysis	• Data from step 4.	• From step 4	-	• Descriptive analysis • Statistical analysis

Research steps	Data needed	Data sources	Data collection method	Data analysis
6. Data Interpretation	• MSWM regulations for EU • Cleaner production options for EU countries • Suggestions on recommendations	• From the literature survey • From step 5	• From earlier steps	• Comparative analysis • Synthesizing the results from earlier steps

3.7 Ethical and Legal Considerations

In order to observe safety, confidentiality, rights for privacy, and protection from deceit while pursuing scientific endeavors, this research considered ethical and legal considerations. To begin with, the researcher sought permission from all relevant authorities to carry out the study. Voluntary participation and free withdrawal of participants were encouraged as research subjects were free to choose to participate without any pressure or coercion. The researcher ensured no coercion to the respondents. Instead, a choice of participation or withdrawal was given. The introduction of the questionnaires pointed out that involvement in the research was a choice, not a forced entity. All participants were free to withdraw or leave the study any time they felt the need to do so. They were informed they did not need to give reasons for leaving the study. All consent forms included a statement about the right to withdraw in compliance with rules and regulations on human freedoms.

The researcher disclosed her name, address, supervisor, the institution the researcher was based on, and the purpose of the study to gain the respondents' confidence. The respondents were free to contact the supervisor for clarification if they faced any constraints. This encouraged respondents' active participation and helped remove any discomfort and suspicions. The participants were also free to seek clarity from the researcher if they ever encountered ambiguous questions. The questionnaires did not ask for the respondents' credentials or personal information, which aided cooperation-informed personal information and undiluted responses.

The researcher observed Zimbabwe's constitution's statutes, rules, and regulations regarding human rights and protection. The researcher ensured that no incentive was given to respondents in any form, that the research was conducted privately, and that raw data obtained from participants was not disclosed to others. The researcher ensured maximum attention to data collection, storage, disclosure, and reuse. In order to avoid plagiarism, the researcher acknowledged and referenced every quoted author.

The researcher will ensure that the resulting research and publications will be used in such a way that they might not harm the participants as a group. Emphasis on privacy was made.

CHAPTER 4

RESULTS AND DISCUSSION (1): THE DRIVERS AND CONSTRAINTS

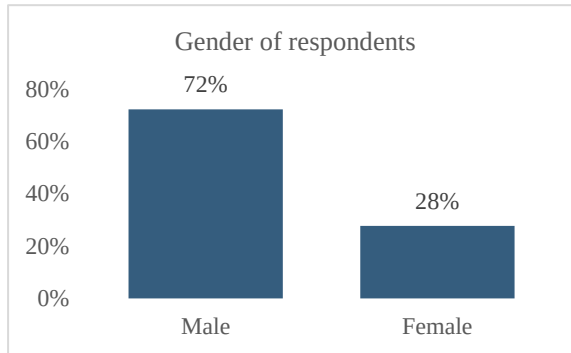
This chapter presents the results derived from the study in relation to the objectives, starting with the descriptive statistics of the SMEs who responded to the survey. The perceptions of the SMEs aid the analysis of drivers and constraints of the SMEs' compliance with MSWM. The results of association tests of variables are then presented. The focus group discussions with Mbare, Glenview, and Highfield residents and interviews with EMAG and Harare City Council officials are also presented. This chapter will primarily present results only, and the full discussions will be presented in chapter 6.

4.1 Descriptive Statistics of the SMEs and the Respondents

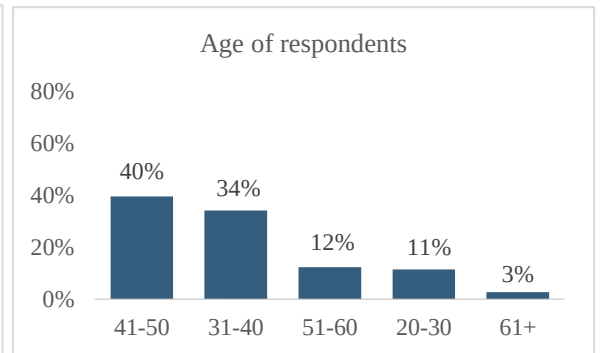
A total of 232 questionnaires were distributed to the targeted samples, SME workers, in Gazaland, Siyaso, and Glenview Area 8. The researcher managed to get back 220 completed questionnaires, a 95% response rate.

4.1.1 Socio-Economic Data of the Respondents

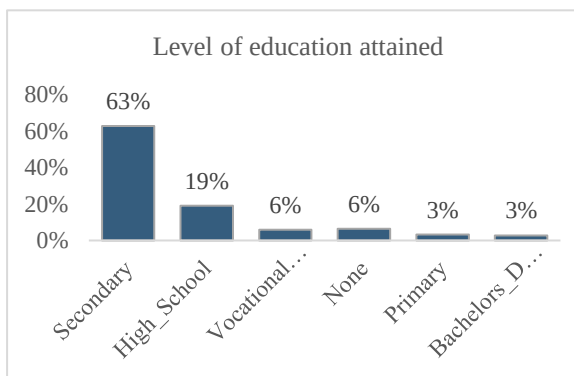
An analysis of the socio-economic data of the respondents was undertaken, which showed that the majority of respondents were males (72%), and females constituted 28% (Figure 4.1a). The age of the respondents was between 31-60 (85.9%), 40% were within the 41-50 age range, 34% were 31-40, and 12% were 51-60 (Figure 4.1b). All these can be considered as working age. The 20-30 age group constitutes only 11%, while the 61⁺ age group constitutes the least percentage (3%). Sixty-three percent attended secondary education, followed by those who attended high school (19%). Those who did not attend school constitute (7%), vocational 6%, primary 3%, and the least the university level (3%) (Figure 4.1c). About 86% have worked in this SME for under ten years (Figure 4.12d). The majority of the respondents currently hold the position of owner of the business (66%) (Figure 4.1e).

Figure 4.1*Descriptive Statistics of the SME Respondents*

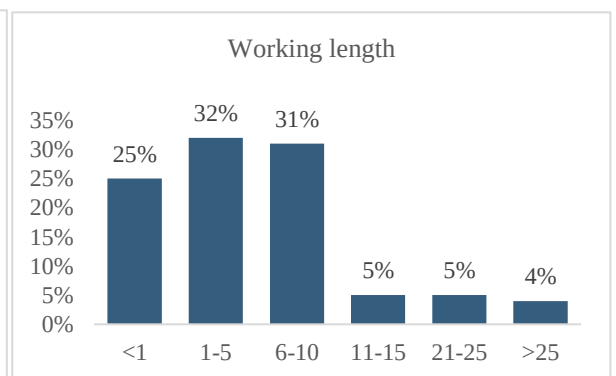
(a)



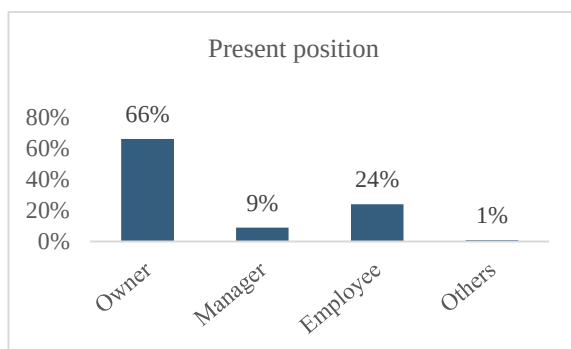
(b)



(c)



(d)



(e)

The result of the study shows partially expected characteristics of the SME respondents. For instance, most respondents' gender is predominantly male despite a 50.7% contribution to Zimbabwe's total labor force being women, according to the World Bank (2022). The reason behind male dominance in the SME sector is that for the past years, Zimbabwe has experienced an economic crisis resulting from the closure of industries, leading to many, most men, losing their jobs and joining the SMEs. The sector was flooded by men who could not survive, becoming SMEs by default (Njanike, 2019). Jerie and Tevera (2014) asserted that the economic implosion in Zimbabwe has resulted in the mushrooming of home industries in Gweru due to high levels of unemployment, explaining why they have not been in the business for long. The age demographic profile reflects the country as a whole, a developing nation with a low life expectancy (Guzel et al., 2021). According to Zimstat (2021), 6.8% of males and 8.9% of females have never been to school, while only 1.70% of the population has received university degrees or higher. However, the profile of the respondents possessed higher education than the national average. Most of these SMEs are the sole owners of the businesses because they do not have enough funds and resources to hire people due to a lack of access to finance, markets, skills, and technology. It has reduced scope and economies of scale, leading to stifled growth.

4.1.2 Characteristics of the SMEs

4.1.1.1 Business Type

The respondents are involved in different businesses: furniture making (36%), welding (23%), catering 18%, chemicals 4%, and others (7%), which are involved in scrap dealing, tire mending, tombstone making, retailing, car mechanics, and engineering (Figure 4.2a).

4.1.2.2 Business Owner

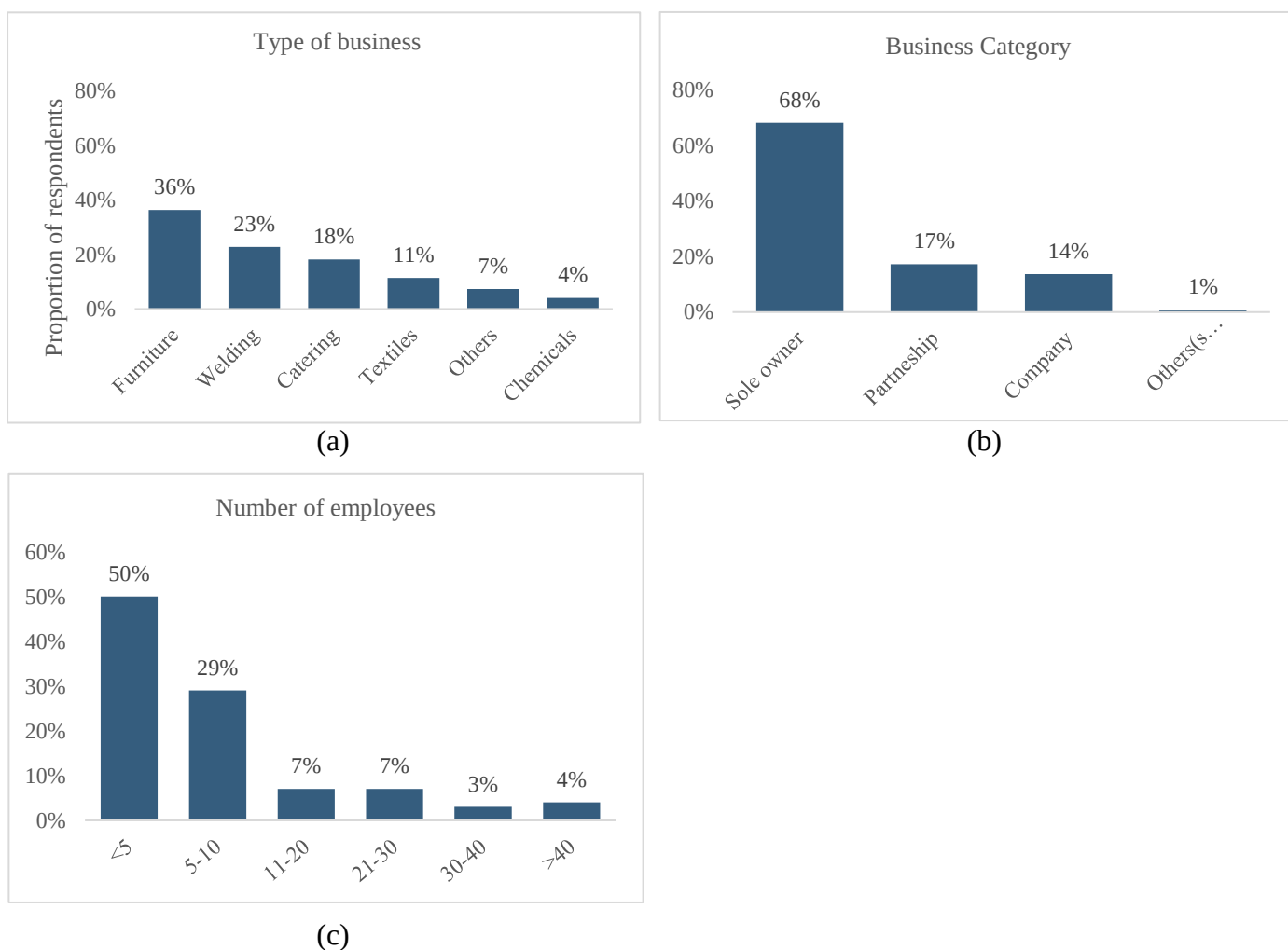
Sixty-eight percent are the sole owners of SMEs. Those in partnership constitute 17%, companies constitute 24%, and others constitute 1% (Figure 4.2b).

4.1.2.3 Number of Employees

Seventy-nine percent have employees up to ten. Seven percent each for 11-20 and 20-30 employees. Only a small percentage have employees of more than 30 (3% for 30-40 and 4% for more than 40) (Figure 4.2c).

Figure 4.2

Characteristics of SMEs



SME businesses exhibit a wide range of characteristics, with furniture making being the largest sector, followed by welding, catering, chemicals, second-hand clothing sales, motor mechanics, and other industries. This result is in agreement with

Jerie (2014), Pedraza (2021), and Jerie and Mandevera (2014), who also acknowledge the diverse range of activities to include manufacturing, chemicals, service repair, furniture making, catering, and construction. However, the concentrations differ: furniture making is the largest sector. The diverse nature of SME businesses produces various waste types, such as metals, scrap metals, plastics, bottles, polythene bags, chemicals, fabrics, and wood shavings. These results match the works of a few studies in Zimbabwe. For instance, Jerie and Tevera (2014) discovered that the same types of waste are produced: wood shavings, plastics, textiles, paper, biodegradable waste, and metals. Similar to Derhab and Elkhwesky (2023), the type of waste generated includes wood, fabrics, metals, papers, and plastics, which have been associated with high pollution levels, diseases, and loss of marine life. Although not specifically applied to SME waste, Tsiko and Togarepi (2012) categorized general waste into six categories: household, commercial, industrial, institutional, municipal, and construction debris, where food, yard waste, and paper were ranked highest on waste generated. However, for SME waste in particular, this research established that furniture and welding waste were on top because the nature of SME business in the study area was furniture making. It is essential to acknowledge that waste management could become more challenging due to the different forms of waste generated. Tsiko and Togarepi (2012) asserted that, despite the increased opportunities for waste recycling and energy recovery, high volumes of waste produced in Harare pose environmental difficulties due to difficulties in handling the waste separately.

4.1.3 SME Waste Management

4.1.3.1 Waste Disposal Method

Most respondents (77%) dispose of their waste in open dumpsites, 16% burn it, 4% dump it in the bush, and 3% bury it (Figure 4.3a).

4.1.3.2 Waste Collection Points

Most businesses (76%) have only 1 to 2 waste collection points, 12% have 3 to 4 points, 5% have 5 to 6 points, and 6% have none (Figure 4.3b).

4.1.3.3 EMA Visits to the Premises

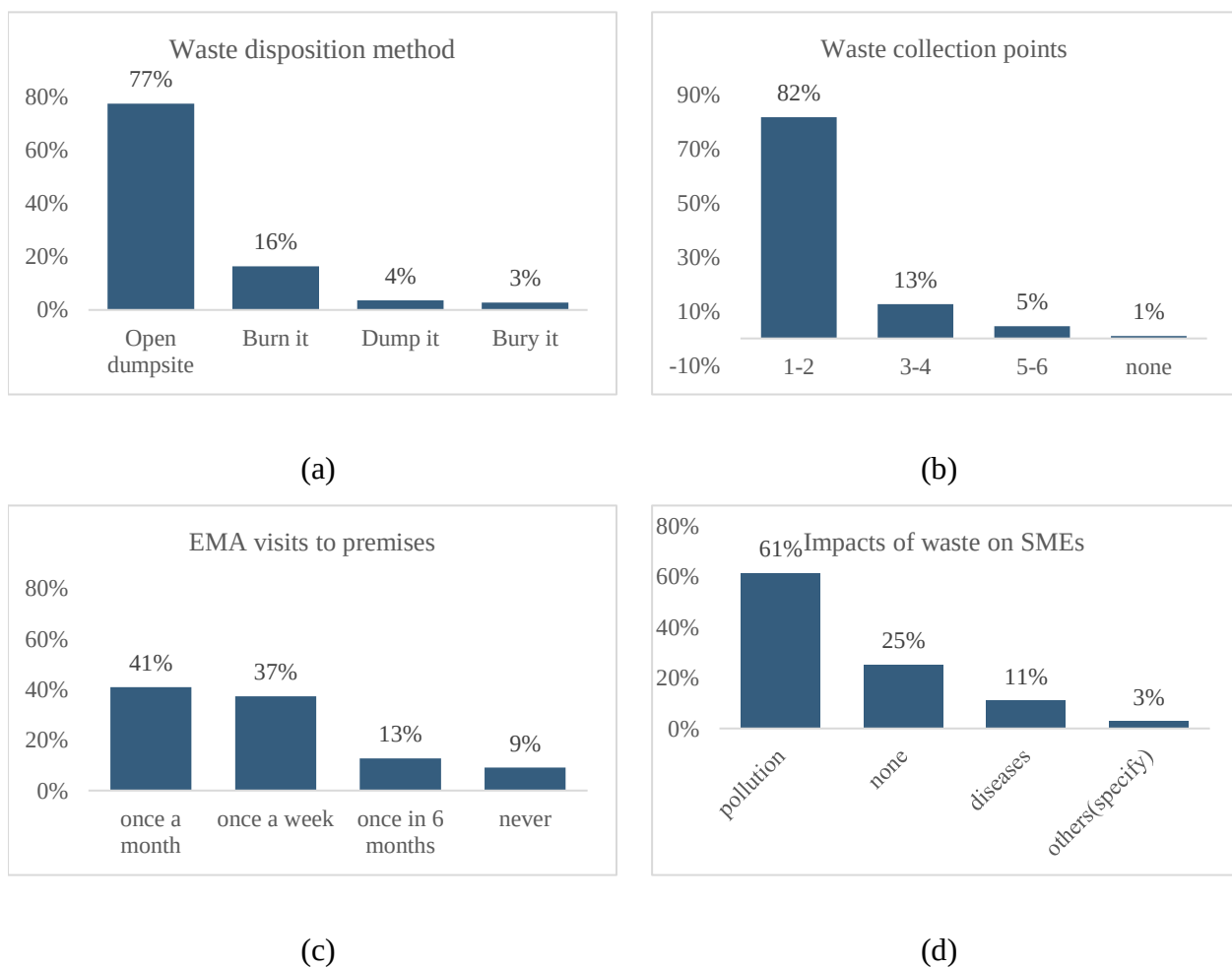
Forty-one percent stated that the EMAG team visits their premises monthly, 37% once weekly, 13% once every six months, and 9% were not visited (Figure 4.3c).

4.1.3.4 Impacts of Waste on the SMEs

The respondents have indicated that waste has caused pollution on their premises (61%), diseases (11%), obstruction to the free movement of people, and injuries (3%); 25% have shown that waste had no significant effects on their premises (Figure 4.3d).

Figure 4.3

SME Waste Handling



Although different types of waste are generated, SMEs similarly use the least desired solid waste management hierarchy. The waste management hierarchy classifies waste management strategies according to their desirability regarding minimization (Ali et al., 2021). According to Ferrari et al. (2016), the waste management hierarchy expresses concerns about waste management to divert waste from landfills. The hierarchy applies prevention, reuse, recycling, recovery, and disposal. Prevention is the best desired on the waste management hierarchy, while disposal is the least desired. The current situation is that SMEs dispose of their waste through traditional and unsustainable ways, for instance, spontaneous and indiscriminate waste disposal along streets, on open vacant land, storm drains, open dumps, and burning. Open dumping is the most common method for SMEs to dispose of solid waste. There is no treatment of waste. There is limited recycling, reuse, and reduction by SMEs (Makwara & Magudu, 2013). These results confirm similar findings that several previous studies demonstrated. For example, Shabani and Jerie (2023) reported that the official disposal sites are operated as open dumps instead of sanitary landfills. Jerie and Tevera (2014) reported that most SME businesses dump waste in backyards and open spaces around their enterprises and burn wood shavings, plastics, papers, and tires. Similarly, Tambura and Mapuva (2019) disclosed that most flea markets do not provide waste containers, compelling them to dispose of waste in open fields and pits. They also provided the reasons small businesses are forced to dispose of organic garbage in open pits or locations where it can decompose: they have no other choice, and other retail dealers burn their waste.

Moreover, the SMEs in this study attributed poor waste management to irregular waste collection. Waste collection is erratic and characterized by few bins and few collection points. The irregular waste collection results from inadequate refuse trucks, fuel shortages, few personnel to do regular collection, and lack of political will (Jerie & Tevera, 2014). The poor SME waste management was blamed for being caused by the City Council's negligence and the lack of political will (Jerie, 2013). Mandevera (2015) mentioned that the Harare city council lacks the capacity to remove waste regularly, particularly inadequate refuse trucks. Interviews and observations by the researcher agree with previous reports, for instance, De Gobbi (2020), that heaps of

uncollected solid waste can be witnessed in open vacant places, storm drains, and dumped in nearby bushes. Adding to irregular waste collection, the few bins provided as receptacles for collection do not match the vast amounts of waste generated and have left enterprise operators with no other alternatives but to throw waste on any vacant land.

Furthermore, instead of the collected waste being handled sanitarily, it is crudely tipped at open dumpsites, which do not meet basic environmental standards, causing ineffectual environmental impact from improper waste management. The uncontrolled open dumps have posed significant public health threats because they have no environmental safeguards. SMEs' poor waste management activities have resulted in severe pollution in their operating complexes and nearby residential areas. It has caused diseases such as cholera, typhoid, and diarrhea in the communities (Nhubu et al., 2017). Poor waste management activities have also obstructed people's movement and caused injuries. The results of the study confirm the forefront of literature in this aspect.

4.2 SMEs' Perceptions of MSWM Regulations

In order to understand the drivers and constraints for the SMEs' compliance, the following information was sought: awareness of the MSWM regulations, Monitoring and Enforcement of MSWM Regulations, requirements for SMEs, compliance reasons, non-compliance reasons, and SMEs compliance with MSWM regulations. Moreover, data were collected to solicit the benefits of complying with MSWM regulations, SMEs' attitudes towards regulations, how Zimbabwean regulations compare with European Union regulations, benefits of cleaner production, and MSWM regulations and SDGs.

4.2.1 Awareness of the MSWM Regulations

To gain some insights into the level of education on MSWM regulations, the questions centered on respondents' awareness of MSWM regulations, whether or not they had been educated on MSWM regulations, their active participation in waste management activities, and their development and possession of annual waste management plans (Table 4.1). The majority of the respondents agreed that they were

aware of the MSWM regulations (91%), whereas 4.5% moderately agreed, and 3.9% did not agree. A significant portion of the surveyed population has received education or information regarding MSWM regulations (63.2%), while 31 % moderately agreed and 5% did not agree.

Nearly half of the respondents (42%) agreed that they actively participate in waste management activities, whilst 33% did not perceive that their SMEs actively engaged in waste management activities. It appears that participation is not strongly related to education and awareness, with a high percentage of answers toward the agreement. Therefore, there could be limitations amongst respondents to fully participating in waste management activities, the limitations which can be subject to further research and investigation.

Most of the respondents (77%) indicated a range of disagreement to strong disagreement that they have licenses for generating waste and pointed out that it is very difficult and expensive to get a license. As a result, only 20.5% agreed that they have licenses for generating waste. A potential gap between waste management education and participation above could be due to the expensive licenses for generating waste. Furthermore, 70% of the respondents did not prepare yearly waste management plans. Again, the difference between education on waste management and practice in the form of annual plan preparation could be attributable to factors such as limited resources to develop the plans and perceived limited benefits of financial returns related to having the plans in the first place, as pointed out by Jerie (2013).

Table 4.1*MSWM Regulations Education*

Item	SD (%)	D (%)	M (%)	A (%)	SA (%)	Mean	S.D.	Average level of agreement with the statement
Awareness of the MSWM Regulations	6 (2.7)	4 (1.8)	10 (4.5)	60 (27.3)	140 (63.6)	4.47	0.883	High
Education on MSWM regulations	0 (0)	11 (5.0)	69 (31.4)	100 (45.5)	40 (18.2)	3.77	0.803	High
Active participation in waste management activities	23 (10.5)	50 (22.7)	55 (25.0)	62 (28.2)	30 (13.6)	3.12	1.1211	Medium
Licensed to generate waste	60 (27.3)	110 (50)	5 (2.3)	40 (18)	5 (2.3)	2.18	1.095	low
Availability of yearly waste management plans	40 (18.2)	115 (52.3)	40 (18.2)	20 (9.1)	5 (2.3)	2.25	0.934	low
Overall mean						3.16		

Note: S.D. = Strongly disagree, D = Disagree, M = Moderately agree, A = Agree, and S.A. = Strongly agree with the statement.

4.2.2 Monitoring and Enforcement of MSWM Regulations

Since monitoring might motivate SMEs' compliance with managing their waste properly, questions were asked about the frequency and nature of waste management monitoring, the monitoring effectiveness, and the penalties for any breaches.

Approximately half of the respondents (51%) did not perceive frequent monitoring and checks by the city council (Table 4.2). However, 35% indicated a strong agreement, and 15% moderately agreed. Regarding waste management inspection by the responsible authorities, the majority of respondents (76%) agreed that regulatory bodies like EMAg inspects waste management in the area, while 19 % moderately agreed, and 9% expressed disagreement and strong disagreement. Despite the waste inspection, only 34% agreed that monitoring and control of compliance with MSWM regulations are effective, while 28% moderately agreed and 39% disagreed. Almost equal percentages were expressed for the statement that penalties were given for non-compliance to waste management legislation: 44% agreed, 43% disagreed, and 14% moderately agreed.

Derhab and Elkhwesky (2023) and Nyakudya et al. (2022) mentioned that the government's effective monitoring system can reduce undesired waste disposal. However, most SME respondents stated that the Environmental Management Agency (EMAg) team responsible for this task rarely inspects the SME complexes (Makwara & Magudu, 2013; Makamba, 2022). Additional interviews with the EMAg identified the reason for this lack of inspection being attributed to a lack of capacity, shortage of fuel, shortage of personnel, and lack of commitment. The explanation agrees with earlier reports by Mandevere (2015) and Jerie (2013).

Table 4.2

Monitoring and Enforcement of MSWM Regulations

Item	SD (%)	D (%)	M (%)	A (%)	SA (%)	Mean	S.D.	Average level of agreement with the statement
In place frequent monitoring/checks by the city council about waste management.	21 (9.5)	90 (40.9)	34 (15.5)	60 (27.3)	15 (6.8)	2.81	1.143	Medium
Regulatory bodies, e.g., EMAg, inspect waste management in the area.	9 (4.1)	2 (0.9)	41 (18.6)	58 (26.4)	110 (50)	4.17	1.032	High
Monitoring and control of compliance with MSWM regulations are effective.	24 (10.9)	62 (28.2)	61 (27.7)	43 (19.5)	30 (13.6)	2.97	1.210	Medium
Penalties are given for non-compliance with waste management legislation.	28 (12.7)	65 (29.5)	30 (13.6)	73 (33.2)	24 (10.9)	3.00	1.257	Medium
Overall mean						3.24		

Note: S.D. = Strongly disagree, D = Disagree, M = Moderately agree, A = Agree, and S.A. = Strongly agree with the statement.

4.2.3 Requirements for SMEs and Support from the Authorities

An analysis of the requirements for SMEs was undertaken, entailing how the responsible organizations' support for waste management requirements were generally met to assess the adequacy of municipal support on waste management. Questions asked within this section included the adequacy of refuse collection trucks, the adequacy of waste-minimizing facilities within the business complex of respondents, and other related issues.

Concerning the adequacy of support from the authorities, seven items were asked for the SMEs' opinions. Overall, perceptions of these statements indicated the inadequacy of support from the authorities. For instance, 76% disagreed that there were enough standard waste bins (Table 4.3). The same percentage also disagreed about having waste collected regularly, and 57% further disagreed that they were collected weekly. There also seemed to be insufficient trucks to collect waste, as 63% disagreed that authorities provided enough refuse trucks. When asked whether they thought that waste was disposed of correctly, 64% disagreed. Moreover, 56% disagreed that penalties were sufficiently deterrent. This result is in line with a study by Tsiko and Togarepi (2012), who state that the Harare City Council is only able to collect about 54 percent, while Nhumbu et al. (2017) state that waste collection in Harare is about 60%. This result agrees with the study by Makwara and Magudu (2013).

On the adequacy from the SMEs' side, 62% of the respondents disagreed that the waste from their complex is in the appropriate place, 71% disagreed that their complex has properly managed dumpsites, meaning there were insufficient dumpsites to receive wastes from their premise, 71% disagreed that they have suitable waste disposal sites, and 59% disagreed that they have methods of minimizing the waste. Almost equal percentages were expressed in the statement about the SMEs paying penalties for non-compliance: 47% agreed, while 40% disagreed. This result concurs with studies by Makwara and Magudu (2013), who reported that at least 70 percent of the collected waste is disposed of at open dumpsites, of which 90 percent do not meet the required standards.

Table 4.3*Requirements for SMEs and Support from the Authorities*

Item	SD (%)	D (%)	M (%)	A (%)	SA (%)	Mean	S.D.	Average level of agreement with the statement
Authorities have provided sufficient standard waste bins for your complex.	58 (26.4)	110 (50.0)	31 (14.1)	11 (5.0)	10 (4.5)	2.11	1.003	Low
There is regular waste collection by the City Council.	39 (17.7)	128 (58.2)	18 (8.2)	30 (13.6)	5 (2.3)	2.25	0.976	Low
Waste is collected weekly by the Municipality	20 (9.1)	105 (47.7)	33 (15.0)	38 (17.3)	24 (10.9)	2.73	1.177	Medium
Authorities have provided enough refuse trucks to collect waste.	35 (17.7)	104 (47.3)	34 (15.5)	40 (18.2)	7 (3.2)	2.45	1.061	Low
Waste is disposed of correctly	30 (13.6)	111 (50.5)	32 (14.5)	41 (18.6)	6 (2.7)	2.46	1.031	Low
Penalties are sufficiently deterrent.	38 (17.3)	85 (38.6)	54 (24.5)	23 (10.5)	20 (9.1)	2.55	1.163	Medium
Waste from your complex is in the rightful place.	37 (16.8)	100 (45.5)	36 (16.4)	34 (15.5)	13 (5.9)	2.48	1.120	Low
The complex has suitable waste disposal sites	46 (20.9)	110 (50.0)	41 (18.6)	19 (8.6)	4 (1.8)	2.20	0.931	Low
The complex has properly managed dumpsites.	29 (13.2)	128 (58.2)	38 (17.3)	15 (6.8)	10 (4.5)	2.31	0.944	Low
The complex has methods for minimizing waste	22 (10.0)	108 (49.1)	39 (17.7)	41 (18.6)	10 (4.5)	2.59	1.045	Medium
The complex has paid penalties for failing to comply	32 (14.5)	54 (24.5)	31 (14.1)	81 (36.8)	22 (10)	3.03	1.266	Medium
Overall mean						2.47		

Note: S.D. = Strongly disagree, D = Disagree, M = Moderately agree, A = Agree, and S.A. = Strongly agree with the statement.

4.2.4 Motivations for Compliance

Questions were asked within this section for the SME's opinions pertaining to motivations for MSWM compliance by SMEs. Respondents perceive the reasons for compliance lie in greater profits resulting from increased business growth, performance, improved image, and various financial opportunities. Specifically, complying with MSWM regulations improves public image (84%), reduces wastes at their complex (74%), enhances business performance (71%), brings extra income (67%), gains access to financial help (67%), reduces production cost (61%), helps get donor support (59%), increases the sales (58%), and promote circular economy (57%) (Table 4.7). We do not find any work explaining similar results; only Hirpe and Yeom (2021) supported that improved business image was why SMEs comply.

Table 4.4

Motivations for Compliance

Item	SD (%)	D (%)	M (%)	A (%)	SA (%)	Mean	S.D.	Average level of agreement with the statement
Compliance improves the public image.	4 (1.8)	8 (3.6)	23 (10.5)	71 (32.3)	114 (51.8)	4.29	0.924	High
It reduces waste from the complex.	6 (2.7)	11 (5.0)	41 (18.6)	52 (23.6)	110 (50.0)	4.13	1.058	High
It enhances business performance.	4 (1.8)	15 (6.8)	46 (20.9)	65 (29.5)	90 (40.9)	4.01	1.029	High
It brings extra income.	5 (2.3)	36 (16.4)	31 (14.1)	70 (31.8)	78 (35.5)	3.82	1.152	High
It helps gain access to finance.	7 (3.2)	35 (15.9)	30 (13.6)	70 (31.8)	78 (35.5)	3.80	1.175	High
It reduces production costs.	5 (2.3)	35 (15.9)	35 (15.9)	64 (29.1)	71 (32.3)	3.64	1.269	High
It helps get donor support	8 (3.6)	30 (13.6)	52 (23.6)	90 (40.9)	40 (18.2)	3.56	1.051	High
It increases sales.	5 (2.3)	29 (13.2)	59 (26.8)	88 (40)	39 (17.7)	3.58	1.002	High
It promotes a circular economy.	7 (3.2)	27 (12.3)	60 (27.3)	82 (37.3)	44 (20.0)	3.59	1.041	High
Overall mean						3.82		

Note: S.D. = Strongly disagree, D = Disagree, M = Moderately agree, A = Agree, and S.A. = Strongly agree with the statement.

4.2.5 Reasons for Non-compliance

Non-compliance to MSWM regulations has been attributed to many reasons. In summary, non-compliance can be attributed to the lack of necessary inputs and the MSWM regulations themselves. The respondents agreed that they lack significant inputs, including financial resources (82%), knowledge of the MSWM content (80%), time (68%), and competency (42%) in MSWM regulations (Table 4.5). The results showed that 80% thought their personnel lacked knowledge, which may contradict the earlier statement that they were aware of the regulations. This contradiction possibly shows that they know some of the regulations, but they do not know them in detail.

On the other hand, 68% agreed that not being involved in providing information for the MSWM regulations may contribute to non-compliance. Also, 64% agreed that some regulations are unclear on what should be done, and 39% agreed that the requirements of MSWM regulations are burdensome, similar to the findings of McAllister (2015).

