THE IMPACT OF IMPLEMENTING CIRCULAR ECONOMY PRACTICES ON WASTE MANAGEMENT IN UGANDA

BELIEVEIN KYATUHAIRE

S21B12/012

A DISSERTATION SUBMITTED TO THE SCHOOL OF BUSINESS IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF A DEGREE OF BACHELOR OF PROCUREMENT AND LOGISTICS MANAGEMENT OF UGANDA CHRISTIAN UNIVERSITY

September, 2024

UGANDA CHRISTIAN UNIVERSITY

A Centre of Excellence in the Heart of Africa

DECLARATION

I, **Believein KYATUHAIRE,** hereby declare that this research dissertation entitled ***"The Impact of Circular Economy Practices on Waste Management in Uganda"*** is my original work and has never been submitted to any higher institution of learning for any academic award.

(Sign) 05 September 2024 **(Date)**

APPROVAL

This research dissertation has been submitted to Uganda Christian University with my guidance as appointed University Supervisor.

Signed: _____ Date: 30/9/2024

Mr. Percy MULOOSI

DEDICATION

This dissertation is dedicated to my parents Mr. Patrick Kamugisha and Ms. Prudence Arinaitwe for their unwavering support, good counsel, and above all you have been a big pertinent pillar and a great encouragement to me and I say God richly Bless You for being there for me through thick and thin. This dissertation is also dedicated to all my siblings; Kwatampora Bridger, Kemigisha Brenda, for all the love and care during the quest for this study journey.

ACKNOWLEDGEMENTS

Unto the Lord be the glory, great thing He has done! My heartfelt gratitude to God Almighty; for the abundant grace and mercies in my life. My enormous appreciation to my advisors (the lecturers) and especially supervisor Mr. Percy MULOOSI for his enormous contributions to this work. I am extremely grateful for his time, advice and pains taking reviewing and suggesting amendments to this work. I also above all appreciate the help of the management and staff of **Takataka Plastics, Kawaala Recycling, Dynamic Recycling and Eco Brix** and all its member organizations for granting me the chance during data collection. My next dose of gratitude goes to all those friends and family who carried this work along with me in their hearts for your immense contributions to the completion of this work. The Good Lord will surely keep your cups running over. Finally, to all the authors whose work I consulted for this research, thank you!

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS/ ACRONYMS

C2C: Cradle to Cradle

CE: Circular Economy

CVI: Content Validity Index

SDGs: Sustainable Development Goals

SSA: Sub-Saharan Africa

WM: Waste Management

ABSTRACT

The study majorly focused on the impact of Circular economy practices and waste management among firms in Uganda. The study was also guided alongside the following research objectives; examine the effect of reverse logistics practices on waste management, assess the effect of recycling on waste management and finally assess the relationship between circular economy and waste management in Uganda. The study also adopted a cross-sectional survey with a combination of qualitative-quantitative data collection methods for this study. A case research design will also be utilized, as this method allows for an in-depth examination of the specific context. Findings of the study on effect of reverse logistics practices on waste management revealed that majority of respondents agreed to the statements used to measure reverse logistics although some were not sure and others disagreed respectively. Furthermore, findings on effect of recycling on waste management revealed that majority of respondents also agreed to the statements used to measure recycling and waste management although some were not sure and others disagreed respectively. Finally, findings on relationship between circular economy practiced revealed positive significant relationship between reverse logistics, recycling and waste management. The study recommended that; manufacturing firms should adopt circular economy practices fully, enhancing Plastic Circularity using Technology, Revise Waste Management Policies, there is need to re-introduce incentives for plastic recycling, and finally the study also recommends that there is need to transition to a circular economy needs application of technologies that support the whole plastic value chain. The study concluded that indeed circular economy practices need to be adopted by manufacturing firms because of the varied advantages and the need to maximise waste management.

CHAPTER ONE
INTRODUCTION

1.0 Introduction

Globally, Circular Economy (CE) can be seen as a production system that optimizes the reusability of by-products/ waste as raw materials. The global population threatens to reach 9-billion by year 2050, consumption levels grow proportionally, raising food, material, and energy demands (Adami and Schiavon, 2021).

On the other hand, Waste Management (WM) has become an issue in developed and developing countries, especially in the Sub-Saharan Africa (SSA) region (Debrah, Teye & Dinis, 2022). The high volume of waste generated in SSA is attributed to rapid population growth and industrialization (Debrah *et al.,* 2022). Therefore, this current chapter contained the background to the study, problem statement, purpose of the study, specific objectives of the study, research questions, significance of the study and scope of the study.

1.1 Background of the study

Historically, the histories of waste, and of the words that have been used and continue to be used to describe it, are inseparable from one another. Indeed, a quick survey shows that three different types of vocabulary have emerged to describe what we now call waste. In the first category, terms are associated (Barles, 2014).

During the 18th century in Europe, medical thinking was characterized by a growing interest in Hippocrates' theories. In particular, his treatise "Airs, Waters, and Places", in which he emphasized the primary role of the environment in health, was frequently referenced. Many doctors followed his recommendations and looked to the environment to explain morbidity and mortality. Many of them considered air, and its intimate and frequent contact with the body, a transmission medium for miasma or sulfurous pollution whose fumes were often considered morbid and deadly (Barles, 2014).

Both industrialization and urbanization separately raised the issue of food resources and raw materials required for industrial use. Demographic growth, the increase in the number of urbanites, required a concurrent increase in agricultural production. According to future agronomists, one way this could be achieved was by improving yields through improved fertilization of croplands. By the late 18th century, a shortage in farm manure prevailed, leading to a search for other fertilizing materials (Hara and Yabar, 2012).

Today it should be observed that waste management theory: Waste Management Theory is founded on the expectation that waste management is to prevent waste causing harm to human health and the environment. The proper definition of waste is crucial to constructing a sustainable agenda of waste management. It is largely the case that current legislation attends to existing waste.

Generally, it should be noted that people may not have full control over the non-organic waste that is recycled or dumped every day. However, if one discusses organic waste and studies the process of managing it, one may also take over organic waste recycling at its own level. This contribution can very much affect our waste supply chains (post-consumer waste, collection of waste, and separation of waste, recycling, landfill) and can make it much easier to deal with the already collected mixed waste, which is a major global concern.

Therefore, it is more cost-effective and environmentally beneficial to deal with separated organic and non-organic waste rather than processed mixed waste and subsequently be unable to recover both. Undeniably, the vision of the complete elimination of waste is highly unrealistic. Hence, the ideal strategy is to regulate and manage the generated waste in a way that is ecologically friendly, economically feasible, and socially acceptable. (Edwards *et al.,* 2017).

Currently, over half of the world's population lives in cities and this proportion is expected to increase to two-thirds by 2050, with 90% of the increase occurring in low- and middle-income countries (Romero-Hernández and Romero, 2018). This direction implies an increasing demand for food, water and energy in cities and at the same time, urban residents generate growing quantities of waste with over 1.6 million tonnes of organic solid waste and over 715 million M^3 of wastewater being generated daily (Ghosh, 2020).

Circular economy (CE) is a system of resource utilization that promotes waste reduction, reuse and recycling, and the restorative capacity of natural resources (Adami and Schiavon, 2021). Growing population, urbanization and changes in consumption patterns increase the demand for energy, food and other essential necessities of life. Linear production models which require large quantities of cheap materials and energy create scarcity in natural resources and culminate in environmental degradation (Mont, 2008). Innovative management of resources utilizing secondary and renewable materials could address scarcity (Debra *et al.,* 2022).

Waste management (WM) is one of the core policy issues in addressing environmental integrity and control of resource depletion for sustainable development (Ghosh, 2020). The approaches to management of waste have been largely linear as opposed to circular. The linear economy is a take-make-dispose economy, which entails extraction of materials from the natural environment to make a product that is disposed after use and ends up as waste. On the contrary, circular economy represents approaches whose intention is regenerative and restorative by design (Kakembo and Kakembo, 2021). Restoration ensures that resources are utilized fully by converting the waste into similar form, while regenerative transforms the waste into other useful products.

In Developing countries, solid waste is usually handled effectively in developed countries. Often, highly advanced and complicated waste management technologies that have shown to be beneficial in developed countries are imported to developing countries (Kakembo and Kakembo, 2021). However, due to a lack of capacity and the incongruity of attempting to construct systems in varied contexts, these solutions are frequently not sustainable. Various authors have focused on the solutions of separating and recycling organic waste from complete solid waste in developing countries (Ghosh, 2020).

In Uganda, currently, over 95% of households rely on wood and charcoal as a source of cooking energy; only 5% have access to electricity (Geme, Nijman, Ntawuhiganayo & Negesa, 2023). Given that these fuels are used by educational institutions, prisons, hospitals, industry (brick/ tile, tea curing, cement and others) their demand grows at 6% annually. Over 80,000 hectares of forests (private and protected) are cleared annually. About 4 million tonnes of wood are consumed every year: accounting for over 70% of deforestation in Uganda (Ogwang and Mwesigwa, 2023).

Therefore, the need to address global challenges has led to a proliferation of sustainability concepts (Kakembo and Kakembo, 2021). Among these is the circular economy (CE) concept which is currently promoted by stakeholders as a perfect replacement for the incumbent linear economy (Ogwang and Mwesigwa, 2023; Geme *et al.*, 2023). Built on a feedback-rich systems perspective, CE seeks to replace the *"take-make-dispose"* tendencies typical of the traditional Linear Economy (LE). This is because LE practices deplete natural capital (Buda, 2022), burden the environment, and threaten economic sustainability (Geme *et al.*, 2023).

