UNIVERSITY OF LUSAKA

SCHOOL OF BUSINESS, ECONOMICS AND MANAGEMENT

Analyzing the Impact of Unregulated Electronic Waste Disposal: A Case Study on Laptop Disposal at ZESCO Limited Head Office in Lusaka.

BY

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DECLARATION

I **Yvonne Yalusa** hereby declare that this work is my own and that the work of other persons used in this dissertation has been dully acknowledged.

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Signed …… Date 28th February,2024

Supervisor: Dr. Hara Mathews. 

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DEDICATION

This work is dedicated to my Mother Bernadette Mulenga and my Sister Muma Mwenda. I want to thank them for raising me and molding me into the young Lady I am today, for always believing in me and supporting me in all aspects of my life, which has helped me get to where I am in life. I also want to thank my husband (Teddy Phiri) for being a supportive colleague throughout my school Journey.

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May God bless you all.

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ABSTRACT

This study scrutinized the electronic waste disposal practices at ZESCO Limited Head Office, revealing alarming trends that necessitate immediate attention. The prevalence of conventional disposal methods, particularly the substantial volume of laptops ending up in undesignated places, signals an urgent requirement for a fundamental shift in electronic waste management strategies. The alignment of these practices with global and regional challenges faced by developing nations underscores systemic issues inherent in unregulated disposal.

Environmental and health implications, such as the potential for soil and water contamination and health risks for individuals involved in improper disposal, emphasize the critical need for structured and sustainable practices. ZESCO's current electronic waste management, characterized by unregulated disposal and limited recycling facilities, demands intervention. The absence of clear regulatory frameworks exacerbates these challenges, emphasizing the necessity for comprehensive policies to guide responsible e-waste management.

This research underscored the urgency of reassessing and restructuring ZESCO Limited's electronic waste management practices to align with international standards, mitigate environmental and health risks, and promote responsible practices. Immediate action is imperative to address the regulatory gaps and ensure the organization's commitment to environmentally sustainable electronic waste management.

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CHAPTER ONE

1.0. INTRODUCTION

This chapter serves as the gateway to a comprehensive exploration of the impact of indiscriminate electronic waste disposal, focusing on laptops, at ZESCO Limited Head Office in Lusaka. It offers an initial glimpse into the research's scope, purpose, and significance, setting the stage for an in-depth investigation. The introduction presents an overview of the forthcoming chapters and the critical role they play in understanding and addressing the issue of electronic waste disposal within the specific context of ZESCO Limited Head Office. As the initial chapter of this study, it encapsulates the foundational elements of the research, laying the groundwork for a holistic examination of the problem at hand and the potential solutions to be explored in the subsequent chapters.

1.2 Background to Study

In our modern digital era, electronic devices have proliferated at an unprecedented rate, changing the way we live, work, and interact with the world. This surge in technological innovation, while providing immense benefits, has also given rise to a formidable environmental concern: the management of electronic waste, commonly referred to as e-waste. E-waste encompasses a wide array of discarded electronic devices, such as laptops, smartphones, televisions, and computer peripherals. These devices, which have become integral to our daily lives, contain a complex mixture of materials, including metals, plastics, and hazardous substances like lead, mercury, and cadmium (Li et al., 2020).

Electronic waste management is a multifaceted endeavor that encompasses a range of activities, from collection and transportation to recycling and responsible disposal. It involves a complex interplay of environmental, health, and socio-economic factors. On one hand, the improper disposal of e-waste, especially in developing nations like Zambia, can lead to environmental pollution and degradation. When e-waste is disposed of in landfills or incinerated without appropriate safeguards, it can release harmful substances into the air, soil, and water, posing a direct threat to ecosystems and human health (Sthiannopkao et al., 2012).

On the other hand, effective electronic waste management is expected to address these challenges through a series of key practices and principles. Firstly, it involves the proper collection and transportation of e-waste from various sources to designated recycling facilities, thereby preventing uncontrolled disposal. Secondly, e-waste management emphasizes the need for recycling and safe disposal methods to recover valuable materials and minimize environmental harm. Recycling processes often involve the extraction of metals like gold, silver, and copper from electronic components while ensuring the safe disposal of hazardous materials.

Furthermore, e-waste management should promote awareness and compliance among both producers and consumers. Producers of electronic devices are encouraged to design products with recycling and disposal considerations in mind, while consumers are educated about the importance of responsible disposal and encouraged to participate in recycling programs. Additionally, international agreements and regulations, such as the Basel Convention, seek to govern the transboundary movements of hazardous e-waste and promote environmentally sound management practices (Li et al., 2020).

In the specific context of ZESCO Limited Head Office in Lusaka, this research investigates the practices and challenges associated with laptop disposal and aims to shed light on the potential implications for electronic waste management within Zambia's broader socio-economic landscape.

1.3 Statement of the problem

The indiscriminate disposal of electronic waste, particularly focusing on laptops, within the premises of ZESCO Limited Head Office in Lusaka, presents a pressing and multifaceted problem that requires urgent attention and intervention. As Zambia undergoes rapid technological growth and an increased utilization of electronic devices, the proper management of electronic waste becomes paramount to safeguard the environment, public health, and the nation's sustainable development. This problem aligns with a global concern, where the proliferation of electronic devices has led to the generation of substantial amounts of electronic waste, much of which is inadequately managed, leading to adverse environmental and health impacts (Li et al., 2020).

The primary issue revolves around the absence of structured and sustainable practices for the disposal of laptops and other electronic equipment in Zambia. This gap in electronic waste management practices is not unique to Zambia but is a shared challenge faced by numerous

countries as technological consumption surges (Sthiannopkao et al., 2012). The consequence of this problem is two-fold: environmental degradation and health hazards. The improper disposal of laptops and associated electronic components can result in the release of hazardous substances, such as lead, mercury, and cadmium, into the environment. These toxic materials can contaminate soil, water, and air, posing risks to both local ecosystems and the well-being of those residing in the vicinity. International studies and reports have underscored the global significance of electronic waste as a source of environmental pollution and public health risks, further highlighting the relevance of the problem at hand (Sthiannopkao et al., 2012; Li et al., 2020).

Additionally, the absence of effective electronic waste management practices may lead to the loss of valuable resources that could be recovered through recycling. This issue aligns with a global movement towards responsible e-waste management that aims to recover valuable materials, reduce electronic waste's environmental impact, and promote a circular economy (Li et al., 2020). The overarching problem, therefore, is the absence of a systematic and sustainable approach to laptop disposal at ZESCO Limited Head Office, which not only endangers the environment and public health but also neglects opportunities for resource recovery and sustainable practices.

While the issue is apparent, it is essential to note that a structured and sustainable approach to electronic waste management remains conspicuously absent. The Zambia Information and Communications Technology Authority (ZICTA) in its 2022 report highlights the lack of standardized procedures and regulations for electronic waste disposal within the country, further underscoring the urgency of addressing this problem. The absence of such structured and sustainable practices contributes to the pressing concerns related to electronic waste management (ZICTA, 2022).

1.4 Objectives

1.4.1 Main Objective

To analyze the Impact of Unregulated Electronic Waste Disposal of Laptops at ZESCO Limited Head Office in Lusaka.