Table 4.5

Reasons for Non-Compliance

Item	SD (%)	D (%)	M (%)	A (%)	SA (%)	Mean	S.D.	Average level of agreement with the statement
Your business lacks financial resources.	2 (0.9)	25 (11.4)	13 (5.9)	50 (22.7)	130 (59.1)	4.28	1.056	High
Your personnel lacks time.	4 (1.8)	18 (8.2)	30 (13.6)	68 (30.9)	100 (45.5)	4.10	1.038	High
Your business was not involved in giving information in the making of MSWM regulations.	10 (4.5)	21 (9.5)	39 (17.7)	130 (59.1)	20 (9.1)	3.59	0.944	High
Your business is incompetent in waste management regulations.	28 (12.7)	30 (13.6)	70 (31.8)	52 (23.6)	40 (18.2)	3.21	1.254	Medium
Your personnel lacks knowledge of the content of MSWM regulations.	1 (0.5)	14 (6.4)	30 (13.6)	65 (29.5)	110 (50)	4.22	0.941	High

Item	SD (%)	D (%)	M (%)	A (%)	SA (%)	Mean	S.D.	Average level of agreement with the statement
You feel the requirements of MSWM regulations as burdensome.	13 (5.9)	40 (18.2)	82 (37.3)	44 (20.0)	41 (18.6)	3.27	1.138	Medium
Some regulations are not clear on what should be done.	19 (8.6)	20 (9.1)	41 (18.6)	39 (17.7)	101 (45.9)	3.83	1.329	High
Overall mean						3.78		

Note: S.D. = Strongly disagree, D = Disagree, M = Moderately agree, A = Agree, and S.A. = Strongly agree with the statement.

4.2.6 Compliance With MSWM Regulations: Actual Practices of Waste Management

To gain insight into how the SMEs comply with the MSWM regulations, questions asked within this section are solicited on their general practices on waste management, ranging from supplying enough bins to paying fines.

The majority of respondents (71%) disagreed that their business provides enough bins despite them discarding waste in the bins (70%), as alluded to by Mafume et al. (2016). They agreed that their businesses emptied bins on time, resulting in 62% agreeing that their working areas were always kept clean and safe. They also agreed that when their businesses violated the MSWM regulations, they pay fines to the city council or other regulatory bodies like EMAG. However, 85% disagreed that their nearby land is pollution-free (Table 4.6).

Table 4.6*Compliance With MSWM Regulations*

Item	SD (%)	D (%)	M (%)	A (%)	SA (%)	Mean	S.D.	Average level of agreement with the statement
Your business provides enough bins in the complex.	39 (17.7)	117 (53.2)	40 (18.2)	16 (7.3)	8 (3.6)	2.26	0.956	Low
Your business discards waste in the bins.	16 (7.3)	30 (13.6)	20 (9.1)	30 (13.6)	124 (56.4)	3.98	1.365	High
Your business empties the bins on time.	16 (7.3)	29 (13.2)	61 (27.7)	64 (29.1)	50 (22.7)	3.47	1.187	Medium
The working area is kept clean and safe all the time.	15 (6.8)	40 (18.2)	30 (13.6)	61 (27.7)	74 (33.6)	3.63	1.298	High
The nearby land is free from pollution.	124 (56.4)	63 (28.6)	20 (9.1)	10 (4.5)	3 (1.4)	1.66	0.920	Low
When your business violates the MSWM laws, it pays a fine to the regulatory authorities	10 (4.5)	25 (11.4)	20 (9.1)	72 (32.7)	93 (42.3)	3.97	1.176	High
Overall mean						3.16		

Note: S.D. = Strongly disagree, D = Disagree, M = Moderately agree, A = Agree, and S.A. = Strongly agree with the statement.

4.2.7 Perceptions of MSWM Regulations and Their Effectiveness

An analysis of the SMEs' opinions on the MSWM regulations was undertaken to investigate how they perceived the regulations and their effectiveness. The statements include both positive and negative. The top two statements that received the highest percentage on the agreement spectrum were about top-down regulations: minimal SME participation (94%) and were made purely by authorities and environmental bodies (88%) (Table 4.7). Another statement aligning with this attitude is that the regulations ignore other stakeholders, which 73% of the respondents agreed. This is probably due to the fact that public education on the MSWM was low, as 72% agreed with this statement. When asked if the regulations are SME-based and people-friendly, only 57% agreed.

However, most respondents agreed that legal and policy framework approaches for MSWM regulations promote waste minimization (82%) and are environmentally effective (65%) since the regulations advocate for waste reduction. They also agreed that the regulations are cost-effective (71%) and that they get incentives for complying, although not often (68%). Despite that, 61% disagreed that MSWM regulations have clear roles and responsibilities, and 47% disagreed that regulations are inclusive. There was a split opinion on whether the regulations take corrective action on non-compliance as 36% agreed, 37% disagreed, and 27% moderately agreed. Similarly, 55% agreed that the MSWM regulations were inadequate, while 39% disagreed. However, they consistently expressed that the fines were not deterrent enough (71%). Notably, Jerie and Tevera's (2014) study presented that 25 percent of their respondents reported that the Gweru City Council lacked the will to enforce penalties.

Perceptions on the implementation side revealed that a significant proportion of SMEs agreed that there were limited funds to implement the MSWM regulations (78%), insufficient budget to provide sufficient equipment (81%) or to update them (72). This result is in agreement with studies by Makwara and Magudu (2013).

Table 4.7

Perceptions of MSWM Regulations and Their Effectiveness

Item	SD (%)	D (%)	M (%)	A (%)	SA (%)	Mean	S.D.	Average level of agreement with the statement
There is minimal SME participation.	5 (2.3)	8 (3.6)	1 (0.5)	64 (29.1)	142 (64.5)	4.50	0.868	High
It was done purely by the authorities and environmental bodies.	6 (2.7)	17 (7.7)	2 (0.9)	47 (21.4)	148 (67.3)	4.43	1.029	High
It ignores other stakeholders.	21 (9.5)	20 (9.1)	18 (8.2)	60 (27.3)	101 (45.9)	3.91	1.328	High
SMEs-based and people-friendly.	20 (9.1)	35 (15.9)	40 (18.2)	62 (28.2)	63 (28.6)	3.51	1.301	High
Public education on waste management is low.	7 (3.2)	25 (11.4)	5 (2.3)	32 (14.5)	151 (68.6)	4.34	1.158	High

Item	SD (%)	D (%)	M (%)	A (%)	SA (%)	Mean	S.D.	Average level of agreement with the statement
Waste management regulations promote waste minimization.	17 (7.7)	20 (9.1)	3 (1.4)	40 (18.2)	140 (63.6)	4.21	1.293	High
Legal and policy framework approaches for MSWM regulations are environmentally effective.	17 (7.7)	20 (9.1)	42 (19.1)	30 (13.6)	111 (50.5)	3.90	1.324	High
MSWM regulations are cost-effective	20 (9.1)	14 (6.4)	30 (13.6)	62 (28.2)	94 (47.2)	3.89	1.277	High
You get incentives for complying	9 (4.1)	31 (14.1)	30 (13.6)	70 (31.8)	80 (36.4)	3.82	1.186	High
MSWM regulations are inclusive.	12 (5.5)	89 (40.5)	44 (20.0)	54 (24.5)	21 (9.5)	2.92	1.118	Medium
MSWM regulations have clear roles and responsibilities.	22 (10.0)	111 (50.5)	40 (18.2)	30 (13.6)	17 (7.7)	2.59	1.088	Medium
MSWM regulations lack clear strategies for action.	21 (9.5)	39 (17.7)	59 (26.8)	81 (36.8)	20 (9.1)	3.18	1.124	Medium
Corrective action is always taken on non-compliance.	10 (4.5)	70 (31.8)	60 (27.3)	60 (27.3)	20 (9.1)	3.05	1.067	Medium
MSWM regulations are not adequate.	15 (6.8)	35 (15.9)	41 (18.6)	73 (33.2)	56 (25.5)	3.55	1.221	High
Fines are not deterrent enough.	5 (2.3)	25 (11.4)	4 (1.8)	46 (20.9)	140 (63.6)	4.32	1.102	High
There are limited funds for implementation.	5 (2.3)	18 (8.2)	2 (0.9)	52 (23.6)	143 (65.0)	4.41	1.014	High
Funds are not enough to buy enough equipment.	8 (3.6)	22 (10)	4 (1.8)	46 (20.9)	140 (63.6)	4.31	1.137	High
Operational equipment is obsolete and insufficient	19 (8.6)	21 (9.5)	20 (9.1)	59 (26.8)	101 (45.9)	3.92	1.302	High
Overall mean						3.82		

Note: S.D. = Strongly disagree, D = Disagree, M = Moderately agree, A = Agree, and S.A. = Strongly agree with the statement.

4.2.8 Perceptions of Cleaner Production

Since globalization has moved toward cleaner production for waste management, the researcher would like to assess the understanding and perceptions of SMEs regarding this issue. Eight questions were asked on profitability, public image, waste treatment, waste minimization, preventativeness of cleaner production, and better quality products. The SMEs' perceptions primarily focus on profitability and preventativeness (Table 4.8). On profitability, about 82% agreed that cleaner production is more profitable and competitive, and producing quality products (77%). As 65% of respondents indicated, good quality products improve SMEs' image.

Regarding preventatives, cleaner production reduces environmental risks, health, and industrial accidents, as 77% of the respondents agreed upon. About 75% agreed that it minimizes waste, and when minimized, it is preventative (70%). About 73% agreed that cleaner production reduces waste treatment and disposal costs since there is less waste production because the more the waste, the greater the treatment and disposal costs. Around 64% agreed that cleaner production recovers valuable products since less waste is produced and the waste is recycled for other products.

Table 4.8

Perceptions of Cleaner Production

Item	SD (%)	D (%)	M (%)	A (%)	SA (%)	Mean	S.D.	Average level of agreement with the statement
It results in better quality products.	6 (2.7)	15 (6.8)	30 (13.6)	55 (25.0)	114 (51.8)	4.16	1.073	High
Cleaner production is preventive.	19 (8.6)	33 (15.0)	18 (8.2)	30 (13.6)	120 (54.5)	3.90	1.416	High
It minimizes waste.	18 (8.2)	22 (10.0)	15 (6.8)	30 (13.6)	135 (61.4)	4.10	1.348	High
It reduces risk to the environment, health, and industrial accidents.	29 (13.2)	16 (7.3)	5 (2.3)	20 (9.1)	150 (68.2)	4.12	1.476	High
Cleaner production reduces waste treatment and disposal costs.	20 (9.1)	34 (15.5)	6 (2.7)	50 (22.7)	110 (50.0)	3.89	1.400	High

Item	SD (%)	D (%)	M (%)	A (%)	SA (%)	Mean	S.D.	Average level of agreement with the statement
It recovers valuable by-products.	16 (7.3)	22 (10.0)	40 (18.2)	41 (18.6)	101 (45.9)	3.86	1.297	High
It improves SMEs' image.	26 (11.8)	30 (13.6)	20 (9.1)	42 (19.1)	102 (46.4)	3.75	1.452	High
Cleaner production is more profitable and competitive.	3 (1.4)	7 (3.2)	30 (13.6)	96 (43.6)	84 (38.2)	4.14	0.867	High
Overall mean						3.99		

Note: S.D. = Strongly disagree, D = Disagree, M = Moderately agree, A = Agree, and S.A. = Strongly agree with the statement.

4.2.9 MSWM Regulations and SDGs

An analysis was undertaken to determine if the MSWM regulations aligned with the sustainable development goals (SDGs). Aspects in this section focused on waste recycling, sustainable consumption, waste treatment, waste collection, and promotion of safe, resilient, and sustainable cities.

The SMEs believed that MSWM regulations ensured sustainable consumption (70%) by reducing the waste produced and promoted safe, resilient, and sustainable cities (70%) (Table 4.9). However, at the current stage, they did not believe that MSWM regulations promote waste recycling (52%), waste treatment (50%), or regular collection of waste (45%).

Table 4.9*MSWM Regulations and SDGs*

Item	SD (%)	D (%)	M (%)	A (%)	SA (%)	Mean	S.D.	Average level of agreement with the statement
MSWM regulations have promoted safe, resilient, and sustainable cities.	20 (9.1)	23 (10.5)	24 (10.9)	52 (23.6)	101 (45.9)	3.87	1.340	High
There has been a regular collection of waste.	19 (8.6)	80 (36.4)	58 (26.4)	31 (14.1)	32 (14.5)	2.90	1.191	Medium
There is a waste treatment	20 (9.1)	90 (40.9)	49 (22.3)	32 (14.5)	29 (13.2)	2.82	1.191	Medium
MSWM regulations have ensured sustainable consumption	7 (3.2)	20 (9.1)	40 (18.2)	50 (22.7)	103 (46.8)	4.01	1.143	High
There is a recycling of waste	24 (10.9)	90 (40.9)	56 (25.5)	32 (14.5)	18 (8.2)	2.68	1.106	Medium
Overall mean						3.24		

Note: S.D. = Strongly disagree, D = Disagree, M = Moderately agree, A = Agree, and S.A. = Strongly agree with the statement.

4.3 Tests of the Associations Among Variables

Different tests to check the associations among variables were described in Chapter 3. This section reports the results of those tests.

4.3.1 Tests for Associations

Three SME business characteristics (number of employees, type of business, and form of the organization) and four SME waste management variables (waste disposal method, number of waste collection points, frequency of EMaG visits, and impact of waste on the premise) were tested to determine their associations and strengths, using Pearson's Chi-Square and Cramer's V test. The results are as follows.

4.3.1.1 Number of Employees

The statistical test results of the number of employees and four SME waste management variables are shown in Table 4.10. The results show no significant association between the number of employees and all variables of SME waste management, with the *p-value* of all associations $> .05$. Therefore, it is likely to conclude that the number of employees does not have any relation with how SMEs manage their wastes.

The results reflect that the business' size does not relate to how the SMEs manage their waste. This may be because of little to no enforcement of regulations despite business requirements to adhere to recycling (Woodard, 2020). Therefore, no matter how big or small the SME, is they may not practice proper waste management due to weak law enforcement. Similarly, most SMEs, regardless of size, dispose of waste by open dumping (Kwenda et al., 2022). They also encounter the inadequacy of waste collection and disposal facilities that the council has put in place (Jerie & Tevera, 2014) and infrequent visits from EMAG. Since their practices are similar regardless of their size, the impact of waste also has no relation to size.

4.3.1.2 Type of Business

The statistical test results of the type of business and four SME waste management variables are shown in Table 4.11. The results show a statistically significant association between the type of business and all variables of SME waste management: business waste disposal ($p = .000$), number of waste collection points ($p = .002$), frequency of EMAG visits ($p = .000$), and impact of waste on the premise ($p = .028$). The Cramer's V tests further inform that the associations between the type of business and all variables of SME waste management possess strong relations (the Cramer's V equaled .351 for the number of waste collection points, .234, .277 for frequency of EMAG visits, and .202 for impact of waste on the premise). Therefore, the test results show that how SMEs manage their waste strongly relates to the type of business, whether the SME is furniture, welding, catering, chemicals, or textiles.

Table 4.10

The Chi-Square and Cramer's V Tests for Associations Between the Number of Employees and SME Waste Management Variables

		df	Value	Asymptotic Significance (2 sided)
Number of Employees * Business Waste disposal	Pearson Chi-Square	15	15.257 ^a	.433
	Likelihood Ratio	15	15.213	.436
	Linear-by-Linear Association	1	.110	.741
	Phi		.263	.433
	Cramer's V		.152	.433
	N of Valid Cases		220	
Number of Employees * Number of waste collection points	Pearson Chi-Square	15	12.381 ^a	.650
	Likelihood Ratio	15	9.372	.857
	Linear-by-Linear Association	1	2.884	.089
	Phi		.237	.650
	Cramer's V		.137	.650
	N of Valid Cases		220	
Number of Employees * Frequency of EMag Visits	Pearson Chi-Square	15	11.685 ^a	.703
	Likelihood Ratio	15	12.569	.636
	Linear-by-Linear Association	1	1.497	.221
	Phi		.230	.703
	Cramer's V		.133	.703
	N of Valid Cases		220	
Number of Employees * Impact of waste on the premise	Pearson Chi-Square	15	11.392 ^a	.724
	Likelihood Ratio	15	14.134	.515
	Linear-by-Linear Association	1	.000	.989
	Phi		.228	.724
	Cramer's V		.131	.724
	N of Valid Cases		220	

To discuss the results, it is more likely that it is because the majority of the SMEs are in the furniture industry. Those in the furniture industry will do open dumping since their waste requires vast and open space (Christian et al., 2022). They need more waste collection points because of the amount of waste produced compared to other types of business (Woodard, 2020). The type of business also relates to the type of waste impact. For instance, those in the catering business produce waste that attracts disease-carrying vectors like rats, mosquitoes, cockroaches, and flies, causing diseases (Ogundele et al., 2018), while those involved in furniture and chemicals may cause all forms of pollution. The type of business attracts varied frequency of EMA visits because those industries producing more waste may have more visits since they are more likely to pollute and be non-compliant than those producing less (Akmal, 2021).

Table 4.11

The Chi-Square and Cramer's V Tests for Associations Between the Type of Business and SME Waste Management Variables

		df	Value	Asymptotic Significance (2 sided)
Type of business * Business Waste disposal	Pearson Chi-Square	15	81.479 ^a	.000
	Likelihood Ratio	15	68.341	.000
	Linear-by-Linear Association	1	5.158	.023
	Phi		.609	.000
	Cramer's V		.351	.000
	N of Valid Cases		220	
Type of business * Number of waste collection points	Pearson Chi-Square	15	36.046 ^a	.002
	Likelihood Ratio	15	31.759	.007
	Linear-by-Linear Association	1	.146	.702
	Phi		.405	.002
	Cramer's V		.234	.002
	N of Valid Cases		220	
Type of business * Frequency of EMag Visits	Pearson Chi-Square	15	50.804 ^a	.000
	Likelihood Ratio	15	47.236	.000
	Linear-by-Linear Association	1	1.305	.253
	Phi		.481	.000
	Cramer's V		.277	.000
	N of Valid Cases		220	
Type of business * Impact of waste on the premise	Pearson Chi-Square	15	27.045 ^a	.028
	Likelihood Ratio	15	31.036	.009
	Linear-by-Linear Association	1	2.295	.130
	Phi		.351	.028
	Cramer's V		.202	.028
	N of Valid Cases		220	

4.3.1.3 Form of Organization

The statistical test results of the form of organization and four SME waste management variables are shown in Table 4.12. The results show statistically significant associations between the form of organization and three variables of SME waste management: business waste disposal ($p = .000$), frequency of EMag visits ($p = .000$), and impact of waste on the premise ($p = .047$). The Cramer's V tests further inform that the associations between the form of organization and business waste disposal method are very strong (Cramer's V = .403), as well as with the frequency of visits (Cramer's V = .273), whereas the relationship between the variable and the impact of waste on the premise is strong (Cramer's V = .161). Therefore, the test results show

that the form of organization is significantly associated with waste disposal method, frequency of EMAG visits, and impact of waste on the premise.

The form of business organization relates to how waste is disposed of, the frequency of EMA visits, and the impact of waste on the premises. The sole owners and individual businesses are likely to do open dumping and burning because of the low capacity to afford better waste disposal methods (Parte & Alberza-Oliver, 2024), yet the frequency of EMA visits is likely to be less with small traders than those with high production and large volume of waste (Woodard, 2020). Large-scale SMEs probably produce more waste (Woodard, 2020), and thus, more waste impact.

Table 4.12

The Chi-Square and Cramer's V Tests for Associations Between the Form of Organization and SME Waste Management Variables

		df	Value	Asymptotic Significance (2 sided)
Form of business * Business Waste disposal	Pearson Chi-Square	9	107.274 ^a	.000
	Likelihood Ratio	9	87.236	.000
	Linear-by-Linear Association	1	.000	.992
	Phi		.698	.000
	Cramer's V		.403	.000
	N of Valid Cases		220	
Form of business * Number of waste collection points	Pearson Chi-Square	9	11.702 ^a	.231
	Likelihood Ratio	9	14.828	.096
	Linear-by-Linear Association	1	6.441	.011
	Phi		.231	.231
	Cramer's V		.133	.231
	N of Valid Cases		220	
Form of business * Frequency of EMAG Visits	Pearson Chi-Square	9	49.238 ^a	.000
	Likelihood Ratio	9	53.455	.000
	Linear-by-Linear Association	1	.502	.479
	Phi		.473	.000
	Cramer's V		.273	.000
	N of Valid Cases		220	
Form of business * Impact of waste on the premise	Pearson Chi-Square	9	17.121 ^a	.047
	Likelihood Ratio	9	17.374	.043
	Linear-by-Linear Association	1	9.411	.002
	Phi		.279	.047
	Cramer's V		.161	.047
	N of Valid Cases		220	

4.3.2 Tests of Differences

A Kruskal-Wallis test was conducted to determine the differences between five characteristics of respondents, three SME business characteristics, and four SME waste management on the level of each of the nine perception variables. Overall, the tests reveal a significantly significant difference in the level of perceptions among six variables: age, working length, number of employees, type of business, form of business, and frequency of EMAG visits (Table 4.13). These variables that contain mean rank differences will be reported further. On the contrary, six characteristic variables do not contain any mean rank differences among sub-groups: gender, education, position in SME, waste disposal method, and waste impacts, and, thus, will not be reported here. In summary, two characteristics of respondents, all three SME business characteristics and one SME waste management variable, contribute to the mean rank differences in perceptions about MSWM regulations.

Table 4.13*Overall Hypothesis Test Summary*

Variable	Kruskal-Willis Test Significance Summary											
	Gender	Age	Education	Working length	Position in the SME	Number of employees	Type of business	Form of business organization	Waste disposal methods	No. of waste collection points	Frequency of EMAG visits	Waste impact
Awareness of the MSWM Regulations	0.75	.000*	.251	.059	.840	.641	.448	.898	.574	.077	.047*	.206
Monitoring and Enforcement of MSWM Regulations	.489	.000*	.261	.084	.599	.287	.076	.668	.188	.223	.043*	.135
Requirements for SMEs and Support from the Authorities	.143	.029*	.603	.405	.785	.098	.755	.010*	.544	.381	.029*	.125
Motivations for Compliance	.118	.836	.434	.017*	.687	.675	.780	.177	.495	.545	.200	.214
Reasons for Non-compliance	.082	.046*	.356	.779	.515	.008*	.049*	.128	.588	.880	.640	.789
Compliance With MSWM Regulations	.924	.063	.279	.401	.170	.044*	.571	.116	.386	.296	.629	.565
Perceptions of MSWM Regulations and Their Effectiveness	.245	.141	.436	.281	.088	.767	.235	.105	.529	.477	.152	.111
Perceptions of Cleaner Production	.588	.291	.614	.049*	.119	.320	.995	.735	.334	.377	.328	.452
MSWM Regulations and SDGs	.969	.023*	.438	.351	.413	.112	.888	.988	.793	.616	.129	.855

Note: Asymptotic Sig. (2-sided test) are displayed. The significance level is .050.

4.3.2.1 Age

A Kruskal-Willis test indicates a significant difference in Age across five variables (Table 4.14): Awareness of the MSWM Regulations, Monitoring and Enforcement of MSWM Regulations, Requirements for SMEs and Support from the Authorities, and MSWM Regulations and SDGs. In this results interpretation, the researcher will primarily use the adjusted significant level together with the graph to interpret the results unless the adjustment is unnecessary; the significant level will be used instead.

Note that all test results referred to here are presented in detail in Appendix D.

Table 4.14

Age and Perception Variables that are Significant Differences

	Age ($df=4$)	
	Test statistic (H)	Asymptotic Sig.
Awareness of the MSWM Regulations	35.28	.000
Monitoring and Enforcement of MSWM Regulations	28.63	.000
Requirements for SMEs and Support from the Authorities	10.78	.029
Reasons for Non-compliance	9.71	.046
MSWM Regulations and SDGs	11.30	.023

Age and Awareness of the MSWM Regulations: The Kruskal-Wallis test shows significant differences between the observed groups ($H(4) = 35.28, p = .000$). Post-hoc analysis (Appendix D) shows significant differences between groups 51-60 years and groups 20-30, 31-40, 41-50, and 60+ years ($p = .000, .001, .000$, and $.001$, respectively). The test results show that the 51-60-year-old group has a higher level of agreement with the awareness of the MSWM regulation statements than the other mentioned groups. Notably, maturity means more experience (Madrigal, 2018). Thus, older SMEs are more exposed to knowledge of regulations than younger people.

Age and Monitoring and Enforcement of MSWM Regulations: The Kruskal-Wallis test shows significant differences between the observed groups ($H(4) = 28.63, p = .000$). Post-hoc analysis shows significant differences between groups 51-60 years and groups 20-30, 31-40, and 41-50 years ($p = .000, .000, \text{ and } .014$ respectively) (Appendix D). The graph in Appendix D further declares that the 51-60-year group has a lower level of agreement with the statements under this variable than other mentioned groups. The reason is likely because they have witnessed the EMA visits less often, and monitoring is ineffective since they rarely visit the premises (INTOSAI, 2016).

Age and Requirements for SMEs and Support from the Authorities: The Kruskal-Wallis test shows significant differences between the observed groups ($H(4) = 10.78, p = .029$). Post-hoc analysis shows significant differences between groups 51-60 years and groups 20-30 and 60+ years ($p = .035$ and $.007$, respectively), as well as between groups 60+ years old and those who are 31-40 and 41-50 years ($p = .015$ and $.039$, respectively) (Appendix D). The graph further clarifies that the 51-60-year group has a higher level of perception than other mentioned groups. In contrast, the 60+ year group perceives this issue less than the other compared groups. The explanation could be because they may have witnessed changes in waste collection and waste disposal methods and because of more life experiences, including exposure to waste management practices (Mukhtar et al., 2017). In addition, some of them may have received an education. The 60+ age group may perceive this issue less than the other groups because they may not have had the same exposure to environmental education. Some might have joined the sector later and may not have had the experiences (Mukhtar et al., 2017).

Age and Reasons for Non-compliance: The Kruskal-Wallis Test shows significant differences between the observed groups ($H(4) = 9.71, p = .046$). Post-hoc analysis shows significant differences between the 60+ and 31-40-year-olds, with the p -value = $.046$ (Appendix D). The 31-40-year-old group seems to agree more with the statements under this variable than the 60+ years old. The results agree well with previous literature (Gray & Shimshack, 2011) because of economic hardships, especially in Zimbabwe, where they struggle to put food on the table. They find it difficult to balance financial home requirements, work, regulations, and personal lives.

The young agree that they are not being consulted in decision-making (Gray et al., 2010) probably because they know they should be part of and participate in decision-making.

Age and MSWM Regulations and SDGs: The Kruskal-Wallis Test shows significant differences between the observed groups ($H(4) = 11.30, p = .023$). Post-hoc analysis, again, shows significant differences between the 60+ years old and the rest of the groups (20-30 years, $p = .040$; 31-40 years, $p = .038$; 41-50 years, $p = .006$; and 51-60 years, $p = .005$) (Appendix D).

In summary, those who are 51-60 and 60+ years old show significantly higher perceptions towards awareness, monitoring, requirements for SMEs, reasons for non-compliance, and the regulations and SDGs than other age groups.

4.3.2.2 Working length

The tests reveal that at least one group among the working lengths is significantly different in their perceptions of motivations for compliance and perceptions of cleaner production (Table 4.15).

Table 4.15

Working Length and Perception Variables that are Significant Differences

	Age ($df=5$)	
	Test statistic (H)	Asymptotic Sig.
Motivations for Compliance	13.80	.017
Perceptions of Cleaner Production	11.12	.049

Working Lengths and Motivations for Compliance: The Kruskal-Wallis test shows differences between the observed groups ($H(5) = 13.80, p = .017$). Post-hoc analysis shows a significant difference between groups of 11-15 years and <1 year ($p = .046$), with the latter group having a higher perception of the motivation for compliance than the former group (Appendix D). Those with a shorter working period have a higher perception of compliance motivation than those with longer working years, which is probably because those with longer working years have more extended

experience, so they better understand the business's culture (Mukhtar et al., 2017). SMEs with shorter working years may feel more pressure to comply with regulations and be hopeful and concerned about their job security.

Working Lengths and Perceptions of Cleaner Production: The Kruskal-Wallis test shows differences between the observed groups ($H(5) = 11.12, p = .049$). Post-hoc analysis shows significant differences between groups <1 year and three other groups: 6-10, 11-15, and >25 years ($p = .012, .031, \text{ and } .027$, respectively) (Appendix D). The graph further illustrates that those new in the business have significantly lower perceptions about cleaner production than those who work longer. This result is because those new to the business might lack exposure and not fully understand the importance of cleaner production. They also might have limited exposure and might not have received the education, unlike those who have worked longer and had more exposure and experience (Madrigal, 2018).

4.3.2.3 Number of Employees

The tests reveal that at least one group among the number of employees is significantly different in their perceptions of Reasons for Non-compliance and Compliance With MSWM Regulations (Table 4.16).

Table 4.16

Number of Employees and Perception Variables that are Significant Differences

	Age ($df=5$)	
	Test statistic (H)	Asymptotic Sig.
Reasons for Non-compliance	15.65	.008
Compliance With MSWM Regulations	11.40	.044

Number of Employees and Reasons for Non-compliance: The Kruskal-Wallis test shows differences between the observed groups ($H(5) = 15.65, p = .008$). Post-hoc analysis shows a significant difference between groups of 5-10 employees and <5 employees group ($p = .031$), with the former group having a lower level of agreement with the statements than the latter (Appendix D). The results imply that a higher number

of employees means limited financial resources to train them on waste regulations. Thus, they lack time and may not be consulted on decision-making, unlike smaller groups that may be able to get the needed resources and can easily share what is available (Wilson, 2008). Smaller groups also mean more frequent interactions. They can also easily manage their resources, unlike a bigger group.

Number of Employees and SME Compliance With MSWM Regulations: The Kruskal-Wallis test shows differences between the observed groups ($H(5) = 11.40, p = .044$). Post-hoc analysis shows significant differences between groups of > 40 employees and three other groups (5-10 employees: $p = .028$, 11-20: $p = .003$, and 21-30: $p = .010$). It also shows the mean rank differences between 11-20 employees and < 5 ($p = .034$) (Appendix D). The graph further explains that the > 40 employees SMEs have higher perceptions of SME compliance than other compared groups. This result indicates that in larger groups, social norms play a significant role; thus, it is likely that more people will follow the rules (Mukhtar et al., 2017). Larger groups are more visible, so increased visibility leads to greater compliance as employees know that their actions are being observed than a small group with less scrutiny (Mukhtar et al., 2017).

4.3.2.4 Type of Business

The type of business only bears significant differences in the perception of non-compliance between some groups, specifically between the furniture and catering businesses. The Kruskal-Wallis test shows differences between the observed groups ($H(5) = 11.13, p = .049$). Post-hoc analysis shows that the significant difference lies in the furniture business and catering ($p = .035$), with the catering business having a higher agreement to statements under the reasons for non-compliance variable than the furniture business. Other businesses do not have any mean rank differences (Appendix D). It is clear that the catering business demands more resources in terms of finance, time, and human resources due to establishments that require food preparation, fresh food, careful handling of food, a better place for operations, a hygienic environment, and hence catering business has more demands (Mbokazi, 2024) than the furniture business.

4.3.2.5 Form of Business Organization

The form of business organization has a significant difference only in the Requirements for SMEs and Support from the Authorities, where no other perception variable has any differences. The Kruskal-Wallis test shows differences between the observed groups ($H(3) = 11.25$, $p = .010$). Post-hoc analysis shows a significant difference between sole-owner and partnership ($p = .035$), with the latter having a higher perception than the former group. Other forms of organization do not have any mean rank differences (Appendix D). This result can be attributed to the fact that those in partnership agree with requirements and support from the authorities because they believe that if their waste is handled properly, they will have support from the authorities. It could also be because they are better equipped than individual businesses (Woodard, 2020). Partnerships have shared responsibilities, leading to better waste management practices because partners can pool resources together, unlike individuals with full liability.

4.3.2.6 Frequency of the EMAG Visits

How often the EMAG visits the SME conveys mean rank differences in three perception variables: Awareness of the MSWM Regulations, Monitoring and Enforcement of MSWM Regulations, and the Requirements for SMEs and Support from the Authorities (Table 4.17), where no other perception variable has any differences.

Table 4.17

Frequency of the EMAG Visits and Perception Variables that are Significant Differences

	Age ($df=3$)	
	Test statistic (H)	Asymptotic Sig.
Awareness of the MSWM Regulations	7.96	.047
Monitoring and Enforcement of MSWM Regulations	8.15	.043
Requirements for SMEs and Support from the Authorities	9.05	.029

Frequency of the EMAG Visits and Awareness of the MSWM Regulations: The Kruskal-Wallis test shows differences between the observed groups ($H(3) = 7.96, p = .047$). Post-hoc analysis shows a significant difference between once a week and once in six months ($p = .050$) and no other differences among groups (Appendix D). Surprisingly, the test shows that the SMEs where EMAG visits more frequently have significantly lower perceptions than SMEs where EMAG visits less often. This result is probably due to the fact that SMEs in Zimbabwe are often criminalised because some operate illegally and are non-compliant with regulations (Makwara & Magudu, 2013). The relationship between the EMAG and SMEs is depraved, so awareness and education may not have made an impact on those SMEs. There may also be lacking practical implementation.

Frequency of the EMAG Visits and Monitoring and Enforcement of MSWM Regulations: The Kruskal-Wallis test shows differences between the observed groups ($H(3) = 8.15, p = .043$). Post-hoc analysis shows a significant difference between once a month and never ($p = .036$) and no other differences among groups (Appendix D). Surprisingly again, the test shows that the SMEs stating that the EMAG never visits their premise have significantly higher agreement with the statements under this variable than SMEs where the EMAG once a month. It can be attributed to their perceptions with regard to how they know EMAG, and also it could be based on their experiences with other businesses they know in the area (Makofske, 2019). They may also have taken inspection and punishment differently: inspection as checking for

compliance and penalizing coming after prior inspection and warnings to fine for non-compliance.