1.2 Problem statement

In Uganda, the limited uptake of circular economy approach undermines the progress the country makes towards achievement of environmental conservation, control of environmental health hazards and promotion of efficient utilization of resources for sustainable development agenda (Ogwang and Mwesigwa, 2023). Castellani, Ferronato & Torretta, (2022) are of the view that a key challenge is that in much of the world and Uganda in particular, appropriate waste disposal options are unavailable, including properly managed landfills, leading to waste plastic simply being dumped on open unestablished plots, accumulating on sides of roadways, and on outskirts of rural residential areas.

Therefore, this accumulation of plastic waste on land can become a breeding ground for mosquitoes, cause clogged waterways and drainages, and reduce the general aesthetics of the community. As plastic can take thousands of years to decompose, both landfills and unregulated plots of land will remain unusable long after the dumping ends, and if not managed properly, chemicals can leach from the plastic into surrounding habitats. Eventually, this plastic waste will be disposed of in, or migrate to surface waters, generating pollution and threating both terrestrial and marine life (Ogwang and Mwesigwa, 2023).

Therefore, it should therefore be observed that although the Government of Uganda and development partners have come up with strategies to minimize waste, according to (Ogwang and Mwesigwa, 2023), they identified that simply the lack of convenient waste disposal containers can affect household waste disposal decisions. If people have to walk long distances to reach a suitable disposal location, they will simply dump the waste nearby on streets, underdeveloped plots of land, or burn it, leading to potentially toxic smoke, especially if plastics are present. Therefore, this study bridged the gap by establishing the impact of implementing circular economy practices on waste management in Uganda.

1.3 Purpose of the study

The purpose of the study was to assess the impact of implementing circular economy practices on waste management in Uganda.

1.4 Specific objectives of the study

1. To examine the effect of reverse logistics practices on waste management in Uganda.
2. To assess the effect of recycling on waste management in Uganda.

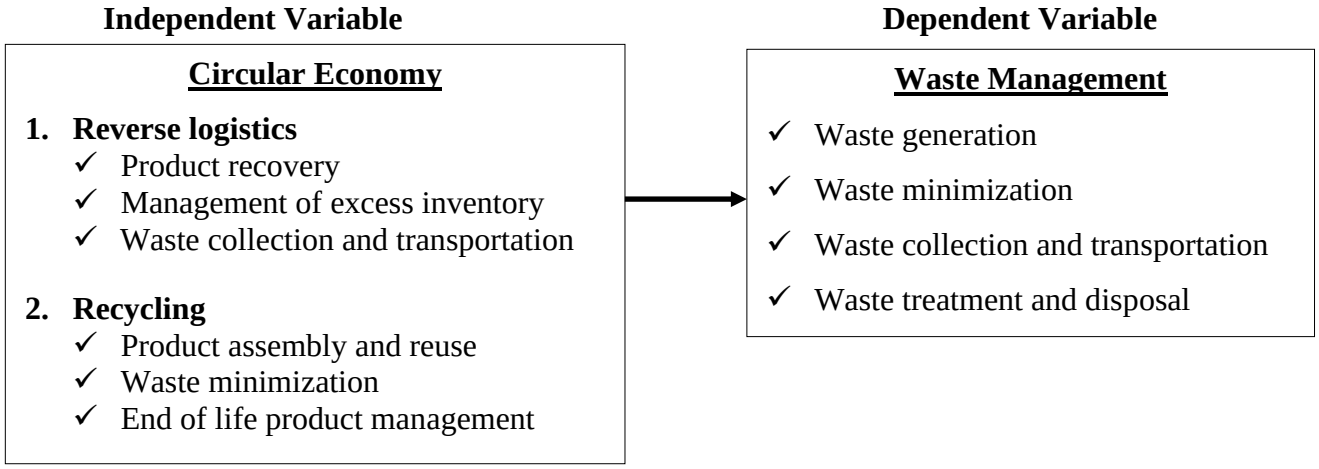
3. To assess the relationship between circular economy and waste management in Uganda.

1.5 Research questions

1. What is the effect of reverse logistics practices on waste management in Uganda?
2. What is the effect of recycling on waste management in Uganda?
3. What is the relationship between circular economy and waste management in Uganda?

1.6 Conceptual framework

The study was guided by the conceptual framework showing the relationship between the independent variable of circular economy practices and the dependent variable of waste management. The figure below depicts the relationship between the variables and their respective attributes;



Source: Adopted from United Nations Economic Commission for Europe (UNECE), (2024); guidelines for measuring circular economy; Castellani, Ferronato & Torretta, (2022).

From the above figure, it should be noted that circular economy is the independent variable that is measured by the attributes of reverse logistics and recycling whereas waste management is the dependent variable measured by the attributes of waste generation, waste minimization, waste collection and transportation and waste treatment and disposal. Therefore, in an ideal situation, circular economy practices of reverse logistics and recycling should help minimize waste pollution.

1.7 Significance of the study

The findings of this study may guide the government of Uganda, policy makers and development partners in understanding the need to adopt circular economy practices and waste management practices which in turn may help conserve the environment amicably.

The findings of the study may also help the government of Uganda in developing policies and regulations that can promote the circular economy and boost the economy.

The study may also help people in developing strategies for managing waste and promoting the circular economy, which can lead to increased profitability and competitiveness. Correspondingly, this can help in developing policies and regulations that can promote the circular economy and sustainable development.

The findings of the study may also act as reference point for future researchers who may want to undertake a study on circular economy practices and waste management. The study was very important to the researcher as it will act as fulfillment for the award of Bachelor's Degree in Procurement and Logistics Management of Uganda Christian University-Mukono.

1.8 Scope of the study

1.8.1 Content Scope

The study basically assessed the impact of implementing circular economy practices on waste management in Uganda. The study majorly focused on examining the effect of reverse logistics practices on waste management, assess the effect of recycling on waste management and finally assess the relationship between circular economy and waste management in Uganda.

1.8.2 Time Scope

The study focused on the period between 2010-2023. This time period was sufficient enough to allow the researcher come up with meaningful literature and findings on the study under scrutiny.

1.7.3 Geographical scope

The study was conducted in Kampala city in Uganda. Numerous waste management interventions have been practiced in Kampala City.

1.8 Definition of key terms

Circular economy: The circular economy is a model of production and consumption, which involves sharing, leasing, reusing, repairing, refurbishing and recycling existing materials and products as long as possible. In this way, the life cycle of products is extended.

Waste management refers to the processes involved in managing waste from cradle to grave. This includes the collection, transportation, disposal/recycling and monitoring of waste materials produced as a result of human activity.

CHAPTER TWO
LITERATURE REVIEW

2.0 Introduction

To gain a more insight into the study variables, this chapter made an in-depth review of related written materials or literature that adds more-light into the key themes under study. The review was structured in a manner that reflected the major contents of the study or specific objectives of study. It discussed what had been found, but pointed out inconsistency of results and then identified gaps. It further justified the need to investigate the impact of circular economy practices on waste management in Uganda.

2.1 Theoretical framework

2.1.1 Cradle to Cradle (C2C) Theory

This study will guide by the Cradle to Cradle (C2C) theory developed by architect William McDonough and the chemist Dr Michael Braungart. As a concept, the Cradle to Cradle (C2C) was proposed and developed by architect William McDonough and the chemist Dr Michael Braungart. They called for a shift in the way we design our material goods and going beyond the concept of eco-efficiency, which has traditionally focused on the impacts of human activity on environment. They observed that eco-efficient strategies are good in minimizing ecological harm in the short-run but are not sufficient to meet the desired goal in the long-run (Mohajan, 2021).

McDonough and Braungart (2002) coined the concept of eco-effectiveness with focus on reduction of waste to increase quality for positive impact rather than reduction for negative impact. In other words, “working on the right things-the right products, services and systems instead of making the wrong thing less bad” (Kopnina, 2018). Eco-effective approach has been known to address the source of the problem while aiming at re-establishing a positive relationship between the human and environment. Therefore, the goal of eco-effectiveness minimizes the “cradle-to grave” flow of materials to the cyclical “cradle-to-cradle” where materials are used repeatedly without losing its property and quality (Bjørn and Hauschild, 2013).

C2C means benefit as much as possible of the product by recycling it and reintroducing it in new forms and uses to serve both the economy and the environment. It is a revolutionary change of the organizations in the products and services design, and production and

distribution (Kopnina, 2018). The C2C concept supports the principle of nature that, “there is no waste on the earth” and “waste equals food”. The waste of one process becomes the food for another which is called as nutrients. There are two types of nutrients: biological nutrients and technical nutrients (Bhise and Kashikar, 2014). Technical nutrients, inorganic materials, should be non-toxic, non-harmful synthetic materials and have no negative effects on the natural environment. Biological nutrients are organic materials that decompose into the soil without affecting the natural environment. Technical nutrients are considered for industrial recycling whereas biological nutrients return to the soil and feed environmental processes. If more waste creates in the environment, the more nutrients are available for producing new products (Bjørn and Strandesen, 2011).