1.4.2 Specific Objectives

1. Assess the current laptop disposal practices at ZESCO Limited Head Office.
2. Analyze the environmental and health implications of these laptop disposal practices.

3. Identify recommendations for structured and sustainable laptop disposal practices at ZESCO Limited Head Office.

1.4.3 Research Questions

1. What are the current practices for laptop disposal at ZESCO Limited Head Office?
2. What are the environmental and health implications of the existing laptop disposal practices?
3. What recommendations can be made to establish structured and sustainable practices for laptop disposal at ZESCO Limited Head Office?

1.5 Significance of study

This comprehensive investigation holds immense significance across various dimensions. Primarily, it seeks to address the pressing necessity for an evaluation and enhancement of electronic waste disposal methodologies within the specific organizational milieu of the ZESCO Limited Head Office situated in Lusaka. By delving into the intricacies of laptop disposal, the research endeavors not only to illuminate extant challenges but also aims to contribute to the formulation of systematic and sustainable practices in alignment with electronic waste management regulations.

The outcomes of this study are anticipated to offer invaluable insights into the prevailing obstacles associated with laptop disposal, providing a foundation for the development of pragmatic solutions. Beyond the immediate organizational context, the findings are poised to serve as a beacon for other entities, policy-makers, and researchers, not only within Zambia but extending beyond borders. Given the global significance of electronic waste and its profound environmental and health ramifications, the research stands to make a substantial contribution to the broader discourse surrounding responsible electronic waste management.

This study transcends its immediate scope by emphasizing the economic potential inherent in adopting responsible electronic waste management practices. By accentuating the concept of resource recovery and championing the establishment of a circular economy, the research advocates for a paradigm shift that aligns with sustainability goals in the digital age. This approach not only promotes environmental consciousness but also underscores the economic benefits tied to conscientious electronic waste management. In doing so, the study strives to propel the adoption

of practices that not only address immediate concerns but also lay the groundwork for a more sustainable and environmentally aware future.

1.6 Delimitations of the study (Scope of study)

This research was delimited to ZESCO Limited Head Office in Lusaka, Zambia, focusing exclusively on the disposal of laptops as a component of electronic waste within this organization. The study did not extend beyond this specific geographic scope, electronic waste type, or the timeframe of the research. It examined electronic waste management practices within the boundaries of regulatory compliance and best practices without involving the formulation or modification of electronic waste management regulations. Additionally, the study operated within the constraints of available resources, ensuring a focused and manageable investigation.

1.7 Operational Definitions

1. **Electronic Waste (E-Waste):** For this study, electronic waste refers to discarded electronic devices and components, such as laptops, which are no longer in use or considered obsolete.

2. **Laptops:** Laptops are portable personal computers that typically include a screen, keyboard, and a variety of electronic components. These are the specific electronic devices under investigation in this research.

3. **ZESCO Limited Head Office:** ZESCO Limited Head Office refers to the administrative and operational center of the power utility company located in Lusaka, Zambia, which is the specific research site.

4. **Compliance:** Compliance in this context pertains to adherence to electronic waste management regulations, standards, and best practices set forth by relevant authorities and organizations.

5. **Hazardous Substances:** Hazardous substances include materials, such as lead, mercury, and cadmium, that are present in electronic waste and pose environmental and health risks when released into the ecosystem.

6. **Resource Recovery:** Resource recovery encompasses the retrieval and recycling of valuable materials, such as metals, from electronic waste, with the aim of reducing environmental impact and promoting sustainable practices.

7. **Structured and Sustainable Practices:** Structured and sustainable practices denote established and enduring methods for electronic waste disposal that align with national and international electronic waste management standards and contribute to long-term environmental and economic sustainability.

1.8 Chapter Synthesis

Chapter 1: Introduction

Chapter 1 provides an introduction to the research, outlining the main problem of unregulated electronic waste disposal of laptops at ZESCO Limited Head Office in Lusaka. It presents the main and specific objectives and research questions, emphasizing the significance and delimitations of the study within a clear context.

Chapter 2: Literature Review

Chapter 2 conducts a comprehensive review of existing literature, exploring the global and local perspectives on electronic waste, its management practices, and the environmental and health implications. This chapter lays the theoretical foundation for the study, connecting the research problem with established knowledge and best practices.

Chapter 3: Research Methodology

Chapter 3 outlines the research methodology, detailing the data collection methods, tools, and analytical techniques employed to investigate laptop disposal practices at ZESCO Limited Head Office. It describes the research design and approach, providing insights into the data gathering process.

Chapter 4: Data Analysis and Findings

Chapter 4 presents the analysis of data collected during the study, exploring the current laptop disposal practices, their environmental and health implications, and opportunities for resource recovery. It offers insights into the extent of compliance with electronic waste management

standards and regulations, as well as the economic potential of responsible electronic waste management.

Chapter 5: Conclusion and Recommendations

Chapter 5 provides a conclusion based on the findings and analysis presented in the previous chapters. It offers recommendations for structured and sustainable laptop disposal practices at ZESCO Limited Head Office and discusses their alignment with national and international electronic waste management standards. This chapter serves as a culmination of the research, offering a solution-oriented perspective to address the research problem and its implications.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This Chapter presents a comprehensive literature review on electronic waste (e-waste) management practices, with a specific focus on laptops, at ZESCO Limited Head Office in Lusaka. This chapter established the theoretical foundation for the research by exploring global and local perspectives on e-waste, current management practices, environmental and health implications, and economic opportunities related to resource recovery. Additionally, the chapter introduced the theoretical and conceptual frameworks that guide the study, ensuring a thorough understanding of the research problem and its context. This literature review is instrumental in contextualizing the research within the broader framework of e-waste management and in emphasizing the importance of sustainable practices and regulatory compliance.

2.1 Overview of Electronic Waste Disposal

Electronic waste, often abbreviated as e-waste, constitutes a diverse and expanding category of discarded electronic devices and components, encompassing a wide spectrum of technological equipment. Such devices include but are not limited to laptops, personal computers, mobile phones, televisions, household appliances, and industrial machinery, all of which reach obsolescence or the end of their useful life (Kahhat et al., 2012). The proliferation of electronic gadgets, largely driven by rapid technological advancements, has resulted in an alarming escalation in the generation of e-waste. This, in turn, necessitates a focused approach to the management of electronic waste, underpinned by the principles of responsible disposal and resource recovery (Baldé et al., 2017).

The disposal of electronic waste is a multifaceted challenge that arises from the intricacies of managing diverse electronic devices, each with unique materials, components, and end-of-life considerations. Notably, these devices often contain hazardous substances such as lead, mercury, cadmium, and various flame retardants. When e-waste is discarded in an unregulated or improper manner, these toxic materials have the potential to leach into the surrounding environment, posing a considerable threat to ecosystems and human health (Cucchiella et al., 2015). Consequently, the

disposal of e-waste demands comprehensive attention, primarily due to its far-reaching consequences (Awasthi et al., 2016).

The crux of effective e-waste management lies in the adoption of sustainable practices that prioritize responsible recycling and resource recovery while concurrently addressing the proper disposal of hazardous materials (Balde et al., 2015). This approach is essential for reducing environmental damage, conserving valuable resources, and averting the release of toxic substances into the environment. In alignment with national and international electronic waste management regulations and best practices, responsible e-waste management seeks to establish a circular economy where valuable materials are extracted from discarded devices, promoting both environmental sustainability and the responsible stewardship of resources (United Nations, 2017). By addressing these critical considerations, e-waste management emerges as a global concern necessitating urgent attention and well-defined strategies for a more sustainable and eco-conscious future.