Frequency of the EMAG Visits and Requirements for SMEs and Support from the Authorities: The Kruskal-Wallis test shows differences between the observed groups ($H(3) = 9.05$, $p = .029$). Post-hoc analysis shows a significant difference between once a month and once a week ($p = .032$) and no other differences among groups (Appendix D). The test showed that the SMEs stating that the EMAG visited their premise once a month have significantly higher agreement with the statements under this variable than SMEs where the EMAG once a week. The results probably imply that fewer inspections may prompt businesses not to prioritize compliance, and they will allocate few resources, while those with frequent visits may prompt businesses to prioritize compliance and will allocate more resources (Makofske, 2019).

4.4 Perspectives of SMEs Waste Management and MSWM Regulations from Other Stakeholders

This section reports the opinions gathered via focus group discussions and interviews with stakeholders, including the residents, the EMAG, and the City Council personnel. The last sub-section also presents the suggestions from SMEs via the last open-ended question in the questionnaires.

4.4.1 Perspectives from Nearby Residents

The following information was summarised and analyzed from the focus group discussions with the Mbare, Glenview, and Highfields residents, totaling 21 individuals.

SMEs' waste disposal methods. The residents indicated that SMEs used open dumping, burning, burying, and throwing waste in the bush as waste disposal methods, as shown in the photos below (Figure 4.13).

Figure 4.4

SMEs' Waste Disposal Methods Around the Redisent Areas



(a) Waste burning at Gazaland



(b) Open dumping at Siyaso



(c) Dumping in the bush close to Gazaland



(d) Mbare residential area

Irregular waste collection. They indicated that the city council waste collection is irregular as they rarely see them collecting waste. “*It has been months now since the municipality collected waste from SME complex. Even if they report, the city council is complacent, nothing has been done*” (Respondent No. 2). They have attributed the irregular waste collection to a shortage of refuse trucks and human resources. They indicated that SMEs do not comply with the regulations as their working areas, nearby bushes, and residential areas are full of waste. The waste produced by SMEs has resulted in all forms of pollution and outbreaks of diseases such as cholera and typhoid.

Effectiveness of regulations. They have pointed out that the MSWM regulations are ineffective since they have not witnessed any waste reduction. “*For years now, waste has been accumulating at all those open spaces you see over there; they have never bothered to collect them. Instead, they have resorted to burning the waste*” (Respondent No.5). They rated waste management by SMEs as the worst because waste is dumped everywhere. They further indicated that there was no recycling, no waste minimization, and no provision of resources. They even believed that the MSWM regulations were not sustainable. They reiterated that the current MSWM regulations should promote more recycling, increased education, and heavy penalties.

Challenges. The key informants believed that SMEs' main problem or limitations in complying with MSWM regulations are the shortage of resources in terms of capital, bins, expert labor, and political will. *"The challenge here is that SMEs do not have money to buy the needed bins, so there is nothing they can do except dispose of their waste in that bush"* (Respondent No.6). *"Our councilor and our honorable MP, SMEs have reported their situation several times but they are very reluctant, they do not care, we are disappointed"* (Respondents No.1). They also pointed out that SMEs do not have enough working space; hence, they are overcrowded, resulting in poor waste management. They indicated that the SMEs pay fines for not complying; however, the fines are not deterrent enough to stop poor waste management. They have shown that MSWM regulations are not environmentally practical and cost-effective.

Lack of incentives. The group indicated that no incentives were given to SMEs for developing and adopting new environmentally cleaner and more economically efficient technologies. *"Some of them have done their best in keeping their premises clean all the time; they even engaged some organizations to help them, but they were given nothing in return"* (Respondent No. 7). They pointed out that cleaner production has been included in the MSWM regulations to a lesser extent because of a shortage of funds and a lack of political will. They recommended the following for improved MSWM regulations:

- (a) increased education and awareness campaigns,
- (b) increased recycling,
- (c) regulatory bodies should frequently check and monitor SMEs' waste management,
- (d) adequate resources should be provided,
- (e) heavy penalties,
- (f) minimizing waste, and
- (g) regular collection of waste by the city council.

In summary, perspectives of waste management and MSWM regulations from the nearby residents indicated that SMEs' waste disposal methods were mainly improper and did not comply with the regulations. They rated waste management by SMEs as the worst. The wastes produced by SMEs have resulted in all forms of

pollution and outbreaks of diseases such as cholera and typhoid. The problems were exacerbated by irregular waste collection by the City Council due to a shortage of trucks and human resources. They also perceived that the SMEs pay fines for not complying; however, the fines are not deterrent enough. Additionally, the group indicated that no incentives were given to SMEs for developing and adopting new environmentally cleaner and more economically efficient technologies. To them, MSWM regulations are neither environmentally practical, cost-effective, or sustainable.

4.4.2 Perspectives From the EMaG Officials

These perspectives were derived from three EMaG Officials from the one-on-one interviews.

Waste disposal. The EMaG official pointed out that SMEs dispose of their waste in diverse ways: municipal bins, designated spaces within their operating complexes, allowing collectors to recycle, open dumps, burn, bury, and compost. According to the officials, municipal bins allow waste to be collected for landfilling and segregation. Disposing of waste at designated spaces within their operating complexes allows for material recovery for recyclers before the material is taken for landfilling.

Recycling. Allowing collectors to recycle introduces circularity and symbiosis. However, dumping waste at undesignated places, burying it, and burning it were ineffective methods of disposing of waste since they have resulted in various pollution and disease outbreaks.

Monitoring and checks. The EMaG officials pointed out that although there are frequent monitoring and checks by the regulatory bodies, they have limited resources. The officials indicated that the current MSWM regulations if implemented well, can effectively control waste management.

Sustainability. The EMaG official rated the sustainability of MSWM to be 4 out of 10. This low rating was attributed to municipalities following a linear economy model, which is costly, resulting in over-accumulation of waste at landfills. Hence, the official suggested circularity as the solution to such a problem. The EMaG official indicated that adopting integrated solid waste management strategies is an urgent

solution that could address the waste problems at SME complexes. The official also suggested that integration and engagement should be incorporated by the MSWM regulations for sustainability and reduction of challenges caused by non-compliance by SMEs. The EMAG official pointed out that littering, dumping, all forms of pollution, and outbreaks of diseases are the problems resulting from non-compliance.

Penalty provisions. Fines and imprisonment are penalties for non-compliance by EMAG against waste management regulations. The EMAG official indicated that they face severe challenges of arrogance by some, as well as difficulties in identifying the culprits in instances when culprits commit crimes after hours. The official's opinion about the level of MSWM regulations in terms of environmental effectiveness is that they are deficient because they cannot prevent pollution.

Cost-effectiveness. Regarding cost-effectiveness, the official indicated that MSWM regulations were very costly because of the need to collect everything for landfilling. The official indicated that there were no incentives for developing and adopting new environmentally cleaner and more economically efficient technologies if MSWM regulations were to be sustainable.

Incentives. The official indicated that the incentives would be incorporated into the billing and tax regimes. The official proposed that for MSWM regulations to be compelling enough, self-monitoring and incentives should be introduced.

Education and training. The EMAG official indicated that the city council was responsible for educating and training SMEs about MSWM regulations. However, the official commented that the nature of education and training is primarily theoretical. This implies there is no practical application; only ideas are given with no practice.

Cleaner production. The official indicated that cleaner production has been included in the MSWM regulations to a lesser extent.

Recommendations. In addition to some suggestions that were made earlier, the official also recommended the following.

- (a) There is a need to move with times and introduce waste reduction, recovery, and circularity in waste management,

- (b) Education and training of SMEs and other stakeholders should be practical.
- (c) Energy recovery should be introduced to cater for large volumes of waste being produced.
- (d) Recycling should be intensified.
- (e) SMEs were to be held accountable for their waste.

In conclusion, the EMAG officials indicated that SMEs dispose of their waste in diverse ways: use municipal bins and designated spaces within their operating complexes, allowing collectors to recycle, burn, bury, compost, and use open dumps. Although they monitor and check SMEs' waste management, they have limited resources. The officials rated their waste management as low and attributed this to SMEs following a linear economy model, which is costly, resulting in waste accumulation at landfills. Thus, the officials suggested circularity as the solution. They indicated that fines and imprisonment are the penalties for non-compliance. Regarding cost-effectiveness, the EMAG officials indicated that regulations were very costly because of the need to collect for landfilling. The EMAG officials indicated that they have been involved in the education and training of SMEs, although the training lacks a practical approach. They recommended a need for waste minimization, recovery, and circularity in waste management, as well as practical education for waste management.

4.4.3 Perspectives from City Council

This section reports the results from the analysis of interviews with three city council personnel.

Waste disposal methods. The city council official indicated that the most dominant waste disposal methods being used by SMEs are incineration, open dumping, burning, and burying. Other waste disposal methods, such as composting, recycling, and reusing, are used on a low scale. The official indicated that the effectiveness of the waste disposal methods depends on the type and quantity of waste, available resources and technology, and level of public participation and support. The official reiterated that incineration, although not environmentally friendly, has ensured the management of hazardous or medical waste. Recycling has helped diversify waste from landfills and

conserve natural resources, although at a low scale. Waste-to-energy has been done at a low scale and has helped to reduce waste.

Monitoring and Evaluation. The official acknowledged continuous monitoring and evaluation by the city council's environmental management unit. However, its application is in limited areas due to a shortage of resources and personnel. The official pointed out that they have very few vehicles for inspections and monitoring, which has derailed their progress in other areas. The official indicated that although the city council's current MSWM regulations effectively control waste management, some enforcement gaps result from resource scarcity.

Sustainability. The official pointed out that MSWM regulations are sustainable to a lesser extent due to limited resources and investment. The officer reiterated that '*as long as there are limited resources, waste management remains a nightmare.*' The regulations provide guidelines for transportation, treatment, disposal, and promotion of 3Rs; however, this has been hindered by a shortage of resources. Hence, the implementation has not been very effective.

Availability of resources. The city council official indicated that the most critical issue that needs urgent addressing on the current MSWM regulations is the provision of resources to implement the existing regulations and political will. MSWM regulations can be applied to effectively reduce challenges caused by non-compliance by SMEs through the following strategies:

- a) strengthening enforcement,
- b) increased participation and awareness,
- c) providing compliance incentives,
- d) allocating more space and engineered landfills for SMEs,
- e) improving waste management infrastructure, and
- f) implementing a reward system for the best waste management practices.

The officer stated that non-compliance problems are public health risks, environmental degradation, financial costs, negative impacts on tourism, and some social impacts. The current penalty provisions are for illegal dumping up to \$2000 or six months imprisonment, littering up to \$20 or 2 months imprisonment, non-

compliance with separation up to \$100, waste collection \$1000, and waste treatment \$5000. The official indicated that the penalties are enormous enough to force compliance if effectively enforced.

Challenges. Problems encountered in enforcing MSWM regulations are limited resources, inadequate infrastructure, informal settlements, lack of public participation, corruption, and political will. The environmental effectiveness of MSWM regulations is mixed with success and challenges, which require a multi-stakeholder approach for sustainable waste management practices. The city has not implemented any incentives, only promoting sustainable waste management practices and partnering with other private players to improve waste management.

Education and training. The city council has been involved in education and training to the general public together with SMEs on a quarterly basis, which provided information on MSWM regulations to SMEs under the program of clean cities and presidential clean-up campaigns. The official pointed out that some workshops were unsuccessful due to limited resources.

Cleaner production. Cleaner production has, to a lesser extent, been included in MSWM regulations due to inadequate resources and lack of political will. The city council pointed out that MSWM regulations for SMEs in Zimbabwe have not been effective enough, mainly because of poor enforcement and a shortage of resources.

In summary, the city council officials indicated that the most dominant waste disposal methods being used by SMEs are incineration, open dumping, burning, and burying. Other waste disposal methods, such as composting, recycling, and reusing, are used on a low scale. The officials pointed out that MSWM regulations are sustainable to a lesser extent due to limited resources and investment. The officials acknowledged continuous monitoring and evaluation by the city council's environmental management unit. However, its application is in limited areas due to a shortage of resources and personnel. Problems encountered in enforcing MSWM regulations are limited resources, inadequate infrastructure, informal settlements, lack of public participation, corruption, and political will. The city has not implemented any incentives due to limited funds. Although the city council has been involved in education and training for

the general public together with SMEs on a quarterly basis, it has been hampered by limited resources. The city council officials pointed out that MSWM regulations for SMEs in Zimbabwe have not been effective enough, mainly because of poor enforcement and a shortage of resources.

4.4.4 Suggestions to Improve MSWM Regulations

This section presents suggestions collected from the last question on the questionnaire, which was an open-question type, during the survey of the SMEs to gather their opinions on the MSWM regulations. Various responses were made, which were compiled by the researcher as follows.

1) Increased education and awareness campaigns. The significant majority of respondents (90%) believed there is a need for increased education and awareness campaigns for SMEs and the general public about the MSWM regulations. They agreed that they were aware of the regulations, *‘Yes, we are aware of them, but there is a need for regular and intensive awareness campaigns to curb ignorance and as a constant reminder to those who are aware’* (Respondent No. 54). Another respondent also said, *‘Education is best when it is given away’* (Respondent No. 123). Some respondents complained that ever since they started their business *“five years ago,”* they did not receive any education (for instance, (Respondent No. 98, 105, and 206).

2) Regulatory bodies should be more strict and designate clear responsibilities. About 30% of the respondents reiterated that some of the MSWM regulations were not clear to them, so they suggested that the regulatory bodies should help with the interpretation of the laws and ensure environmental laws are adhered to since some of the SMEs no longer care of where they are disposing their waste. More than half of the respondents suggested that regulations should emphasize waste minimization at the source. Manufacturers were supposed to be made responsible for their packaging, and their products should have designs that produce less waste. They cited examples of cereal products with more oversized and multiple packaging. One of the respondents reiterated that *‘It is the duty of EMAg to ensure that regulations should be strictly implemented and these manufacturers should be taken to task pertaining their*

packaging. They blamed the regulatory bodies for being complacent' (Respondent No. 75).

3) *Stronger penalties.* About 80% of the respondents suggested that MSWM regulations should be punitive enough to deter poor waste management since the present penalties are too low to secure compliance. Some respondents pointed out, *'To them, penalties do not matter since the penalty fees they pay are very meager; hence, the uncaring attitude'* (Respondents No. 49 and 79). Also, about 60% feel that the regulations should have provisions for prosecutions to ensure conformance since people are afraid of prosecutions.

4) *Making recycling mandatory.* More than 80% suggested that recycling should be intensified and made mandatory to ensure waste reduction since most of the waste is thrown away, causing health hazards. One respondent pointed out, *'There is a lot of valuable material being dumped if companies could innovate and intensify recycling'* (Respondent No. 124). *'Yes, there are companies which do recycling, but it is not enough,'* says another respondent (Respondent No. 43). About 20% also cited that the laws should have provisions on composting and other recovering methods of waste.

5) *Restricting the number of workers on the work site.* Some respondents (30%) suggested that the MSWM regulations should have provisions to regulate the numbers working at the different complexes, as they felt they were overcrowded, which is probably the primary reason why people are dumping waste everywhere. However, due to high levels of unemployment in the country, people have no other means of survival, hence resorting to work in those areas to earn a living. The more the number of SMEs in a place, the more the amount of waste. This phenomenon will create problems in controlling and monitoring waste management.

6) *Resource availability.* About 85% suggested that resources be availed so that SMEs can properly dispose of their waste. Resources to be available include staffing to carry their waste, enough trucks to collect the waste, more bins, and enough money to pay the workers since they are demotivated. They pointed out that the city council has very few personnel for waste collection, which they attributed to meager salaries. *'How*

can one person be expected to do effective waste collection throughout the complex,” said one of the respondents (Respondent No. 176).

7) *SME involvement in MSWM decision-making.* About 92% of the respondents suggested that SMEs are to be involved in decision-making pertaining to waste management since they are the ones producing and handling the waste. They indicated that they had not been involved in deciding waste management regulations (40%) and that it was a top-down approach.

8) *More frequent inspections and monitoring.* About 60% of the respondents suggested that the regulatory bodies, EMAG, and city council should have frequent inspections to ensure compliance since most SMEs just dump waste anywhere.

9) *Regular waste collection.* About 80% of the respondents proposed that there should be regular waste collection by the city council. Instead of weekly waste collections, the city council spent two months with no collections done. ‘*This is disheartening,*’ according to the respondents (Respondent No. 88). They suggested that landfills should be properly designated for waste disposal. Some advocated for a timely review of the regulations in order to get in touch with the latest trends in waste management.

10) *Incentives.* Almost three-quarters of the respondents (75%) believe that MSWM regulations should incentivize those abiding by the regulations to motivate others.

CHAPTER 5 RESULTS AND DISCUSSION (2)

COMPARATIVE ANALYSIS OF THE EUROPEAN UNION VS ZIMBABWEAN WMSW REGULATIONS

This chapter compares the regulations of the European Union (EU) and the Zimbabwean MSWM. The researcher chose the EU to compare in the hope that Zimbabwe will align its waste management policies with global standards since the European models are considered benchmarks for waste management. Although the Zimbabwean context may differ from the EU regarding culture, environment, socio-economic, and administration, the comparison will benefit Zimbabwean MSWM regulations because the EU has robust waste management policies for resource efficiency, recycling, and minimizing waste. The lessons learned from the comparison will help Zimbabwe adopt the best practices (Pouikli, 2020). Zimbabwe will draw inspiration from the best practices to enhance its MSWM framework. The comparison with the EU was made because the EU emphasizes the circular economy principles (Brendzel-Skowera, 2021), has managed to slow down its waste generation and disposal, and has targeted the recycling of 50% of its municipal waste and 70% of construction waste by 2020 (Halkos & Petrou, 2016). The EU emphasizes waste minimization and zero landfilling based on a waste management hierarchy. The amount of municipal waste put into landfills in the EU has fallen by more than 25% since 1995, and its policy on waste aims to make waste management more efficient (Pouikli, 2020). The EU is driving toward high MSW recycling rates and low dumping. Northern European countries have, to a greater extent, moved away from landfilling to higher recycling rates (Chioatto et al., 2023). The amount of waste recycled rose from 25.1 million tonnes in 1995 to 65 million tonnes in 2012 (Valavanidis & Vlachogianni, 2015). The EU waste management laws are more stringent and rigorous, and this will help Zimbabwe tighten its law enforcement. The introduction of the SDGs necessitated the comparison since all countries were to meet them; hence, comparing with the EU waste management regulations will fast track its progress since the EU waste regulations are considered the benchmark (Ogotu & Kathambi, 2022).

In order to unravel the comparisons between EU MSWM regulations and Zimbabwean regulations, the researcher used a range of literature sources such as journal articles, online articles, conference papers, books, and government publications. The articles were analyzed, synthesized, and critically evaluated to clearly understand the EU and Zimbabwean regulations.

The comparison will benefit Zimbabwean municipalities in different ways. It will help identify the EU's best practices on waste management, the development of its policies, and how it has fared through time. It is an investigative process that will allow Zimbabwean municipalities to build on the wisdom of designs that are being practiced in the MSWM legal framework in EU MSWM. The lessons learned from the comparison will enable Zimbabwean stakeholders to develop an improved waste management framework that ensures sustainable waste management and broadens the regulator's thinking about the products' functionality, waste minimization, how others have dealt with complexities of regulations in dealing with waste management and how best the regulations are to be revised to meet international standards that will ensure sustainability. Above all, this will enable us to gather information about what is and is not working to learn how to improve the Zimbabwean MSWM regulations to achieve sustainable waste management across Zimbabwe. The differences and similarities between the EU MSWM regulations and the Zimbabwean regulations will help to provide an in-depth analysis of the causes of weak enforcement of regulations and a comprehensive guide on the causes of poor and weak enforcement of MSWM regulations and their mitigation.

5.1 Waste Management in the European Union

The EU first introduced regulations to manage waste in the early 80s (EU, 2017). The primary objective is to reduce the effects of waste on the land and improve resource efficiency. The first premise for EU waste management regulations is to foster waste prevention, to better treat waste residuals by promoting recycling rates, and to reduce waste diverted into landfills (Chioatto et al., 2023). The EU's waste policies are in the form of directives, expectations, and ways forward. This section will look at the development and regulations of the EU waste policies.

5.1.1 The Historical Context and Evolution of Waste Management Practises in the EU

The management of waste was critical in European waste management policy through the Environmental Action Plan (EAP) in the 1970s up until 1990s, making it mandatory for member states to put in an application within the given time limits. Complementing the 1st EAP, the European institutions issued the 1975 Waste Framework Directive (WFD) 75/442/EEC, binding the member states to apply it within defined deadlines. Not until the 4th EAP (1987–1992) did a hierarchy of waste management principles appear (in 1989), putting waste prevention as a priority, followed by other options such as recycling, energy recovery, reuse, and disposal. Following the 1992 Rio Conference, the EU made waste management one of seven priority issues within the 5th EAP (1993–2000).

The circular economy started in the 7th EAP (2013–2020) and was implemented in the EU's policy-making (Stankevicius et al., 2020). In 2015, the 1st Circular Economy Action Plan (CEAP) was introduced (Wonka, 2015) with the aim to accelerate the shift to a circular from the linear model. In 2018, the Waste Framework Directive was revised to Directive 2018/851, considered part of the Union's Circular Economy Package. The development of the legislation frameworks is shown in Table 5.1.

Table 5.1

Evolution of EU Waste Policy Frameworks

Environmental Action Programme (EAP)	Year	General Waste Policy
1st EAP (1973-1976)	1975	Waste Framework Directive, 75/442/EEC excluding agricultural waste from its scope
2nd EAP (1977-1981) 3rd EAP (1982-1986) 4th EAP (1987-1992)	1991	Amendment of WFD (Directive 91/156/EEC)
5th EAP (1993-2001)	1994	Decision 94/3/EC

Environmental Action Programme (EAP)	Year	General Waste Policy
	2000	Decision 2000/532/EC
6 th EAP (2002-2013)	2006	Amendment of WFD (Directive 2006/12/EC)
	2008	Amendment of WFD (Directive 2008/98/EC)
	2018	Amendment of WFD (Directive 2018/851)
7 th EAP (2013-2020)	2020	New Circular Economy Action Plan
8 th EAP (2021)	2021	Climate-neutral, resource-efficient economy

Source: Duquennoi and Martinez (2022).

5.1.2 The EU Legislation Frameworks

Various EU directives establish the legal framework for solid waste management. The directives are classified as the framework, the waste streams, and waste treatment. The frameworks deal with treating and managing waste in the EU and introduce the Polluter Pays Principle (PPP) and the Extended Producer Responsibility (EPR) (Duquennoi & Martinez, 2022). Waste stream directives deal with complete waste flows from their source, domestic or industrial sources, up until its disposal. Each waste stream has its specific characteristics and applicable legislation. The treatment directives deal with waste treatment (Bourguignon, 2018). They ensure that waste is treated before disposal or landfilling.

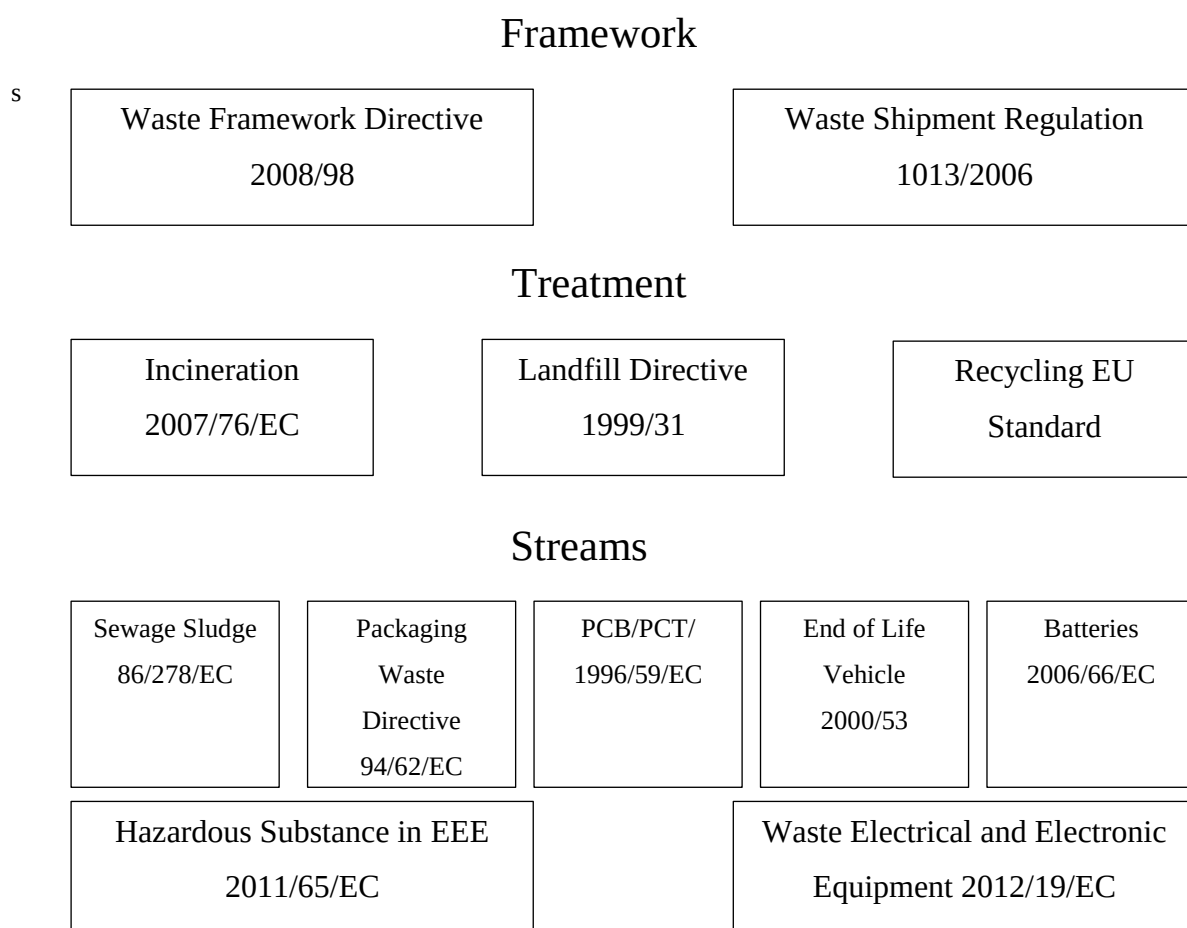
The frameworks comprise three levels. The WFD 2008/98/EC¹ and the Waste Shipment Regulations 1013/2006 are at the top level. The second level comprises the Waste Treatment Directive, which includes the Waste Incineration Directive (2000/76/EC), the Landfill Directive (1999/31/EC), and the Recycling EU Standards. On the third level is the Waste Stream Directive, composed of seven directives: the Sewage Sludge Directive, the Packaging and Packaging Waste Directive 94/62/EC, the Polychlorinated Biphenyls/Polychlorinated Terphenyls (PCB/PCT), the End of Life Vehicles 2000/53/EC, the Batteries Directive 2018/849, the Hazardous Substances in

¹ The numbers accompanying the Directives shows the year of enactment and the number of the directive.

Electrical Electronic Equipment and the Waste Electrical and Electronic Equipment (EEE) 2012/19 (Worldbank, 2011).

The main target of the Waste Framework Directives was to increase the reuse and recycling of materials from households and other material recovery of non-hazardous construction and demolition waste (Marišová & Valeníčková, 2021). It established a waste hierarchy: prevention, preparing for reuse, recycling, other recovery and disposal. The Landfill Directive (1999/31/EC) aims to reduce the adverse effects of landfilling on the environment and provides restrictions on landfilling of all waste (Badura, 2021). The Waste Incineration Directive (2000/76/EC) aims to minimize the impact of adverse environmental impacts resulting from emissions to air, soil, and water from the incineration and co-incineration of waste (Batsioula, 2020). The Sewage Sludge Directive 86/278/EEC prohibits sewage sludge that results in concentrations of heavy metals and advocates for sewage sludge to be treated before application on land (Batsioula, 2020). The Packaging and Packaging Directive provides for preventing, recovering, and reusing packaging waste in member states. The PCB/PCT provides for the controlled disposal of PCBs/PCTs and the decontamination of equipment (Serpe et al., 2013). Appropriate measures are to be taken to avoid dumping, uncontrolled waste disposal, and use of processes that harm the environment.

The End-of-Life Vehicles Directive sets out limits to waste production arising from end-of-life vehicles and their components. The Batteries Directive regulates the placement on the batteries market and accumulations of those that contain hazardous substances (Badura, 2021). The Hazardous Substances in EEE set out the restriction of using certain hazardous substances in electrical and electronic equipment. The Waste Electrical and Electronic Equipment (WEEE) 2012/19 governs the treatment of electrical and electronic equipment waste (Duquennoi & Martinez, 2022). It requires separate collection and proper treatment of WEEE. All the regulations are to be fulfilled by the member states. Figure 5.1 shows EU framework legislation.

Figure 5.1*The EU Legislation Frameworks*

Source: Redrawn from ‘Solid Waste Management in Bulgaria, Croatia, Poland, and Romania: A Cross-Country Analysis of Sector Challenges Towards EU Harmonization,’ by World Bank, 2011.

The long-term aim of the EU legislation is to change Europe into a recycling community where waste is a vital resource and to prevent waste at all times (Halkos & Petrou, 2016). Only the major directives are reviewed here: general waste management legislation (the Waste Framework Directive 2018/851, amended 2008/98), waste treatment legislation (the Waste Incineration Directive 2000/76/E), waste disposal legislation (the Landfill Directive 2018/850, amended 1999/31), and legislation on waste streams (the Packaging and Packaging Waste Directive 2018/852/EC 2018/852, amended 94/62/EC), the Single-Use Plastic Directive 2019/904 and the Plastic Bags Directive (2015/720).

5.1.2.1 The Waste Framework Directive (WFD) 2018/851

This directive gives the legislative framework for general waste management. It emphasizes and takes into account the precautionary principle (European Commission, 2018) and is based on the following:

i) Prevention. The directive puts waste prevention on the uppermost of the hierarchy of waste options. The other options then follows that reuse, recycling, and other recovery options.

ii) The Polluter Pays Principle. This principle aims to prevent and remedy environmental damage. As per this guiding principle, the original waste producer shall bear the waste management costs to prevent and rectify environmental damage.

ii) Extended Producer Responsibility. This principle aims to strengthen the reuse and the prevention, recycling, and other waste recovery.

The WFD includes targets for EU member states to recycle 50% of their municipal waste and 70% of their waste from construction by 2020. It follows a five-step order in which prevention is the best option, followed by reuse, recycling, and other forms of recovery, with disposal such as landfills as a last resort. While the EU regulations are clear-cut on recycling, the WFD regulates prevention and treatment, i.e., landfill, incineration (for disposal and energy recovery), recycling, and composting and digestion. The 2018/851 Directive secured the goals on MSW recycling and reuse (from 55% in 2025 to 65% in 2035), and the 2018/850 Directive strengthened the MSW

landfilled target at less than 10% of the total amount of MSW generated by 2035 (Chioatto et al., 2023).

5.1.2.2 The Waste Incineration Directive 2000/76/EC

Its objective is to reduce the negative environmental consequences resulting from incineration plants (Del Castillo, 2008). All waste incineration must comply with the Waste Incineration Directive. All the incineration plants should have environmental permits, which authorize them to discharge used water caused by exhaust gas clean up. However, it was noted that incinerators were less effective since they failed to make waste disappear but instead transformed it into heavy metals, ash, and toxic compounds that are harmful to human health (Del Castillo, 2008).

5.1.2.3 The Landfill Directive 1999/31 (Amended by 2018/850)

The Landfill Directive is another EU legislative policy on waste management that lays down mandatory requirements for landfills to minimize their harmful consequences on human health and the environment (Del Castillo, 2008). The directive categorizes different waste and to apply for all landfills. All waste should be treated before being taken to landfills. The directive identifies the classification of the landfill types and obliges member states to minimize biodegradable waste in landfills (Del Castillo, 2008). It is the duty of member states to ensure that all landfill sites should not operate provided they comply with the directives (Del Castillo, 2008).

According to Njoku et al. (2015), vast amounts of waste were sent to landfills before the advent of the EU Landfill Directive. With the existence of the directives, there was a reduction of more than 23%, showing the effectiveness of this policy. From 1996 to 2018, the average EU-28-landfilling rate fell from 64% to 23%. MSW recycled also rose 30% from 17%, while incinerated MSW increased to 136 kg per capita in 2019 from 67 kg per capita (Eurostat, 2019). Notably, the data varied considerably among countries, for instance, from 407 kg per capita in Latvia and 228 kg per capita in Romania due to poorly developed collection and recycling facilities to 511 kg per capita in the Netherlands and 615 kg per capita in Germany, with more than 50% recycling rates and landfilling near to zero (Chioatto et al., 2023). In Sweden, the amount of landfill waste dropped quite significantly from 42kg per capita in 2004 to

23kg per capita in 2005 and 3kg per capita in 2012. This reduction was after a ban on landfilling of organic material in 2005 (Valavanidis & Vlachogianni 2015), as illustrated in Table 5.2.

Table 5.2

Amount of landfilling dropping from 2004-2012 in Sweden

Year	Amount landfilled per person
2004	42 kg
2005	23 kg
2012	3 kg

Source: Valavanidis & Vlachogianni (2015).

5.1.2.4 The Packaging and Packaging Waste Directive 2818/852/EC

This legislation sets the minimum packaging weight at 60% and the minimum and maximum weight of packaging material to be recycled. It aims to prevent packaging waste generation and its environmental impact and promote further recycling through recycling targets (Pouikli, 2020). The directive prescribes requirements for preventing, reusing and recovering for packaging waste. All the states are to ensure that all packaging complies with the needed requirements. This directive takes after the producer responsibility principle.

5.1.2.5 The Single Use Plastic Directive (Directive 2019/904)

It directs the prevention of impact of certain plastic products on the environment, which aims to prevent plastic consumption for certain plastic products. It also lists PET bottles, plastic cutlery, food containers, packets and wrappers, plastic straws, and beverage containers (Del Castillo, 2008).

5.1.2.6 The Plastic Bags Directive (Directive 2015/720)

This legislation was amended to the Packaging and Packaging Waste Directive and was embraced for prevention against utilizing lightweight plastic bags. However,

the Commission failed to set targets for reducing lightweight plastic bags and left it up to member states to decide how to reduce them (Del Castillo, 2008).