The C2C theory is relevant to this study it supports “zero emissions, zero resource use and zero toxicity” that is, a product should not create any waste or emit any pollutants into the environment (Baumgartner & Zielowski, 2007). The C2C design aims not to reduce the linear material flows and production but make nutrients to live in circular cycles, where value once created, remains the same. C2C is a development paradigm that focuses on eco-effectiveness (Toxopeus *et al.,* 2015). In nature, waste creates by one creature must become a nutrient for another. Also, in the earth all energies come from the sun and use of renewable energies must be increased. All the materials of nature must be non-toxic and safe for humans and the environment (McDonough *et al.,* 2003).

2.2 Effect of reverse logistics practices on waste management

Reverse logistics is a relatively new phenomenon in the research area mainly referring to damaged goods that should be returned to the manufacturers or distributors. Terms such as return logistics, retro logistics or reverse distribution are all used by many literatures to mean reverse logistics (Wiel, Bossink & Masurel, 2012).

Reverse logistics is defined by Dias & Braga Junior, (2016) as the process of planning, implementing, and controlling the efficient, cost-effective flow of raw materials, in-process inventory, finished goods and related information from the point of consumption to the point of origin for the purpose of recapturing value or proper disposal”. Reverse logistics is an integrated network structure of activities involving aspects of collection, inspection, sorting, pre-processing and the entire logistics and distribution (Dias & Braga Junior, 2016). It involves the backward flow of goods from the customer to a manufacturer aimed at adding value to the products returned and proper disposal (Kuno and Arani, 2024).

Reverse logistics has become an important service management activity involving the take back of products and the operations involved are more complex than the forward traditional logistic chain (Valenzuela, Alfaro, Fuertes, Vargas & Sáez-Navarrete, 2021). The traditional forward flow of goods as put forward by Valenzuela *et al.*, (2021) involves the goods flow from the manufacturers to the final consumers yet reverse logistics moves the goods in the opposite direction that is to say from the customers to the point of origin or manufacture. The system is yet to receive much attention though it is still carried out by the unorganized sector for recyclable materials such as plastics and paper (Castellani, Ferronato & Torretta, 2022). The effective and efficient product management in the manufacturing sector such as repair after sales services depend heavily on effective reverse logistics (Castellani *et al.*, 2022).

Reverse logistics put forward by Kalubanga and Mbekeka, (2024) notes that the ultimate goal of a firm is resource reduction which includes minimizations of materials used and minimization of wastes and energy saved through the production of more environmentally efficient products. In the authors' work, the aim of the firm should be to reuse the materials followed by recycling of the waste to the maximum. It is crucial to note that at the end of the forward logistics chain, little attention was directed to what happens to the products at the end of the chain. Here focus is placed on the final disposal of waste at that point. In their discussion, Rodríguez, Gallegos, Ortiz-Paniagua & Tapia, (2023) showed that reverse logistics has many aspects and abilities that differentiate it from just mere forward logistics. Reverse logistics is now being recognized as a driver of logistics and supply chain due to the increasing number of research publications in the subject.

Contestably, Aming'a, Marwanga & Annan, (2024) are of the view that reverse logistics support of a circular economy is changing the linear business version of materials movement to a closed-loop of products and materials flow. Employing reverse logistics helps a business organization in reducing, reusing, and recycling waste and promotes a good public image. There are many activities in the reverse logistics area that companies require in order to retain returned materials, and viable places for the returned products must be distinguished, i.e., assembly line, delivery, and refabrication lines.

Mostafa, (2020) alluded that different types of products in the reversal movement in reverse logistics systems can be directly reused, repaired, refurbished, remanufactured, recycled, incinerated, or landfilled, which we called reverse logistics activities. During reverse logistics activities, incineration and landfilling are the last options when the returned product provides

no value (waste) to the organization. Thus, waste disposal with energy recovery minimizes the volume of landfills by using the caloric content of the generated waste. Increasing energy through incineration could also produce economic benefits if that energy is utilized for new purposes.

In Pakistan, according to the Ministry of the Environment, about 54,850 tons of solid waste is being generated on daily basis in urban areas, less than 60 percent of this generated solid waste is being collected properly. According to the same department there is no city in Pakistan having proper waste collection and disposal system for municipal and hazardous wastes (Waqas, Honggang, Khan, Ahmad, Ullah & Iqbal, 2021).

In relation to Uganda, reverse logistics of waste is taking course as a result of partnerships of the private enterprises. Collection of materials and products is done by informal low-income groups of individuals who collect and sort out paper, scrap metal, cardboards, polythene bags and plastics which they sell to private middlemen and plastic recycling companies (Rugasira, Agaba, Byarugaba, Makumbi, Kyatuheire & Asiimwe, 2022).

2.3 Effect of recycling on waste management

In these contemporary times, recycling of waste is a must say concept that acts as a lever in ensuring that waste related problems are avoided thus promotion of a healthy environment. Recycling is defined as the process to change waste, used or returned products into new products to prevent waste of potentially useful materials, reduce the consumption of fresh raw materials, reduce energy usage, and reduce air pollution (Kountouris, 2022).

The focus of reverse logistics is on management of waste, recycling and recovery of parts or products (remanufacturing). Remanufacturing is the process where some components of the used products are disassembled, cleaned, reprocessed, inspected, and reassembled so that it can be used again (Ko *et al.*, 2020). Remanufacturing implies that used components are collected and transported to remanufacturing facilities and when necessary, these are disassembled, checked, tested, cleaned, repaired and determined to be safe and fully functional for placing back on the market (Lavee, Regev & Zemel, 2009).

Generally, aiming to meet sustainable resource use policy objectives and reduce waste production, national governments and international organizations encourage household waste recycling (Lavee, Regev & Zemel, 2009), through behavioral interventions, information campaigns and pecuniary incentives. Target 12.5 of the Sustainable Development Goals for

example calls for reducing waste generation through recycling, while the EU's Waste Framework Directive (2008/98/CE) aspired to increase municipal waste recycling rates among member states to 50% by 2020 (European Commission 2018).

Differences in waste management practices remain across jurisdictions sharing common policy objectives, with aggregate recycling rates often varying across regions at comparable levels of development, employing similar waste management policies, and sharing similar institutions (Degli Antoni and Marzetti, 2019). Assessing the influence of location-specific norms, traditions and collective practices on individual waste management attitudes and behavior, can contribute to explaining contemporaneous differences in recycling rates across and within countries, and assist in the design of regionally relevant, effective sustainability policy (Ko, Kim, Shin & Shin, 2020).

In industrial society, waste generation and dumping have become an intrinsic role (Ko *et al.*, 2020). The domestic and commercial waste sources have increased considerably all around the world in the last ten years. The householders, commercial establishments, industries, and various small and big stores constantly contribute to the tremendous amount of waste. The waste products can be measured as millions of tons, while the population living in urban and city limits has increased 400% in the past 20 years.

This enormous population growth has contributed tremendous liquid and solid waste, and it is a matter of national as well as a global concern. The waste volume is not a big problem, but the inability of individuals, society, governments, together with the disposal of waste management companies have failed to manage the task of waste reduction and environmental safety. The dirty environment affects the aesthetic sensibilities, living standards, health of human beings, implicating the quality of lives. Improper waste storage and disposal can create hazards to society through air pollution, water, and land (Ado, & Muktar, 2011).

Usually, most manufacturing firms such as the plastic industry cannot give due attention to reverse logistics processes, rather, they concentrate on forwarding logistics activities (Rodríguez *et al.*, 2023). Environmental preservation is a joint program of business owners and governments in power both in developed and developing countries. Ethiopia is among the countries taking action to make and implement a green economy. However, recycling wastes that come from used plastic bottled water and reverse logistics system implementation is still a problem in developing countries such as Ethiopia (Degli Antoni and Marzetti, 2019).

In Ethiopia, a large number of the community in urban areas favor bottled water at home, their workplace, or hotels without understanding the effect the used plastic packages have on the ecosystem (Teshome, 2021; Gelan, (2021). Moreover, most civic societies in Ethiopia perceive waste management as the sole responsibility of government authorities due to the literacy gap and lack of awareness. According to Teshome, (2021), most used plastics in Ethiopia are not collected and returned from end-users to the recycling hub due to the lack of a holistic reverse logistics system. Thus, the following schematic diagram shows the pathway of reverse logistics that was proposed in recycling used plastic bottles as a means of waste management (Hirpe and Yeom, 2021).

Furthermore, implementing reverse logistics in the recycling of used plastic bottled water waste management contributes to the achievement of sustainable development goals (SDGs), (Kalubanga and Mbekeka, 2024). More specifically, according to Rodríguez *et al.,* (2023), plastic waste management has a significant contribution to SDG3: good health and well-being, SDG6: clean water and sanitation, SDG8: Decent work and economic growth, SDG9: industry, innovation, and infrastructure, SDG11: sustainable cities and communities, SDG12: responsible consumption and production, SDG13: climate action, SDG14: life below water, SDG15: life on land.

Recycled materials can be converted into new products that can be consumed as paper, plastic and glass (Zhu *et al.,* 2008). The difference between recycling and remanufacturing practices is that the recycled products are not usable and it is not a must that the finished product must be of the original form or utility. In other words, the materials from the products to be recycled become raw materials to produce other products (De brito, Dekker and Flapper, 2005). Recycling as well as reusing recycled materials proves to be advantageous for many reasons as it reduces the amount of waste sent to landfills, conserves natural resources, saves energy, reduces green gas emission and helps create new jobs (Ellram, 2006).