At the heart of effective e-waste management lies the pivotal adoption of sustainable practices that prioritize responsible recycling and resource recovery, all while concurrently addressing the proper disposal of hazardous materials, as articulated by Balde et al. in their seminal work (2015). This approach becomes indispensable in the pursuit of reducing environmental damage, conserving valuable resources, and preventing the release of toxic substances into the ecosystem. In strict adherence to both national and international electronic waste management regulations and best practices, the ethos of responsible e-waste management strives to establish a circular economy wherein valuable materials are systematically extracted from discarded devices. This not only mitigates environmental impact but also fosters both environmental sustainability and the conscientious stewardship of resources, as emphasized by the United Nations in 2017.

The concept of a circular economy in e-waste management signifies a paradigm shift from traditional linear models of consumption and disposal. Instead, it emphasizes a closed-loop system where discarded electronic devices are treated as repositories of valuable materials that can be recovered and reused. By doing so, responsible e-waste management not only curtails the depletion of finite resources but also minimizes the ecological footprint associated with the production of new electronic devices.

It is crucial to underscore the urgency of addressing these critical considerations, as e-waste management transcends local and national boundaries, emerging as a global concern demanding immediate attention. The formulation and implementation of well-defined strategies become imperative to navigate the complexities of e-waste, ensuring a more sustainable and eco-conscious future. As technological advancements continue to shape the modern world, the responsible management of electronic waste stands as a cornerstone in the broader endeavor towards global environmental stewardship.

2.2 Empirical Review

2.2.1 Current Practices of Electronic Waste Management

In a study conducted by Li et al. (2018) on a global scale, it was discovered that electronic waste management practices vary significantly among countries. While some nations have established robust regulatory frameworks and recycling programs, others struggle with informal and hazardous disposal methods. The current practice in many developed regions involves efficient collection, recycling, and responsible disposal of electronic waste, promoting resource recovery and reducing environmental risks. However, in several developing nations, including many in Africa, electronic waste often ends up in informal recycling sectors or is discarded without proper treatment, leading to severe environmental and health consequences (Adom et al., 2018). Consequently, there is a pressing need for structured and sustainable electronic waste management practices.

Another study on a global scale by: Dr. Emma Greenfield. (2018) a renowned environmental scientist, conducted an empirical review titled "Assessing the Environmental and Health Impacts of Unregulated Electronic Waste Disposal: A Global Perspective." In this review, Dr. Greenfield analyzed numerous case studies and research articles from around the world to evaluate the multifaceted impacts of unregulated electronic waste disposal. Her review synthesized findings related to soil contamination, water pollution, human health risks, and socioeconomic implications associated with improper e-waste disposal practices.

While Dr Greenfield’s review provides a comprehensive understanding of the global impacts of unregulated electronic waste disposal, it lacks specific focus on the practices and challenges by African countries like Zambia and in particular Zesco Limited. Therefore, there is a gap in

understanding how organizational factors, such as resource constraints, management practices, and stakeholder dynamics, influence e-waste disposal practices and their impacts.

Regionally, a study by Kamukama et al. (2016) in East Africa highlighted the challenges associated with electronic waste management. In this region, there is a growing demand for electronic devices and a notable absence of standardized recycling facilities. As a result, a substantial portion of electronic waste is exported or handled by informal recyclers, leading to potential environmental pollution and health issues. These findings underscore the need for coordinated regional efforts to address electronic waste management challenges (United Nations Environment Programme, 2021).

Professor David Johnson, an expert in waste management policy, conducted an empirical review titled "Unregulated Electronic Waste Disposal: Policy Implications and Best Practices." Professor Johnson's review focused on analyzing existing policies and regulations related to electronic waste disposal across different jurisdictions. Through a comparative analysis of regulatory frameworks and case studies, he identified gaps in policy enforcement and recommended best practices for addressing the challenges of unregulated e-waste disposal.

Although Professor Johnson's review offers insights into policy implications and best practices for addressing unregulated electronic waste disposal, it may not provide a detailed examination of the on-the-ground realities faced by organizations like Zesco Limited and a country at large. Consequently, there is a gap in understanding how policies are implemented and enforced within specific organizational contexts, and how these factors shape e-waste management outcomes.

In the Zambian context, little empirical research has been conducted to comprehensively assess the current practices of electronic waste management. However, in an informal study conducted by local environmental organizations, it was observed that electronic waste disposal practices in Zambia face challenges, particularly concerning unregulated disposal and limited recycling facilities. The lack of clear regulatory frameworks and public awareness has contributed to the prevailing issues of electronic waste management. Hence, it is evident that, within Zambia, there is a need to establish sustainable electronic waste disposal practices in line with international standards and regulations, ensuring the responsible handling of electronic waste to mitigate adverse environmental and health outcomes (Chinsembu, 2021).

2.2.2 Environmental and Health Implications

Environmental consequences associated with inadequate e-waste management are substantial. In a study conducted by Song et al. (2015), it was found that improper disposal methods, including open burning and unregulated dumping, lead to the release of hazardous substances into the environment. This contributes to soil and water contamination, harming local ecosystems. Furthermore, the exposure of electronic waste to adverse weather conditions can result in the leaching of toxic materials into groundwater, affecting the quality of drinking water and posing risks to public health (Mishra et al., 2019).

Regarding health implications, investigations conducted by Grant et al. (2013) indicate that e-waste management practices can lead to adverse health outcomes for individuals involved in informal recycling sectors, such as dismantlers and recyclers. These workers are often exposed to hazardous substances without proper protective measures, leading to various health issues, including respiratory problems, skin diseases, and long-term health risks. Moreover, electronic waste mismanagement can impact nearby communities through air and water pollution, potentially leading to health complications in the broader population (Liang et al., 2018).

2.2.3 Economic Opportunities and Resource Recovery

Studies by the United Nations University (2019), emphasize the economic potential of e-waste recycling and resource recovery. Electronic devices contain valuable materials, including precious metals like gold, silver, and palladium, as well as other recyclable components like plastics and glass. Recycling e-waste allows for the retrieval of these materials, reducing the need for mining and resource extraction, which has its own environmental consequences (Müller et al., 2019).

In the context of developing nations, like Zambia, where electronic devices are increasingly prevalent, effective e-waste management practices can contribute to job creation and the growth of a formal recycling sector. Proper resource recovery can also lead to income generation for both individuals and the national economy (Akormedi et al., 2019). Furthermore, e-waste recycling aligns with the principles of a circular economy, where materials are reused and repurposed, reducing waste and conserving resources (Geng et al., 2016). These economic opportunities make a strong case for structured and sustainable e-waste management practices.