5.1.2.7 Legal Framework Concerning Cleaner Production and Circular Economy

Cleaner production (CP) aims to reduce pollution intensity and its environmental impact. It improves process efficiency, products, and service quality. The excess material is recycled back into the process. The EU has been actively promoting CP practices in its member states. At the European level, although there is no legislation explicitly concerning CP, the Integrated Pollution Prevention and Control (IPPC) Council Directive 96/61/EC promotes the adoption of CP practices. In Eastern Europe, carbon dioxide and sulfur dioxide emissions were reduced due to CP Projects by 52,500 and 1,916 tonnes, respectively, from 1998 to 1999 (Kusena et al., 2014). All this points to a reduction in pollution levels. In Lithuania, the CP methodology was introduced in 1993, addressing a reduction in air pollution and effective use of resources, and it was the most successful program.

5.1.3 Waste Collection, Disposal, and Penalties for Non-Compliance

The EU waste regulations provide for separate waste collection such as plastics, paper, metals, and waste oils. The EU has recommended measures to improve and expand the separate collection of waste across municipalities, including targets, financial incentives, and sanctions (Taušová, 2019). Waste is collected regularly. The high waste collection is characterized by hygienic practices. The city councils are capacitated with enough manpower, bins, and refuse trucks for waste collection. The bins and trucks are adequate to collect the required waste. It has been evidenced that there is adequate waste collection in the EU.

In Europe, energy recovery is the most used way to dispose of plastic waste, followed by recycling. The most harmful option for the environment and people's health is simply disposing of waste (EP, 2021); hence, waste is converted to energy and recycled. According to statistics from 2021, 49% of all municipal waste in the EU is recycled or composted. The EU has set a target of 60% for the reuse and recycling of

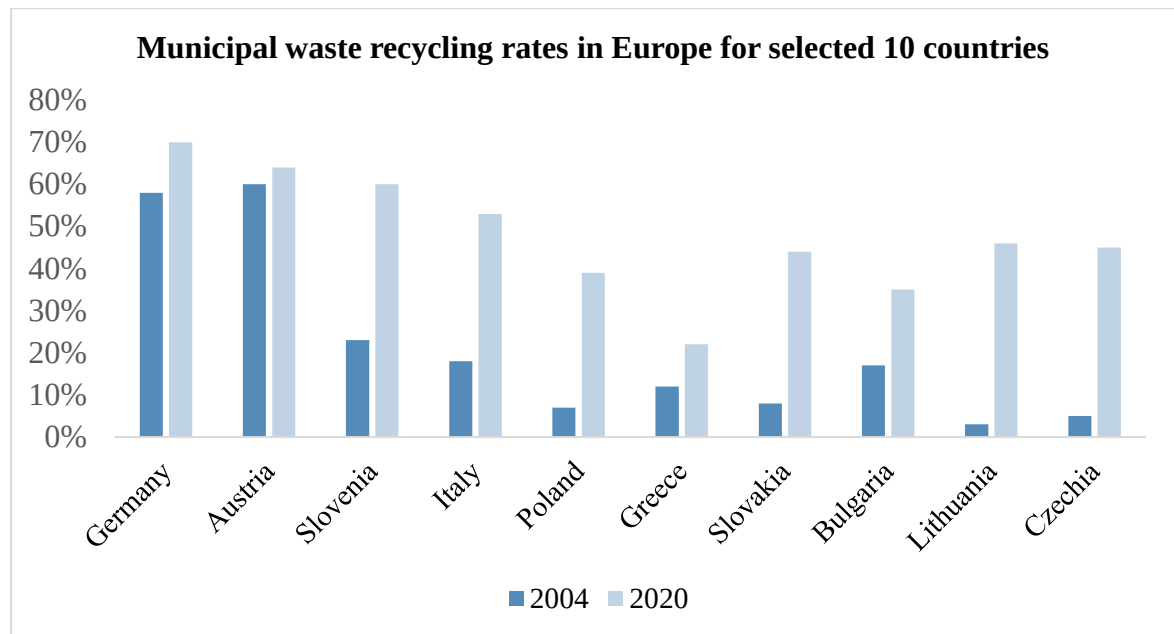
municipal waste by 2030. Landfilling is almost non-existent in most countries like Bulgaria, the Netherlands, Denmark, and Sweden.

As penalties for non-compliance, member states are charged high fines and prosecuted if they fail to comply with waste regulations. The EPR has an obligation that the waste producers meet the cost of producing the waste. The PPP ensures that polluters pay for the pollution they have done to the environment, and the penalties are stiffer (Parliament, 2021).

5.1.4 The EU Waste Policies Successes

The recycling rates have been steadily growing. Around 55% of all waste was recycled by the EU except for primary minerals in 2016, compared with 53% in 2010 (Eurostat, 2019). Recycling packaging waste surpassed 67% in 2016 compared with 64% in 2010, whilst 2016 plastic packaging surpassed 42% compared with 24% in 2005. In 2017, the Municipal waste recycling rate was 46% compared with 35% in 2007 (Eurostat, 2019). The EU's average recycling rate for municipal waste almost doubled from 27.3% in 2000 to 49% in 2021. Five member states recycled more than half of their waste: 71% in Germany, 60% in Slovenia, 57.8% in the Netherlands, 55.3% in Luxembourg, and 53.3% in Belgium (European Commission, 2023). The EU waste policies have been considered efficient because of the targets and some of them being achieved.

Figure 5.2 below shows increased municipal rates in Europe between 2004 and 2020. All the selected ten countries have shown a rise in recycling rates between 2004 and 2020. Lithuania shows the most tremendous rise in recycling rates between 2004 and 2020, followed by Czechia, and the slightest increase was experienced by Germany, although it has the highest recycling rates. This increased rate undoubtedly shows that EU waste management policies are effective and successful.

Figure 5.2*Increased Recycling Rates in Europe*

Note. Redrawn from ‘Municipal waste recycling rates in Europe by country’ by the European Environment Agency. https://www.eea.europa.eu/data-and-maps/daviz/municipal-waste-recycled-and-composted-#tab-chart_7.

The Extended Producer Responsibility legislation has generally achieved expected downstream impacts and resource benefits, reducing the volume of waste headed for landfills and incinerators and reducing virgin materials use. This strategy has contributed significantly to plastic waste prevention (Pouikli, 2020).

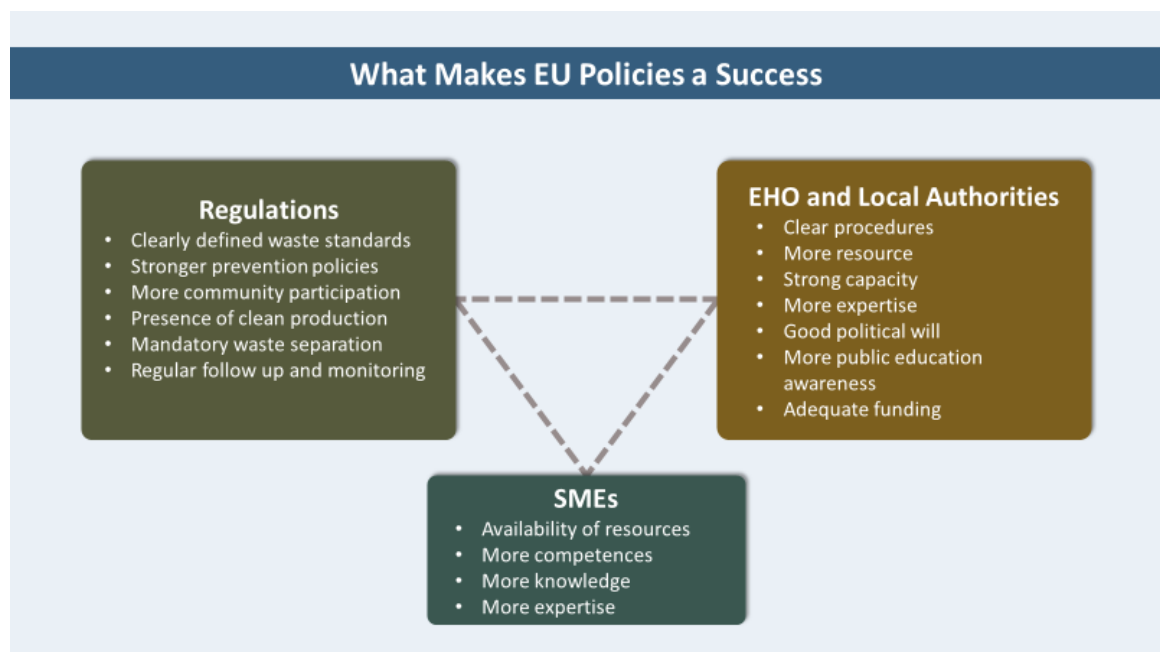
Figure 5.3 below shows what makes EU policies a success. The EU waste policies are clearly defined, meaning the regulatory framework has clear roles and regulations for the people. People know the roles that they are supposed to assume. There are more robust prevention policies, meaning that the regulations are preventive; for example, the WFD emphasizes that it is mandatory for industrial installations to have environmental permits based on needed necessities. Strict requirements are laid down by the landfills directive to prevent and minimize their harmful effects on the environment. The average EU landfilling rates fell significantly, showing the

effectiveness of the policy. More community participation in cleaner production was adopted under a new circular Economy Action Plan in 2020. There is mandatory separation, regular follow-ups, and close monitoring with regulations.

The other factor that makes EU policies successful is good political will. The governments are supportive of waste policies. More money is allocated towards waste management (Bourguignon, 2015). The Environmental Health Officers (EHO) and local authorities enable the EU regulation to succeed. The procedures are clear, and their restrictions are strict (Valavanidis & Vlachogianni 2015). They have more resources, strong capacity in terms of equipment, refuse trucks, bins, and staff, more expertise, good political will, more public education awareness, and funding (World Bank, 2012). The SMEs' adequate resources, competencies, knowledge of their work, and expertise make it possible for the EU waste policies to succeed (Mitchell et al., 2011).

Figure 5.3

What makes EU policies a Success



5.2 Waste Management in Zimbabwean Municipalities

According to Jerie (2013), Zimbabwe lacks an overall waste act providing an integrated waste management approach, but an encompassing legal framework exists in rural and urban areas. The principal statutes governing MSWM in Zimbabwe are the Environmental Management Act [Chapter 20:27], the Public Health Act [Chapter 15:09], the Urban Councils Act, and the Harare City By-laws (Jerie, 2013). See Chapter 2 (section 2.1) for full details of the acts and measures related to MSWM.

5.2.1 The Historical Context and Evolution of Waste Management Practices in Zimbabwe

The Zimbabwean waste laws date back to the colonial period. During the Colonial era, many African countries inherited the legal system and statutes from their colonial rulers, and Zimbabwe was no exception. The laws were established during colonial rule, and these frameworks remained in place after independence. The Urban Councils Act dates back to 1891, when the Salisbury Sanitary Board was formed (Wekwete, 1989, as cited in Mapuva, 2010). Subsequently, several amendments were made to the Act. After independence amendments to the Urban Councils Act 1973, Chapter 14 removed racial discrimination on tenure and representation in urban areas. The involvement of former local governments has seen the enactment of the Urban Councils Act in 1980, which was amended several times (Mapuva, 2010). The by-laws for waste management can be traced back to 1948. The Salisbury (Waste Management) of 1979 repelled the Salisbury Sanitary and refused removal in 1953 and 1978. These later by-laws and the Anti-litter by-laws of 1981 are the most essential MSWM currently used in Harare.

The Public Health Act in Zimbabwe was enacted in 1924 and commenced in 1925. The Act was adopted from the English law on Public Health, aiming to create the legal framework for protecting public health in Zimbabwe (TARSC & PHAB, 2014). The reason behind adopting the English laws was that they covered a wide range of matters affecting public health. Zimbabwe looked to the United Kingdom for inspiration in shaping its waste management practices because it has well-established practices, including recycling, waste reduction, resource efficiency, and circularity

(Nyakudya, 2022). However, Zimbabwe's alignment with the UK waste management regulations faced challenges due to differing contexts, cultures, preferences, societal expectations, and industrial perceptions. The alignment failed due to resource constraints, lack of technical expertise to develop comprehensive waste management systems, poverty and attitudes, and lack of capacity (Bere, 2020).

The Public Health Act was enacted in 1924 and commenced in 1925. The Act was adopted from the English law on Public Health, aiming to create the legal framework for protecting public health in Zimbabwe (Training and Research Support Centre: TARSC, Ministry of Health: MoH & Public Health Accreditation Board: PHAB, 2014). The administration of the Act is assigned to the Ministry of Health and Child Welfare. It aims to prevent diseases and health risks and control activities that pose health problems (Government of Zimbabwe, 2002).

The Environmental Management Act [Chapter 20:27] (EMA) is the supreme environmental law of the country. It was enacted in 2002 to become the principal law that harmonized the scattered pieces of legislation. It ensures sustainable management, preservation, conservation, and protection of natural resources and prevents environmental degradation and conservation. Table 5.3 demonstrates the timeline of the MSWM regulations development in Zimbabwe.

5.2.2 The Zimbabwean Regulations Framework

As mentioned earlier, the Environmental Management Act [Chapter 20:27], the Public Health Act [Chapter 15:09], the Urban Councils Act, and the Harare City By-laws are the principal statutes governing MSWM in Zimbabwe (Jerie, 2013). Here, the author will analyze the existing laws concerning the same aspects presented in the EU legislative frameworks.

Table 5.3

The Historical Context and Development of Waste Management Legislations in Zimbabwe.

Year	Waste Policy
1891	Urban Councils Act
1924	Public Health Act
1948	By-laws on waste management. Salisbury sanitary and refuse removal.
1973	Urban Councils Act Amended
1979	Salisbury (Waste Management) By-laws
1981	Anti-litter By-laws
2002	Environmental Management Act [20:27]

5.2.2.1 General Waste Framework

Laws concerning the general waste framework comprise the EMA [Chapter 20:27], the Public Health Act, the Harare By-laws, and the Urban Councils Act. The EMA [Chapter 20:27] is the primary legislation for formulating environmental quality standards and plans. It monitors and regulates waste management activities. Policies and programs for all forms of pollution are to be coordinated and complied with. It also embraces the polluter pays principle and emphasizes waste disposal and the waste holder, but it does not promote extended producer responsibility (EPR). On the other hand, the Public Health Act, the Harare By-laws, and the Urban Councils Act allow authorities to take legal and practical measures concerning particular areas to keep them clean all the time. It stipulates penalties to be paid by persons failing to comply with regulations

5.2.2.2 Waste Treatment Operations

EMA [Chapter 20:27] stipulates that waste must be treated before disposal. For instance, the SI 6 2007 regulates effluent and solid waste discharge into the environment. It requires that effluent and solid waste be treated before disposal to ensure that it does not cause harm to the environment. The SI 10 of 2007 provides for

the management of hazardous waste. It requires the hazardous waste to be treated before disposal to minimize the risk of harm.

5.2.2.3 Legal Aspects Related to Landfill

EMA [Chapter 20:27] states that all waste must be taken to landfills, and all landfills must meet the standards and be properly engineered. However, in Zimbabwe, landfills are failing to meet the standards.

5.2.2.4 Legal Aspects Related to the Packaging and Packaging Waste

SI 98 of 2010 prevents for the manufacturing and importation of packaging plastics of a wall thickness of less than 30 micrometers. The Plastic Packaging and Plastic Bottles (Amendment) Regulations (2012) amended the SI 98 of 2010 by adding the responsibilities of an establishment to take all measures available to it for (i) recycling, ii) prevention, iii) reuse, and iv) disposal in an appropriate manner.

5.2.2.5 Legal Aspects Related to Single-Use Plastics

SI 98 of 2010 banned the use of polystyrene food containers in 2017 and other single-use plastic products. However, there is not much information on the specific laws governing single-use plastics

5.2.2.6 Legal Aspects Related to Plastic Bags

SI 98 of 2010 spells out regulations on the use of plastics. It states that using banned cheap plastic carrier bags attracts a fine of US \$5000 or a one-year jail term. Zimbabwe banned the use of Kaylites. However, the regulations are partial since they did not call off entirely from the system but gave minimum restrictions.

5.2.2.7 Legal Framework Related to Cleaner Production and Circular Economy

Currently, Zimbabwe's regulations are based on the traditional linear approaches to waste management. Zimbabwe has yet to embrace a circular economy to minimize environmental production impacts. The circular economy advocates for sustainable production, reasoned consumption, and efficient waste management.

Zimbabweans need to nurture a proper waste processing culture in the mindset to adopt and understand that waste is a valuable resource. Circularity is yet to grow in the Zimbabwean context. Waste generators need to be more aware of the potential value of waste materials, while producers need to create incentives for consumers to adhere to waste regulation policies set and enforced by authorities (Brendzel-Skowera, 2021). The gaps in waste management can be best closed if a country adopts a circular economy. However, the Zimbabwean circular economy has been hindered by insufficient resources, political unwillingness, and non-involvement of the public (Nyakudya et al., 2022).

The primary goal of CP is pollution prevention by eliminating or reducing waste or emissions while increasing organizational profits. Programs related to CP have been initiated in Zimbabwe with the assistance of international organizations through information exchange and capacity building. However, it was noted that most CP programs were shortlived and donor-funded (Kusena et al., 2014). A lack of adequate regulation pressure has hindered successful implementation, lack of market incentives, and lack of cleaner production technologies (Kusena et al., 2014).

Table 5.4 briefly summarizes the waste frameworks between the EU and Zimbabwe.

Table 5.4*Comparison between the EU and Zimbabwean Waste Frameworks*

	EU MSWM regulations	Zimbabwean MSWM regulations
The general framework	- Waste Framework Directive - It emphasizes and takes into account the prevention, PPP, and EPR	EMA [Chapter 20:27] gives the general waste framework. Policies and programs pertaining to all forms of pollution are to be coordinated and complied with. It takes into account the PPP.
Waste Treatment Operations	Waste must be treated before disposal	Waste must be treated before disposal
Legal aspects related to landfills	All landfills meet the required standards. They should be maintained and engineered.	All landfills should be engineered and meet the required standards.
Legal aspects related to the packaging and packaging waste	Strict legislation sets the minimum packaging weight at 60% and the minimum and maximum weight of packaging material to be recycled	There is no strict legislation on packaging and packaging waste.
Legal aspects related to single-use plastics	Strict ban on the use of single-use plastics	There is no strict legislation on the use of single-use plastics
Legal aspects related to plastic bags	Strict legislation on targets set on the maximum and minimum set standards to be complied with	No strict legislation. Prohibition on the manufacture or importation of plastic packaging
Legal Framework Related to Cleaner Production and Circular Economy	- Cleaner production is long-lived and supported strongly by the government. - The circular economy has grown widely in the EU and has become a defining feature of the EU's economy through the 2020 Circular Economy Action Plan.	- Cleaner production is short-lived and dependent on donors - Circular Economy is yet to grow in Zimbabwe. It is hampered by a shortage of resources.

5.2.3 Waste Collection, Disposal, and Penalties for Non-Compliance in Zimbabwe

There is inefficient and erratic waste collection in Zimbabwe, with variable service levels and poor and unhygienic operating practices. The low waste collection levels and rudimentary disposal methods are a cause for concern since they have triggered open dumping. Most city councils lack the capacity to remove waste regularly, particularly inadequate refuse trucks. It has been revealed that there is inadequate waste collection, as evidenced by heaps of uncollected solid waste in many cities of Zimbabwe. The few bins provided as receptacles for collection do not match the vast amounts of waste generated and have left enterprise operators with no other alternatives but to throw waste on any vacant land.

In most cities, waste collection is, on average, done per week and daily in areas where more waste is generated, as illustrated in Table 5.5. However, due to resource constrictions, waste collection is irregular and infrequent. In a survey by TARSC, deficient solid waste services were found in Harare (Tsiko & Togarepi, 2012). The Harare city council suspended door-to-door refuse collection due to the fleet of vehicles, which was no longer functional. It was confirmed with this study that, in particular, the Harare City Council Waste Management Department has poor equipment to manage domestic refuse properly.

Table 5.5

Harare's Solid Waste Collection Frequency Plan

Sector	Waste collection frequency plan
Household	Once a week
Industrial sites	Once a week
CBD	Daily
Market place	Daily
Hotels	Daily
Hospitals	Once a week
Schools	Once a week
Colleges	Once a week

Source: Tsiko and Togarepi (2012)

Zimbabwe utilizes the least desired solid waste management hierarchy, including open dumping, burying, burning, incineration, landfilling, and composting. Waste disposal and waste treatment are dependent on conventional ways. The commissioned disposal sites are managed as open dumps instead of sanitary landfills (Shabani & Jerie, 2023). The uncontrolled dumps create environmental hazards, cause remarkable public health threats, and affect the land. Tsiko and Togarepi (2012) point out that at least 70% of waste is indiscriminately dumped at open dumpsites, 90% of which do not meet the required standards.

The 3Rs (recycling, reuse, and reduction) approaches are still in the infancy in Zimbabwe. Approximately 90% of waste generated in Zimbabwe is disposed of legally and illegally (Mandeverere & Jerie, 2018), with only 10% recycled. Waste in Zimbabwe is therefore taken as a useless product. Waste is disposed of improperly in unengineered landfills.

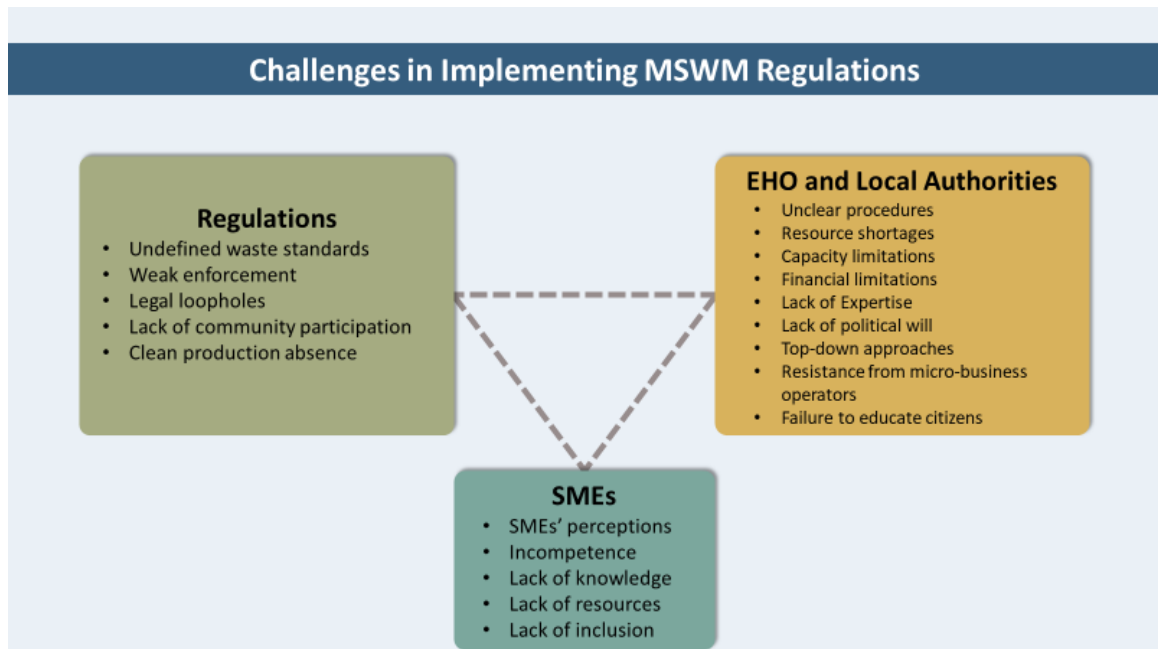
SI 6 of 2007 uses the PPP to regulate solid waste and effluent. The waste generators are to be responsible for their waste; hence, they are supposed to pay. However, this principle does not work since the fines are too low to secure compliance; the polluters find it better to pay than to put the measures in place. The charges are set in stages, with stage 1 being the lowest offense level at \$5, while stage 14 is the highest level of offense at \$5000 (Table 5.6). Stage 14 mainly penalizes large companies for accidents such as oil spills. Although the fines are too low compared to the degradation that will have been caused, there is no political will to implement these laws. There are no environmental courts where environmental offenders can be apprehended. The current courts do not prioritize environmental offenses over other cases.

Table 5.6*EMAg's Scale of fines*

EMA: Scale of fines	
Level	Fine
1	\$5
2	\$15
3	\$30
4	\$100
5	\$200
6	\$300
7	\$400
8	\$500
9	\$600
10	\$700
11	\$1000
12	\$2000
13	\$4000
14	\$5000

5.2.4 Zimbabwean Challenges in MSWM Regulation Implementation

While the EU waste policy frameworks have shown remarkable progress, many challenges are associated with Zimbabwean municipalities' waste management. The researcher analyzed and categorized these challenges into three main groups: two from the main actors, which are the EHO, local authorities, and SMEs, and one from the regulations themselves. Figure 5.4 summarizes the key challenges, whereas Chapter 2 provides the details of these challenges.

Figure 5.4*Zimbabwean Challenges in MSWM Regulation Implementation***5.3 Comparative Analysis Between the EU and Zimbabwe:****Key Differences and Similarities**

The comparison of the EU and Zimbabwean MSWM is discussed here, highlighting the key differences and similarities so that the comparison results and lessons learned can inform decision-makers to improve the MSWM regulations in Zimbabwe.

5.3.1 Differences

The comparative analysis provides clear insights into various aspects of EU regulations that differ from Zimbabwean regulations. Significant differences include the coverage of the policies, the key approaches to waste management, the form of policies, policies on cleaner production, penalties and law enforcement, policies and capacity building, and specific policies regarding plastic waste.

Waste coverage. The first and foremost difference is how the EU policy frameworks have covered a wide range of waste, whereas the Zimbabwean ones touch

on only a limited number of waste types. The EU classifies waste according to the European Waste Catalogue with 839 waste types (SEPA, 2015), while the Zimbabwean provides a few waste types.

Key approaches to waste management. The major difference between the EU and Zimbabwean MSWM regulations is that the EU regulations are based on waste minimization, precaution, prevention, and waste separation at source. Their frameworks put emphasis on circularity, where waste is considered a vital resource and should be recovered, reused, or recycled as much as possible. It introduces an order of preferences for waste management called the waste hierarchy, which utilizes the most desirable options. In contrast, the Zimbabwean regulations are based on traditional linear and end-of-pipe approaches where there is collection and disposition of waste by burning, landfilling, waste burying, and use of open pits (Shabani & Jerie, 2023). The regulations utilize the least desired SWM hierarchy disposal approach. The approach follows a ‘take – make – consume – throw away’ pattern (Pires et al., 2011). The legislation mainly rests on the principle of solid waste disposal and treatment. While the EU emphasizes waste minimization through recycling, recovery, and reuse, Zimbabwean legal frameworks failed to consider solid waste reduction strategies, leading to large volumes of waste finding their way to the dump site.

The waste policy for the EU provides for an improved waste management framework, which stimulates initiatives in recycling and waste separation, limits landfilling, and creates incentives for consumer behavior change (Pouikli, 2020). It also aims to reduce the actual quantity of waste generated and the amount of harmful substances it contains. The extended producer responsibility principle ensures that producers bear financial and organizational waste management responsibility. Contrarily, this is not the scenario in Zimbabwe. MSWM regulations in Zimbabwe do not give manufacturers responsibility for the waste they have produced. The burden is entirely on the consumer.

Form of policies. Most EU directives have definitive targets, intense follow-up, and government support. Resources are to be sufficiently provided for the regulation goals to succeed. Workshops are held to conscientize states on the requirements of waste management. Generally, that is why recycling rates and energy recovery have

increased significantly in EU countries (World Bank, 2012). On the contrary, Zimbabwe lacks policy goals to set explicit targets for MSWM. To make matters worse, there are low levels of awareness, a shortage of resources, and a lack of political will. This has led to indiscriminate and improper waste collection and resulted in the amount of urban waste collected in small and large municipalities decreasing from at least 80% to as low as 30%.

Cleaner production. The EU policies have clear standards for recycling, reusing, and recovery. Cleaner production has been included to a greater extent. Zimbabwean regulations do not have clear recycling, reusing, and recovery standards. They also do not emphasize cleaner production; no regulations on cleaner production have been established.

Law enforcement and penalties. The EU waste policies provide strong enforcement regimes regarding penalties imposed for non-compliance. The fines and taxes are very high in the EU. Solid enforcement measures help compliance with the regulations. The EU has two types of penalties: lump sums and daily fines. The commission sets the minimum lumpsum annually for each member state. For example, Belgium would pay at least 2.7 million pounds for not complying. Denmark and Greece could be fined 1.5 million. Germany, France, and the UK pay at least 10 million pounds depending on the size of the country (Client Earth, 2016). However, in Zimbabwe, most solid waste management penalties are not substantial enough to deter undesired behavior. Additionally, the ZW responsible agencies do not effectively enforce the laws when violations occur.

Policies and capacity building. Waste management policies in the EU are well-funded and fully capacitated. They have adequate funds and equipment for waste management. Heavy budgets and investments are made for waste management. According to EUROPA (2014), 2.45 billion of EU grants were allocated for waste management investments in Bulgaria, Poland, Croatia, and Romania. This is different from the Zimbabwean regulations. Inadequate financial resources have hampered the effectiveness of solid waste management regulations. In Zimbabwe, most city councils lack the capacity to remove waste regularly, particularly adequate refuse trucks. The Harare City Council Waste Management Department, in particular, has poor equipment

to properly manage domestic refuse. The shortage of refuse trucks has resulted in erratic removal of waste. All these challenges of inadequate refuse collection vehicles emanate from economic problems, resulting in indiscriminate waste dumping. For SMEs, in particular, the cost of complying with laws is quite expensive. They cannot fund legal requirements like environmental impact assessments (EIA) and regular refuse removal since they aim to survive through employment creation and income generation (De Gobbi, 2020).

Level of Education. High levels of education characterize the EU waste legislation. People are fully aware of the regulations. Massive campaigns and education are done to all citizens timeously. In Zimbabwe, in contrast, low conscientising of MSWM regulations characterizes Zimbabwean regulations. The people are not fully aware of the regulations. Very few workshops were being carried so they were unaware of some regulations. Thus, some regulations are not clear to them.

Legislative frameworks for specific waste. The EU has further provided a legislative framework to cover packaging waste. The Packaging and Packaging Waste Directive 2818/852/EC of the EU aims to prevent the generation of packaging waste and its environmental impact and promotes further recycling through recycling targets (Pouikli, 2020). It sets the minimum packaging weight at 60% and provides that waste should be recovered or incinerated at waste incineration plants. It sets the minimum and maximum weight of packaging material to be recycled. The manufacturer is held accountable for the packaging. Conversely, the Zimbabwean MSWM regulations have not yet included waste from packaging. Moreover, manufacturers are not responsible for packaging; the consumer is responsible for packaging waste.

In the EU, plastic bag use has been restricted, while Zimbabwean MSWM regulations have not fully addressed it. Although there are no clear-cut regulations on the use and disposition of plastic bags, the Environmental Management Agency has banned the use of kaylites by restaurants but has not been intensified in other areas.

Permits for waste treatment. In Zimbabwe, most industries do not have permits for waste treatment operations or incineration permits; hence, most waste is disposed of untreated. Few industries have proper secondary treatment facilities. There are

irregular inspections done to enforce wastewater treatment. The industries lack the proper treatment facilities due to a shortage of funds. Disposing of polluted effluent into the public sewer poses health and environmental consequences to the environment (Manhokwe et al., 2018). The other cause for industries not having permits for waste treatment is low fines imposed on them; hence, they find it easier to pollute than to comply. In the EU, no member states are allowed to operate incineration plants without permits. The permit content are set clear, and there is a detailed criteria for waste treatment plants. Waste treatment plants are designed and modified to treat wastewater and effluent before discharging (European Commission, 2022). In the EU, mandatory environmental inspections and site visits are carried out often, forcing industries to adhere to regulations. If member states are not respecting permit conditions, enforcement action is taken by competent authorities. The competent authority will rectify any shortcomings experienced pertaining to permits for waste treatment within the shortest time period. EU member states have complied with regulations by obtaining waste treatment permits (European Commission, 2022).

5.3.2 Similarities

Responsible authority. The policy formulation in EU countries like Bulgaria, Croatia, Poland, and Romania, just like in Zimbabwe, is mainly the responsibility of the Ministry of Environment. For both the EU and Zimbabwean MSWM regulations, municipalities are responsible for better service provision and waste management. In both the two, municipalities are mandated to ensure regular domestic waste collection and transportation to the landfills.

Lack of incentive. A lack of incentives for complying with MSWM regulations has been similar in the EU and Zimbabwean. In the EU context, incentives have not been applied across the EU countries. This has been attributed to a lack of will. In the Zimbabwean context, it is attributed to the lack of funding. In Europe, there are few incentives to comply with waste legislation to promote improved environmental attitudes. This is also the same scenario in Zimbabwe. SMEs have lamented that they are not incentivized to comply with MSWM regulations (Cecere et al., 2020). However, the EU member states introduced pay-as-you-throw (PAYT) to incentivize residents to divert waste streams typically created by municipalities to particular collection areas

(Pires et al.,2011). In the UK, the chief reason behind the lack of compliance is a lack of involvement of people and stakeholders in policy-making procedures. This is also the primary cause of non-compliance by SMEs to MSWM regulations in Zimbabwe. It is a top-down approach that is also common and has created resentment amongst the people.

Top-down approaches. A top-down approach exists in both contexts, where the public is not involved in decision-making.

Polluter Pay Principle. The other similarity is that they have the PPP in both the EU and Zimbabwean contexts.

Table 5.7 summarizes the critical points of differences and similarities discussed above.

Table 5.7

Comparison Between the EU and Zimbabwean MSWM Regulations

	EU MSWM regulations	Zimbabwean MSWM regulations
Key differences		
Waste coverage	The EU has a well-established comprehensive waste management system that classifies waste according to the European Waste Catalogue with 839 types.	Zimbabwean waste management is less developed and less comprehensive. The system is still in its infancy, with a few types of waste addressed.
Approaches Targets	Emphasize circularity; waste is considered a vital resource.	Still based on the traditional linear approach, waste is considered something to be rid of.
	Based on principles of precaution, prevention, and rectifying pollution at source.	Rest on principles of make and dispose.
	Emphasize waste reduction.	Emphasize end-of-pipe solutions.
	Emphasize waste minimization through recycling, reuse, and recovery.	Emphasize landfilling, open dumping, burying, and incineration.
	Manufacturers are held responsible for the waste.	Consumers and waste generators are held responsible for the waste.
	There are definite targets for waste management regulation.	There are no set targets for waste management regulations.
Form of policies	Waste policies are in the form of directives, expectations, and ways forward.	Waste policies are in the form of Acts and By-laws.