Empirically, EL-Maghraby *et al.,* (2010) emphasized that recycling requires significantly less energy, water 23 and other resources to recycle materials than to produce new materials. Also, Bwire (2015) emphasized that by recycling plastic materials, production time is reduced, which means less greenhouse gas emissions into the atmosphere and conservation of resources. This is in line with a study by Banar and Çokaygil (2009), in which recycling was found to have many strategic benefits including; reducing the consumption of fresh raw materials, reducing energy usage, and reducing air pollution.

In the study carried out by Ochiri *et al.,* (2015) on the effects of recycling strategy on firm performance. The study findings revealed that 94.9% of the respondents confirmed that recycling strategy is a significant factor influencing performance of publishing firms. Additionally, as products are recycled into new products, Olariu (2014) asserted that this could avoid further depletion of natural resources, reduce the amount of waste thrown away and lessen the need to build more facilities.

Contestably, recycled materials can also be converted into new products that can be consumed again such as paper, plastic, and glass (Allwood, 2014). To an individual firm, this translates to cost savings and new streams of income Blumberg, (2005), which should improve the profitability. While most recyclable materials are non-biodegradable, it goes without saying that recycling firms save the environment from potential deterioration (Haas, Krausmann, Wiedenhofer & Heinz, (2015). Contrary to this, Duzgun *et al.,* (2019) argued out that comparing recycling with other reverse logistics options like reuse, remanufacturing among others, recycling requires most effort. It consumes and requires most resources and energy therefore, when selecting a reverse logistics option, industry practitioners should focus on options that require less effort, such as reusing, repairing, instead of traditional recycling.

2.4 Relationship between circular economy and waste management

Waste management and circular economy hold considerable potential for mitigating climate change (Liviu, Razvan & Alina, 2021). Countries can benefit from linking these two areas as part of their climate policy mix, according to the briefing which is based on two technical reports prepared for the European Environment Agency (EEA). According to European Environment Agency, the key findings revealed that Circular economy actions are generally underrepresented in the reported national climate policies and measures, often due to their cross-sectoral complexity and the absence of specific guidelines to consider them in climate reporting (Tomić and Schneider, 2020).

Some form of circular economy policies and measures are included in 6% of the climate policies reported by European countries (with a strong focus on waste). Impacts on emission reductions that these actions would deliver are however rarely quantified. The waste sector's total Green House Gases (GHG) emissions in European countries have decreased by 42% since 1990 and are projected to continue declining, with an expected reduction of 68% by 2050 compared to 1990 levels. While the waste sector accounts for about 3% of GHG

emissions, better use of waste as a resource and preventing waste can help reduce emissions in other sectors (Chioatto and Sospiro, 2023).

Geme, Nijman, Ntawuhiganayo & Negesa, (2023) in their study in Uganda are of the view that circular economy's aim is to achieve sustainability through closed cycles to accomplish the balance between economic valuation, social inclusiveness and environmental resilience. It focuses on the proposal of transformation of energy and material flows used to generate economic value, from a linear system to a circular system inspired by the concept of sustainable development. In this sense, the most commonly accepted concept of CE on the part of professionals and companies is that proposed by Ddiba *et al.,* (2023) which introduces the phases of reuse, remanufacturing and recycling of materials, components and products when they have reached the end of their use or the end of their useful life, whose original economic value has already been lost. The incorporation of these phases implies a decrease in the demand for resources (Geme *et al.,* 2023).

Lee *et al.,* (2017) alluded that any waste-management infrastructure will function efficiently only when all components are present, requiring waste producers to become members. Circular Economy Hubs, areas for businesses with the necessary infrastructure (such as electricity, heating, other energies, smart web connections, and logistics) organized by the public sector, are promoting the concept of circular economies. Such hubs provide the opportunity for cooperation between companies, bringing them close to raw materials, energy, partners, and other infrastructure requirements. This creates positive operational environments and the opportunity for small enterprises to become involved.

Liviu *et al.,* (2021) are of the view that the essence of circular economy is to reduce in order to decouple the economic growth of natural resource consumption. To achieve this, it is necessary to reduce material consumption and minimize waste generation. Waste generation is currently a highly serious issue. By 2050, waste levels will double. Rubbish is generated faster than other environmental pollutants, including GHG emissions. According to the World Bank the generation of global solid waste will triple in the year 2100, due to: (1) increase in consumption directly related to world population growth, and (2) to the linear system of industrialization, which is still under transformation into a circular system (Chioatto and Sospiro, 2023).

Therefore, the reduction of waste through its transformation into new resources is a priority. Waste management is in the 2030 Agenda for Sustainable Development with its inclusion in the SDG "Responsible Production and Consumption" in goal 12.5, which is to "considerably reduce the generation of waste through activities based on prevention, reduction, recycling and reuse" (Ddiba *et al.*, 2022). There are currently structures for waste management backed by international and national regulations. This allows the identification of essential operations for waste management and prioritized, in descending order of importance, as follows: prevention, reuse preparation, recycling, other recovery (including energy use) and disposal/ landfill (Joshi, Seay & Banadda, 2019).

2.5 Summary of the literature review

This study on the impact of circular economy practices on waste management in Uganda has, through the review of accessible literature found out that despite the extensive research done in the area of circular economy practices and waste recycling, there are still gaps. While there is a lot of literature on circular economy practices, most of this literature is old and is analyzed in the context of western developed countries. Literature that is recent is scarce and literature analyzed in the context of Africa, particularly Uganda is almost non-existent. However, even though the literature reviewed has gaps, as indicates above, there seems to be consensus among most reviewed authors.

CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Introduction

This chapter presented the research methodology that was used in the study. It contained the research design, study population, sample size and sampling techniques, data collection methods, data collection instruments, validity and reliability measures, data collection approaches, techniques for data analysis, and approaches towards the measurement of variables.

3.2 Research Design

The researcher adopted a cross-sectional survey with a combination of qualitative-quantitative data collection methods for this study (Hunziker and Blankenagel, 2024). Recent literature supports the effectiveness of cross-sectional designs in providing a snapshot of the variables of interest at a single point in time (Wang & Cheng, 2020). A case research design will also be utilized, as this method allows for an in-depth examination of the specific context (Hancock, Algozzine & Lim, 2021). Under the case research design, both qualitative and quantitative (triangulation) research approaches were used during data collection and analysis. Triangulation approach was chosen to enrich the study which enhanced the validity and reliability of the conclusions or inferences drawn from the study (Guetterman, Plano Clark & Molina-Azorin, 2024).

3.3 Study Population

Nguyen, Resweber & Karhadkar, (2023) see study population as a subset of the target population from which the sample is actually selected. For this current study, the study population comprised of 200 respondents within Uganda practicing circular economy practices and waste management practices. This therefore formed the unit of analysis for the study. The population was selected because the researcher was limited with finances to undertake a larger study population.

3.4 Determination of Sample Size

In this study, the researcher used Krejcie and Morgan table for sample size determination (Uakarn, Chaokromthong & Sintao, 2021). Therefore, in line with Krejcie and Morgan Constants, the researcher generated a sample of 132 respondents as shown in *table 3.1* below. The sample size for the study was 132 respondents out of a study population of 200 respondents within the various companies and organizations in Uganda.

Table 3.1: Determination of sample size

Population category	Target Population (N)	Sample (n)	Sampling technique
Companies and organizations practicing circular economy and waste management practices.	200	132	Simple Random Sampling
Total	**200**	**132**	

Source: Primary Data, (2024)

3.5 Sampling techniques

A sample is a subset of the population, and sampling techniques determine how this sample is chosen from the population (Turner, 2020). It represents a portion of the total population and serves as a basis for study and analysis, facilitating generalizations about the entire population (Sukmawati, Salmia & Sudarmin, 2023). In this study, two main sampling approaches were employed; stratified random sampling and purposive sampling (Obilor, 2023).

3.5.1 Stratified random sampling

Stratified sampling was utilized to sample category of employees of companies involved in Waste Recycling. This technique involved categorizing respondents into strata before randomly selecting them. It ensured an equal opportunity for each element in the population to participate in the study (Sarantakos, 2018; Obilor, 2023). Consequently, employees within the companies hence had an equal chance of participation in the study. Additionally, stratified random sampling minimized researcher bias during respondent selection (Maxwell, 2019). Babbie (2020) further underscores the impartiality of random sampling, which meets the researcher's needs. Respondents were randomly selected from different branches and departments to form distinct strata (Sukmawati *et al.*, 2023).

3.5.2 Purposive Sampling

Purposive sampling was employed to select participants in managerial positions in the companies. According to Obilor, (2023), purposive sampling involved specifically targeting individuals based on their expertise or knowledge related to the research topic or variables. This method ensured that the researcher engages with knowledgeable respondents to enrich the study (López, 2023). The study utilized purposive sampling to target these specific groups within companies. Additionally, Russell (2019) emphasized the necessity of purposive sampling, particularly in technical and investigative studies.

3.6 Data collection methods

The method of data collection was mainly the use of questionnaire surveys for collecting quantitative data in form of numerals from the various respondents in companies and organizations practicing circular economy practices and waste management and interviews for collecting qualitative data in form of opinions, attitudes, and judgments from managers and supervisors of companies (Sukmawati, 2023).