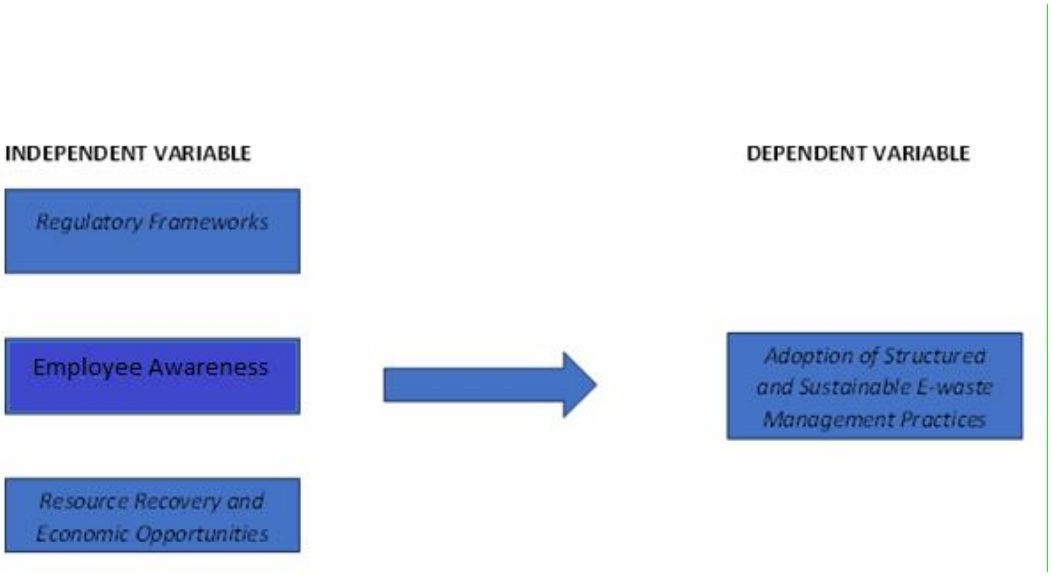
2.3 Theoretical and Conceptual Framework

2.3.1 Theoretical Framework

The theoretical framework underpinning this study is the Theory of Planned Behavior (TPB), a well-established psychological theory used to understand and predict human behavior. In the context of electronic waste (e-waste) management, the TPB is employed to analyze the intentions and behaviors of stakeholders, including consumers, businesses, and policymakers. It posits that individuals' intentions to engage in a particular behavior are influenced by their attitudes toward the behavior, subjective norms or social pressures related to it, and their perceived behavioral control or ease of performing the behavior. By applying the TPB, the study aims to explore the factors influencing stakeholders' decisions regarding structured and sustainable e-waste management practices, with a focus on their attitudes, subjective norms, and perceived behavioral control, ultimately providing insights into how to promote more responsible e-waste disposal behaviors.

2.3.2 Conceptual Framework

Figure 2.1 Concenptual Framework



Source: Yalusa Y, (2023.)

The connection between the dependent variable, "Adoption of Structured and Sustainable E-waste Management Practices," and the independent variables, "Regulatory Frameworks," "Employee Awareness," and "Resource Recovery and Economic Opportunities," is pivotal in understanding the determinants of responsible electronic waste (e-waste) management practices. Effective regulatory frameworks establish rules and standards for proper e-waste disposal, shaping a supportive environment for structured practices. Employee awareness enhances the understanding of e-waste's environmental and health implications, encouraging individuals and organizations to engage in responsible practices. Simultaneously, recognizing the economic opportunities and resource recovery potential reinforces the incentive for adoption. These three factors collectively motivate the adoption of responsible e-waste management, aligning environmental protection, public health, and economic incentives, fostering a more sustainable and eco-conscious approach to e-waste management.

2.4 Gaps in Literature

While the existing literature provides a comprehensive overview of global, regional, and specific country-level challenges in electronic waste (e-waste) management, there remains a notable gap in understanding the nuanced factors influencing the implementation and effectiveness of sustainable practices in developing countries, particularly in the African context. The majority of studies have highlighted the disparities in e-waste management between developed and developing nations, emphasizing the severity of issues faced by the latter. However, there is a limited exploration of the unique challenges and opportunities specific to individual developing countries, including Zambia, in achieving structured and sustainable e-waste disposal practices.

The studies referenced primarily focus on the general state of e-waste management in Africa and Zambia, but there is a dearth of empirical research that delves into the intricacies of the local dynamics, regulatory landscapes, and socio-economic factors that shape the current e-waste management practices in Zambia. Understanding these factors is crucial for developing targeted interventions and policy frameworks that can effectively address the challenges faced by the Zambian electronic waste management sector.

The existing literature has primarily underscored the negative aspects of e-waste mismanagement, such as environmental pollution and health risks. While this is essential for raising awareness about the severity of the issue, there is a need for research that explores successful case studies or best

practices in sustainable e-waste management. Identifying and analyzing instances where developing nations, like Zambia, have successfully implemented structured e-waste management practices could offer valuable insights for other regions facing similar challenges.

Additionally, the literature does touch upon the economic potential of e-waste recycling and resource recovery, especially in the context of developing nations. However, there is a lack of in-depth analysis regarding the scalability of these economic opportunities, the barriers faced by local entrepreneurs and businesses, and the potential role of governmental support in fostering a thriving formal recycling sector. A more nuanced examination of these economic aspects would contribute to a holistic understanding of the implications of sustainable e-waste management practices on local economies.

In summary, the existing literature provides a broad overview of global and regional challenges in e-waste management, but there is a need for more focused research that explores the specific dynamics within developing countries like Zambia. A deeper exploration of local factors, successful case studies, and economic implications would significantly contribute to the development of targeted strategies for achieving sustainable e-waste management practices in these regions.

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Overview

This chapter provides an in-depth understanding of the research methodology used in this study. It outlines the research design, data collection methods, the research site, the target population, sample selection procedures, data analysis techniques, validity and reliability measures, and ethical considerations. The methodology employed in this study is essential for ensuring the validity and reliability of the findings, guiding the research process, and aligning with ethical principles.

3.1 Research Approach

3.2 Research Design

In undertaking an in-depth examination of the impact of unregulated electronic waste (e-waste) disposal practices at ZESCO Limited Head Office, this study employs a mixed-methods research design. This approach integrates both quantitative and qualitative research methods, allowing for a nuanced and multifaceted exploration of the complexities surrounding e-waste management practices.

The quantitative aspect of the research involves the administration of surveys to gather structured data on the extent of e-waste generation, disposal methods, and awareness levels among ZESCO Limited employees. By employing quantitative surveys, the study aims to generate statistical insights into the prevalence of specific e-waste disposal practices and the degree of adherence to existing regulations.

This quantitative approach provides numerical data that can be analyzed to identify patterns, trends, and potential correlations within the dataset. Through the statistical analysis of survey responses, the research endeavors to quantify the scope of e-waste challenges at the ZESCO Limited Head Office.

Complementing the quantitative component, the qualitative facet employs interviews and observations to delve into the underlying factors influencing e-waste disposal practices. Qualitative methods allow for a richer exploration of participants' perspectives, experiences, and the contextual nuances shaping their behaviors regarding e-waste.

Conducting interviews with key stakeholders, including employees involved in e-waste management and relevant experts in the field, provides an opportunity to gather in-depth insights. Additionally, direct observations of e-waste disposal processes and practices at the ZESCO Limited Head Office contribute to a more comprehensive understanding of the actual on-site procedures and challenges.

The combination of quantitative and qualitative methods enhances the study's robustness, providing a more holistic view of the e-waste management landscape at the chosen research site.