	EU MSWM regulations	Zimbabwean MSWM regulations
Clean production	• They have clear standards for recycling, reusing, and recovery. • Cleaner production has been included to a greater extent.	• Do not have clear standards for recycling, reusing, and recovery. • Cleaner production has not been included.
Law enforcement and penalties	• Vigorous law enforcement and heavy penalties.	• Weak law enforcement and undeterred penalties.
Policies and capacity building	• The frameworks direct the local authorities to provide adequate refuse trucks, bins, funds for the workers, and expert labor. • They have adequate resources to implement waste management regulations.	• The framework does not direct local authorities to provide adequate refuse trucks, bins, funds for the workers, and expert labor. • They do not have adequate resources to implement waste management regulations.
Level of education and participation	• Campaigns and education are done for all citizens. • There is more participation from private players.	• Very few workshops were being carried out. • There is limited private participation.
Legislative frameworks for specific waste	• Restriction of plastic bags	• No clear cut on the use of plastic bags
Industrial waste treatment permits	• They have industrial waste treatment permits.	• They do not have industrial waste treatment permits.
Key similarities		
Responsible Authority	• The Ministry is responsible for policy formulation, and the municipalities are mandated to ensure regular domestic waste collection.	• The Ministry is responsible for policy formulation. The municipalities are mandated to ensure regular domestic waste collection.
Incentives	• Lack of incentives	• Lack of incentives
Public involvement	• Uses top-down approach	• Uses top-down approach
Use of Polluter Pays Principle	• Use the polluter pays principle.	• Use the polluter pays principle.

5.3.3 Challenges, Opportunities, and Strategies to Adapt the EU MSWM to Zimbabwe

The infrastructure and technology gap is one of the challenges faced by the EU and Zimbabwe. The EU has a well-established waste management infrastructure, advanced technologies, and efficient systems (UNEP, 2018), while Zimbabwe lacks adequate waste collection, recycling, treatment, and disposal mechanisms. In a similar fashion, the EU has strict waste management regulations, while Zimbabwe's policies

are weak and lack effective implementation (Makwara & Magudu, 2013). Furthermore, Zimbabwe suffers financial constraints in implementing sustainable waste management practices that require colossal investment (Bere, 2020), unlike the EU, which has more funding mechanisms (UNEP, 2018). It is further limited by socio-economic differences affecting waste management practices between the EU and Zimbabwe. Cultural attitudes differ. Zimbabwe's informal sector is significant, but formalizing it is difficult (Hassan et al., 2017). A lack information on recycling and waste reduction rates characterizes the Zimbabwean MSWM. This shortage hampers knowledge transfer.

However, comparing the EU and Zimbabwe MSWM regulations opens a wide range of opportunities. Since the EU has implemented circular economy practices such as waste recycling and reduction, knowledge transfer will help Zimbabwe transition toward a circular economy emphasizing resource efficiency and minimizing waste (Nyakudya, 2022). The EU has successfully implemented waste-to-energy technology, which can help Zimbabwe to emulate the EU and promote energy recovery in the country. By transferring knowledge of these technologies, Zimbabwe can learn the best practices and governance models from the EU to improve its waste management systems. According to Tabani (2023), collaborative programs can facilitate training and capacity building for Zimbabwean professionals. Expertise in waste sorting, recycling, and sustainable waste management practices can be shared through capacity building. Nyakudya (2022) asserted that knowledge transfer will result in new technologies, waste reduction methods, and better sustainable practices.

In order to successfully adapt elements of EU MSWM regulations to Zimbabwean-specific contexts, several measures need to be drawn. Advantageously, Zimbabwe has waste management regulations such as EMA, Public Health Act, Urban Councils Act, and Harare Waste Management By-laws. These regulations can be revised to fully embrace sustainable practices. The EU's circular economy principles emphasize resource efficiency, internalizing environmental costs, and a closed-loop system. The government and other stakeholders, like policy practitioners, should implement policies, initiatives, and legislation for the circular economy. Zimbabwe can adopt similar strategies by encouraging recycling and waste reduction and emphasizing them in Zimbabwean waste regulations.

There is also a need to strengthen the financial base, which can be done by collaborating in new ways with private organizations and companies that can provide them with the financial backing required for efficient service provision (Tsiko & Togarepi, 2012). The government should encourage banks to make loans available to the city councils for waste management initiatives. According to Muvoti (2020), regulatory and fiscal incentives are needed to stimulate circular thinking, such as implementing compostable and biodegradable materials. The government can introduce a mandatory tax on all waste disposal to push the public to recycle (Muvoti, 2020). The government should allow councils to charge fees and rates in foreign currency since councils cannot meet the demands as revenues are being paid in local currency which loses value each time.

Local authorities should receive funds to improve their waste management service delivery. One of the success stories in the EU in waste management is holding manufacturers accountable for their products. The Zimbabwean government can adapt this strategy to suit its context by making manufacturers design their products with reuse and recycling in mind and become responsible for their waste. Zimbabwe lacks a stand-alone waste management policy; hence, it should have a comprehensive one that streamlines efforts and addresses gaps and overlaps, promoting more attention to problems. Since there are different types of solid waste treatment and recycling, Zimbabwe should choose their favorite based on different factors such as income, waste characteristics, and the primary purpose of waste treatment (Ntagisanimana et al., 2020).

More significantly, there is a need for strong community engagement and awareness about waste management. Local communities should be involved in waste collection and clean-up initiatives. There is a need for a multi stakeholder approach followed by policy instruments to ensure that waste management becomes a public and private sector.

5.4 Comparative analysis between African MSWM regulations and the EU²

In Africa, strategies and waste policies have been created in addition to the available legislation and policies, which are country-specific (UNEP, 2018). According to Bello (2016), the management of waste in Africa is a significant problem that requires serious consideration. In order to curb waste management problems, several countries in Africa are part of multi-lateral Environmental Agreements (MEAs), which are essential in protecting the environment and human health. Some of the agreements include the Basel Convention (1992), the Bamako Convention, the Convention on Marine Pollution, the Minamata Convention on Mercury (2013), the Stockholm Convention, and the United Nations Framework Convention on Climate Change (1992) (UNEP, 2018).

The African Union's Agenda 2063 aims at the socio-economic transformation of the African continent. It outlines goals that are to be achieved in the first ten years. African countries should recycle at least 50% of their waste.

African countries signed the Libreville Declaration on Health and Environment in Africa 2008 on 29 August 2008 in Libreville Gabon. It reaffirms African countries' commitment to implementing the Bamako Convention on the ban of importation of hazardous waste. The East African strategy provides goals for 2011/12-2015/16 including specific targets to be achieved; however, the approach has seen the absence of effective legislation and a shortage of funds for waste management. According to Godfrey et al. (2019), Rwanda in 2008 and Kenya in 2017 managed to successfully implement a total ban on the use of plastic bags.

Even though most African countries ratified the MEAs on waste management, they were not mastered into national laws because of competing needs (UNEP, 2014). According to Godfrey et al. (2008), although several policies are already in place in Africa, it remains unclear if the introduced policies are being practiced or remain on paper. Most African countries focus on waste management; however, there are several

² This part was not initially included in the study's objectives but was suggested by the examiners to be added. Thus, it may not address any of the research's objectives.

factors that hinder waste management. According to UNEP (2018), waste management problems are worse in African countries due to weak enforcement of legislation, weak governance, poor attitudes, political unwillingness, poor services, and corruption (UNEP, 2014). According to Godfrey et al. (2008), although several policies are already in place in Africa, it remains unclear how these have been translated into action and what progress has been made toward achieving their objectives and commitments. Most African countries dictate how waste should be managed, but many factors constrain the waste management system. According to UNEP (2018), waste management problems are worse in African countries due to weak governance, institutional capacity to support improved waste management in African countries, weak legislation, lack of enforcement, low public awareness, negative attitudes, poor state of services, political instability and corruption (UNEP, 2018). The problems are further exacerbated due to inadequate and malfunctioning operational equipment, lack of adequate public participation, lack of knowledge about waste recycling, and fragmentation in legislation (UNEP, 2018). The same literature stated that the policies show that, at least on paper, there is political commitment to improve waste management at a continental level in Africa. Country examples include deficiencies in financial resources, technical and skilled workforce, public awareness, and public cooperation, which are significant contributors to the failure of waste management policies in Botswana (Mmereki et al., 2015). Reasons for failure of waste management policies in Ghana include lack of enforcement, transparency, and monitoring mechanisms (Godfrey et al., 2019).

On the contrary, the EU has applied successful and well-functioning waste management systems because of advanced legislation that integrated waste management operations during collection and disposal. They have adopted zero-waste policies to benefit the environment. It was a success due to the enabling environment of strong political will, active participation of public and private players, stronger capacitation, and higher levels of knowledge (UNEP, 2018). One of the success stories of environmental policy in Europe is the increase in municipal waste recycling rate. The European Environment Agency countries achieved an average total recycling rate of 33% in 2014 compared with 23% in 2004 (EEA, 2016). According to statistics from 2021, 49% of all municipal waste in the EU is recycled. The EU has set a target of 60%

for the reuse and recycling of municipal waste by 2030, of which Germany, Bulgaria, Austria, and Slovenia have already reached and exceeded the 60% target. The rate of landfilling decreased in the EU from 24% in 2017 to 18% in 2020 (European Parliament, 2023).

The emergence of recycling across the African continent is characterized by poverty, unemployment, and socio-economic needs driven by public and private sector design. For example, approximately 70-80% of the municipal solid waste generated in Africa is recyclable, but only 4% is currently recycled (AUDA-NEPAD, 2021).

5.5 Conclusion and Lessons Drawn

In both contexts, it has been noted that comprehensive MSWM legislation exists. For the EU, MSWM policies are in the form of directives, expectations, and ways forward, whereas in the Zimbabwean context, waste legislation is in the form of Acts and By-laws. The EU waste legislation is based on circularity, where waste is considered a vital resource. Vigorous waste legislation enforcement in the EU, coupled with solid capacitation in terms of resources. There are many investments in waste management and strong political will. The directives are mandatory and are applied across the EU. Waste management regulations in the EU are well-funded and fully capacitated. They have adequate funds and equipment for waste management.

The Zimbabwean MSWM regulations follow a traditional linear approach in waste management activities. Waste is regarded as a useless resource, and the most significant percentage of it finds its way to landfills and dumpsites. The implementation and enforcement of laws is weak. Implementation and enforcement are hampered by limited capacity and shortage of resources. There is not much investment in waste management. The budgets are constricted and skewed to other ministries. There is a lack of political will in the Zimbabwean context. The results have shown that local authorities, the Councilors, and the Members of Parliament are very reluctant to address the issues with waste management. Although people are aware of the MSWM regulations, they are not fully aware of all of them. Education and awareness campaigns are done at a low level. The public is not fully conscious of MSWM regulations. The people are not fully aware of the regulations. Monitoring and compliance checkups are

limited. Effective waste management for sustainable development promotes healthy well-being and considers their future. It brings about disease-free environments, and businesses will operate to their total capacity, resulting in more economic development that satisfies the needs of present and future generations.

In the Zimbabwean context, some factors may result in the success of waste management regulations, and factors that may hinder the progress thereof. Massive education and community awareness campaigns may yield the best results if designed and implemented well. Given the ubiquity of knowledge in Zimbabwe, it is highly likely that if the local authorities take it upon themselves and become conscientious, the communities about waste management, waste reduction, and waste recycling are achievable. However, what may hinder Zimbabwe from achieving improved waste management are constrained budgets, shortage of resources, corruption, and political and socio-economic environment. As much as businesses may want to have good practices in waste management, the prevailing environment and culture will influence the practices. Businesses need to invest in employee training in order to empower their employees to take personal action as a way of reducing waste. Employees who are empowered and knowledgeable can come up with innovative waste management ideas. Such employees have best potential to adopt best approaches to reduce waste and are environmentally conscious (Tabani, 2023). If well-designed and implemented, integrated solid waste management systems will promote waste reduction in Zimbabwe (Bere, 2020).

This chapter delved into how Zimbabwean MSWM regulations differed from EU MSWM regulations. The findings from the comparative analysis have shown the contrast between the EU's efficient, solid, and effective waste management regulations and the Zimbabwean traditional linear-approach regulations. Zimbabwean waste policies have slowed its progress due to many challenges, including low levels of educational awareness, weak enforcement, shortage of resources, low penalties, lack of political will, and top-down approaches.

In order to move forward, the Zimbabwean MSWM regulations can be improved by escalating recycling rates, building a solid technical, institutional, and financial base, and developing strong targets to shift from linear strategies to circularity.

There is a need for a more robust, solid institutional, technical, and capital operation base. The Zimbabwean government should allocate a budget to provide adequate operational equipment, waste collection trucks, and refuse bins. There should also be enough funding for waste operation services. Waste management should be part of government investments. This can be done through resource mobilization from private players and donors.

A comparison was also made between African MSWM regulations and the EU MSWM regulations. In Africa, like Zimbabwe, waste management regulations have been threatened by inadequate implementation and enforcement mechanisms, limited resources, and political interference. The EU waste management was a success due to the enabling environment due to strong political will, stronger capacitation, and higher levels of awareness. Therefore, Zimbabwean authorities need encouragement to support a circular economy that includes recycling, reducing, and reusing waste. This can be achieved through intensive and rigorous public campaigns, incentives, and regulations that encourage sustainable production and consumption.

The following section draws lessons on how to improve Zimbabwean MSWM regulations to match those of the EU:

a. Building strong enforcement capacities. This is best done through legally independent bodies that may be incorporated, act on their own initiative, and take appropriate enforcement actions through heavy fees, sanctions, and sanctions.

b. Providing capacity and resources. To successfully implement waste projects, grant funding should be heavily availed to support project preparations and implementation.

c. Increasing private participation in service provision. Private providers should be incorporated to benefit the system. These have brought heavy funding and innovation, as evidenced in the EU.

d. Intensifying recycling rates. Countries like Bulgaria, Romania, Poland, and Croatia have intensified their recycling rates and have immensely increased, leading to a reduction of waste directed to landfills.

e. Investing heavily in waste management. Funds should be available for the successful implementation of MSWM regulations. Countries like Romania, Bulgaria, Poland, and Croatia have had access to large amounts of EU grant assistance and support from European financial institutions.

f. There is a need for a strong institutional, technical, and financial operation base. The government should allocate a budget to provide adequate operational equipment, waste collection trucks, and refuse bins. There should be provision of enough funding for waste operation services. Waste management should be part of government investments. This can be done through resource mobilization from private players and donors.

g. Developing definite targets. There is a need to develop targets for any regulations put in place, and there should be follow-up on the compliance of the targets, as is the case with EU waste directives.

h. There is a need to shift from a linear approach to waste management to circularity, which promotes efficient use of resources characterized by waste minimization and energy recovery. It reduces the consumption of raw materials and allows for more recycling, giving products a second life.

i. There is a need to adopt cleaner production, waste reduction, waste recovery, and reuse methods.

j. Industrial waste treatment permits should be obtained to ensure that disposal of industrial effluents is regulated and the waste is treated in a manner that will not cause environmental harm.

k. To secure compliance, there is a need to provide incentives to individuals or companies to motivate them to continue complying if they comply with the regulations.

l. All the stakeholders should be involved in decision-making pertaining to waste policy formulation and its implementation so that they become the owners of the regulations. Doing so will ultimately increase their compliance. This can be done through massive education and awareness campaigns.

Table 5.8 highlights significant critical points of the proposed improvement.

Table 5.8

Proposed Zimbabwean MSWM Regulations Improvement

Proposed improvement of Zimbabwean MSWM regulations	
Waste coverage	• The regulations should cover a wide range of different types of waste to be inclusive. • The regulations should address all aspects of the physical environment, including critical raw materials.
Approaches	• Circularity strategies must be mainstreamed in waste policies through integrated waste management. • The regulations should be based on prevention and waste minimization. The laws should emphasize recycling, reuse, and recovery. • The regulatory bodies and city council should implement policies and complementary regulations that ensure high-quality waste segregation and collection. Policies should be integrated to maximize sustainable development across regions. • Waste separation should be made mandatory.
Form of policies	• The policies should rest on targets, severe monitoring, and timely reviews. • Targets should be clearly spelled out: these can be yearly targets or after five or ten-year periods. It will enable effective evaluation and assessment. • Records and statistics should be available to track waste management's progress. • There should be a review of regulatory frameworks to support recycling markets.
Cleaner production and circular economy	• The laws should emphasize CP and circular economy. • There should be adequate investment policies on research and development that support CP and circular economy.
Law enforcement and penalties	• The law enforcement should be strong and effective. • The penalties should be punitive enough to secure compliance. For instance, level 10-15 offenses should attract a jail term. Licenses should be drawn from industries and closed if they fail to comply. For smaller industries, charges should start from \$1000, and for large industries, charges should start from \$20000. • The cost of non-compliance should outweigh the cost of compliance.
Policies and capacity building	• The framework should direct the local authorities to provide adequate refuse trucks, bins, funds for the workers, and expert labor through the involvement of the private sector and NGOs. • There is a need to invest in the circular economy by contributing funds towards solid waste recycling. • There is a need for capacity building for enforcement bodies to strengthen enforcement through engagement with other private enforcement bodies. • There is a need for the government to embrace suitable technologies to support sustainable waste management.
Capital Investment	• There is a need for capital investment and operational maintenance budgeting for MSWM infrastructure and equipment. The Ministry should make more funds available to purchase the required equipment and pay

Proposed improvement of Zimbabwean MSWM regulations	
	workers. Funds should be availed on a quarterly basis, and reviews on the adequacy of the funds should be done timeously.
Education and Training	• There is a need for intensive education and awareness programs to change people's attitudes and behavior towards waste management regulations. • Health Officers, waste managers, and decision-makers should be trained in practical aspects of MSWM. • All stakeholders need to analyze, evaluate, and interpret the policies.
Inspections	• There is a need to do a risk-based approach to inspections, targeting activities with a high risk of non-compliance to ensure efficient use of resources. • Regulatory bodies should do regular and routine checkups to ensure compliance with MSWM regulations. • Reports should be availed on the inspections done, and recommendations should be made and complied with to ensure sustainable waste management.
Incentives	• There is a need to introduce enforcement and incentive measures such as the Pay As You Throw (PAYT) system, which incentivizes households to produce less waste and properly separate waste.
Decision making	• Involve all stakeholders when formulating municipal waste programs to ensure their acceptance and increase the chance of success.
Legislative frameworks for specific waste	• Waste policies must be clear-cut. • The law on the use of plastic bags should be clear-cut.

CHAPTER 6

DISCUSSION AND CONCLUSION

This study explores SMEs' perception of compliance with MSWM regulations in Zimbabwe. The results of this study showed insights into what the SMEs have faced, and the analysis showed some factors that could be classified regarding the drivers and constraints associated with Zimbabwean municipalities' waste management regulations. This chapter presents the synthesis of the results and discussions in the previous two chapters. It then outlines recommendations for stakeholders regarding SME waste management. The conclusion and recommendations for future research to be carried out based on this study's findings are presented afterward.

6.1 Discussion on the Constraints and Drivers for the SMEs' MSWM Compliance

Despite governments establishing legislation for waste management, it is clear that putting policies into practice is challenging. According to Nyampundu et al. (2020), regulations do exist in small businesses, but they are less effective in managing waste due to poor implementation of the regulations. The survey and the follow-up interviews confirmed that waste management presents myriad challenges. It was identified from this study that the root of the matter is attributable to several causes: waste generation (throwing instead of recycling), inadequate waste receivers, irregular waste collection, incorrect waste disposal, and insufficient resources to handle these processes altogether. Hove-sibanda (2018) similarly mentioned that the main challenges to compliance with regulations are a shortage of resources, low levels of educational and awareness campaigns, perceptions, lack of capacity, and low levels of technology. This problem identification will lead the researcher to formulate some guidelines to encourage SMEs to practice what the regulations provide for in a later section in this chapter.

Adding to the complexity of this scenario is the diverse spectrum of businesses operating within this sector. From furniture crafting and welding to catering, chemical production, tire repair, tombstone crafting, and retail trade, the range of enterprises leads to a heterogeneous waste generation landscape. Thus, the challenge extends

further when considering the need for specific disposal methods tailored to distinct waste categories, thus amplifying the intricacy of the waste management puzzle.

Another board reason for the SMEs' non-compliance with waste management regulations could be explained here. In the early 2000s, the closing of large companies created high levels of unemployment and an economic downturn in the country, resulting in SME businesses as the only hope of survival (Jerie & Tevera, 2014). Thus, environmental sustainability has received low priority and is the least desired by SMEs since their current objective is profit-making to sustain their living (De Gobbi, 2020). The economic hardships resulted in the government prioritizing other sectors that could improve the financial crisis, resulting in laxity in emphasizing and enforcing environmental responsibilities (Hove-sibanda, 2018). Waste management by SMEs has become highly unsustainable. Waste generation and disposal and their impact on the environment have become a cause for concern (Derhab & Elkhwesky, 2023). About 90% of generated waste in Zimbabwe is disposed of through legal and illegal strategies, with only 10% recycled (Mandeverere & Jerie, 2018). Additionally, Chikowore (2021) remarked that since regulations do not have waste minimization strategies, waste management practices by SMEs are not likely to be sustainable.

The perception survey results indicate a generally high awareness of MSWM regulations but reveal gaps in participation, waste generation licensing, and annual waste management plan preparation. The survey also showed a range of challenges and inadequacies in both the requirements placed on SMEs and the support they receive from authorities in waste management related to infrastructure, waste minimization, waste collection services, and the effectiveness of penalties as a compliance tool.

SMEs reflected on non-compliance with MSWM regulations, including financial constraints, knowledge gaps, time limitations, regulatory clarity issues, and perceived burdensome requirements. However, they also stated their willingness to pay fines for regulatory violations for failing to empty bins in a timely manner. They also appeared to have varying perceptions of waste management monitoring and enforcement effectiveness. In short, SMEs held both positive and negative perceptions of MSWM regulations. While there was recognition of the environmental and cost-effective aspects of the regulations, there were concerns about top-down approaches,

lack of clarity, and inadequate enforcement measures. Besides, financial constraints and budget limitations presented challenges in implementing these regulations.

6.1.1 Constraints

This section discusses the constraints associated with Zimbabwean municipalities' waste management regulations drawn from the document analysis and the survey results.

Low levels of education and awareness. Although most respondents agreed that they were aware of the regulations, the majority concurred that there had been very little education and awareness campaigns done by the regulatory bodies and the city council. This result agrees with Massoud et al. (2017). Almost half of the respondents agreed they actively participate in waste management activities. The low participation could result from the limitations that need to be investigated. Makwara and Magudu (2013) mentioned that low awareness of MSWM regulations has compromised sustainable solid waste management.

Resource Shortages. Resources are needed to ensure that laws and regulations are adequately enforced. Resource inadequacy, poor waste management, and infrastructure remain difficult obstacles to sound waste disposal by SMEs (Jerie & Tevera, 2014). Results from the survey have shown that waste collection is hampered by the few trucks available, resulting in irregular waste collection. This result confirms a previous study by Mafume et al. (2016). SMEs do not have enough receptacles for waste disposal due to a lack of funds. They indicate that the regulations require more capital, yet they do not have the money to prepare yearly waste. The city council has very few waste collectors due to the city council's failure to pay them. Makamba (2022) also pointed out this reason. They also indicated they did not have time for waste management since they are chasing profits and their businesses do not have higher returns.

Ineffectiveness of regulations. The SMEs have pointed out that the MSWM regulations are ineffective since they have not witnessed any waste reduction. This notation is supported by Batista et al. (2021). They rated waste management by SMEs as the worst because waste is dumped everywhere. They further indicated that there

was no recycling or provision of resources; similar results were alluded to by WLSA (2020). They even believed that the MSWM regulations were not sustainable. They reiterated that the current MSWM regulations should promote more recycling, increased education, and heavy penalties.

Lack of incentives. The residents indicated that no incentives were given to SMEs for developing and adopting new environmentally cleaner and more economically efficient technologies because of a shortage of funds and a lack of political will, which agrees with previous studies by Cecere et al. (2020).

Irregular waste collection. The SMEs indicated that the city council waste collection is irregular as they rarely see them collecting waste. They have attributed the irregular waste collection to a shortage of refuse trucks and human resources. The same factors were identified by Jerie and Tevera (2014). SMEs indicated that they do not have anywhere to dispose of their waste except using open vacant land close by, as supported by Mafume et al. (2016).

Weak Enforcement. As enshrined in the EMA, the waste policy states that pollution is an offense punishable by the law. The violation penalty may be in the form of a fine, imprisonment, or both. Results from the survey indicated that if they fail to comply with the regulations, they are fined. However, the fines are very low to secure compliance such that they continue to pollute the environment, confirming the study by Makwara and Magudu (2013). Some complained that the city council visits were erratic, making people reluctant to comply (Jerie & Mandeverere, 2014; Tsiko & Togarepi, 2012).

Legal Loopholes. Some of the environmental regulations do not clearly define the legal conditions. The Public Health Act, for instance, prohibits the public from polluting their premises, but it does not mention premises on which they do not reside (Batista et al., 2021). The SMEs have agreed that they have caused pollution on nearby land and any vacant places. They do not have anywhere to dispose of the waste. Waste collection is irregular; hence, they are left with no option (Jerie, 2013).

Resistance. Negative attitudes toward the inspectorate result in resistance to complying with the standards. The SMEs feel that the regulations are burdensome. The

shortage of resources and lack of clear guidance result in frustration, as alluded to by Massoud et al. (2017). They lamented that they do not get clear instructions from the city council yet are expected to comply. This resistance to changing their behavior may be found in older individuals than younger individuals (Massoud et al., 2017).

Lack of Expertise. The lack of qualified and competent persons responsible for implementing the environmental standards hampers compliance with regulations. The city council authorities lamented that while they are willing to conscientize the public and fully implement the standards, they are crippled since they have a shortage of manpower with expertise. The findings support Mafume et al. (2016) and Abarca et al. (2013), who attributed poor waste management to a lack of skilled human resources to conscientize the public.

The lack of guidance. A lack of clear guidance on what is expected from the SMEs makes them refrain from complying with regulations. UNEP (2013) explained further that SMEs, in particular, do not know what to do, why or how to do it, what to expect from inspectors, their requirements, what they will pay attention to, and how they will react. Some of the regulations are not clear to them. They complained that the inspectors often criminalize them, yet what exactly they should do is unclear.

Lack of MSWM Regulations Education. Theoretically, awareness and participation in something will only be expected from someone who has received adequate education in a particular subject or field, which is supported by Chikowore (2021), who says that the community should take proactive steps in raising awareness in the public on waste management. Triangulation of the data shows that the result could be linked to the council's limited operational capacity to carry out this mandate effectively, as mentioned by Muswema and Oelofse (2016). Again, this could be linked to operational and capacity constraints.

6.1.2 Drivers

SMEs identify various motivations for MSWM compliance but can be focused on two main elements: business profits and environmental benefits. Business profits include business growth, improved SMEs' and public images, enhanced performance, and financial incentives, such as extra income, increased sales, reduced production cost, and increased financial opportunities regarding access to financial help and donor support. The highlighted environmental benefits are reduced waste and contributions to a circular economy.

Motivations for compliance mainly concentrate on financial benefits. Most respondents agreed that complying with MSWM regulations reduces production costs since waste is recycled and minimized through regular waste collection, recycling, increased bins, and heavy fining, in line with studies done by UNEP (2016). McAllister (2015) explained that waste reduction also contributes to a more significant reduction, reduced regular costs, and improved safe and healthy working areas, which enhances their business performance. Hirpe and Yeom (2021) further clarified that increased business performance results in improved public image. When a company has a better public image, it gets extra income. Customers often give greater value to products that have shown commitment to comply with MSWM regulations. Compliance with regulations promotes and improves a company's image. Improving the public's image will help a firm increase sales and gain a significant market share (Starkey 1998). A better public image will also promote a prominent company placement in the market. Some SMEs have noticed improved relationships with the community and public sector, increasing their desire to enhance their ties with customers and suppliers (Purwandani & Michaud, 2021).

Extra income is also obtained by SMEs when they implement MSW regulations. There is a reduction in production costs and increased productivity (Derhab & Elkhwesky, 2023). Implementing MSWM regulations in small businesses helps improve economic resource extraction by decreasing the money required for solid waste collection, treatment, and disposal and creating recyclable markets (UNEP 2013). Although green business practices entail additional expenses, they frequently have observable advantages like decreased material prices and higher earnings

(Čekanavičius et al., 2014). SMEs can also get donor assistance with a competitive market advantage and excellent environmental profile (OECD 2007). Besides, SMEs can benefit through environmental improvements such as tax cuts and government subsidies. Furthermore, complying with MSWM regulations promotes a circular economy (Derhab & Elkhwesky, 2023), which gives waste a second life as a new product, increasing access to finance and helping them get donor support.

There are several causes for non-compliance, as determined by the SMEs. Compliance with waste laws is usually linked to adequate management of resources such as electricity and water. They strongly agreed that their businesses lack resources in terms of finance and time (Mafume et al. 2016). Without financial resources, their businesses cannot function since money is needed to purchase the bins, pay for waste collection, and pay for other requirements (Rademaekers et al., 2011). The lack of time for waste management could be because they focus on day-to-day living since profits are low due to low-scale operations.

SMEs feel the lack of involvement in providing information to make MSWM regulations, signaling that a top-down approach hampers compliance, as mentioned by OECD (2015). This reason could be why the majority have indicated that their businesses are incompetent in waste management. The fact that the SMEs feel that the requirements of MSWM regulations are burdensome is probably a result of them not being involved in decision-making, as McAllister (2015) pointed out. Non-compliance is further exacerbated by unclear regulations, resulting in them not knowing the roles and responsibilities they are supposed to assume.

The actual adherence to MSWM regulations shows a real problem in the management. Although SMEs are required by the regulations to provide waste bins in their complex, only one-third adhere to it. Mandever (2015) also stated similar incidents. The shortage of bins could undoubtedly be attributed to financial constraints, but it is uncertain whether the lack of understanding also contributes to this behavior. Since SMEs do not have proper dumping sites, they dump their waste indiscriminately on nearby land (Makwara & Magudu, 2013; Jerie & Tevera, 2014). This practice creates chain problems, resulting in other pollution.

The SMEs in this study thought the regulations were not inclusive, which could result in them not being involved in waste management decision-making. Makwara and Magudu (2013) also mentioned this in the same light. The SMEs thought regulations did not specify clear roles and responsibilities because they did not know what roles to assume, which agrees with studies by Batista et al. (2021). The split opinions on corrective action on non-compliance might result from corruption and irregular visits by the City Council.

SMEs did not agree that the current regulations promote recycling, showing that recycling is being done but on a low scale, as confirmed by a study by Jerie (2013). Also, the regulations that do not promote waste treatment might make it expensive.

6.2 Lessons learned from the analysis of EU regulations

The comparative analysis between the EU and ZW legislation has provided helpful insight into waste management. Comprehensive MSWM legislation exists in both contexts. It has been noted that the EU MSWM regulations emphasize waste prevention through reduction, recycling, reuse, and recovery. However, the Zimbabwean MSWM regulations emphasize end-of-pipe solutions. According to Di Maria et al. (2018), the most effective approach for waste management is currently based on the 3Rs and is the vital component of integrated waste management. However, developing countries are still greatly affected by uncontrolled dumping, littering, and burning. According to Ferrari et al. (2016), waste management in Europe is shaped by the waste hierarchy principle, which results in effective waste management. This situation contrasts with the African region, which generates less waste but is characterized by open waste dumping and burning due to inadequate resource waste management (Ferrari et al., 2016).

Di Maria et al. (2018) documented a story of successful waste management that has shown that Umbria in Italy has fully implemented legislation that makes it successful, just like other EU member states. Umbria has high recycling rates and high levels of waste separation and collection, contrasted to the West Bank (Palestine), which is characterized by unsafe open dumping, low levels of recycling, and a lack of

adequate awareness, resulting in low performance of the waste management systems. The latter example is the same scenario with Zimbabwe.

The EU regulations frameworks emphasize circularity and introduce an order of preferences for waste management called the waste hierarchy, which utilizes the most desirable options (López-Portillo, 2021). In contrast, Zimbabwean regulations emphasize end-of-pipe approaches where waste is collected and disposed of, the least desired hierarchy disposal approach (Makwara & Magudu, 2013; Shabani & Jerie, 2022; Tsiko & Togarepi, 2012). Zimbabwean regulatory bodies should take a leaf from the EU regulations and follow the most desirable hierarchy waste disposal approach.

Results have shown that law enforcement for EU MSWM regulations is vigorous and the penalties are heavy, while law enforcement for Zimbabwean MSWM regulations is weak and the penalties are unfettering. This may be a characteristic of developing countries, as shown in Di Maria et al.'s (2018) example of the West Bank (Palestine). The author further explained that most West Bank (Palestine) interventions have failed due to a lack of rigorous legislative framework and awareness.

The EU MSWM regulations provide for industrial waste treatment, which is strictly adhered to, whereas the Zimbabwean MSWM regulations are not strict about adherence to waste treatment. According to Ntagisanimana et al. (2021), waste treatment in African countries is affected by the total absence of infrastructure, culture, and low investment in waste management. Despite that, African governments have been called to increase the budgets for waste management.

What is good about the EU MSWM regulations is that they have broader waste coverage, while the Zimbabwean regulations are less comprehensive and touch on only a limited number of waste types. EU waste is classified into several waste types, while Zimbabwe provides a few waste types. The EU's broad coverage has allowed developed countries to manage any waste, while for developing countries, the limited waste coverage has neglected some types of waste (Kumari & Raghubanshi, 2023).

There are high levels of education and awareness of MSWM regulations in the EU, while in Zimbabwe, there are low levels of education. According to Ntagisanimana et al. (2021), low public awareness and lack of enforcement have aggravated poor waste

management. It has been noted that although the Zimbabweans are aware of the regulations, they do not have more details about them since there are low levels of education.