3.5.1 Questionnaire surveys

Here, a set of questions is distributed by physical copies, and the responders fill it out on their own. To gather quantitative information about the beliefs, judgments, attitudes, experiences, and behaviors of 132 respondents, questionnaire surveys with question items were given to them. Surveys using questionnaires were selected because they yielded information that helped evaluate the study's research questions or hypothesis (Srivastava, 2024; Frölich and Schellhammer, 2024).

3.5.2 Interviews

The interview technique was employed to collect qualitative data from employees in managerial positions. This method was favored because it allowed the researcher to ask probing questions and delve deeper into the topic under study (Seidman, 2019). Moreover, the interview method facilitated immediate feedback to the researcher through face-to-face interactions, enhancing the richness of the data collected. Furthermore, unlike surveys or self-reported data, face-to-face interviews empowered the researcher to steer the conversation, ensuring the focus remains on the targeted participant and their experiences. This method also helped a researcher to decode body language. Beyond words, non-verbal cues like facial expressions and posture can speak volumes. Face-to-face interviews unlock this unspoken language, adding depth and nuance to the data being collected (Frolich and Schellhammer, 2024).

3.6 Data Collection Instruments

The researcher used the questionnaires and interview guides as the data collection instruments. Frolich and Schellhammer, (2024) posited the requisite need for use of questionnaire instrument and interview guide in ensuring the need to keep quality standards of data collected in a single study.

3.6.1 Questionnaire

This research made use of a carefully crafted questionnaire guide to capture a broader range of data and uncover patterns and statistical relationships between variables under study. Well-designed questionnaire acted as a bridge – connecting the researcher's objectives with the live experiences of participants. Questionnaires offered a standardized approach to data collection, ensuring consistency and facilitating comparisons across large sample sizes. This enabled quantitative analysis and the identification of statistically significant trends.

Furthermore, with a questionnaire, reaching a vast pool of participants became attainable, expanding the research scope and enhancing generalizability of findings. This questionnaire was administered physically and paper-based formats were used in the course of data collection. Beyond yes/ no answers, the questionnaire employed a 5-point Likert scale (Chen, 2020). This allowed statistical analysis, hypothesis testing, and the exploration of correlations between variables.

Section A included organized demographic inquiries concerning participants, such as gender, name, and the role or position of the participant in the company or organization. These questions aimed to facilitate an examination of gender biases among various sexes. Section B of the survey contained 10 inquiries focusing on waste management. These inquiries employed a 5-point Likert scale, ranging from strongly agrees, agree, neutral, disagree to strongly disagree. Moving to Section C, it comprised of 20 questions using a 5-point Likert scale to gauge circular economy practices. Within this section, there were 10 questions each on reverse logistics and recycling (Babbie & Maxfield, 2019; Fink, 2019; Frolich and Schellhammer, 2024).

3.6.2 Interview Guide

An interview guide is a structured list of thematic areas or issues that guide the researcher in engaging with respondents during an interview (Lavrakas, 2019). It serves as a framework for ensuring that key topics related to the study’s dependent and independent variables are covered comprehensively (Sithanant, Chaiyasoonthorn & Chaveesuk, (2023). In this study, the interview guide consisted of key thematic questions aligned with the conceptual framework, research objectives and research questions as focus areas.

3.7 Data quality control

The researcher used validity and reliability paradigms to ensure the quality of the research instruments (William, 2024).

3.7.1 Validity

To ensure the validity of the instrument, it (instruments) underwent content and validity checks by supervisors, colleagues, and other research experts (Amin, 2019). This process aimed to assess the extent to which the instrument accurately captured the intended information. Feedback from these stakeholders guided adjustments to the instrument, such as removing ambiguous items and correcting typographical errors.

William (2024) emphasized the importance of respondent validation in ensuring the stability of qualitative data. This involved checking the completeness of data collection results for any missing responses and other discrepancies. Additionally, Gupta, (2023) suggested employing respondent validation techniques to enhance the reliability of qualitative findings.

The Content Validity Index (CVI), was calculated as the number of correctly rated items divided by the total number of items and multiplied by 100. This formula was utilized to assess the instruments content validity (Polit & Beck, 2020; Indarta, Ambiyar, Ranuharja & Dewi, 2023).

3.7.2 Reliability

In a research study, to ensure the reliability of quantitative data, the Cronbach's Alpha Reliability Coefficient for Likert Type Scales test was conducted (William (2024). Cronbach's alpha is a widely-used measure of internal consistency or reliability in statistics (Russell, 2018). It assesses the extent to which items in a scale are correlated with each other. Izah, Sylva & Hait, (2023) suggests that a reliability coefficient of 0.70 or higher, obtained from a substantial sample, is necessary to consider an instrument reliable.

3.8 Procedure of data collection

The researcher obtained a letter of introduction from Uganda Christian University to help with introductions to various respondents. After the construction of instruments, the researcher took them for approval to the supervisor and there after they were taken for pretesting in selected few respondents. The researcher carried out a pilot run on a participating group in the study.

Pretesting will be done by picking 25 respondents from the study area and giving them the same approved questionnaires. Pretesting helps to know whether respondents interpret phrases and questions as the researcher wants them, it also helps to obtain a general assessment of respondents' ability to perform required tasks (recall relevant information, estimate frequency of specific behaviors) and it also helps to obtain ideas for question wording in case rephrasing of the original statements is needed.

3.9 Data Analysis

3.9.1 Quantitative data analysis

Generally, in performing quantitative analysis, data collected in the field was edited, coded, classified on the basis of similarity and then tabulated (Riazi, Ghanbar & Rezvani, 2023). To permit quantitative analysis, data will be converted into numerical codes representing attributes or measurement of variables (Riazi *et al.*, 2023).

Descriptive statistics such as frequency distributions, percentages and frequency tables was used to analyze qualitative data and relate variables which are attained from the study (Walz, Zeilfelder & Rießinger, 2023). The study adopted regression and correlation analysis (Kulaylat, Tran, Kulaylat & Hollenbeak). Regression analysis was used to come up with the model expressing the hypothesized relationship between the independent variables of circular economy practices and the dependent variable of waste management.

3.9.2 Qualitative data analysis

In this study, thematic Analysis was used to identify patterns and themes within qualitative data. Here the researcher began by familiarizing herself with the data through repeated readings. Then code different segments of data based on recurring themes or patterns. Then group codes into broader themes and subthemes. Findings within each theme was summarized. Triangulation; after running the analyses, findings from quantitative and qualitative analyses was compared, looking out for convergence or divergence between the two sets of data. Interpretation of the combined results was provided to provide a deeper understanding of the research questions (Khoa, Hung, & Hejsalem-Brahmi, 2023).

3.10 Measurement of variables

In this current study, Section B of the questionnaire document contains the independent variable attributes of waste generation, minimization, collection and disposal. In this section, a 5 Point Likert Scale of 1=Strongly Disagree 2=Disagree 3=Neutral 4=Agree and 5=Strongly Agree was used to tap respondents' perception of their level of engagement.

Section C contained statements on circular economy and was measured using the 5 Point Likert Scale of 1=Strongly Disagree 2=Disagree 3=Neutral 4=Agree and 5=Strongly Agree. Data that was generated from open ended interview questions was used in the qualitative analysis. The information was studied and categorized according to context; the responses were grouped according to the dominantly relevant themes. The Likert scale was chosen because it was easier to use compared to other methods (Hutchinson & Chyung, 2023).

3.11 Ethical considerations

Ethical considerations are fundamental in research involving human participants, ensuring their rights, privacy, and confidentiality was protected (Nii Laryeafio & Ogbewe, 2023). This study strictly adhered to ethical guidelines and principles to uphold the integrity of the research process and safeguard participants' welfare. Prior to their involvement, participants were provided with clear and comprehensive information about the study's objectives, procedures, potential risks, and benefits.

Therefore, obtaining informed consent was a crucial step, ensuring participants voluntarily agree to participate. Measures was implemented to maintain the confidentiality of participants' information, including anonymizing participant identities and securely storing data to prevent unauthorized access. Electronic files were protected using encryption and password measures. Steps was taken to minimized any potential harm or discomfort to participants, including providing support resources and allowing participants to withdraw from the study at any time without facing any penalty. Approval were sought from relevant institutional review boards or ethics committees to ensure compliance with ethical standards and regulations. This ensured that the research meets ethical requirements and upholds the rights and well-being of participants.

3.12 Limitations and delimitations of the study

Guetterman *et al.,* (2024) allude that Limitations are influences outside a researcher's control that restrict methodology, such as sample size, lack of data or prior research, self-reported data, and cultural bias. Delimitations are boundaries set by the researcher, such as aspects not examined in the study.

Unwillingness to disclose information is one of the limitations that the researcher may experience: This meant drawing inadequate information from the respondents which compromised the validity of the findings of this study. The researcher alleviated this by

explaining to the respondents the level of integrity of the study and assured them that the information they provided was handled with utmost confidentiality.

Loss of questionnaires by respondents is also one of the limitations that was experienced by the researcher: This meant that missing of valuable information from the respondents which affected the sample size of the study. The researcher minimized this limitation by carrying along more questionnaires for distribution so that all the valuable information be captured and the sample size not affected.