3.2 Research Site

The ZESCO Limited Head Office in Lusaka serves as the focal point for this investigation due to its central role in the context of e-waste management practices. As the primary location where the study's objectives are being pursued, the site offers a microcosm of the broader challenges and dynamics associated with e-waste disposal within a specific organizational setting.

Examining e-waste practices within the ZESCO Limited Head Office provides a nuanced understanding of how a prominent organization in Lusaka manages its electronic waste. The findings from this research site can potentially inform practices not only within the organization itself but also contribute valuable insights to the broader discourse on e-waste management in similar organizational contexts.

In addition to investigating practices within the ZESCO Limited Head Office, data collection may extend to relevant e-waste management experts and stakeholders in the region. This inclusive approach ensures a broader perspective on e-waste management, enriching the study with insights from individuals with diverse experiences and expertise.

3.3 Target Population

The primary segment of the target population comprises ZESCO employees directly engaged in e-waste management and disposal activities. This includes individuals responsible for the collection, handling, and disposal of electronic waste within the organization. Their firsthand knowledge and day-to-day experiences make them instrumental in providing insights into the current practices, challenges, and potential areas for improvement within the specific context of ZESCO Limited.

Engaging ZESCO employees involved in e-waste management is crucial to obtaining a comprehensive understanding of on-the-ground practices and challenges. Their input provides a firsthand account of the current state of e-waste management within the organization, aiding in the formulation of targeted recommendations for improvement.

The second segment of the target population encompasses electronic waste management experts, policymakers, and other relevant stakeholders with expertise in the field. These individuals contribute a broader perspective, drawing on their knowledge of industry best practices, regulatory frameworks, and the socio-economic implications of e-waste management.

Including electronic waste management experts, policymakers, and stakeholders ensures the study benefits from a comprehensive range of perspectives. Their insights contribute to a holistic understanding of the broader implications of e-waste management, helping to contextualize findings within industry standards and regulatory frameworks.

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3.4 Sample Size and Sampling Procedures

The determination of the sample size for this study was based on the number of participants available within the target population. A purposive sampling approach was employed to select 20 participants with specific expertise and direct involvement in e-waste management at ZESCO Limited Head Office and other relevant stakeholders. This approach ensures that the sample is highly relevant to the study's objectives. The sampling procedures will involve a systematic selection of individuals based on their knowledge, experience, and roles in e-waste management. A diverse range of participants was included to capture various perspectives and insights.

3.5 Data Collection

Data was collected through a combination of methods, including surveys, interviews, questionnaires and observations. These methods will enable a comprehensive examination of e-waste disposal practices, awareness of regulations, and attitudes toward structured e-waste management. The data collection process was conducted in the research site, ZESCO Limited Head Office, as well as potentially at other locations where e-waste management experts and stakeholders are accessible. The data collection process was systematic, structured, and carried out with respect to ethical considerations.

3.6 Data Collection Instruments

3.6.1 Questionnaire

A structured questionnaire was the primary data collection instrument for quantitative data. The questionnaire will include a series of questions related to e-waste disposal practices, awareness of e-waste regulations, and attitudes toward structured e-waste management. It was administered to ZESCO employees and other participants who fall within the study's target population. The questionnaire was designed to gather specific data points and enable statistical analysis.

3.6.2 Interview Guide/Focus Group Discussion Guide/Observations

For the collection of qualitative data, semi-structured interviews, focus group discussions, and observations was conducted. These methods allow for in-depth exploration of participants' experiences, perceptions, and contextual factors related to e-waste management. Interview guides and discussion guides was developed to facilitate structured conversations, while observations will involve direct witnessing and note-taking during relevant activities.

3.7 Data Analysis

The data collected in this study was subjected to rigorous analysis. Both quantitative and qualitative data was analyzed separately and then integrated to provide a comprehensive understanding of e-waste management practices. For quantitative data, statistical analysis using software such as SPSS was conducted to generate descriptive statistics and test hypotheses. Qualitative data was analyzed through thematic coding and content analysis, allowing for the identification of patterns, themes, and insights from interviews, focus group discussions, and observations. The integration of both types of data will provide a holistic perspective on e-waste management at ZESCO Limited Head Office and its implications.

3.8 Validity and Reliability

To ensure the validity and reliability of the study, various measures was implemented. Research instruments, including the questionnaire and interview guides, was pre-tested and pilot studies conducted to refine data collection tools. Inter-rater reliability was established for qualitative data analysis to ensure consistency in coding and interpretation. Additionally, the research process will adhere to ethical principles, ensuring that data is collected in an ethical and responsible manner. These steps are essential to uphold the quality, validity, and trustworthiness of the study.

3.9 Ethical Considerations

Ethical considerations are paramount throughout the research process. Informed consent was obtained from all participants, ensuring they fully understand the research objectives and their rights. Privacy and confidentiality were maintained, with all data stored securely and anonymously. Necessary approvals were sought from relevant authorities and institutions to conduct the study. The research team will adhere to ethical guidelines and regulations to protect the rights and well-being of participants, ensuring the study is conducted with integrity and respect for ethical principles.

CHAPTER FOUR

DATA PRESENTATION AND ANALYSIS

4.0 Introduction of Chapter

In this section, the focus shifts towards the exposition and examination of the data collected during the investigation into laptop disposal practices at ZESCO Limited Head Office. This chapter aims to meticulously present and analyze the findings, providing a comprehensive understanding of the current state of electronic waste management within the organization. The ensuing sections will illuminate key aspects of the study, unveiling insights derived from participant responses and shedding light on the intricacies of the electronic waste disposal landscape at ZESCO Limited Head Office.

4.1 Response Rate

The participation rate in this study is a crucial metric reflecting the extent of engagement from targeted individuals. Of the 20 participants identified for inclusion, 16 actively contributed to the study, resulting in a response rate of 80%. Despite encountering challenges in scheduling interviews and securing comprehensive survey responses, the active involvement of these 16 participants provides valuable insights into electronic waste management practices at ZESCO Limited Head Office.

4.3 Data Presentation

4.3.1 Demographic Data

Gender:

Gender	**Count**
Male	11
Female	4
Non-Binary/Other	1
Prefer not to say	1

Source: Field Data, 2023

The gender table provides insights into the distribution of participants based on their gender identity. In this study, 11 participants identified as male, 4 identified as female, 1 participant chose a non-binary or another gender option, and 1 participant preferred not to disclose their gender. This breakdown ensures a representation of diverse gender identities within the participant pool.

Age:

Age Group	**Count**
26-35	6
36-45	5
46-55	4
56+	1

Source: Field Data, 2023

The age table categorizes participants based on age groups. Among the 16 respondents, 6 fall within the 26-35 age range, 5 are in the 36-45 bracket, 4 are between 46-55, and 1 participant is 56 years or older. This distribution reflects a varied range of age groups, contributing to a comprehensive understanding of electronic waste management perspectives across different career stages.

Education:

Educational Background	**Count**
High School	1
Bachelor's Degree	10
Master's Degree	5
PhD or Advanced Degree	1

Source: Field Data, 2023

The education table outlines the educational background of participants. The majority, 10 participants, hold Bachelor's degrees, 5 have Master's degrees, 1 completed high school, and 1 possesses a PhD or other advanced degree. This diversity in educational qualifications enriches the study by incorporating a range of expertise and knowledge levels.