The EU has vital policy goals to set explicit and definitive targets, intense follow-up, and government support. Resources must be sufficiently provided for the regulation goals to succeed (Pouikli, 2020). Workshops are held to conscientize states on the requirements of waste management. Zimbabwe lacks policy goals to set explicit targets for MSWM (Shabani & Jerie, 2022). Zimbabwe should learn from the EU regulations and ensure they have vital policy goals and intense follow-ups on compliance with regulations by individuals and companies.

Additionally, the EU policies have clear standards for recycling, reusing, and recovery, which have helped reduce the amount of waste sent to landfills and enhanced waste recovery (World Bank, 2012). Cleaner production has been included to a greater extent. Zimbabwean regulations do not have clear recycling, reusing, and recovery standards. There is less emphasis on cleaner production; no regulations on cleaner production have been established (Nyakudya et al., 2022). This has resulted in vast volumes of waste being sent to landfills, posed all forms of pollution, and exposed people to different health problems (Shabani & Jerie, 2022).

Furthermore, EU waste policies provide strong enforcement regimes regarding penalties imposed for non-compliance. The EU's fines and taxes are very high (Client Earth, 2016). Member states are mandated to impose punitive penalties. However, in Zimbabwe, most solid waste management penalties are not substantial enough to deter non-compliance (Makwara & Magudu, 2013). The people find it better to pay fines than to comply, and it has compromised waste management in Zimbabwe. This calls for the Zimbabwean government to set heavy punitive laws and not limit them to prosecution. In a similar light, Makwara and Magudu (2013) proposed punitive sentences that are enough to help deter non-compliance.

Waste management policies in the EU are well-funded and fully capacitated (Client Earth, 2016). These adequate funds and equipment for waste management (Di Maria et al., 2018) and a robust political will to support heavy budgets and investments

towards waste management are what Zimbabwe should learn from because, in the Zimbabwean context, there is a lack of political will, skewed budgets and a shortage of adequate resources (Makwara & Magudu, 2013). The Zimbabwean government should ensure adequate financial resources to ensure the effectiveness of solid waste management regulations. The city councils should be capacitated, particularly on refuse trucks, receptacles, and workers, and better salaries for the workers. The same suggestion has been put forward in previous studies, such as McAllister (2015), who stated that there is a need to prioritize waste management through budgeting, cost accounting, and cost reduction, and above all, waste management costs should be internalized in the production, distribution, and consumption phases to promote efficient use and conservation of materials. However, this suggestion seems not to progress as Shabani and Jerie (2022) still venture to recommend the same thing in the publication seven years later.

Zimbabwe should learn from the EU pertaining to education and awareness campaigns. Massive campaigns and education characterize the EU, but they differ in Zimbabwe. According to Nyathi and Togo (2020), an effective policy is hinged on educating the public; there is a need for policy sharing, posters for anti-littering and illegal dumping, and routine monitoring to check on compliance. Yasmeen et al. (2023) added that regular educational campaigns are masterpieces of effective waste management programs. Makwara and Magudu (2013) assert that outreach programs, zero littering campaigns, and seminars are strongholds for a robust waste management program. A study by Tsiko and Togarepi (2012) agreed with this study's finding that Zimbabwe has low conscientizing of MSWM regulations. The people are not fully aware of the regulations. Very few workshops were being carried so they were unaware of some regulations. Zimbabwe should take a leaf from the EU regulations and ensure everyone is taken aboard. Regular educational campaigns should be put in place.

The EU has made progress in waste reduction through massive recycling, waste treatment, sustainable consumption, and energy recovery (Pouikli, 2020). Zimbabwean regulations should take a leaf from the EU by reorienting its waste management regulations towards minimization.

6.3 Recommendations to Improve Zimbabwean MSWM Regulations

Following the study's results and discussions, this section presents recommendations to improve Zimbabwean MSWM regulations. They are constructed particularly for the EMAG, the government, and the Harare City Council.

6.3.1 Recommendation Guidelines for the EMAG

The EMAG is responsible for enabling proper waste management. Thus, for SMEs to move forward more sustainably, they are recommended to implement the guidelines in Table 6.1.

Table 6. 1

Recommendation Guidelines for the EMAG and Monitoring Assessment

Guidelines	Activities	Monitoring Guidelines
<i>Endorse circular economy</i>	• Make the mandatory practice of recycling in the regulations, which should be intensive. • Reusing, recovering, restoring, composting, and other waste recovery methods should be featured prominently to create a vibrant SME ecosystem that is ecologically and environmentally friendly.	• The EMAG should do annual follow-ups and assessments if the practice has been done.
<i>Conduct tailor-made education for SMEs, businesses, and the general public</i>	• Conduct effective and regular ongoing education and awareness campaigns to raise awareness of the MSWM regulations, including cleaner production and consumption for SMEs and the general public. • The program should be tailored to suit the needs of different groups in society so that they are fully aware of the regulations and the impacts of non-compliance.	• Follow up on the number of yearly programs to enhance the understanding of MSWM and cleaner production. • Follow up on the number of individuals, SMEs, and businesses trained annually.
<i>Frequent inspections and monitoring</i>	• Conduct more frequent and consistent inspections and monitoring observations to keep polluters on guard steadfastly.	• Schedule and number of inspections and monitoring per year
<i>Involve SMEs in</i>	• Before issuing any laws and regulations, participation from	• Regular follow-ups on SMEs to ensure they

Guidelines	Activities	Monitoring Guidelines
<i>decision-making</i>	SMEs should be sought, or their situations and concerns should be considered an integral part of the decision-making processes governing waste management.	are abreast of any changes and amendments and that their contributions are considered.
<i>Waste segregation to minimize and reduce waste.</i>	• EMAg should promote waste minimization at the source. • EMAg Provincial managers should provide the necessary education on waste segregation at the source and ensure compliance.	• Follow up on the number of education programs.
<i>Clarify ambiguous regulations</i>	• Clarify ambiguous regulations to help SMEs understand and adhere to environmental laws.	• Regular meetings with SMEs to discuss environmental laws
<i>Promote eco-packaging</i>	• Support manufacturers to change to eco-friendly packaging and product design	• Number of SMEs that have been promoted

6.3.2 Recommendation Guidelines for the Government

The guidelines for the government bodies to move forward regarding SME waste management are listed in Table 6.2.

Table 6.2

Recommendation Guidelines for the Government and Monitoring Assessment

Guidelines	Activities	Monitoring Guidelines
<i>Provide incentives for compliance</i>	• Financial incentives for compliance should be established, such as tax reductions and discounts for compliant SMEs. • Implementing a reward system for the best waste management practices.	• A follow-up by local authorities should be carried out, including financial audits, to ensure no misappropriation of funds.
<i>Allocate sufficient resources for waste management</i>	• The government must prioritize budgetary allocations for management because staffing, waste collection trucks, waste-receiving bins, and designated waste receptors are inevitable factors in effective waste administration.	• A higher budget for MSWM allocated to the local authorities

Guidelines	Activities	Monitoring Guidelines
<i>Improve MSWM infrastructure</i>	- Allocating more space and engineered landfills for SMEs. - Improving waste management infrastructure	EMAg and the City Council should do a follow-up to ensure that all the areas have the required landfills.
<i>Regular environmental law revision</i>	The Zimbabwean government should constantly revise the environmental laws and enforce them through punitive penalties.	Ministerial representatives should do a follow-up to ensure that regular revisions of the laws and high penalties are being given to deter non-compliance.
<i>Provide a waste management framework</i>	The Ministry of Environment should provide a waste management framework for different types of SMEs to serve as industry guidelines.	Such frameworks are created for different types of SMEs
<i>Promote corporate social responsibility</i>	Companies like UNKI, Rio Zim, Zimplats, and other organizations should provide infrastructure for communities in which they operate so that they can recycle and implement other waste minimization programs.	The government can follow up with all the companies to ensure that each company implements waste management in their respective operational areas.
<i>Set aside a national clean-up day</i>	The President has set aside the First Friday of every month as a national clean-up day. This initiative should be taken seriously and should be made mandatory.	The government and the regulatory bodies should do a follow up in communities to ensure that it is being done religiously.

6.3.3 Recommendation Guidelines for the Harare City Council

Since this study area is in Harare City, the guidelines for local authorities, particularly the Harare City Council, were generated as illustrated in Table 6.3.

Table 6.3*Recommendation Guidelines for the Harare City Council and Monitoring Assessment*

Guidelines	Activities	Monitoring Guidelines
<i>Ensure regular waste collection</i>	The City Council should ensure regular waste collection.	Set up a platform that SMEs can record and report irregular waste collection.
<i>Designated adequate landfills</i>	The City Council should allocate adequate landfills to receive waste sufficiently so that minimum residual waste will be left to create micro-environmental pollution at the disposal sites.	The responsible authority should follow up on the number of landfills designated.
<i>Partnerships with private companies</i>	- The local authorities should work with private companies to provide financial backup and source funds for waste management infrastructure. - Some private companies have made loans available to the Harare City Council, which should also apply to all the city councils in Zimbabwe.	Intense auditing of the loans and finances by the responsible authorities should be carried out to ensure that the funds are being used for the intended purpose.
<i>Integrated solid waste management</i>	- The City Council should provide the required infrastructure to allow citizens to separate waste at source and proper waste disposal facilities. - SMEs should be empowered to recycle and compost, and local authorities should render necessary support in conjunction with the Ministry of Environment.	The EMAG should constantly and frequently monitor all activities that generate waste and ensure appropriate measures are taken to minimize waste generation and properly dispose of the waste.

6.4 Conclusion

Table 6.4 depicts the overall study. The study aimed to assess the drivers and constraints for SMEs' MSWM compliance, compare the Zimbabwean MSWM regulations with those of EU countries, and propose recommendations for improved MSWM regulations to foster sustainability. The following methods were used to answer the objectives: quantitative survey research, document comparative analysis, and analysis and synthesis of the study's results.

The results have shown that a comprehensive MSWM legislation exists in SME waste management. However, SMEs have not yet fully implemented MSWM regulations. In other words, there is no link between policy and practice. Waste is indiscriminately dumped in open spaces, burning, burying, illegal dumps, and landfilling.

Table 6.4

Research Summary

Reorienting Zimbabwean Municipal Solid Waste Management Regulations Towards SMEs' Sustainable Management		
Objectives		
1) To assess the drivers and constraints for MSWM compliance by SMEs.	2) To compare the Zimbabwean MSWM regulations with those of EU countries.	3) To propose recommendations for improved MSWM regulations to foster sustainability.
Methods		
Quantitative Survey Research	Document Comparative Analysis	Analysis of the study's results
Results		
DRIVERS - Enhanced business - Improved Public image - Extra income - Cost reduction - Waste reduction CONSTRAINTS - Resource shortage - Resistance - Low levels of - Lack of incentives - Ineffective regulations - Lack of expertise - Legal loopholes	- EU emphasizes circularity and waste reduction. - Policies are in the form of directives, expectations, and ways forward. - Vigorous law enforcement - The framework directs authorities to provide adequate resources - Emphasizes end-of-pipe solutions - Based on the linear traditional approach to waste management.	- EMAg should conduct massive education and awareness campaigns - EMAg should endorse mandatory recycling - EMAg to conduct frequent inspections and monitoring - Government to provide adequate resources - The government should give incentives for compliance - Government should improve waste management infrastructure - Laws should be constantly revised - The city council should ensure regular waste collection - The city council must allocate adequately designed landfills

The survey results indicated a generally high awareness of MSWM regulations but revealed gaps in actual participation, licensing for waste generation, and the preparation of annual waste management plans. The survey also showed a range of challenges and inadequacies in both the requirements placed on SMEs and the little support received from authorities in waste management related to infrastructure, waste minimization, waste collection services, and the effectiveness of penalties as a compliance tool.

Regulatory bodies such as EMAg have failed to do effective monitoring and frequent inspections for SME compliance with MSWM regulations due to lack of knowledge, low capacity, shortage of resources, shortage of manpower, and lack of commitment. SMEs have not complied with MSWM regulations due to weak enforcement of laws, legal loopholes, financial limitations, local authorities capacity limitation, lack of political will, lack of community participation, lack of expertise, and SMEs' perceptions.

In order to overcome the challenges, there is a need for collaborative decision-making involving all SMEs when formulating municipal waste programs to promote their acceptance and increase their chance of success. There is a need for waste minimization through intensive recycling, heavy penalties, high levels of education, and awareness campaigns. There is a need to adopt an integrated municipal solid waste management system that aligns with international best practices. Clear regulations and waste management standards can dissolve ambiguous and confusing regulations, extending a guiding hand to SMEs. This clarity can foster comprehensive understanding and, consequently, help bring about compliance with waste management laws. This clarification can also extend to cover the responsibility of SMEs and manufacturers to emphasize waste minimization at its very source, and they are responsible for embracing the mantle of eco-friendly packaging and the clever design of their products.

Most importantly, Zimbabwe should shift from the traditional linear approach to circularity and adopt innovative policies to promote sustainable consumption and low marginalization. MSWM regulations should be vigorously enforced, and cleaner production should be embraced to promote SMEs' waste management sustainability.

6.5 Suggestions for Future Research

This research found that the regulations significantly influence how SMEs manage their waste. However, there are several aspects deemed necessary for further investigation in order to contribute to the improvement of this issue. For instance, the research should be carried out to establish a comprehensive guide on the causes of poor and weak enforcement of MSWM regulations. More in-depth studies should be undertaken to promote the circular economy to achieve Zimbabwean SMEs' sustainable development goal.

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APPENDIX A

QUESTIONNAIRE FOR SMEs

This questionnaire is part of a PhD research on “Reorienting Zimbabwean Municipal Solid Waste Management (MSWM) Regulations towards SMEs sustainable management. The study aims to construct a framework of recommendations for improved MSW regulations to foster sustainability by SMEs. Your voluntary cooperation in answering the questions will help the researcher assess the current situation correctly, and then the improvement can be proposed.

Your responses are confidential. Only the research team will have access to raw data and responses that can be linked to individuals. Proper measures will be taken to protect your confidentiality. Your written comments may be used for reporting purposes. Information you provide in your comments that may identify you will be removed to the extent possible.

If you have any questions about this survey, please contact;

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Before continuing, please select your choice below. Clicking “Agree” means that:

- I have read the information above.
- I voluntarily agree to participate.
 - ☐ Agree
 - ☐ Disagree

SECTION 1: BACKGROUND INFORMATION OF THE RESPONDENT AND THE BUSINESS

Instruction: Please tick the appropriate and applicable box.

1. Gender

- ☐ Male ☐ Female

2. Age

- ☐ 20-30 ☐ 31-40 ☐ 41-50
☐ 51-60 ☐ 61+

3. Highest education levels

- ☐ None ☐ Primary ☐ Secondary ☐ High School
☐ Vocational Training ☐ Bachelor degree ☐ Others (specify)

4. Working length in this company (years)

- ☐ < 1 ☐ 1 -5 ☐ 6-10 ☐ 11-15
☐ 21-25 ☐ > 25

5. Number of employees (persons)

- ☐ < 5 ☐ 5 - 10 ☐ 11 - 20 ☐ 21-30
☐ 30 - 40 ☐ > 40

6. Present position in the business

- ☐ Owner ☐ Manager ☐ Employee ☐ Others (specify)

7. Type of business

- ☐ Furniture ☐ Welding ☐ Catering ☐ Chemicals
☐ Textiles ☐ Others (Specify)

8. Which of the following best describes the form of your business organization?

- ☐ Sole owner ☐ Company ☐ Partnership ☐ Others (specify)

SECTION 2: THE BUSINESS SOLID WASTE MANAGEMENT

9. How does your business dispose of waste?

- ☐ Burying it
 ☐ Burn it
 ☐ Dumping it in the bush
 ☐ Open dumpsite

10. How many waste collection points does your business have?

- ☐ 1 to 2
 ☐ 3 to 4
 ☐ 5 to 6
 ☐ None

11. How often does the Environmental Management Agency (EMA) team visit your premises?

- ☐ Once a week
 ☐ Once a month
 ☐ Once in 6 months
 ☐ Never

12. How can you rate the waste management situation at your premises?

- ☐ Good
 ☐ Better
 ☐ Bad
 ☐ Worst

13. What significant effects do the wastes have on your premises?

- ☐ Diseases
 ☐ Pollution
 ☐ None
 ☐ Others (specify)

SECTION 3: PERCEPTION OF MSWM REGULATIONS

Instruction: Indicate your response by ticking in the appropriate space according to the following index that applies to your situation:

1 = Strongly Agree, 2 = Agree, 3 = Moderate, 4 = Disagree, 5 = Strongly Disagree.

Items		Level				
		1	2	3	4	5
3.1 MSWM Regulations Education						
1	You are aware of the MSWM regulations.					
2	You have been educated on MSWM regulations.					
3	You actively participate in waste management activities.					
4	You have licenses for generating waste.					
5	You have prepared yearly waste management plans.					
3.2 MSWM regulations monitoring						
1	There is frequent monitoring and checks by the city council about waste management.					

Items		Level				
		1	2	3	4	5
2	Regulatory bodies like EMA inspects waste management in the area.					
3	Monitoring and control of compliance with MSWM regulations are effective.					
4	Penalty provisions are given for non-compliance with waste management legislation.					
3.3 Requirements for SMEs						
1	Authorities have provided sufficient standard waste bins (receptacles) for your complex.					
2	There is regular waste collection.					
3	Waste is collected weekly by the municipality.					
4	Authorities have provided enough refuse trucks to collect waste.					
5	Waste is disposed of correctly.					
6	Penalties are sufficiently deterrent.					
7	Waste from your complex is in the rightful place.					
8	The complex has suitable waste disposal sites.					
9	The complex has properly managed dumpsites.					
10	The complex has methods for minimizing waste.					
11	The complex has paid penalties for failing to comply.					
3.4 Motivations for Compliance						
1	Complying with MSWM regulations improves SMEs with an improved public image.					
2	Complying with MSWM regulations reduces waste at the complex.					
3	Complying with MSWM regulations enhances business performance.					
4	Complying with MSWM regulations helps get extra income.					
5	Complying with MSWM regulations gains access to financial help.					
6	Complying with MSWM regulations reduces production costs.					
7	Complying with MSWM regulations helps get donor support.					
8	Complying with MSWM regulations increases your sales.					
9	Complying with MSWM regulations promotes a circular economy.					
3.5 Reasons for non-compliance						
1	Your business lacks financial resources.					
2	Your personnel lacks knowledge of the content of MSWM regulations.					
3	Your personnel lacks time.					
4	Your business is incompetent in waste management regulations.					

Items		Level				
		1	2	3	4	5
5	Your business was not involved in giving information in the making of MSWM regulations.					
6	Some regulations are not clear on what should be done.					
7	You feel the requirements of MSWM regulations as burdensome.					
3.6 Compliance with MSWM regulations						
1	Your business provides enough bins in your complex.					
2	Your business discards waste in the bins.					
3	Your business empties the bins on time.					
4	The working area is kept clean and safe all the time.					
5	When you violate the MSWM laws, you pay a fine to the city council or regulatory authorities.					
6	The nearby land is free from pollution.					
3.7 Perceptions of MSWM regulations and their effectiveness						
1	There is minimal SMEs participation.					
2	It was done purely by the authorities and environmental bodies.					
3	Ignores other stakeholders.					
4	SMEs based and people friendly.					
5	Public education on waste management is low.					
6	Waste management regulations promote waste minimisation.					
7	Legal and policy framework approaches for MSWM regulations are environmentally effective.					
8	MSWM regulations are cost effective.					
9	You get incentives for complying.					
10	MSWM regulations are inclusive.					
11	MSWM regulations have clear roles and responsibilities.					
12	MSWM regulations lack clear strategies for action.					
13	Corrective action is always taken for non compliance.					
14	MSWM regulations are not adequate in terms of coverage.					
15	Fines are deterrent enough.					
16	There are limited funds for implementation.					
17	Funds from the Government are not enough to buy enough equipment.					
18	Operational equipment is obsolete and insufficient.					
3.8 Perceptions of Cleaner Production						
1	Cleaner production is more profitable and competitive.					
2	It results in better quality products.					

Items		Level				
		1	2	3	4	5
3	It improves SME image.					
4	It reduces risk to the environment, health and of industrial accidents.					
5	It minimizes waste.					
6	Cleaner production is preventive.					
7	Cleaner production reduces waste treatment and disposal costs.					
8	It recovers valuable products.					
3.9 MSWM Regulations and SDGs						
1	Promotes recycling of waste.					
2	Ensures sustainable consumption.					
3	Promotes waste treatment.					
4	Promotes regular waste collection.					
5	Promotes safe, resilient, and sustainable cities.					

SECTION 4: OTHER CONCERNS/SUGGESTIONS

What suggestions do you have on MSWM regulations and compliance?

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Thank you for your participation.

APPENDIX B

Interview guide for EMA and Harare City Council

This interview guide is part of a PhD research on “Reorienting Zimbabwean Municipal Solid Waste Management (MSWM) Regulations towards SMEs’ sustainable management. The study aims to construct a framework of recommendations for improved MSW regulations to foster sustainability by SMEs. Your voluntary cooperation in answering the questions will help the researcher assess the current situation correctly, and then the improvement can be proposed.

Your responses are confidential. Only the research team will have access to raw data and responses that can be linked to individuals. Proper measures will be taken to protect your confidentiality.

If you have any questions about this survey, please contact;

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QUESTIONS

A. General Information

1. What is your age?.....

2. What is your highest qualification?

3. What is your work designation?

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B. Municipal Solid Waste Management Regulations practices

4. Which areas are under your jurisdiction?

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5. How broad is the area under your jurisdiction?

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6. a) Comment on the methods of waste disposal by the SMEs

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b) Show the effectiveness of each method

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7. Are there frequent monitoring and checks by your regulatory body?

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8. What is your opinion about the current MSWM regulations effectively control waste management?

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9. In your opinion, can the current MSWM regulations enable sustainable management of waste? Why?

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10. a) According to your rating, are the MSWM regulations sustainable?

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b) What is the reason for your answer above?

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11. What are the most critical issues that need urgent attention regarding the current MSWM regulations?

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12. How can MSWM regulations be applied to effectively reduce challenges caused by non-compliance by SMEs?

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13. What are the problems of non-compliance?

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14. What penalty provisions are given for non-compliance against waste management legislation?

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15. What do you think are the punitiveness of the penalties?

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16. What problems do you encounter in enforcing Municipal Solid Waste Management regulations?

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17. What is your opinion about the level of MSWM regulation in terms of

i) Environmental effectiveness?

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ii) Cost effective?

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iii) Incentives for developing and adopting new environmentally cleaner and economically more efficient technologies?

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18. a) Have you ever been involved in educating and training SMEs about MSWM regulations?

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b) If yes, comment on the nature of educating and training of SMEs done during these workshops

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19. To what extent has cleaner production been included in MSWM regulations for Zimbabwe?

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20. i) To what extent do MSWM regulations for SMEs in Zimbabwe effective enough?

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ii) If not, what are your suggestions to make the MSWM regulations effective?

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21. What are your recommendations inorder to improve MSWM regulations?

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Thank you for your participation.

APPENDIX C

Focus Group Discussion Guide For Ward Committee Members

This Focus Group Discussion Guide is part of a PhD research on “Reorienting Zimbabwean Municipal Solid Waste Management (MSWM) Regulations towards SMEs sustainable management. The study aims to construct a framework of recommendations for improved MSW regulations to foster sustainability by SMEs. Your voluntary cooperation in answering the questions will help the researcher assess the current situation correctly, and then the improvement can be proposed.

Your responses are confidential. Only the research team will have access to raw data and responses that can be linked to individuals. Proper measures will be taken to protect your confidentiality.

If you have any questions about this survey, please contact;

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QUESTIONS

1. Where do SMEs dispose their waste
2. a) How do SMEs dispose of waste at their premises?
b) Comment on the methods of waste disposal by the SMEs and show the effectiveness of each method.
3. How frequent is waste collection by the city council?
4. How often do regulatory bodies inspect SMEs?
5. a) Do SMEs comply with MSWM regulations?
b) Please demonstrate how they do it
6. a) Do SMEs pay fines for non-compliance?
b) If so, how much do they pay?
c) How often do they pay?
d) Under what circumstances do they pay?
7. Is the Harare Municipality providing enough trucks for waste collection?
8. If possible, may we tour around the place to check on the cleanliness of the area.
9. a) Do SMEs recycle their waste?
b) What type of waste do SMEs recycle?
c) How much are they charged for recycling?
d) What is done to the waste after recycling?
e) Does the recycling reduce the costs?
10. In your own opinion, to what extent are the operations for SMEs minimise waste production?
11. For what purposes are the generated waste used for ?
12. How do you ensure that SMEs are given awareness on health, hygiene and the environment and how often does this happen?
13. To what extent does the waste produced by SMEs affect the residents?
14. Do you think the current MSWM regulations are effective to control waste management?

15. In your opinion, can the current MSWM regulations enable sustainable management of waste?
16. a) According to your rating, are the MSWM regulations sustainable?
b) What is your reason for your answer above?
17. What is your opinion about the level of MSWM regulation in terms of
 - a) environmental effectiveness?
 - b) cost effective?
 - c) incentives for developing and adopting new environmentally cleaner and economically more efficient technologies?
18. a) Have you ever been involved in educating and training SMEs about MSWM regulations?
b) If yes, comment on the nature of educating and training of SMEs done during these workshops
19. To what extent has cleaner production been included in MSWM regulations for Zimbabwe?
20. a) Do you think MSWM regulations for SMEs in Zimbabwe are effective enough?
b) If not, what are your suggestions to make the MSWM regulations effective?
21. What are your recommendations in order to improve MSWM regulations?

Thank you for your participation.

APPENDIX D

SPSS Hypothesis Test Results

1. Operationalization of variables

Variable	Code	Variable items
Awareness of the MSWM Regulations	SME_Awareness1	You are aware of the MSWM regulations.
	SME_Awareness2	You have been educated on MSWM regulations.
	SME_Awareness3	You actively participate in waste management activities.
	SME_Awareness4	You have licenses for generating waste.
	SME_Awareness5	You have prepared yearly waste management plans.
Monitoring and Enforcement of MSWM Regulations	Monitoring1	There is frequent monitoring and checks by the city council about waste management.
	Monitoring2	Regulatory bodies like EMA inspects waste management in the area.
	Monitoring3	Monitoring and control of compliance with MSWM regulations are effective.
	Monitoring4	Penalty provisions are given for non-compliance with waste management legislation.
Requirements of SMEs and support from the Authorities	SME_REQ1	Authorities have provided sufficient standard waste bins (receptacles) for your complex.
	SME_REQ2	Waste is collected weekly by the Municipality.
	SME_REQ3	The complex has suitable waste disposal sites.
	SME_REQ4	The complex has methods for minimizing waste.
	SME_REQ5	Waste is disposed of correctly.
	SME_REQ6	Waste from your complex is in the rightful place.
	SME_REQ7	The complex has paid penalties for failing to comply.
	SME_REQ8	Penalties are sufficiently deterrent.
	SME_REQ9	Authorities have provided enough refuse trucks to collect waste.
	SME_REQ10	There is regular waste collection by the City Council.
	SME_REQ11	The complex has properly managed dumpsites.
Motivations for compliance	Motivation_for_Compliance1	Complying with MSWM regulations reduces waste from your complex.
	Motivation_for_Compliance2	Complying with MSWM regulations enhances your business performance.
	Motivation_for_Compliance3	Complying with MSWM regulations improves SMEs with an improved public image.
	Motivation_for_Compliance4	Complying with MSWM regulations reduces production costs.
	Motivation_for_Compliance5	Complying with MSWM regulations has promoted a circular economy.
	Motivation_for_Compliance6	Complying with MSWM regulations increases your sales.
	Motivation_for_Compliance7	Complying with MSWM regulations helps you have access to finance.
	Motivation_for_Compliance8	Complying with MSWM regulations brings extra income.
	Motivation_for_Compliance9	Complying with MSWM regulations helps you get donor support.
Reasons for Non-compliance	Noncompliance_reason1	Your business lacks financial resources.
	Noncompliance_reason2	Your personnel lacks time.
	Noncompliance_reason3	Your business was not involved in giving information in the making of MSWM regulations.
	Noncompliance_reason4	Your business is incompetent in waste management regulations.
	Noncompliance_reason5	Your personnel lacks knowledge of the content of MSWM regulations.
	Noncompliance_reason6	You feel the requirements of MSWM regulations are burdensome.
	Noncompliance_reason7	Some regulations are not clear on what should be done.
Compliance with MSWM regulations	SMEs_Compliance1	Your business provides enough bins in your complex.
	SMEs_Compliance2	Your business discards waste in the bins.
	SMEs_Compliance3	Your business empties the bins on time.
	SMEs_Compliance4	The working area is kept clean and safe all the time.

	SMEs_Compliance5	The nearby land is free from pollution.
	SMEs_Compliance6	When you violate the MSWM laws, you pay a fine to the city council or regulatory authorities.
Perceptions of MSWM regulations and their effectiveness	Effectiveness1	Legal and policy framework approaches for MSWM regulations are environmentally effective.
	Effectiveness2	MSWM regulations are cost-effective.
	Effectiveness3	You get incentives for complying.
	Effectiveness4	Waste management regulations promote waste minimization.
	Effectiveness5	MSWM regulations are inclusive.
	Effectiveness6	MSWM regulations have clear roles and responsibilities.
	Effectiveness7	Corrective action is always taken on non-compliance.
	Effectiveness8	MSWM regulations lack clear strategies for action.
	Effectiveness9	MSWM regulations are not adequate.
	Effectiveness10	Fines are not deterrent enough.
	Effectiveness11	Your business has limited funds for implementation.
	Effectiveness12	Public education on waste management is low.
	Effectiveness13	Operational equipment is obsolete and insufficient.
	Effectiveness14	Funds are not enough to buy enough equipment.
	Effectiveness15	SMEs-based and people-friendly.
	Effectiveness16	It was done purely by the authorities and environmental bodies.
	Effectiveness17	It ignores other stakeholders.
	Effectiveness18	There is minimal SME participation.
Perceptions of Cleaner Production	Cleaner_Production1	It results in better quality products.
	Cleaner_Production2	Cleaner production is preventive.
	Cleaner_Production3	It minimizes waste.
	Cleaner_Production4	It reduces risk to the environment, health, and industrial accidents.
	Cleaner_Production5	Cleaner production reduces waste treatment and disposal costs.
	Cleaner_Production6	It recovers valuable by-products.
	Cleaner_Production7	It improves SMEs' image.
	Cleaner_Production8	Cleaner production is more profitable and competitive.
MSWM Regulations and SDGs	Sustainable_development1	MSWM regulations have promoted safe, resilient, and sustainable cities.
	Sustainable_development2	There has been a regular collection of waste.
	Sustainable_development3	There is a waste treatment.
	Sustainable_development4	MSWM regulations have ensured sustainable consumption
	Sustainable_development5	There is a recycling of waste.