CHAPTER FOUR
DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.0 Introduction

This chapter was concerned with analysis, interpretation and presentation of data. The study aimed at assessing the impact of circular economy practices on waste management in Uganda. This study was carried out along the objectives which included; examine the effect of reverse logistics practices on waste management, assess the effect of recycling on waste management and finally assess the relationship between circular economy and waste management in Uganda. Data collected under the above objectives was analyzed using SPSS V25 and presented in four sub sections: Section one presented the background information of the respondents, section two and three analyzed the major variables or objectives under investigation or scrutiny.

4.1 Response Rate

Table 4.2: Showing Response Rate

Category	Frequency (n=132)	Response Rate (%)
Returned	110	83.3
Not Returned	022	16.7
Total	**132**	**100.0**

Source: Primary Data, (2024).

From the total sample size of the study (132), it can be observed that only 110 questionnaires with response rate of 83.3% were returned and 022 questionnaires with response rate of 16.7% were not returned (Table 4.2). This therefore presupposes that the study generated meaningful findings with response rate of 83.3% with the current sample size of 110 respondents who filled the questionnaires and interviews conducted by the researcher respectively. The response rate was considered appropriate since Sekaran (2008), argues that any response above 75% is rendered appropriate as best for any study.

4.2 Demographic Characteristics of the Respondents and firm or company characteristics

This section covered the demographic characteristics/ bio data of the respondents and firm or company characteristics that were considered pertinent for this study in the form of gender, age group, highest education level and marital status of respondents. The demographic information and firm characteristics helped the researcher obtain the basic characteristics of the respondents involved in the study and company profile in question.

4.2.1 Gender of the Respondents

The gender of respondents was sought pertinent for the study. The various responses from respondents in regards their gender traits can be illustrated in Figure 1.1;

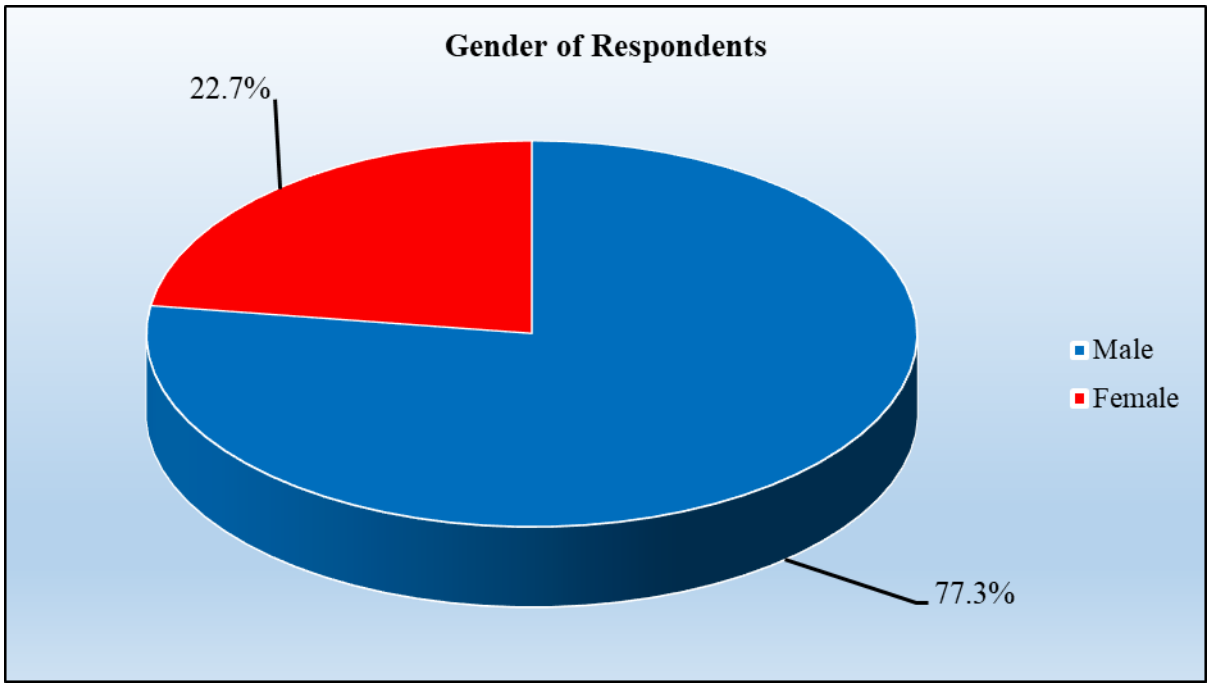


Figure 4.1: Gender of Respondents
Source: Primary Data, (2024).

Findings reveal that majority of respondents 77.3% were male and minority of respondents 22.7% were female. This therefore implies that majority of respondents involved in the study were male although females were also involved in the study. This implies that indeed companies involved in circular economy practices and waste management has employed more males than the females as it is evidenced that the tasks involved require manual energy which the males possess than their gender counterparts the female. The gender distribution however represents a fair gender balancing an indication of successful efforts of various gender mainstreaming campaigns practiced by companies.

4.2.2 Age Group of Respondents

The age group of respondents within the firms or companies was also considered for this study. The various responses in regards the age group was illustrated in Table 4.3;

Table 4.3: Age Group of Respondents

	Category	Frequency	Percent	Valid Percent	Cumulative Percent
	18-25 years	55	50.0	50.0	50.0
	26-33 years	30	27.3	27.3	77.3
Valid	34-41 years	15	13.6	13.6	100.0
	42 years +	10	09.1	09.1	
	Total	**110**	**100.0**	**100.0**	

Source: Primary Data, (2023).

Findings reveal that majority of respondents 50.0% were in the age bracket of 18-25 years, 27.3% of respondents were in the age bracket of 26-33 years, 13.6% of respondents were in the age bracket of 34-41 years and minority 09.1% of the respondents were in the age bracket of 42 years and above. This differentiation in age implies that indeed the study was majorly dominated by mature adult youths of 18-25 years, 26-33 years and 34-41 years respectively. The justification is that majority of that age group is involved in active employment and search for jobs hence depicting reason for youth employment in firms or companies that are engaged in circular economy practices and waste management.

4.2.3 Education Level of Respondents

The education level of respondents was also considered for the study. The various responses from respondents in regards their education levels was also illustrated in Table 4.4 respectively;

Table 4.4: Education level of respondents

	Category	Frequency	Percent	Valid Percent	Cumulative Percent
	No education	12	10.9	10.9	10.9
	Certificate	25	22.7	22.7	33.6
Valid	Diploma	38	34.5	34.5	68.1
	Degree	29	26.4	26.4	94.5
	Masters	06	05.5	05.5	100.0
	Total	**110**	**100.0**	**100.0**	

Source: Primary Data, (2024).

Findings reveal that majority of respondents 34.5% had attained diploma level of education, 22.7% of respondents had attained certificate level of education, 10.9% of respondents had not attained any level of education. Furthermore, 26.4% of respondents had attained degree level of education and minority of respondents 05.5% had attained master's level of education. This therefore clearly implies that the study was majorly dominated by respondents who had attained diploma education, certificate education, and degree and

master's education. This depicts that the respondents were well educated and informed and therefore furnished this study with better information on circular economy practices and waste management.

4.2.4 Marital status of respondents

The marital status of respondents was also considered pertinent for this study. The various responses from respondents were also illustrated in Figure 4.2 below;

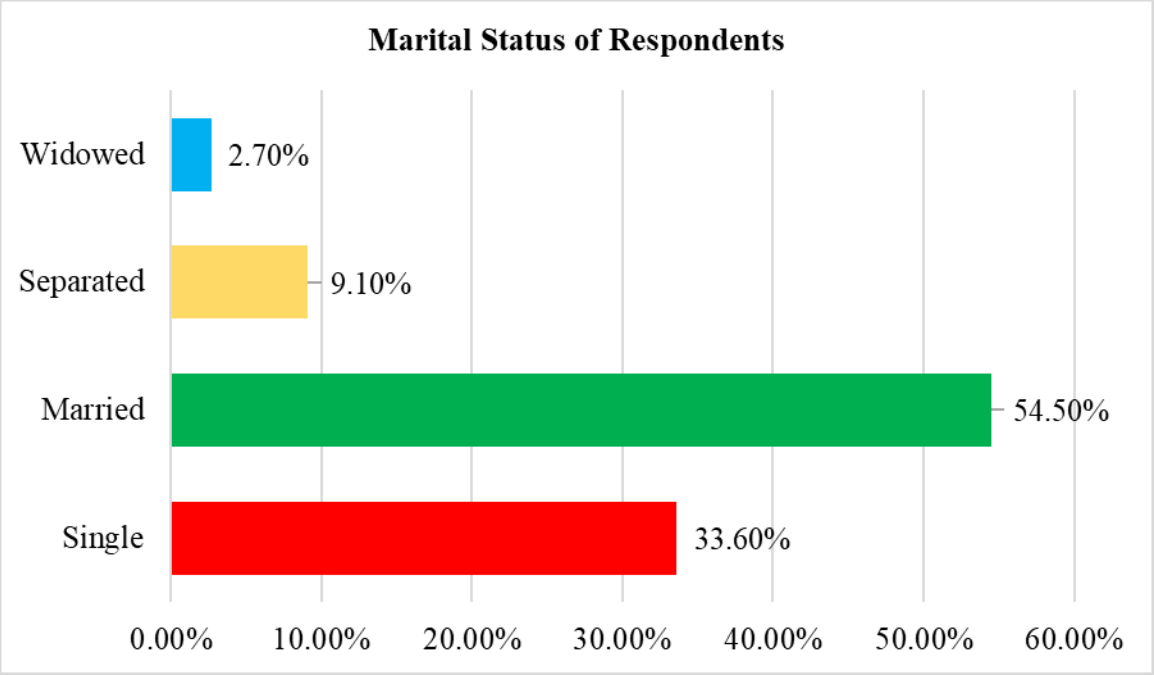


Figure 4.2: Marital Status of Respondents
Source: Primary Data, (2024).