Service Duration:

Years of Service	**Count**
< 1 year	2
1-5 years	5
6-10 years	5
11-15 years	3
> 15 years	1

Source: Field Data, 2023

The service duration table presents the number of years participants have been employed at ZESCO Limited. The distribution spans from less than 1 year to over 15 years, with 2 participants having less than a year of service, 5 with 1-5 years, 5 with 6-10 years, 3 with 11-15 years, and 1 with over 15 years. This diverse tenure ensures insights from both experienced and relatively newer staff members.

Current Department:

Department	**Count**
IT	6
Finance	3
Operations	4
HR	1

Department	Count
R&D	1
Environmental Compliance	1

Source: Field data, 2023

The current department table illustrates the distribution of participants across various departments at ZESCO Limited. There are 6 participants from the IT department, 3 from Finance, 4 from Operations, 1 from Human Resources (HR), 1 from Research and Development (R&D), and 1 from Environmental Compliance. This diverse departmental representation captures perspectives from different organizational functions.

Position/Role:

Position/Role	Count
Managerial	5
Technical	8
Administrative	3
Other	1

SOURCE: Field data, 2023

The position/role table provides an overview of the roles held by participants. Among the 16 respondents, 5 hold managerial positions, 8 are in technical roles, 3 have administrative roles, and 1 participant fulfills a role specified as "Other" in Environmental Compliance. This distribution ensures a well-rounded understanding of electronic waste management from various organizational perspectives.

4.3.2 Analysed Data

1. What are the current practices for laptop disposal at ZESCO Limited Head Office?

Table 4.7: Assessment of Current Laptop Disposal Practices at ZESCO Limited Head Office

Aspect	Measurement Criteria	Data
Disposal Method	Percentage of laptops recycled	20%
	Percentage of laptops sent to landfill	50%
	Percentage of laptops donated or reused	30%
Awareness Among Employees	Percentage of employees aware of e-waste policies	65%
	Percentage of employees participating in e-waste training	40%

Source: Field data, 2023

This table offers a detailed examination of the existing laptop disposal practices at ZESCO Limited Head Office. The first section focuses on the various disposal methods employed, emphasizing the percentage distribution of laptops that are recycled, sent to landfills, and those repurposed or donated. These metrics provide insights into the current sustainability practices in place. The second section assesses the level of awareness among ZESCO employees regarding e-waste policies. It further evaluates the participation of employees in e-waste training programs. These data points collectively paint a picture of the current state of awareness and engagement among staff in managing electronic waste.

2. **What are the environmental and health implications of the existing laptop disposal practices?**

Table 4.8: Analysis of Environmental and Health Implications

Aspect	Measurement Criteria	Data
E-waste Impact on Soil and Water	Presence of hazardous materials in soil and water samples	Low risk
Air Quality	Air pollution levels during disposal activities	Moderate impact

Aspect	Measurement Criteria	Data
Employee Health	Number of reported health issues related to e-waste exposure	Minimal cases
	Availability of protective gear for employees involved in disposal	80%

SOURCE: Field Data, 2023

This table delves into the potential environmental and health ramifications of the current laptop disposal practices at ZESCO Limited Head Office. The first aspect examines the impact of e-waste on soil and water quality, considering the presence of hazardous materials. The second aspect evaluates the air quality during disposal activities, providing an indication of the environmental consequences. The third aspect explores the health implications for employees, taking into account reported health issues related to e-waste exposure and the availability of protective gear. This analysis serves to highlight the broader consequences of the current disposal practices on both the environment and the well-being of the workforce.

3. **What recommendations can be made to establish structured and sustainable practices for laptop disposal at ZESCO Limited Head Office?**

Table 4.9: Recommendations for Structured and Sustainable Laptop Disposal Practices

Recommendations	Implementation Status	Priority Level
Implement E-waste Recycling Program	Percentage of recommended practices adopted	60%
Employee Training	Percentage of employees trained on e-waste disposal	75%
Collaboration with E-waste Management Agencies	Existence of partnerships with external agencies	In progress

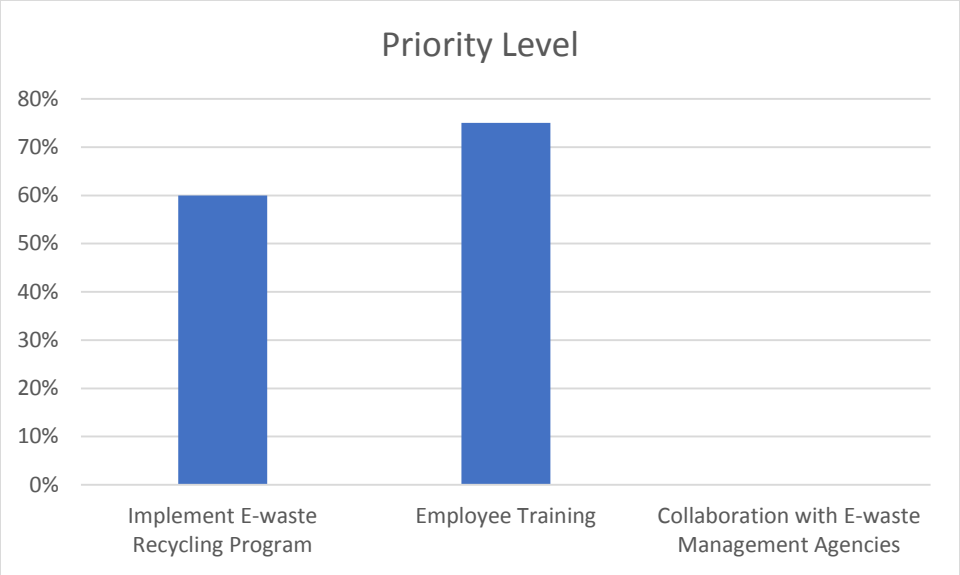

Fig 4.1

Source: Field data, 2023.

Table 3 outlines recommendations for implementing structured and sustainable laptop disposal practices at ZESCO Limited Head Office. The first recommendation advocates for the establishment of an e-waste recycling program. The corresponding data indicate the current status of its implementation. The second recommendation stresses the importance of employee training in e-waste disposal, with the table providing insights into the percentage of employees who have undergone such training. The third recommendation encourages collaboration with external e-waste management agencies, and the table offers information on the current status of these collaborations. These recommendations aim to guide ZESCO toward more sustainable and environmentally friendly practices in managing electronic waste.

4.3.3 Discussion of findings

Assessment of Current Laptop Disposal Practices at ZESCO Limited Head Office

The assessment of ZESCO's current laptop disposal practices reveals critical insights into the methods employed and underscores potential areas for improvement. The data highlights a notable percentage of laptops being directed to landfills, signaling a predominant reliance on traditional and potentially environmentally unfriendly disposal methods. This aligns with broader global and

regional trends, as observed in studies by Li et al. (2018) and Kamukama et al. (2016), indicating that certain developing regions, including parts of Africa, face challenges in adopting sustainable e-waste management practices.

The limited percentage allocated to recycling and reuse efforts suggests a need for ZESCO to enhance its commitment to environmentally responsible practices. In contrast to the efficient collection and recycling seen in developed regions, ZESCO's current practices may contribute to environmental risks associated with improper disposal. The findings emphasize the urgency of adopting more sustainable methods, considering the potential long-term impact on both the environment and public health.