2. Normality Tests

Tests of normality of characteristic variables

	Tests of Normality					
	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Gender	.454	220	.000	.560	220	.000
Age	.207	220	.000	.895	220	.000
Highest education levels	.319	220	.000	.797	220	.000
Working years	.201	220	.000	.857	220	.000
Number of employees	.278	220	.000	.728	220	.000
Present position in the business	.408	220	.000	.655	220	.000
Type of business	.220	220	.000	.829	220	.000
Form of Business	.417	220	.000	.641	220	.000
Business Waste disposal	.470	220	.000	.549	220	.000
Number of waste collection points	.483	220	.000	.482	220	.000
Frequency of EMA Visits	.255	220	.000	.814	220	.000

	Tests of Normality					
	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Impact of waste on the premise	.340	220	.000	.795	220	.000
MeanofSME_Awareness	.122	220	.000	.952	220	.000
MeanofMonitoring	.116	220	.000	.968	220	.000
MeanofSME_REQ	.108	220	.000	.974	220	.000
MeanofMotivation	.094	220	.000	.979	220	.002
MeanofNoncompliance	.100	220	.000	.983	220	.009
MeanofSME_compliance	.091	220	.000	.979	220	.002
MeanofMSWM_Regulations	.076	220	.004	.992	220	.310
MeanofCleaner_production	.080	220	.001	.972	220	.000
MeanofSustainable_development	.126	220	.000	.971	220	.000

a. Lilliefors Significance Correction

3. Homogeneity tests

3.1 Test of Homogeneity of Variances: Gender

Test of Homogeneity of Variances					
		Levene Statistic	df1	df2	Sig.
Mean of SME Awareness of MSWM regulations	Based on Mean	2.463	1	218	.118
	Based on Median	2.448	1	218	.119
	Based on Median and with adjusted df	2.448	1	213.373	.119
	Based on trimmed mean	2.492	1	218	.116
Mean of Monitoring and Enforcement of MSWM Regulations	Based on Mean	.143	1	218	.706
	Based on Median	.057	1	218	.812
	Based on Median and with adjusted df	.057	1	213.658	.812
	Based on trimmed mean	.159	1	218	.691
Mean of Requirements of SMEs and support from the Authorities	Based on Mean	.143	1	218	.706
	Based on Median	.133	1	218	.716
	Based on Median and with adjusted df	.133	1	217.736	.716
	Based on trimmed mean	.135	1	218	.714
Mean of Motivations for compliance	Based on Mean	.028	1	218	.867
	Based on Median	.026	1	218	.872
	Based on Median and with adjusted df	.026	1	216.059	.872
	Based on trimmed mean	.029	1	218	.865
Mean of Reasons for Non-compliance	Based on Mean	3.375	1	218	.068
	Based on Median	3.372	1	218	.068
	Based on Median and with adjusted df	3.372	1	216.569	.068
	Based on trimmed mean	3.788	1	218	.053
Mean of Compliance with MSWM regulations	Based on Mean	.411	1	218	.522
	Based on Median	.452	1	218	.502
	Based on Median and with adjusted df	.452	1	217.470	.502
	Based on trimmed mean	.485	1	218	.487

Mean of MSWM regulations and effectiveness	Based on Mean	1.394	1	218	.239
	Based on Median	1.682	1	218	.196
	Based on Median and with adjusted df	1.682	1	212.721	.196
	Based on trimmed mean	1.374	1	218	.242
Mean of Cleaner production	Based on Mean	.677	1	218	.412
	Based on Median	.639	1	218	.425
	Based on Median and with adjusted df	.639	1	217.695	.425
	Based on trimmed mean	.617	1	218	.433
Mean of sustainable development	Based on Mean	4.110	1	218	.044
	Based on Median	3.461	1	218	.064
	Based on Median and with adjusted df	3.461	1	216.524	.064
	Based on trimmed mean	4.098	1	218	.044

3.2 Test of Homogeneity of Variances: Age

Test of Homogeneity of Variances: Age					
		Levene Statistic	df1	df2	Sig.
Mean of SME Awareness of MSWM regulations	Based on Mean	1.261	4	215	.287
	Based on Median	1.669	4	215	.158
	Based on Median and with adjusted df	1.669	4	206.498	.159
	Based on trimmed mean	1.276	4	215	.280
Mean of Monitoring and Enforcement of MSWM Regulations	Based on Mean	2.914	4	215	.022
	Based on Median	3.130	4	215	.016
	Based on Median and with adjusted df	3.130	4	208.933	.016
	Based on trimmed mean	2.978	4	215	.020
Mean of Requirements of SMEs and support from the Authorities	Based on Mean	1.084	4	215	.365
	Based on Median	1.033	4	215	.391
	Based on Median and with adjusted df	1.033	4	210.026	.391
	Based on trimmed mean	1.129	4	215	.344
Mean of Motivations for compliance	Based on Mean	.227	4	215	.923
	Based on Median	.194	4	215	.941
	Based on Median and with adjusted df	.194	4	214.439	.941
	Based on trimmed mean	.230	4	215	.922
Mean of Reasons for Non-compliance	Based on Mean	2.199	4	215	.070
	Based on Median	2.134	4	215	.078
	Based on Median and with adjusted df	2.134	4	212.224	.078
	Based on trimmed mean	2.190	4	215	.071
Mean of Compliance with MSWM regulations	Based on Mean	.842	4	215	.500
	Based on Median	.785	4	215	.536
	Based on Median and with adjusted df	.785	4	207.449	.536
	Based on trimmed mean	.848	4	215	.496
Mean of MSWM regulations and effectiveness	Based on Mean	1.334	4	215	.259
	Based on Median	1.290	4	215	.275
	Based on Median and with adjusted df	1.290	4	205.010	.275
	Based on trimmed mean	1.297	4	215	.272
Mean of Cleaner production	Based on Mean	1.522	4	215	.197

Mean of sustainable development	Based on Median	1.469	4	215	.213
	Based on Median and with adjusted df	1.469	4	199.232	.213
	Based on trimmed mean	1.459	4	215	.216
	Based on Mean	2.130	4	215	.078
	Based on Median	1.651	4	215	.163
	Based on Median and with adjusted df	1.651	4	206.037	.163
	Based on trimmed mean	2.122	4	215	.079

3.3 Test of Homogeneity of Variances: Education

Test of Homogeneity of Variances: Education					
		Levene Statistic	df1	df2	Sig.
Mean of SME Awareness of MSWM regulations	Based on Mean	.791	5	214	.557
	Based on Median	.646	5	214	.665
	Based on Median and with adjusted df	.646	5	209.017	.665
	Based on trimmed mean	.762	5	214	.578
Mean of Monitoring and Enforcement of MSWM Regulations	Based on Mean	4.675	5	214	.000
	Based on Median	4.508	5	214	.001
	Based on Median and with adjusted df	4.508	5	203.944	.001
	Based on trimmed mean	4.709	5	214	.000
Mean of Requirements of SMEs and support from the Authorities	Based on Mean	1.228	5	214	.297
	Based on Median	1.279	5	214	.274
	Based on Median and with adjusted df	1.279	5	192.821	.274
	Based on trimmed mean	1.201	5	214	.310
Mean of Motivations for compliance	Based on Mean	.619	5	214	.685
	Based on Median	.529	5	214	.754
	Based on Median and with adjusted df	.529	5	199.836	.754
	Based on trimmed mean	.582	5	214	.714
Mean of Reasons for Non-compliance	Based on Mean	1.095	5	214	.364
	Based on Median	.932	5	214	.461
	Based on Median and with adjusted df	.932	5	200.097	.461
	Based on trimmed mean	1.059	5	214	.384
Mean of Compliance with MSWM regulations	Based on Mean	.996	5	214	.421
	Based on Median	.934	5	214	.460
	Based on Median and with adjusted df	.934	5	206.702	.460
	Based on trimmed mean	1.001	5	214	.418
Mean of MSWM regulations and effectiveness	Based on Mean	1.343	5	214	.247
	Based on Median	1.248	5	214	.288
	Based on Median and with adjusted df	1.248	5	203.058	.288
	Based on trimmed mean	1.339	5	214	.249
Mean of Cleaner production	Based on Mean	.991	5	214	.424
	Based on Median	.905	5	214	.479
	Based on Median and with adjusted df	.905	5	200.999	.479
	Based on trimmed mean	.922	5	214	.468
Mean of sustainable development	Based on Mean	.518	5	214	.762
	Based on Median	.355	5	214	.878

	Based on Median and with adjusted df	.355	5	208.096	.878
	Based on trimmed mean	.519	5	214	.762

3.4 Test of Homogeneity of Variances: Working Length

Test of Homogeneity of Variances: Working years					
		Levene Statistic	df1	df2	Sig.
Mean of SME Awareness of MSWM regulations	Based on Mean	2.476	5	214	.033
	Based on Median	2.595	5	214	.027
	Based on Median and with adjusted df	2.595	5	207.967	.027
	Based on trimmed mean	2.482	5	214	.033
Mean of Monitoring and Enforcement of MSWM Regulations	Based on Mean	.724	5	214	.606
	Based on Median	.578	5	214	.717
	Based on Median and with adjusted df	.578	5	204.494	.717
	Based on trimmed mean	.717	5	214	.612
Mean of Requirements of SMEs and support from the Authorities	Based on Mean	.372	5	214	.868
	Based on Median	.382	5	214	.861
	Based on Median and with adjusted df	.382	5	211.785	.861
	Based on trimmed mean	.376	5	214	.865
Mean of Motivations for compliance	Based on Mean	.786	5	214	.561
	Based on Median	.646	5	214	.665
	Based on Median and with adjusted df	.646	5	200.904	.665
	Based on trimmed mean	.791	5	214	.557
Mean of Reasons for Non-compliance	Based on Mean	.273	5	214	.928
	Based on Median	.362	5	214	.874
	Based on Median and with adjusted df	.362	5	208.728	.874
	Based on trimmed mean	.290	5	214	.918
Mean of Compliance with MSWM regulations	Based on Mean	.687	5	214	.634
	Based on Median	.721	5	214	.608
	Based on Median and with adjusted df	.721	5	213.013	.608
	Based on trimmed mean	.696	5	214	.627
Mean of MSWM regulations and effectiveness	Based on Mean	.614	5	214	.690
	Based on Median	.635	5	214	.673
	Based on Median and with adjusted df	.635	5	196.459	.673
	Based on trimmed mean	.619	5	214	.686
Mean of Cleaner production	Based on Mean	2.429	5	214	.036
	Based on Median	2.255	5	214	.050
	Based on Median and with adjusted df	2.255	5	202.876	.050
	Based on trimmed mean	2.377	5	214	.040
Mean of sustainable development	Based on Mean	3.456	5	214	.005
	Based on Median	2.043	5	214	.074
	Based on Median and with adjusted df	2.043	5	170.025	.075
	Based on trimmed mean	3.452	5	214	.005

3.5 Test of Homogeneity of Variances: Number of Employees

Test of Homogeneity of Variances: Number of Employees					
		Levene Statistic	df1	df2	Sig.
Mean of SME Awareness of MSWM regulations	Based on Mean	1.280	5	214	.274
	Based on Median	1.267	5	214	.279
	Based on Median and with adjusted df	1.267	5	196.399	.280
	Based on trimmed mean	1.326	5	214	.254
Mean of Monitoring and Enforcement of MSWM Regulations	Based on Mean	2.048	5	214	.073
	Based on Median	1.936	5	214	.090
	Based on Median and with adjusted df	1.936	5	201.162	.090
	Based on trimmed mean	2.042	5	214	.074
Mean of Requirements of SMEs and support from the Authorities	Based on Mean	.860	5	214	.509
	Based on Median	.872	5	214	.500
	Based on Median and with adjusted df	.872	5	207.957	.500
	Based on trimmed mean	.847	5	214	.517
Mean of Motivations for compliance	Based on Mean	.511	5	214	.768
	Based on Median	.646	5	214	.665
	Based on Median and with adjusted df	.646	5	196.482	.665
	Based on trimmed mean	.538	5	214	.747
Mean of Reasons for Non-compliance	Based on Mean	.746	5	214	.589
	Based on Median	.748	5	214	.588
	Based on Median and with adjusted df	.748	5	187.319	.588
	Based on trimmed mean	.782	5	214	.563
Mean of Compliance with MSWM regulations	Based on Mean	1.756	5	214	.123
	Based on Median	1.629	5	214	.153
	Based on Median and with adjusted df	1.629	5	178.123	.154
	Based on trimmed mean	1.775	5	214	.119
Mean of MSWM regulations and effectiveness	Based on Mean	.944	5	214	.454
	Based on Median	.873	5	214	.500
	Based on Median and with adjusted df	.873	5	184.609	.500
	Based on trimmed mean	.940	5	214	.456
Mean of Cleaner production	Based on Mean	.625	5	214	.681
	Based on Median	.509	5	214	.769
	Based on Median and with adjusted df	.509	5	171.792	.769
	Based on trimmed mean	.523	5	214	.759
Mean of sustainable development	Based on Mean	.302	5	214	.911
	Based on Median	.418	5	214	.836
	Based on Median and with adjusted df	.418	5	203.206	.836
	Based on trimmed mean	.328	5	214	.896

3.6 Test of Homogeneity of Variances: Position

Test of Homogeneity of Variances: Position				
	Levene Statistic	df1	df2	Sig.

Mean of SME Awareness of MSWM regulations	Based on Mean	.073	3	216	.974
	Based on Median	.081	3	216	.970
	Based on Median and with adjusted df	.081	3	210.998	.970
	Based on trimmed mean	.061	3	216	.980
Mean of Monitoring and Enforcement of MSWM Regulations	Based on Mean	1.290	3	216	.279
	Based on Median	1.482	3	216	.220
	Based on Median and with adjusted df	1.482	3	211.457	.221
	Based on trimmed mean	1.298	3	216	.276
Mean of Requirements of SMEs and support from the Authorities	Based on Mean	1.369	3	216	.253
	Based on Median	.512	3	216	.674
	Based on Median and with adjusted df	.512	3	163.814	.674
	Based on trimmed mean	1.310	3	216	.272
Mean of Motivations for compliance	Based on Mean	.482	3	216	.695
	Based on Median	.531	3	216	.662
	Based on Median and with adjusted df	.531	3	211.582	.662
	Based on trimmed mean	.501	3	216	.682
Mean of Reasons for Non-compliance	Based on Mean	1.522	3	216	.210
	Based on Median	1.373	3	216	.252
	Based on Median and with adjusted df	1.373	3	205.486	.252
	Based on trimmed mean	1.511	3	216	.213
Mean of Compliance with MSWM regulations	Based on Mean	1.634	3	216	.182
	Based on Median	1.645	3	216	.180
	Based on Median and with adjusted df	1.645	3	208.818	.180
	Based on trimmed mean	1.612	3	216	.188
Mean of MSWM regulations and effectiveness	Based on Mean	.993	3	216	.397
	Based on Median	1.064	3	216	.365
	Based on Median and with adjusted df	1.064	3	213.642	.365
	Based on trimmed mean	.958	3	216	.413
Mean of Cleaner production	Based on Mean	.474	3	216	.701
	Based on Median	.442	3	216	.723
	Based on Median and with adjusted df	.442	3	214.995	.723
	Based on trimmed mean	.439	3	216	.725
Mean of sustainable development	Based on Mean	2.874	3	216	.037
	Based on Median	3.102	3	216	.028
	Based on Median and with adjusted df	3.102	3	200.567	.028
	Based on trimmed mean	2.928	3	216	.035

3.7 Test of Homogeneity of Variances: Type of Business

Test of Homogeneity of Variances: Business Type					
		Levene Statistic	df1	df2	Sig.
Mean of SME Awareness of MSWM regulations	Based on Mean	1.503	5	214	.190
	Based on Median	1.473	5	214	.200
	Based on Median and with adjusted df	1.473	5	206.502	.200
	Based on trimmed mean	1.507	5	214	.189
	Based on Mean	3.545	5	214	.004

Mean of Monitoring and Enforcement of MSWM Regulations	Based on Median	2.926	5	214	.014
	Based on Median and with adjusted df	2.926	5	188.225	.014
	Based on trimmed mean	3.564	5	214	.004
Mean of Requirements of SMEs and support from the Authorities	Based on Mean	2.729	5	214	.021
	Based on Median	2.285	5	214	.047
	Based on Median and with adjusted df	2.285	5	192.091	.048
	Based on trimmed mean	2.670	5	214	.023
Mean of Motivations for compliance	Based on Mean	1.045	5	214	.392
	Based on Median	1.031	5	214	.400
	Based on Median and with adjusted df	1.031	5	212.499	.400
	Based on trimmed mean	1.093	5	214	.365
Mean of Reasons for Non-compliance	Based on Mean	1.763	5	214	.122
	Based on Median	1.732	5	214	.129
	Based on Median and with adjusted df	1.732	5	202.272	.129
	Based on trimmed mean	1.808	5	214	.112
Mean of Compliance with MSWM regulations	Based on Mean	2.662	5	214	.023
	Based on Median	2.522	5	214	.030
	Based on Median and with adjusted df	2.522	5	198.823	.031
	Based on trimmed mean	2.739	5	214	.020
Mean of MSWM regulations and effectiveness	Based on Mean	.754	5	214	.584
	Based on Median	.773	5	214	.570
	Based on Median and with adjusted df	.773	5	210.042	.570
	Based on trimmed mean	.747	5	214	.589
Mean of Cleaner production	Based on Mean	1.491	5	214	.194
	Based on Median	1.457	5	214	.205
	Based on Median and with adjusted df	1.457	5	198.404	.206
	Based on trimmed mean	1.461	5	214	.204
Mean of sustainable development	Based on Mean	.726	5	214	.605
	Based on Median	.671	5	214	.646
	Based on Median and with adjusted df	.671	5	211.227	.646
	Based on trimmed mean	.734	5	214	.599

3.8 Test of Homogeneity of Variances: Form of Organization

Test of Homogeneity of Variances: Form of Organization					
		Levene Statistic	df1	df2	Sig.
Mean of SME Awareness of MSWM regulations	Based on Mean	1.778	3	216	.152
	Based on Median	1.640	3	216	.181
	Based on Median and with adjusted df	1.640	3	205.069	.181
	Based on trimmed mean	1.805	3	216	.147
Mean of Monitoring and Enforcement of MSWM Regulations	Based on Mean	.432	3	216	.730
	Based on Median	.419	3	216	.740
	Based on Median and with adjusted df	.419	3	212.869	.740
	Based on trimmed mean	.441	3	216	.724
	Based on Mean	.891	3	216	.446
	Based on Median	.864	3	216	.460

Mean of Requirements of SMEs and support from the Authorities	Based on Median and with adjusted df	.864	3	201.937	.461
	Based on trimmed mean	.912	3	216	.436
Mean of Motivations for compliance	Based on Mean	.694	3	216	.556
	Based on Median	.682	3	216	.564
	Based on Median and with adjusted df	.682	3	208.851	.564
	Based on trimmed mean	.706	3	216	.549
Mean of Reasons for Non-compliance	Based on Mean	.627	3	216	.598
	Based on Median	.661	3	216	.577
	Based on Median and with adjusted df	.661	3	214.958	.577
	Based on trimmed mean	.627	3	216	.598
Mean of Compliance with MSWM regulations	Based on Mean	3.184	3	216	.025
	Based on Median	2.688	3	216	.047
	Based on Median and with adjusted df	2.688	3	203.845	.048
	Based on trimmed mean	3.143	3	216	.026
Mean of MSWM regulations and effectiveness	Based on Mean	1.147	3	216	.331
	Based on Median	1.107	3	216	.347
	Based on Median and with adjusted df	1.107	3	211.791	.347
	Based on trimmed mean	1.164	3	216	.325
Mean of Cleaner production	Based on Mean	1.528	3	216	.208
	Based on Median	1.700	3	216	.168
	Based on Median and with adjusted df	1.700	3	212.179	.168
	Based on trimmed mean	1.554	3	216	.201
Mean of sustainable development	Based on Mean	1.393	3	216	.246
	Based on Median	.849	3	216	.469
	Based on Median and with adjusted df	.849	3	206.415	.469
	Based on trimmed mean	1.354	3	216	.258

3.9 Test of Homogeneity of Variances: Waste Disposal Method

Test of Homogeneity of Variances: Waste disposal					
		Levene Statistic	df1	df2	Sig.
Mean of SME Awareness of MSWM regulations	Based on Mean	.565	3	216	.639
	Based on Median	.535	3	216	.659
	Based on Median and with adjusted df	.535	3	212.373	.659
	Based on trimmed mean	.559	3	216	.643
Mean of Monitoring and Enforcement of MSWM Regulations	Based on Mean	.532	3	216	.661
	Based on Median	.578	3	216	.630
	Based on Median and with adjusted df	.578	3	211.868	.630
	Based on trimmed mean	.539	3	216	.656
Mean of Requirements of SMEs and support from the Authorities	Based on Mean	.516	3	216	.672
	Based on Median	.592	3	216	.621
	Based on Median and with adjusted df	.592	3	212.849	.621
	Based on trimmed mean	.520	3	216	.669
Mean of Motivations for compliance	Based on Mean	.531	3	216	.661
	Based on Median	.569	3	216	.636

	Based on Median and with adjusted df	.569	3	208.379	.636
	Based on trimmed mean	.546	3	216	.651
Mean of Reasons for Non-compliance	Based on Mean	.645	3	216	.587
	Based on Median	.684	3	216	.563
	Based on Median and with adjusted df	.684	3	213.370	.563
	Based on trimmed mean	.636	3	216	.592
	Based on Mean	.946	3	216	.419
Mean of Compliance with MSWM regulations	Based on Median	.893	3	216	.446
	Based on Median and with adjusted df	.893	3	211.826	.446
	Based on trimmed mean	.999	3	216	.394
	Based on Mean	.158	3	216	.924
Mean of MSWM regulations and effectiveness	Based on Median	.150	3	216	.930
	Based on Median and with adjusted df	.150	3	212.084	.930
	Based on trimmed mean	.155	3	216	.926
	Based on Mean	.540	3	216	.655
Mean of Cleaner production	Based on Median	.389	3	216	.761
	Based on Median and with adjusted df	.389	3	201.505	.761
	Based on trimmed mean	.485	3	216	.693
	Based on Mean	1.476	3	216	.222
Mean of sustainable development	Based on Median	1.035	3	216	.378
	Based on Median and with adjusted df	1.035	3	208.031	.378
	Based on trimmed mean	1.446	3	216	.230
	Based on Mean				

3.10 Test of Homogeneity of Variances: Number of Waste Collection Points

Test of Homogeneity of Variances: Number of Waste Collection Points					
		Levene Statistic	df1	df2	Sig.
Mean of SME Awareness of MSWM regulations	Based on Mean	1.503	3	216	.215
	Based on Median	1.332	3	216	.265
	Based on Median and with adjusted df	1.332	3	212.435	.265
	Based on trimmed mean	1.501	3	216	.215
Mean of Monitoring and Enforcement of MSWM Regulations	Based on Mean	2.508	3	216	.060
	Based on Median	3.057	3	216	.029
	Based on Median and with adjusted df	3.057	3	212.627	.029
	Based on trimmed mean	2.597	3	216	.053
Mean of Requirements of SMEs and support from the Authorities	Based on Mean	1.310	3	216	.272
	Based on Median	1.317	3	216	.270
	Based on Median and with adjusted df	1.317	3	212.945	.270
	Based on trimmed mean	1.333	3	216	.265
Mean of Motivations for compliance	Based on Mean	.619	3	216	.603
	Based on Median	.612	3	216	.608
	Based on Median and with adjusted df	.612	3	187.684	.608
	Based on trimmed mean	.616	3	216	.606
Mean of Reasons for Non-compliance	Based on Mean	1.010	3	216	.389
	Based on Median	.924	3	216	.430

	Based on Median and with adjusted df	.924	3	213.395	.430
	Based on trimmed mean	1.008	3	216	.390
Mean of Compliance with MSWM regulations	Based on Mean	3.689	3	216	.013
	Based on Median	3.838	3	216	.010
	Based on Median and with adjusted df	3.838	3	207.993	.011
	Based on trimmed mean	3.678	3	216	.013
	Based on Mean	.370	3	216	.774
Mean of MSWM regulations and effectiveness	Based on Median	.365	3	216	.778
	Based on Median and with adjusted df	.365	3	211.987	.778
	Based on trimmed mean	.351	3	216	.788
	Based on Mean	.789	3	216	.501
Mean of Cleaner production	Based on Median	.749	3	216	.524
	Based on Median and with adjusted df	.749	3	212.674	.524
	Based on trimmed mean	.753	3	216	.522
	Based on Mean	1.715	3	216	.165
Mean of sustainable development	Based on Median	1.417	3	216	.239
	Based on Median and with adjusted df	1.417	3	213.429	.239
	Based on trimmed mean	1.717	3	216	.165

3.11 Test of Homogeneity of Variances: Frequency of EMaG Visits

Test of Homogeneity of Variances: Frequency EMA Visits					
		Levene Statistic	df1	df2	Sig.
Mean of SME Awareness of MSWM regulations	Based on Mean	1.071	3	216	.362
	Based on Median	.933	3	216	.425
	Based on Median and with adjusted df	.933	3	204.499	.426
	Based on trimmed mean	1.003	3	216	.393
Mean of Monitoring and Enforcement of MSWM Regulations	Based on Mean	2.317	3	216	.077
	Based on Median	2.741	3	216	.044
	Based on Median and with adjusted df	2.741	3	215.326	.044
	Based on trimmed mean	2.364	3	216	.072
Mean of Requirements of SMEs and support from the Authorities	Based on Mean	.228	3	216	.877
	Based on Median	.106	3	216	.956
	Based on Median and with adjusted df	.106	3	208.710	.956
	Based on trimmed mean	.202	3	216	.895
Mean of Motivations for compliance	Based on Mean	.276	3	216	.843
	Based on Median	.289	3	216	.833
	Based on Median and with adjusted df	.289	3	209.317	.833
	Based on trimmed mean	.292	3	216	.831
Mean of Reasons for Non-compliance	Based on Mean	.977	3	216	.405
	Based on Median	.942	3	216	.421
	Based on Median and with adjusted df	.942	3	213.570	.421
	Based on trimmed mean	.956	3	216	.415
Mean of Compliance with MSWM regulations	Based on Mean	.899	3	216	.443
	Based on Median	.943	3	216	.420
	Based on Median and with adjusted df	.943	3	211.181	.420

Mean of MSWM regulations and effectiveness	Based on trimmed mean	.901	3	216	.442
	Based on Mean	.188	3	216	.904
	Based on Median	.246	3	216	.864
	Based on Median and with adjusted df	.246	3	212.278	.864
	Based on trimmed mean	.222	3	216	.881
Mean of Cleaner production	Based on Mean	.385	3	216	.764
	Based on Median	.271	3	216	.846
	Based on Median and with adjusted df	.271	3	211.480	.846
	Based on trimmed mean	.336	3	216	.799
Mean of sustainable development	Based on Mean	.758	3	216	.519
	Based on Median	.852	3	216	.467
	Based on Median and with adjusted df	.852	3	206.645	.467
	Based on trimmed mean	.788	3	216	.502

3.12 Test of Homogeneity of Variances: Waste Impact on Premise

Test of Homogeneity of Variances: Waste Impact					
		Levene Statistic	df1	df2	Sig.
Mean of SME Awareness of MSWM regulations	Based on Mean	.100	3	216	.960
	Based on Median	.278	3	216	.841
	Based on Median and with adjusted df	.278	3	188.017	.841
	Based on trimmed mean	.106	3	216	.956
Mean of Monitoring and Enforcement of MSWM Regulations	Based on Mean	1.375	3	216	.251
	Based on Median	1.164	3	216	.325
	Based on Median and with adjusted df	1.164	3	210.592	.325
	Based on trimmed mean	1.370	3	216	.253
Mean of Requirements of SMEs and support from the Authorities	Based on Mean	3.700	3	216	.013
	Based on Median	2.787	3	216	.042
	Based on Median and with adjusted df	2.787	3	174.463	.042
	Based on trimmed mean	3.378	3	216	.019
Mean of Motivations for compliance	Based on Mean	.790	3	216	.500
	Based on Median	.636	3	216	.593
	Based on Median and with adjusted df	.636	3	206.371	.593
	Based on trimmed mean	.742	3	216	.528
Mean of Reasons for Non-compliance	Based on Mean	.586	3	216	.625
	Based on Median	.633	3	216	.595
	Based on Median and with adjusted df	.633	3	211.322	.595
	Based on trimmed mean	.706	3	216	.549
Mean of Compliance with MSWM regulations	Based on Mean	.840	3	216	.473
	Based on Median	.937	3	216	.423
	Based on Median and with adjusted df	.937	3	212.496	.423
	Based on trimmed mean	.891	3	216	.447
Mean of MSWM regulations and effectiveness	Based on Mean	.251	3	216	.860
	Based on Median	.376	3	216	.770
	Based on Median and with adjusted df	.376	3	214.562	.770
	Based on trimmed mean	.277	3	216	.842

Mean of Cleaner production	Based on Mean	.542	3	216	.654
	Based on Median	.541	3	216	.655
	Based on Median and with adjusted df	.541	3	212.240	.655
	Based on trimmed mean	.542	3	216	.654
Mean of sustainable development	Based on Mean	.912	3	216	.436
	Based on Median	.616	3	216	.605
	Based on Median and with adjusted df	.616	3	203.590	.605
	Based on trimmed mean	.877	3	216	.454

4. Test of Differences

4.1 Pairwise Comparisons of Age and Perceptions Variables

The test values of pairwise comparisons (Post-hoc test) that have not been presented in detail in Chapter 4 are to be presented here. Only the statistically significant groups are presented, as the SPSS will not compare the means that are not significant. According to the EZ SPSS Tutorial (2024), if the distribution of scores on your dependent variable does not have a similar shape for each level of the independent variable, the Kruskal-Wallis test can only be used to compare the mean ranks of each group. These mean ranks can be found in the Pairwise Comparisons chart in the SPSS output for the Kruskal-Wallis test. Therefore, in this results interpretation, the researcher will primarily use the adjusted significant level together with the graph to interpret the results, unless in the case that no adjusted was necessary, the significant level will be used instead.

Hypothesis Test Summary				
	Null Hypothesis	Test	Sig.	Decision
1	The distribution of MeanofSME_Awareness is the same across categories of Age.	Independent-Samples Kruskal-Wallis Test	.000	Reject the null hypothesis.
2	The distribution of MeanofMonitoring is the same across categories of Age.		.000	Reject the null hypothesis.
3	The distribution of MeanofSME_REQ is the same across categories of Age.		.029	Reject the null hypothesis.
4	The distribution of MeanofMotivation is the same across categories of Age.		.836	Retain the null hypothesis.
5	The distribution of MeanofNoncompliance is the same across categories of Age.		.046	Reject the null hypothesis.
6	The distribution of MeanofSMEcompliance is the same across categories of Age.		.063	Retain the null hypothesis.
7	The distribution of MeanofMSWMRegulations is the same across categories of Age.		.141	Retain the null hypothesis.
8	The distribution of MeanofCleanerproduction is the same across categories of Age.		.291	Retain the null hypothesis.

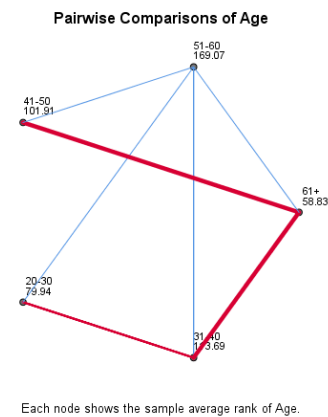
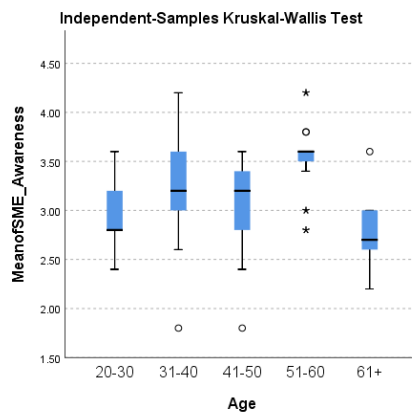
9	The distribution of MeanofSustainable is the same across categories of Age.		.023	Reject the null hypothesis.
Asymptotic significances are displayed. The significance level is .050.				

4.1.1 Age and Awareness of MSWM Regulations

Independent-Samples Kruskal-Wallis Test Summary

Total N	220
Test Statistic	35.275 ^a
Degree Of Freedom	4
Asymptotic Sig.(2-sided test)	.000

a. The test statistic is adjusted for ties.



Pairwise Comparisons of Age and Awareness					
Sample 1- Sample 2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj. Sig. ^a
61+-20-30	21.107	28.555	.739	.460	1.000
61+-41-50	43.080	26.513	1.625	.104	1.000
61+-31-40	54.860	26.649	2.059	.040	.395
61+-51-60	110.241	28.350	3.889	.000	.001
20-30-41-50	-21.974	14.254	-1.542	.123	1.000
20-30-31-40	-33.753	14.506	-2.327	.020	.200
20-30-51-60	-89.134	17.434	-5.113	.000	.000
41-50-31-40	11.780	9.897	1.190	.234	1.000
41-50-51-60	-67.160	13.838	-4.853	.000	.000
31-40-51-60	-55.381	14.097	-3.928	.000	.001
Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.					
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.					
a. Significance values have been adjusted by the Bonferroni correction for multiple tests.					

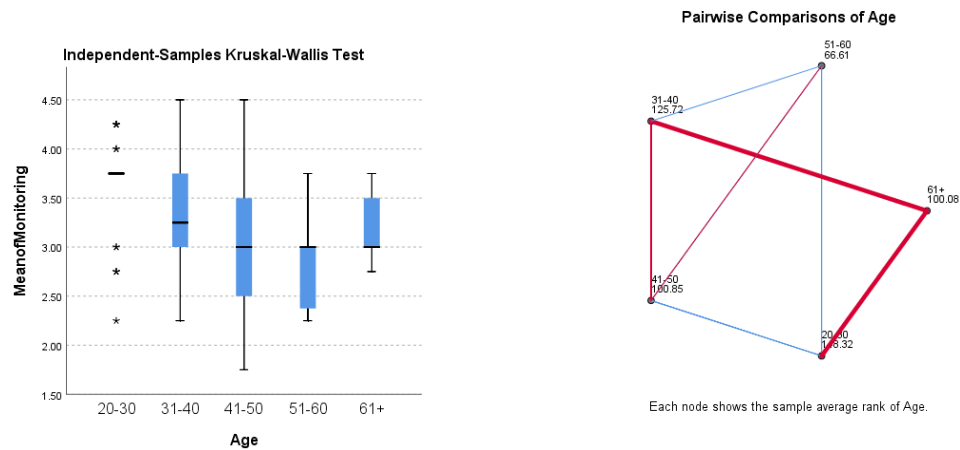
4.1.2 Age and Monitoring and Enforcement of MSWM Regulations

Independent-Samples Kruskal-Wallis Test Summary

Total N	220
Test Statistic	28.625 ^a
Degree Of Freedom	4

Asymptotic Sig.(2-sided test) .000

a. The test statistic is adjusted for ties.



Pairwise Comparisons of Age and Monitoring					
Sample 1- Sample 2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj. Sig. ^a
51-60-61+	-33.472	28.469	-1.176	.240	1.000
51-60-41-50	34.239	13.896	2.464	.014	.137
51-60-31-40	59.109	14.157	4.175	.000	.000
51-60-20-30	81.709	17.508	4.667	.000	.000
61+-41-50	.767	26.625	.029	.977	1.000
61+-31-40	25.637	26.762	.958	.338	1.000
61+-20-30	48.237	28.676	1.682	.093	.925
41-50-31-40	24.869	9.939	2.502	.012	.123
41-50-20-30	47.469	14.314	3.316	.001	.009
31-40-20-30	22.600	14.567	1.551	.121	1.000

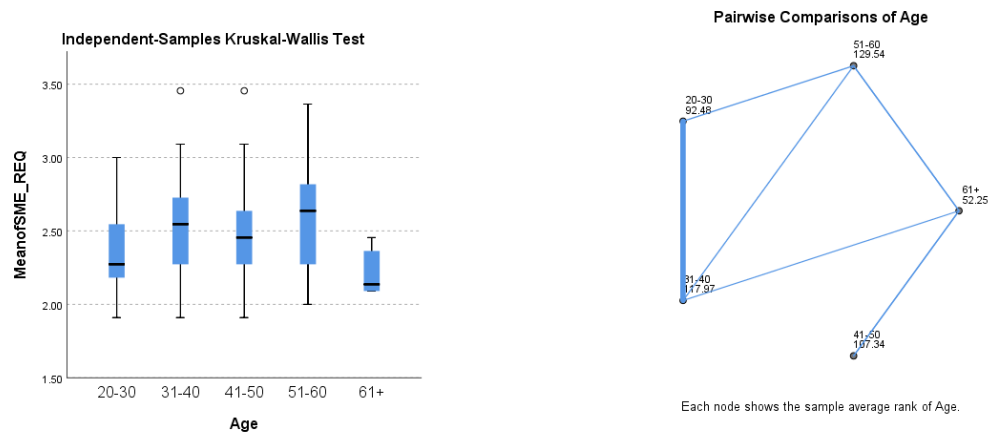
Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

a. Significance values have been adjusted by the Bonferroni correction for multiple tests.

4.1.3 Age and Requirements for SMEs and Support from the Authorities

Independent-Samples Kruskal-Wallis Test Summary	
Total N	220
Test Statistic	10.782 ^a
Degree Of Freedom	4
Asymptotic Sig.(2-sided test)	.029

a. The test statistic is adjusted for ties.