Findings reveal that majority of respondents 54.5% were married, 33.6% of respondents were single and 9.1% of respondents were separated and minority 2.7% were widowed. This hence implies that majority of respondents involved in the study were married and single respectively although some were separated and widowed. This implies that the respondents in the various companies were mature enough and had families thus making the study successful.

4.3 Firms/ Company Characteristics

The firm or company characteristics of the various companies involved in circular economy practices inform of sub-sector, number of years and number of employees employed by firms was also considered pertinent for this study. The various responses from respondents were also illustrated in sub sections below;

4.3.1 Sub-sector of the firm/ company

The sub sector of the firms/ of the various companies was also considered for the study. The various responses from respondents in regards to the firm subsector was also illustrated in Table 4.5 respectively;

Table 4.5: Sub-sector of the firm/ company

	Category	Frequency	Percent	Valid Percent	Cumulative Percent
	Food	15	13.6	13.6	13.6
	Plastics	28	25.5	25.5	39.1
Valid	Beverages	25	22.7	22.7	61.8
	Others	42	38.2	38.2	100.0
	Total	**110**	**100.0**	**100.0**	

Source: Primary Data, (2024)

Findings reveal that majority of respondents 38.2% were involved in other circular economy businesses and waste management followed by 25.5% of respondents were involved in plastics sector, 22.7% of respondents were involved in beverages sector and minority 13.6% of respondents were involved in food sector. This hence implies that the study was attached to various sectors within circular economy and waste management. Furthermore, the sectors refined the study by ensuring that quality feedbacks on issues of circular economy and waste management were availed to the researcher making the study inevitable.

4.3.2 Number of years in existence (Age of the firm)

The number of years in existence of the various companies was also considered pertinent for the study. The various responses from respondents in regards to the age of the firm or sector was illustrated in Table 4.6 respectively;

Table 4.6: Number of years in existence (Age of the firm)

	Category	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 1 year	25	22.7	22.7	22.7
	2-4 years	70	63.6	63.6	86.3
	5 year and above	15	13.6	13.6	100.0
	Total	**110**	**100.0**	**100.0**	

Source: Primary Data, (2024)

Findings reveal that majority of respondents 63.6% has spent 2-4 years practicing circular economy and waste management followed by 22.7% of respondents had spent less than 1 year and minority 13.6% of respondents had spent more than 5 years. This implies that firms had spent more years practicing circular economy and waste management and thus were

experienced enough and this furnished the study with relevant information on circular economy and waste management.

4.3.3 Number of employees

The number of employees of the various companies was also considered paramount for the study. The various responses from respondents in regards to the age of the firm or sector was illustrated in Figure 4.3 respectively;

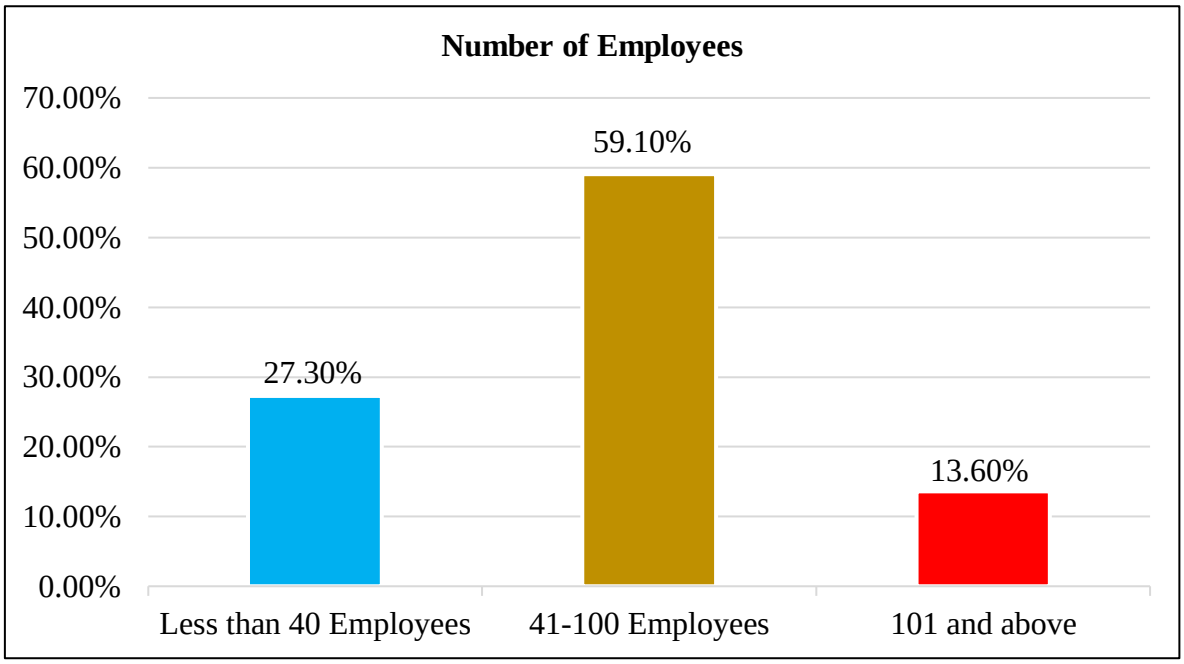


Figure 4.3: Number of employees employed by firms
Source: Primary Data, (2024).

Findings reveal that majority 59.1% of firms employed 41-100 employees in various departments followed by 27.3% of firms employed less than 40 employees and minority 13.6% of firms employed 101 employees and above. This hence implies that indeed firms involved in circular economy and waste management employ reasonable workforce thus helping in reducing unemployment in Uganda.

4.4 Effect of reverse logistics practices on waste management

The effect of reverse logistics practices on waste management was considered for the study. The various responses from respondents were analyzed on Five-Point Likert Scale in the form of Strongly Agree, Agree, Not Sure, Disagree and Strongly Disagree (Table 4.7).

Table 4.7: Effect of reverse logistics practices on waste management

Valid Responses on reverse logistics and Waste Management.	SA	A	NS	D	SD
Our firm accepts returns of products sold to our customers.	45(40.9)	35(31.8)	20(18.9%)	6 (5.5%)	4(3.5%)
Our company tracks the volume of products returned and subsequently resold to customers.	45(40.9%	40(36.4%)	10(9.1%)	15(13.7%)	0(0.0%)
Our company is keen on the supply chain of products in reverse logistics.	30(27.3%)	50(45.5%)	10(9.1%)	16(14.6%)	4(3.6%)
Our company has products transportation plan to ensure that goods are recycled and resold to customers.	42(38.2%)	48(43.6%)	13(11.8%)	3(2.7%)	4(3.6%)
Our firm has in place designated return centres for our products.	52(47.3%)	35(31.8%)	10(9.1%)	10(9.1%)	3(2.7%)
Our firm also has in place waste management policy on products returned to the company.	31(28.2%)	50(45.5%)	18(16.4%)	8(7.3%)	3(2.7%)
The quality of products returned to the company is assessed to ensure that they are fit for reuse.	41(37.3%)	32(29.1%)	22(20.0%)	7(6.4%)	8(7.3%
The firms' decision on reverse logistics practices is influenced by government policies.	39(35.5%)	35(31.8%)	19(17.3%)	12(10.9%)	5(4.5%)

Source: Primary Data, (2024).

Findings on Table 4.7 reveal that majority of respondents 72.7% agreed to the statement our firm accepts returns of products sold to our customers. Furthermore, 18.9% of respondents were not sure and 09.0% of respondents disagreed to the same statement that our firm accepts returns of products sold to our customers. This therefore implies that indeed companies involved in reverse logistics and waste management accepts returns of products sold to our customers.

Findings further reveal that majority of respondents 77.3% agreed to the statement that our company tracks the volume of products returned and subsequently resold to customers. Furthermore, 09.1% of respondents were not sure and only 13.7% of respondents disagreed to the same statement that our company tracks the volume of products returned and subsequently resold to customers. This therefore implies that indeed companies involved in reverse logistics tracks the volume of products returned and subsequently resold to customers. Findings on table 4.7 further reveal that majority of respondents 79.1% agreed that our firm has in place designated return centres for our products. Furthermore, 09.1% of

respondents were not sure and only 11.8% of respondents disagreed to the same statement. This therefore implies that indeed firms in reverse logistics have in place designated return centres for its products.

Finally, findings on Table 4.7 further reveal that majority of respondents 81.8% agreed to the statement our company has products transportation plan to ensure that goods are recycled and resold to customers. Furthermore, 11.8% of respondents were not sure and 06.3% of respondents disagreed to the same statement. This therefore implies that indeed firms involved in reverse logistics have products transportation plan to ensure that goods are recycled and resold to customers.