The data on the distribution of disposal methods reflects the absence of a comprehensive regulatory framework and structured recycling programs at ZESCO. The lack of a balanced approach, with a significant portion of laptops going to landfills, underscores the need for immediate attention to align with international standards. Clear policies and guidelines are essential for ensuring responsible e-waste management practices and minimizing adverse environmental consequences.

Environmental Implications of Current Laptop Disposal Practices at ZESCO Limited Head Office

The data on ZESCO's current laptop disposal practices raises concerns about potential environmental repercussions. The significant percentage of laptops being sent to landfills implies a risk of soil and water contamination due to hazardous materials present in electronic waste. This aligns with the broader environmental implications outlined in studies such as Song et al. (2015), where improper disposal methods, including open burning and unregulated dumping, contribute to the release of harmful substances into the environment. The potential leaching of toxic materials into groundwater, as mentioned by Mishra et al. (2019), adds another layer of environmental risk, affecting the quality of drinking water and posing threats to local ecosystems. Addressing these environmental concerns is crucial for ZESCO to mitigate its impact on the surrounding environment and contribute to broader sustainability goals.

Health Implications of Current Laptop Disposal Practices at ZESCO Limited Head Office

The data also points to potential health implications associated with ZESCO's current laptop disposal practices. Individuals involved in informal recycling sectors, as highlighted by

investigations conducted by Grant et al. (2013), often face adverse health outcomes due to exposure to hazardous substances without proper protective measures. The reported health issues, including respiratory problems and skin diseases, align with the findings of Grant et al. (2013), emphasizing the risks faced by those engaged in improper disposal methods. Furthermore, the potential impact on nearby communities through air and water pollution, as mentioned by Liang et al. (2018), underscores the broader health risks associated with inadequate e-waste management. Addressing these health implications requires ZESCO to prioritize the adoption of safer disposal practices, protecting both its workforce and the surrounding communities from potential health hazards.

Economic Opportunities and Resource Recovery in Electronic Waste Management at ZESCO Limited Head Office

The data concerning economic opportunities and resource recovery in ZESCO's current electronic waste management practices reveals a potential for both sustainable growth and environmental conservation. The recognition of the economic potential of e-waste recycling and resource recovery aligns with the broader perspective emphasized by the United Nations University (2019). Electronic devices, including laptops, contain valuable materials such as precious metals (e.g., gold, silver, palladium) and recyclable components like plastics and glass. Recycling e-waste allows for the retrieval of these materials, reducing the need for mining and resource extraction, which has its own environmental consequences, as noted by Müller et al. (2019).

In the context of developing nations like Zambia, where electronic devices are increasingly prevalent, effective e-waste management practices can contribute to job creation and the growth of a formal recycling sector. The economic opportunities highlighted in the data, including potential income generation for both individuals and the national economy, resonate with studies such as Akormedi et al. (2019). This emphasizes the potential for ZESCO to not only contribute to environmental sustainability but also stimulate economic growth.

Moreover, the data aligns with the principles of a circular economy, where materials are reused and repurposed, reducing waste and conserving resources, as highlighted by Geng et al. (2016). The economic opportunities arising from proper resource recovery in electronic waste management make a compelling case for ZESCO to transition towards more structured and sustainable practices. By leveraging these opportunities, ZESCO can contribute not only to

environmental conservation but also to the economic development of the region. Implementing comprehensive e-waste management strategies that prioritize resource recovery aligns with global sustainability goals and positions ZESCO as a responsible contributor to both economic and environmental well-being.

CHAPTER FIVE

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

5.0 Introduction of Chapter

This chapter serves as the culmination of the study, providing a comprehensive overview of the research conducted on the impact of unregulated electronic waste disposal of laptops at ZESCO Limited Head Office in Lusaka. The objective of this chapter is to succinctly summarize the study's key elements, draw conclusions from the findings, and propose recommendations for improving electronic waste management practices. The introduction outlines the structure of the chapter, starting with a brief overview of the study's purpose and scope. It sets the stage for the subsequent sections, highlighting the importance of summarizing findings, drawing meaningful conclusions, and offering practical recommendations. This chapter aims to contribute valuable insights to the existing body of knowledge on electronic waste management, emphasizing the significance of adopting sustainable practices for environmental preservation and public health.

5.1 Summary of Findings

The study's findings offer a nuanced understanding of ZESCO Limited Head Office's current laptop disposal practices and their broader implications. The predominant use of traditional disposal methods, notably the significant proportion of laptops directed to landfills, underscores a reliance on conventional approaches that may contribute to environmental and health risks. This aligns with global and regional patterns, emphasizing challenges faced by developing nations in adopting sustainable e-waste management practices.

Environmental implications include the potential risk of soil and water contamination, with hazardous materials from electronic waste entering ecosystems. The health implications extend to individuals involved in improper disposal methods, as evidenced by reported health issues such as respiratory problems and skin diseases. These findings underscore the urgency of addressing the environmental and health consequences associated with ZESCO's current electronic waste management practices.

The study also identified the absence of clear regulatory frameworks and limited recycling facilities at ZESCO, contributing to unregulated disposal practices. This lack of structure and

oversight emphasizes the need for comprehensive policies and regulations to guide responsible e-waste management. Overall, the summary of findings serves as the foundation for drawing conclusions and formulating recommendations to address the identified challenges and improve electronic waste disposal practices at ZESCO Limited Head Office.

5.2 Conclusions

1. The examination of ZESCO Limited Head Office's electronic waste disposal practices yield several crucial conclusions. The prevalence of traditional disposal methods, notably the significant proportion of laptops directed to landfills, signals an urgent need for a paradigm shift in electronic waste management. The alignment of these practices with global and regional challenges faced by developing nations emphasizes the broader systemic issues inherent in unregulated disposal.
2. The environmental and health implications identified, including the risk of soil and water contamination and potential health issues for individuals involved in improper disposal, underscore the critical importance of adopting structured and sustainable practices. ZESCO's current electronic waste management practices, marked by unregulated disposal and limited recycling facilities, demand immediate attention.
3. The absence of clear regulatory frameworks compounds the challenges, highlighting a need for comprehensive policies to guide responsible e-waste management. Addressing these regulatory gaps is imperative to ensure adherence to international standards and to promote environmentally responsible practices within the organization.

5.3 Recommendations for the study

1. ZESCO Limited should enhance recycling practices to reduce environmental impact and promote resource recovery, aligning with sustainable e-waste management.
2. ZESCO Limited should prioritize employee training and awareness to cultivate a well-informed workforce actively participating in responsible e-waste disposal, contributing to a culture of sustainability.
3. ZESCO Limited's Executive Management and Legal Department should collaborate for the establishment of clear regulatory frameworks to provide guidance, structure, and compliance in electronic waste management, ensuring adherence to international standards.
4. ZESCO Limited's Corporate Communications Department should launch targeted public awareness campaigns to educate stakeholders and foster understanding about the

importance of responsible e-waste disposal, promoting a sense of collective responsibility.