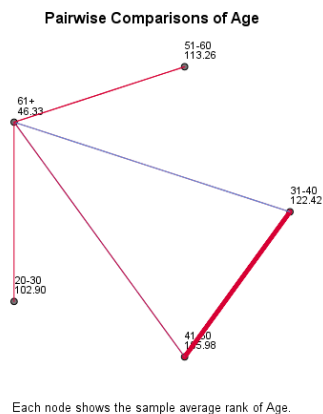
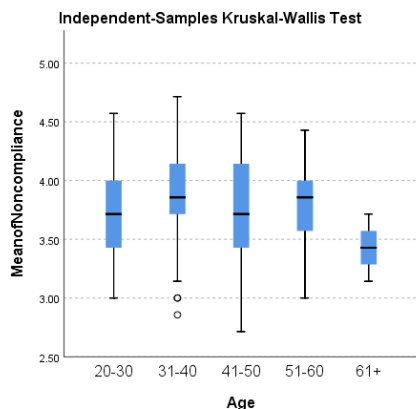
Pairwise Comparisons of Age and SME Requirements					
Sample 1- Sample 2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj. Sig. ^a
61+-20-30	40.230	28.815	1.396	.163	1.000
61+-41-50	55.095	26.754	2.059	.039	.395
61+-31-40	65.723	26.891	2.444	.015	.145
61+-51-60	77.287	28.607	2.702	.007	.069
20-30-41-50	-14.865	14.383	-1.033	.301	1.000
20-30-31-40	-25.493	14.638	-1.742	.082	.816
20-30-51-60	-37.057	17.592	-2.106	.035	.352
41-50-31-40	10.629	9.987	1.064	.287	1.000
41-50-51-60	-22.192	13.963	-1.589	.112	1.000
31-40-51-60	-11.564	14.225	-.813	.416	1.000

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

a. Significance values have been adjusted by the Bonferroni correction for multiple tests.

4.1.4 Age and Reasons for Non-Compliance

Independent-Samples Kruskal-Wallis Test Summary	
Total N	220
Test Statistic	9.705 ^a
Degree Of Freedom	4
Asymptotic Sig.(2-sided test)	.046
a. The test statistic is adjusted for ties.	



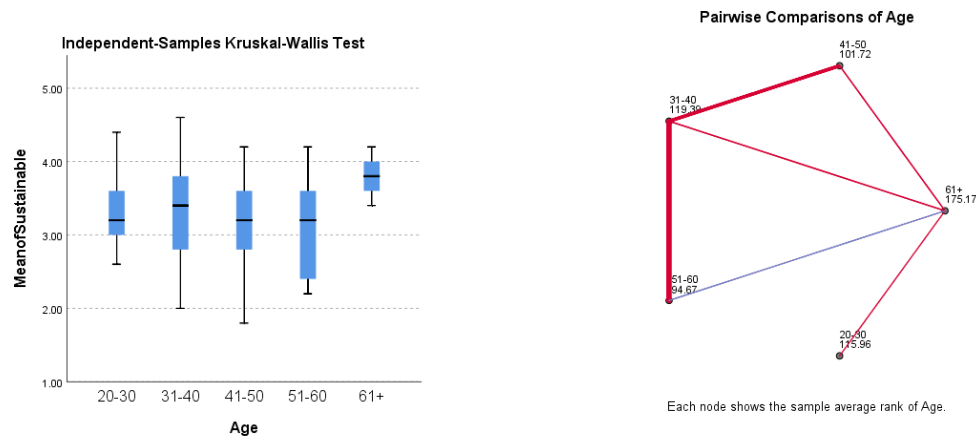
Pairwise Comparisons of Age and Reasons for Non-compliance					
Sample 1-Sample 2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj. Sig. ^a
61+-20-30	56.567	28.741	1.968	.049	.490
61+-41-50	59.644	26.685	2.235	.025	.254
61+-51-60	66.926	28.534	2.345	.019	.190
61+-31-40	76.087	26.823	2.837	.005	.046
20-30-41-50	-3.077	14.346	-.214	.830	1.000
20-30-51-60	-10.359	17.547	-.590	.555	1.000
20-30-31-40	-19.520	14.600	-1.337	.181	1.000
41-50-51-60	-7.282	13.928	-.523	.601	1.000
41-50-31-40	16.443	9.962	1.651	.099	.988
51-60-31-40	9.161	14.189	.646	.519	1.000

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

a. Significance values have been adjusted by the Bonferroni correction for multiple tests.

4.1.5 Age and MSWM Regulations and SDGs

Independent-Samples Kruskal-Wallis Test Summary	
Total N	220
Test Statistic	11.303 ^a
Degree Of Freedom	4
Asymptotic Sig.(2-sided test)	.023
a. The test statistic is adjusted for ties.	



Pairwise Comparisons of Age and Sustainable Development					
Sample 1-Sample 2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj. Sig. ^a
51-60-41-50	7.057	13.936	.506	.613	1.000
51-60-20-30	21.293	17.558	1.213	.225	1.000
51-60-31-40	24.720	14.197	1.741	.082	.816
51-60-61+	-80.500	28.550	-2.820	.005	.048
41-50-20-30	14.236	14.355	.992	.321	1.000
41-50-31-40	17.663	9.967	1.772	.076	.764
41-50-61+	-73.443	26.701	-2.751	.006	.059
20-30-31-40	-3.427	14.609	-.235	.815	1.000
20-30-61+	-59.207	28.757	-2.059	.040	.395
31-40-61+	-55.780	26.838	-2.078	.038	.377

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same. Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

a. Significance values have been adjusted by the Bonferroni correction for multiple tests.

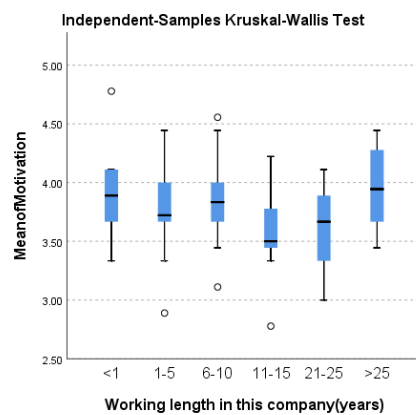
4.2 Pairwise Comparisons of Working Length and Perceptions Variables

Hypothesis Test Summary				
	Null Hypothesis	Test	Sig.	Decision
1	The distribution of MeanofSME_Awareness is the same across categories of Working length in this company(years).	Independent-Samples Kruskal-Wallis Test	.059	Retain the null hypothesis.
2	The distribution of MeanofMonitoring is the same across categories of Working length in this company(years).		.084	Retain the null hypothesis.
3	The distribution of MeanofSME_REQ is the same across categories of Working length in this company(years).		.405	Retain the null hypothesis.
4	The distribution of MeanofMotivation is the same across categories of Working length in this company(years).		.017	Reject the null hypothesis.
5	The distribution of MeanofNoncompliance is the same across categories of Working length in this company(years).		.779	Retain the null hypothesis.
6	The distribution of MeanofSMEcompliance is the same across categories of Working length in this company(years).		.401	Retain the null hypothesis.

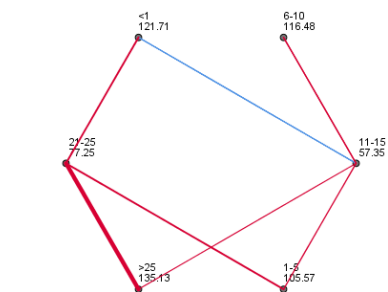
7	The distribution of MeanofMSWMRegulations is the same across categories of Working length in this company(years).		.281	Retain the null hypothesis.
8	The distribution of MeanofCleanerproduction is the same across categories of Working length in this company(years).		.049	Reject the null hypothesis.
9	The distribution of MeanofSustainable is the same across categories of Working length in this company(years).		.351	Retain the null hypothesis.
Asymptotic significances are displayed. The significance level is .050.				

4.2.1 Working Length and Motivations for Compliance

Independent-Samples Kruskal-Wallis Test Summary	
Total N	220
Test Statistic	13.789 ^a
Degree Of Freedom	5
Asymptotic Sig.(2-sided test)	.017
a. The test statistic is adjusted for ties.	



Pairwise Comparisons of Working length in this compa...



Pairwise Comparisons of Working length in this company and Motivation					
Sample 1- Sample 2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj. Sig. ^a
11-15-21-25	-19.900	28.264	-.704	.481	1.000
11-15-1-5	48.221	21.366	2.257	.024	.360
11-15-6-10	59.128	21.405	2.762	.006	.086
11-15-<1	64.363	21.758	2.958	.003	.046
11-15->25	-77.775	29.979	-2.594	.009	.142
21-25-1-5	28.321	21.366	1.326	.185	1.000
21-25-6-10	39.228	21.405	1.833	.067	1.000
21-25-<1	44.463	21.758	2.044	.041	.615
21-25->25	-57.875	29.979	-1.931	.054	.803
1-5-6-10	-10.907	10.761	-1.014	.311	1.000

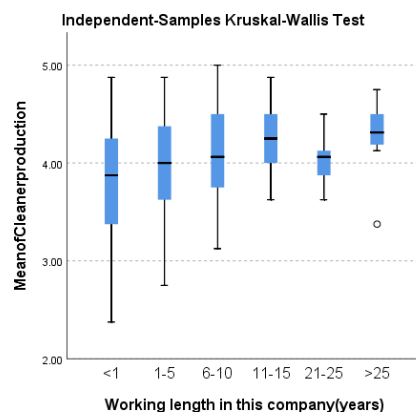
1-5-<1	16.142	11.447	1.410	.159	1.000
1-5->25	-29.554	23.587	-1.253	.210	1.000
6-10-<1	5.235	11.520	.454	.650	1.000
6-10->25	-18.647	23.623	-.789	.430	1.000
<1->25	-13.412	23.943	-.560	.575	1.000

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.
a. Significance values have been adjusted by the Bonferroni correction for multiple tests.

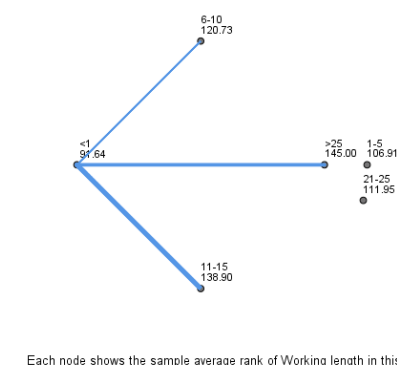
4.2.2 Working Length and Perceptions of Cleaner Production

Independent-Samples Kruskal-Wallis Test Summary	
Total N	220
Test Statistic	11.124 ^a
Degree Of Freedom	5
Asymptotic Sig.(2-sided test)	.049

a. The test statistic is adjusted for ties.



Pairwise Comparisons of Working length in this compa...



Pairwise Comparisons of Working length in this company and Cleaner Production					
Sample 1- Sample 2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj. Sig. ^a
<1-1-5	-15.268	11.498	-1.328	.184	1.000
<1-21-25	-20.311	21.856	-.929	.353	1.000
<1-6-10	-29.089	11.572	-2.514	.012	.179
<1-11-15	-47.261	21.856	-2.162	.031	.459
<1->25	-53.361	24.051	-2.219	.027	.398
1-5-21-25	-5.043	21.462	-.235	.814	1.000
1-5-6-10	-13.821	10.810	-1.279	.201	1.000
1-5-11-15	-31.993	21.462	-1.491	.136	1.000
1-5->25	-38.093	23.693	-1.608	.108	1.000
21-25-6-10	8.778	21.501	.408	.683	1.000
21-25-11-15	26.950	28.392	.949	.343	1.000
21-25->25	-33.050	30.114	-1.098	.272	1.000
6-10-11-15	-18.172	21.501	-.845	.398	1.000
6-10->25	-24.272	23.729	-1.023	.306	1.000

11-15->25	-6.100	30.114	-.203	.839	1.000
Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same. Asymptotic significances (2-sided tests) are displayed. The significance level is .05.					
a. Significance values have been adjusted by the Bonferroni correction for multiple tests.					

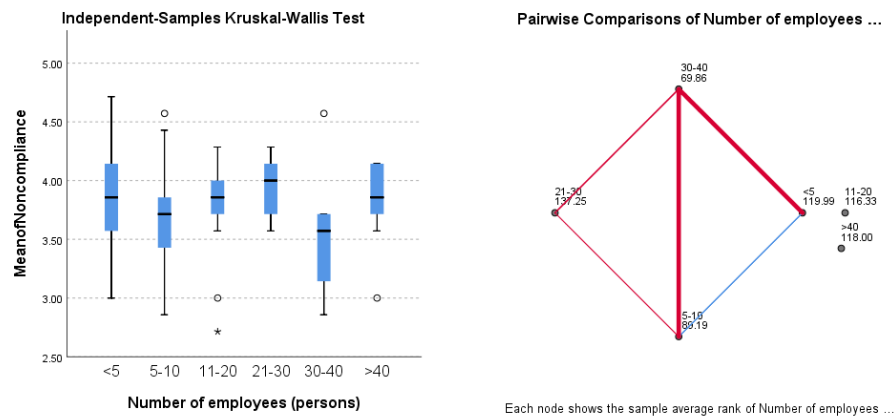
4.3 Pairwise Comparisons of the Number of Employees and Perceptions

Variables

Hypothesis Test Summary				
	Null Hypothesis	Test	Sig.	Decision
1	The distribution of MeanofSME_Awareness is the same across categories of Number of employees (persons).	Indepen- dent- Samples Kruskal- Wallis Test	.641	Retain the null hypothesis.
2	The distribution of MeanofMonitoring is the same across categories of Number of employees (persons).		.287	Retain the null hypothesis.
3	The distribution of MeanofSME_REQ is the same across categories of Number of employees (persons).		.098	Retain the null hypothesis.
4	The distribution of MeanofMotivation is the same across categories of Number of employees (persons).		.675	Retain the null hypothesis.
5	The distribution of MeanofNoncompliance is the same across categories of Number of employees (persons).		.008	Reject the null hypothesis.
6	The distribution of MeanofSMEcompliance is the same across categories of Number of employees (persons).		.044	Reject the null hypothesis.
7	The distribution of MeanofMSWMRegulations is the same across categories of Number of employees (persons).		.767	Retain the null hypothesis.
8	The distribution of MeanofCleanerproduction is the same across categories of Number of employees (persons).		.320	Retain the null hypothesis.
9	The distribution of MeanofSustainable is the same across categories of Number of employees (persons).		.112	Retain the null hypothesis.
Asymptotic significances are displayed. The significance level is .050.				

4.3.1 Number of Employees and Reasons for Non-Compliance

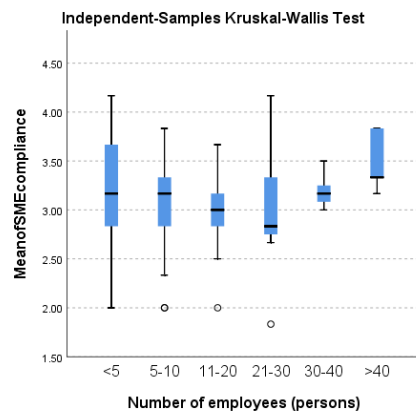
Independent-Samples Kruskal-Wallis Test Summary	
Total N	220
Test Statistic	15.648 ^a
Degree Of Freedom	5
Asymptotic Sig.(2-sided test)	.008
a. The test statistic is adjusted for ties.	



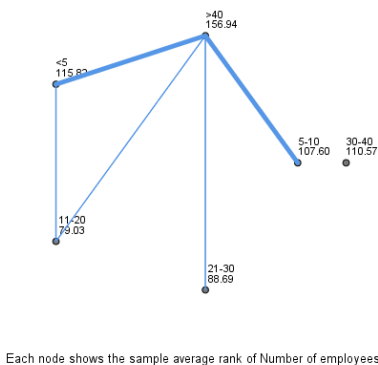
Pairwise Comparisons of the Number of Employees and Reasons for Non-compliance					
Sample 1-Sample 2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj. Sig. ^a
30-40-5-10	19.333	25.188	.768	.443	1.000
30-40-11-20	46.476	28.939	1.606	.108	1.000
30-40->40	-48.143	31.861	-1.511	.131	1.000
30-40-<5	50.134	24.644	2.034	.042	.629
30-40-21-30	67.393	28.650	2.352	.019	.280
5-10-11-20	-27.143	18.163	-1.494	.135	1.000
5-10->40	-28.810	22.529	-1.279	.201	1.000
5-10-<5	30.800	9.989	3.083	.002	.031
5-10-21-30	-48.060	17.699	-2.715	.007	.099
11-20->40	-1.667	26.657	-.063	.950	1.000
11-20-<5	3.658	17.401	.210	.834	1.000
11-20-21-30	-20.917	22.722	-.921	.357	1.000
>40-<5	1.991	21.919	.091	.928	1.000
>40-21-30	19.250	26.342	.731	.465	1.000
<5-21-30	-17.259	16.916	-1.020	.308	1.000
Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.					
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.					
a. Significance values have been adjusted by the Bonferroni correction for multiple tests.					

4.3.2 Number of Employees and Compliance With MSWM Regulations

Independent-Samples Kruskal-Wallis Test Summary	
Total N	220
Test Statistic	11.395 ^a
Degree Of Freedom	5
Asymptotic Sig.(2-sided test)	.044
a. The test statistic is adjusted for ties.	



Pairwise Comparisons of Number of employees ...



Pairwise Comparisons of Number of Employees and SME Compliance					
Sample 1- Sample 2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj. Sig. ^a
11-20-21-30	-9.654	22.717	-.425	.671	1.000
11-20-5-10	28.562	18.160	1.573	.116	1.000
11-20-30-40	-31.538	28.933	-1.090	.276	1.000
11-20-<5	36.789	17.398	2.115	.034	.517
11-20->40	-77.911	26.652	-2.923	.003	.052
21-30-5-10	18.908	17.696	1.068	.285	1.000
21-30-30-40	-21.884	28.644	-.764	.445	1.000
21-30-<5	27.135	16.913	1.604	.109	1.000
21-30->40	-68.257	26.337	-2.592	.010	.143
5-10-30-40	-2.976	25.183	-.118	.906	1.000
5-10-<5	8.227	9.987	.824	.410	1.000
5-10->40	-49.349	22.525	-2.191	.028	.427
30-40-<5	5.251	24.639	.213	.831	1.000
30-40->40	-46.373	31.855	-1.456	.145	1.000
<5->40	-41.122	21.915	-1.876	.061	.909

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.
a. Significance values have been adjusted by the Bonferroni correction for multiple tests.

4.4 Pairwise Comparisons of the Type of Business and Perceptions

Variables

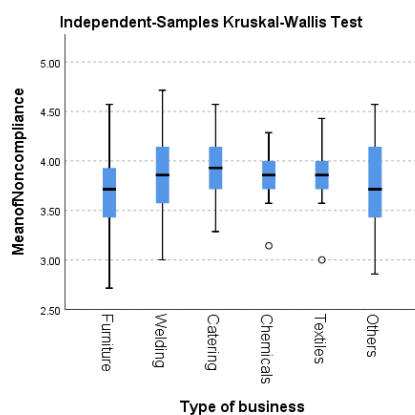
Hypothesis Test Summary				
	Null Hypothesis	Test	Sig.	Decision
1	The distribution of MeanofSME_Awareness is the same across categories of Type of business .	Independ ent- Samples Kruskal- Wallis Test	.448	Retain the null hypothesis.
2	The distribution of MeanofMonitoring is the same across categories of Type of business .		.076	Retain the null hypothesis.
3	The distribution of MeanofSME_REQ is the same across categories of Type of business .		.755	Retain the null hypothesis.

4	The distribution of MeanofMotivation is the same across categories of Type of business .		.780	Retain the null hypothesis.
5	The distribution of MeanofNoncompliance is the same across categories of Type of business .		.049	Reject the null hypothesis.
6	The distribution of MeanofSMEcompliance is the same across categories of Type of business .		.571	Retain the null hypothesis.
7	The distribution of MeanofMSWMRegulations is the same across categories of Type of business .		.235	Retain the null hypothesis.
8	The distribution of MeanofCleanerproduction is the same across categories of Type of business .		.995	Retain the null hypothesis.
9	The distribution of MeanofSustainable is the same across categories of Type of business .		.888	Retain the null hypothesis.
Asymptotic significances are displayed. The significance level is .050.				

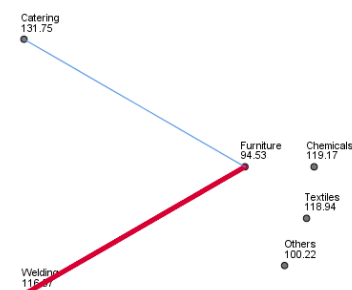
4.4.1 Number of Employees and Reasons for Non-Compliance

MeanofNoncompliance across Type of business

Independent-Samples Kruskal-Wallis Test Summary	
Total N	220
Test Statistic	11.126 ^a
Degree Of Freedom	5
Asymptotic Sig.(2-sided test)	.049
a. The test statistic is adjusted for ties.	



Pairwise Comparisons of Type of business



Each node shows the sample average rank of Type of business .

Pairwise Comparisons of Type of Business and Non-compliance					
Sample 1-Sample 2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj. Sig. ^a
Furniture-Others	-5.694	17.314	-.329	.742	1.000
Furniture-Welding	-22.045	11.397	-1.934	.053	.796
Furniture-Textiles	-24.415	14.486	-1.685	.092	1.000
Furniture-Chemicals	-24.642	22.228	-1.109	.268	1.000
Furniture-Catering	-37.225	12.243	-3.041	.002	.035
Others-Welding	16.351	18.159	.900	.368	1.000
Others-Textiles	18.721	20.241	.925	.355	1.000
Others-Chemicals	18.948	26.342	.719	.472	1.000
Others-Catering	31.531	18.701	1.686	.092	1.000
Welding-Textiles	-2.370	15.486	-.153	.878	1.000
Welding-Chemicals	-2.597	22.892	-.113	.910	1.000
Welding-Catering	-15.180	13.411	-1.132	.258	1.000
Textiles-Chemicals	.227	24.576	.009	.993	1.000
Textiles-Catering	12.810	16.118	.795	.427	1.000
Chemicals-Catering	12.583	23.324	.539	.590	1.000
Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same. Asymptotic significances (2-sided tests) are displayed. The significance level is .05.					
a. Significance values have been adjusted by the Bonferroni correction for multiple tests.					

4.5 Pairwise Comparisons of the Form of Organization and Perceptions

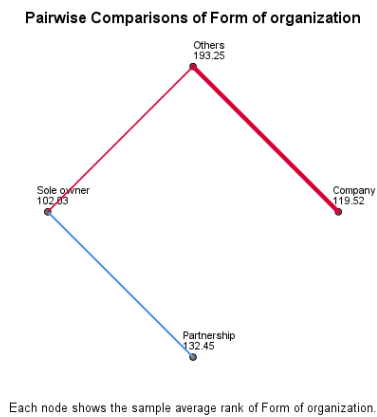
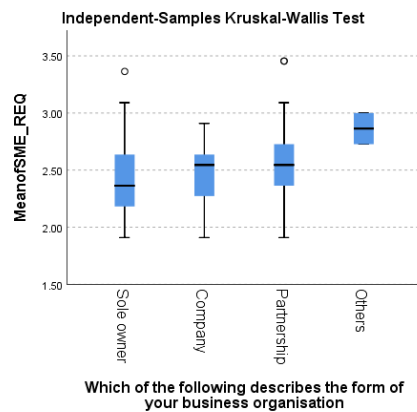
Variables

Hypothesis Test Summary				
	Null Hypothesis	Test	Sig.	Decision
1	The distribution of MeanofSME_Awareness is the same across categories of Which of the following describes the form of your business organisation.	Independent-Samples Kruskal-Wallis Test	.898	Retain the null hypothesis.
2	The distribution of MeanofMonitoring is the same across categories of Which of the following describes the form of your business organisation.		.668	Retain the null hypothesis.
3	The distribution of MeanofSME_REQ is the same across categories of Which of the following describes the form of your business organisation.		.010	Reject the null hypothesis.
4	The distribution of MeanofMotivation is the same across categories of Which of the following describes the form of your business organisation.		.177	Retain the null hypothesis.
5	The distribution of MeanofNoncompliance is the same across categories of Which of the following describes the form of your business organisation.		.128	Retain the null hypothesis.
6	The distribution of MeanofSMEcompliance is the same across categories of Which of the following describes the form of your business organisation.		.116	Retain the null hypothesis.
7	The distribution of MeanofMSWMRegulations is the same across categories of Which of the following describes the form of your business organisation.		.105	Retain the null hypothesis.
8	The distribution of MeanofCleanerproduction is the same across categories of Which of the following describes the form of your business organisation.		.735	Retain the null hypothesis.
9	The distribution of MeanofSustainable is the same across categories of Which of the following describes the form of your business organisation.		.988	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .050.

4.5.1 Form of Business Organization and Requirements for SMEs and Support from the Authorities

Independent-Samples Kruskal-Wallis Test Summary	
Total N	220
Test Statistic	11.249 ^a
Degree Of Freedom	3
Asymptotic Sig.(2-sided test)	.010
a. The test statistic is adjusted for ties.	



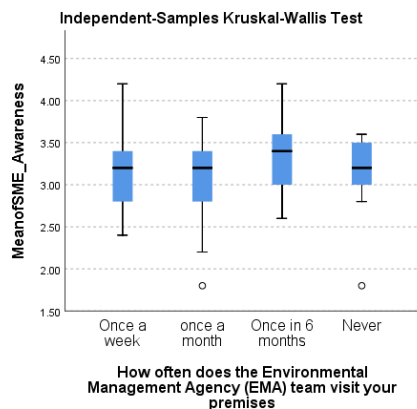
Pairwise Comparisons of the Form of Business Organization and SME Requirements					
Sample 1-Sample 2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj. Sig. ^a
Sole owner-Company	-17.483	12.677	-1.379	.168	1.000
Sole owner-Partnership	-30.414	11.511	-2.642	.008	.049
Sole owner-Others	-91.217	45.117	-2.022	.043	.259
Company-Partnership	-12.931	15.480	-.835	.404	1.000
Company-Others	-73.733	46.289	-1.593	.111	.667
Partnership-Others	-60.803	45.983	-1.322	.186	1.000
Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.					
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.					
a. Significance values have been adjusted by the Bonferroni correction for multiple tests.					

4.6 Pairwise Comparisons of the Frequency of EMaG Visits and Perceptions Variables

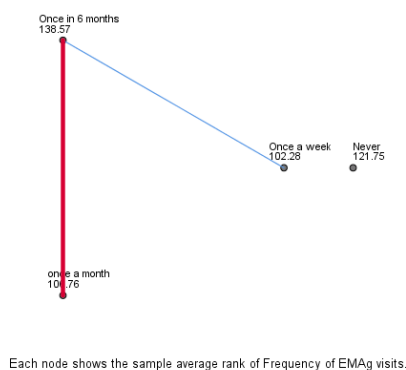
Hypothesis Test Summary				
	Null Hypothesis	Test	Sig.	Decision
1	The distribution of MeanofSME_Awareness is the same across categories of How often does the Environmental Management Agency (EMA) team visit your premises.	Independ ent- Samples Kruskal- Wallis Test	.047	Reject the null hypothesis.
2	The distribution of MeanofMonitoring is the same across categories of How often does the Environmental Management Agency (EMA) team visit your premises.		.043	Reject the null hypothesis.
3	The distribution of MeanofSME_REQ is the same across categories of How often does the Environmental Management Agency (EMA) team visit your premises.		.029	Reject the null hypothesis.
4	The distribution of MeanofMotivation is the same across categories of How often does the Environmental Management Agency (EMA) team visit your premises.		.200	Retain the null hypothesis.
5	The distribution of MeanofNoncompliance is the same across categories of How often does the Environmental Management Agency (EMA) team visit your premises.		.640	Retain the null hypothesis.
6	The distribution of MeanofSMEcompliance is the same across categories of How often does the Environmental Management Agency (EMA) team visit your premises.		.629	Retain the null hypothesis.
7	The distribution of MeanofMSWMRegulations is the same across categories of How often does the Environmental Management Agency (EMA) team visit your premises.		.152	Retain the null hypothesis.
8	The distribution of MeanofCleanerproduction is the same across categories of How often does the Environmental Management Agency (EMA) team visit your premises.		.328	Retain the null hypothesis.
9	The distribution of MeanofSustainable is the same across categories of How often does the Environmental Management Agency (EMA) team visit your premises.		.129	Retain the null hypothesis.
Asymptotic significances are displayed. The significance level is .050.				

4.6.1 Frequency of the EMaG Visits and Awareness of the MSWM Regulations

Independent-Samples Kruskal-Wallis Test Summary	
Total N	220
Test Statistic	7.958 ^a
Degree Of Freedom	3
Asymptotic Sig.(2-sided test)	.047
a. The test statistic is adjusted for ties.	



Pairwise Comparisons of Frequency of EMAG visits



Pairwise Comparisons of Frequency of Agency Visits and Awareness

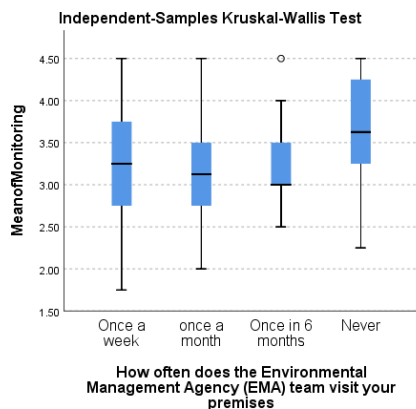
Sample 1-Sample 2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj. Sig. ^a
Once a week-once a month	-4.475	9.589	-.467	.641	1.000
Once a week-Never	-19.470	15.665	-1.243	.214	1.000
Once a week-Once in 6 months	-36.291	13.749	-2.640	.008	.050
once a month-Never	-14.994	15.528	-.966	.334	1.000
once a month-Once in 6 months	-31.816	13.592	-2.341	.019	.115
Never-Once in 6 months	16.821	18.390	.915	.360	1.000

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same. Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

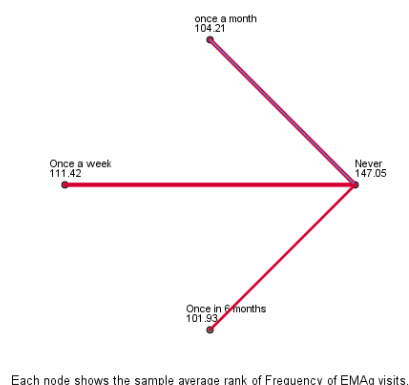
a. Significance values have been adjusted by the Bonferroni correction for multiple tests.

4.6.2 Frequency of the EMAG Visits and Monitoring and Enforcement of MSWM Regulations

Independent-Samples Kruskal-Wallis Test Summary	
Total N	220
Test Statistic	8.146 ^a
Degree Of Freedom	3
Asymptotic Sig.(2-sided test)	.043
a. The test statistic is adjusted for ties.	



Pairwise Comparisons of Frequency of EMAG visits



Pairwise Comparisons of Frequency of Agency Visits and Monitoring

Sample 1-Sample 2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj. Sig. ^a
Once in 6 months-once a month	2.277	13.650	.167	.868	1.000
Once in 6 months-Once a week	9.492	13.807	.688	.492	1.000
Once in 6 months-Never	-45.121	18.467	-2.443	.015	.087
once a month-Once a week	7.215	9.630	.749	.454	1.000
once a month-Never	-42.844	15.593	-2.748	.006	.036
Once a week-Never	-35.629	15.731	-2.265	.024	.141

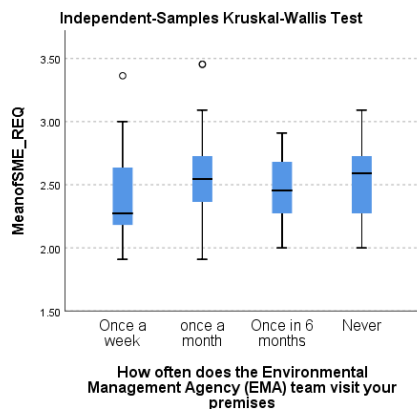
Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.

Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

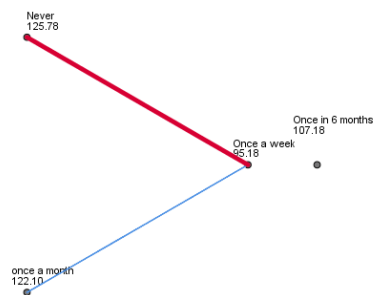
a. Significance values have been adjusted by the Bonferroni correction for multiple tests.

4.6.3 Frequency of the EMAG Visits and Requirements for SMEs and Support from the Authorities

Independent-Samples Kruskal-Wallis Test Summary	
Total N	220
Test Statistic	9.045 ^a
Degree Of Freedom	3
Asymptotic Sig.(2-sided test)	.029
a. The test statistic is adjusted for ties.	



Pairwise Comparisons of Frequency of EMAg visits



Each node shows the sample average rank of Frequency of EMAg visits.

Pairwise Comparisons of Frequency of Agency Visits and Awareness and SME Requirements					
Sample 1-Sample 2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj. Sig. ^a
Once a week-Once in 6 months	-12.002	13.874	-.865	.387	1.000
Once a week-once a month	-26.923	9.676	-2.782	.005	.032
Once a week-Never	-30.598	15.807	-1.936	.053	.317
Once in 6 months-once a month	14.921	13.716	1.088	.277	1.000
Once in 6 months-Never	-18.596	18.557	-1.002	.316	1.000
once a month-Never	-3.675	15.669	-.235	.815	1.000
Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same. Asymptotic significances (2-sided tests) are displayed. The significance level is .05.					
a. Significance values have been adjusted by the Bonferroni correction for multiple tests.					

VITAE

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Post Graduate Diploma in Safety, Health and Environmental Management	Midlands State University	2013
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List of Publication and Proceeding

The Challenges and Opportunities of Zimbabwean SMEs in Implementing Municipal Solid Waste Management Regulations. [Manuscript submitted for publication] *Int. J. Sustainable Society*. (Under review).

Mashiringwane, Chengetai and Roongtawanreongsri, Saowalak. 2024. SMEs' Drivers and Constraints in Sustainable Waste Management Compliance: Insights from Zimbabwe. *The International Journal of Sustainability Policy and Practice*, 20(1): 23-52. <https://doi.org/10.18848/2325-1166/CGP/v20i01/23-52>.

Mashiringwane, Chengetai and Roongtawanreongsri, Saowalak. 2024. Comparative Analysis of the European Union vs. Zimbabwean Municipal Solid Waste Management Regulations. *The International Journal of Sustainability Policy and Practice*, 20(2): 103-127. <https://doi.org/10.18848/2325-1166/CGP/v20i02/103-127>