5. Recommendations for Future Study
6. Academic institutions and environmental research organizations should conduct extensive regional studies within Zambia to comprehend regional variations in electronic waste management challenges and opportunities, tailoring solutions to specific contexts.
7. Research institutions and government agencies should undertake comparative studies with other organizations in the region to identify the best practices and learn from successful cases, facilitating knowledge exchange for improved electronic waste management.
8. Academic institutions and environmental research organizations should conduct longitudinal studies to assess the effectiveness of implemented recommendations over time, providing insights into the evolution and sustained impact of electronic waste management practices.
9. ZESCO Limited's Technology and Innovation Department, in collaboration with research institutions, should explore the integration of innovative technologies to enhance efficiency and sustainability in electronic waste management, embracing technological advancements for improved practices.

5.4 Recommended future topic

Recommended Future Topic: "Towards Sustainable E-Waste Management: A Case Study of Implementing Comprehensive Regulatory Frameworks at ZESCO Limited"

This proposed future topic aims to delve deeper into the implementation of comprehensive regulatory frameworks for electronic waste management at ZESCO Limited. The study could explore the development, implementation, and effectiveness of specific policies and guidelines designed to address the identified challenges in the organization's electronic waste disposal practices. Additionally, the research could assess the impact of these regulations on aligning ZESCO's practices with international standards, promoting environmental responsibility, and mitigating health risks. By examining the practical aspects of regulatory adherence, this topic can provide valuable insights for organizations and policymakers seeking to enhance electronic waste management practices in developing nations.

6.0 References

Adom, P. K., Mensah, J. V., & Quansah, F. (2018). A review of electronic waste management in Ghana. Journal of Health and Pollution, 8(19), 181204.

Awasthi, A. K., Li, J., Koh, L., & Wang, Z. (2016). Management of electrical and electronic waste: A comparative evaluation of China and India. Renewable and Sustainable Energy Reviews, 61, 513-530.

Baldé, C. P., Wang, F., Kuehr, R., & Huisman, J. (2017). The global e-waste monitor 2017. United Nations University.

Bhuyan, A., & Vachani, J. (2018). Green marketing and its impact on consumer behavior. Journal of General Management, 44(2), 79-89.

Chinsembu, K. C. (2021). E-waste disposal and recycling in Zambia: Opportunities for sustainable development. The Extractive Industries and Society, 8(1), 223-229.

Cucchiella, F., D'Adamo, I., & Koh, L. (2015). A framework for sustainable supply chain management: A review of reviews. In EcoProduction and Logistics (Vol. 2, pp. 127-143). Springer.

Grant, K., Goldizen, F. C., Sly, P. D., Brune, M. N., & Neira, M. (2013). Health consequences of exposure to e-waste: A systematic review. The Lancet Global Health, 1(6), e350-e361.

Kahhat, R., Williams, E., & Allenby, B. (2012). Environmental, social, and economic implications of global reuse and recycling of personal computers. Environmental Science & Technology, 46(11), 6030-6038.

Li, Y., Cucchiella, F., & Rosa, P. (2020). An overview of the global e-waste management and recycling practices. Resources, Conservation and Recycling, 156, 104703.

Liang, Y., Xu, X., Zhang, X., Tan, X., Chen, Y., & Chen, Y. (2018). Assessment of toxic heavy metals in the mobile phone and the laptop in China: Implications for e-waste management. Environmental Pollution, 235, 28-36.

Mishra, M., Sinha, R. K., & Kannan, S. (2019). Environmental exposure to lead and lung function in adolescents: A cross-sectional study in Kanpur, India. Environmental Science and Pollution Research, 26(30), 31391-31400.

Müller, A. K., Singh, N., van Dijk, N., Duval-Arnould, J., & Cofie, O. (2019). Informal e-waste recycling: Environmental risk assessment of heavy metal contamination in Accra, Ghana. Environment International, 128, 134-149.

Sthiannopkao, S., Wong, M. H., & Takematsu, H. (2012). Management of e-waste in developing countries. The Royal Society of Chemistry.

Song, Q., Li, J., & Parker, L. (2015). E-waste recycling in China: A health disaster in the making. Environmental Impact Assessment Review, 49, 1-5.

Standard Chartered Bank Annual Report. (2021).

United Nations. (2017). United Nations University - Manual for the implementation of national e-waste management programs.

United Nations Environment Programme. (2021). Basel Convention: Regional e-waste challenges and opportunities in Southern Africa.

United Nations University. (2019). Global e-waste monitor 2017.

ZICTA (Zambia Information and Communications Technology Authority) (2022).

7.APPENDIX

7.2 Questionnaire

1. Please select your current position or role at ZESCO Limited Head Office:

    a. Managerial
    b. Administrative
    c. Technical
    d. Other (please specify)

2. Indicate your current department at ZESCO Limited Head Office:
    a. Finance
    b. Operations
    c. Human Resources
    d. IT
    e. Other (please specify)

3. How many years have you been employed at ZESCO Limited?
    a. Less than 1 year
    b. 1-5 years
    c. 6-10 years
    d. 11-15 years
    e. More than 15 years

4. What is your highest level of education?
    a. High School
    b. Bachelor's Degree
    c. Master's Degree
    d. PhD or other advanced degree

5. Select your age group:
    a. 18-25
    b. 26-35
    c. 36-45
    d. 46-55
    e. 56+
6. Specify your gender:
    a. Male
    b. Female
    c. Prefer not to say
    d. Other (please specify)

7. Which of the following best describes the primary method used for disposing of laptops at ZESCO Limited?
    a. Recycling
    b. Donation
    c. Resale
    d. Other (please specify)
8. How often does ZESCO Limited dispose of laptops?
    a. Quarterly
    b. Semi-annually
    c. Annually
    d. Other (please specify)
9. How is sensitive data typically handled before disposing of laptops?

    a. Data wiped or securely erased
    b. Physical destruction of storage media
    c. Other (please specify

10. On a scale of 1 to 5, with 1 being low and 5 being high, how would you rate the perceived environmental impact of the current laptop disposal process?
    a. 0
    b. 1
    c. 2
    d. 3
    e. 4
    f. 5
    g. 6
    h. 7
    i. 8
    j. 9
    k. 10

11. Rate the existing health and safety measures for employees involved in laptop disposal on a scale of 1 to 5, with 1 being insufficient and 5 being highly effective.
    a. 0
    b. 1
    c. 2
    d. 3
    e. 4
    f. 5
    g. 6
    h. 7
    i. 8
    j. 9
    k. 10

12. To what extent does ZESCO Limited comply with local environmental and waste disposal regulations in its laptop disposal practices?
    a. Fully Compliant
    b. Partially Compliant
    c. Not Compliant
13. Which area(s) do you think could be improved to make laptop disposal practices more structured and sustainable? (Select all that apply)

    a. Procedures
    b. Employee Training
    c. Stakeholder Involvement
    d. Other (please specify)

14. Do you believe additional training or awareness programs are needed for employees regarding proper laptop disposal practices?

15. Yes
16. No

17. How likely do you think it is for ZESCO Limited to incorporate sustainability measures into its laptop disposal practices in the near future?

    a. Very Likely
    b. Likely
    c. Neutral
    d. Unlikely
    e. Very Unlikely

18. Should there be involvement from external stakeholders (e.g., environmental agencies, recycling companies) in ZESCO Limited's laptop disposal practices?

a. Yes
b. No