4.5 Effect of recycling on waste management

The effect of recycling practices on waste management was also considered for the study. The various responses from respondents in regards to recycling and waste management were analysed on Five-Point Likert Scale in the form of Strongly Agree, Agree, Not Sure, Disagree and Strongly Disagree (Table 4.8).

4.5.1 Periodic Waste Collection and Treatment Plan

The respondents were asked if the firms have periodic waste collection and treatment plant. The various responses were illustrated in Figure 4.4.

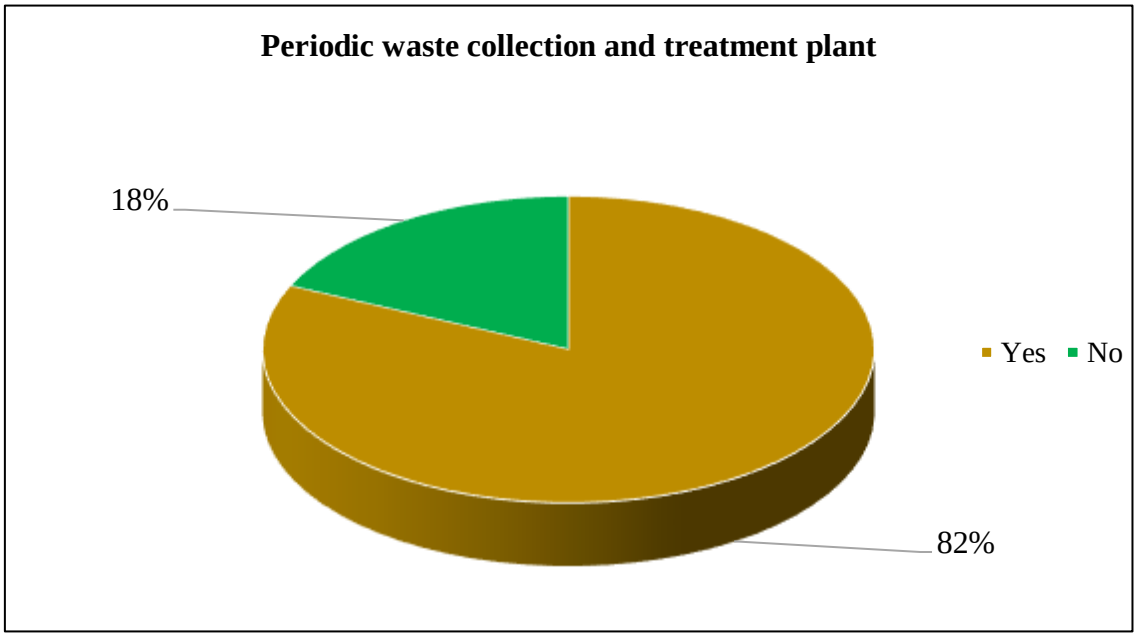


Figure 4.4: Periodic waste collection and treatment plant:
Source: Primary Data, (2024).

Findings on Figure 4.4 reveal that majority of respondents 82% agreed that yes their companies or firms have in place periodic waste management plant and plan and minority 18% observed that No their firms does not comply with any periodic waste management plant. This therefore implies that firms or companies have in place periodic waste management plant to help enhance recycling and waste management paradigms.

4.5.2 Recycling and waste management

The various responses from respondents in regards to recycling and waste management were analysed on Five-Point Likert Scale in the form of Strongly Agree, Agree, Not Sure, Disagree and Strongly Disagree (Table 4.8).

Table 4.8: Showing Recycling and waste management

Valid Responses on Recycling and waste management.	SA	A	NS	D	SD
Some of our firm's waste products are collected by the retailers.	40(36.4%)	48(43.6%)	10(9.1%)	12(10.9%)	0(0%)
Our firm has a vehicle that moves to collect wastes in different locations.	57(51.8%)	43(39.1%)	3(2.7%)	3(2.7%)	4(3.6%)
Waste collection through retailers has tremendously contributed to waste reduction.	45(40.9%)	50(45.5%)	5(4.5%)	10(9.1%)	0(0%)
Our firm puts in place collection facilities near its customers for collection and disposal of waste products.	42(38.2%)	45(40.9%)	13(11.8%)	8(7.3%)	2(1.8%)
Recycled materials can be converted into new products that can be consumed as plastic and glass.	46(41.8%)	45(40.9%)	8(7.3%)	4(3.6%)	7(6.7%)
Product collection practices minimize environmental risks and hazards.	53(48.2%)	45(40.9%)	9(8.2%)	3(2.7%)	0(0%)
Collection of waste products by manufactures has contributed to reduction in waste accumulation.	55(50.0%)	43(39.1%)	5(4.5%)	3(2.7%)	4(3.6%)
Recycling practices save the environment from potential deterioration.	46(41.8%)	38(34.5%)	15(13.6%)	4(3.6%)	5(4.5%)
Our firm embraces recycling practices in order to reduce the amount of waste sent to landfills.	50(45.5%)	45(40.9%)	4(3.6%)	8(7.3%)	3(2.7%)

Source: Primary Data, (2024).

Findings on Table 4.8 reveal that majority of respondents 90.9% agreed to the statement our firm has a vehicle that moves to collect wastes in different locations. Furthermore, 2.7% of respondents were not sure and 06.3% of respondents disagreed to the same statement that our firm has a vehicle that moves to collect wastes in different locations. This therefore implies that indeed companies involved in recycling have a vehicle that moves to collect wastes in different locations. Findings further reveal that majority of respondents 86.4% agreed to the statement that waste collection through retailers has tremendously contributed to waste reduction. Furthermore, 04.5% of respondents were not sure and only 9.1% of respondents

disagreed to the same statement that waste collection through retailers has tremendously contributed to waste reduction. This therefore implies that waste collection through retailers has tremendously contributed to waste reduction.

Findings on Table 4.8 also revealed that majority of respondents 89.1% agreed to the statement that product collection practices minimize environmental risks and hazards. Furthermore, 08.2% of respondents were not sure and only 2.7% of respondents disagreed to the same statement that product collection practices minimize environmental risks and hazards. This therefore implies that product collection practices minimize environmental risks and hazards. Finally, findings on Table 4.8 revealed that majority of respondents 86.4% agreed to the statement that our firm embraces recycling practices in order to reduce the amount of waste sent to landfills. Furthermore, 03.6% of respondents were not sure and only 10.0% of respondents disagreed to the same statement that our firm embraces recycling practices in order to reduce the amount of waste sent to landfills. This therefore implies that our firm embraces recycling practices in order to reduce the amount of waste sent to landfills.

4.6 Relationship between circular economy practices and waste management

To establish the relationship between the IV (circular economy practices) and the DV (waste management), five-point Likert scale and correlation coefficient was conducted to see how the independent and the dependent variable are related (Table 4.10 and 4.11 respectively).

4.6.1 Analysis of circular economy practices and waste management using Likert Scale

Table 4.9: Relationship between circular economy practices and waste management

Valid Responses	SA	A	NS	D	SD
Circular economy practices lead to reduced waste.	45(40.9%	40(36.4%)	10(9.1%)	15(13.7%)	0(0.0%)
Remanufacturing practices minimizes environmental risks and hazards.	30(27.3%)	50(45.5%)	10(9.1%)	16(14.6%)	4(3.6%)
Our firm packages products in reused packaging materials.	42(38.2%)	48(43.6%)	13(11.8%)	3(2.7%)	4(3.6%)
Reusing of products is more effective than recycling as regards to environmental performance.	42(38.2%)	45(40.9%)	13(11.8%)	8(7.3%)	2(1.8%)
Our firm deposits minimal waste on land which reduces waste pollution.	46(41.8%)	45(40.9%)	8(7.3%)	4(3.6%)	7(6.7%)
Packaging materials used by the firm have minimal environmental threats.	53(48.2%)	45(40.9%)	9(8.2%)	3(2.7%)	0(0%)
As a result of embracing circular economy practices, environment performance has significantly improved as result of reduced waste pollution.	55(50.0%)	43(39.1%)	5(4.5%)	3(2.7%)	4(3.6%)
Our firms' innovations have greatly led to emergence of new products through circular economy practices.	40(36.4%)	48(43.6%)	10(9.1%)	12(10.9%)	0(0%)

Findings on Table 4.9 reveal that majority of respondents 77.3% agreed to the statement that circular economy practices lead to reduced waste. Furthermore, 9.1% of respondents were not sure and 13.7% of respondents disagreed to the same statement that circular economy practices lead to reduced waste. This therefore implies that indeed companies involved in circular economy and waste management lead to reduced waste. Findings further reveal that majority of respondents 79.1% agreed to the statement that reusing of products is more effective than recycling as regards to environmental performance. Furthermore, 11.8% of respondents were not sure and 9.1% of respondents disagreed to the same statement that reusing of products is more effective than recycling as regards to environmental performance. This therefore implies that indeed reusing of products is more effective than recycling as regards to environmental performance.

4.7 Correlation Coefficients

4.7.1 Reverse logistics and Waste Management

Table 4.10: Correlation between Reverse logistics and Waste Management

		Reverse Logistics	Waste Management
Reverse Logistics	Pearson Correlation	1	.142**
	Sig. (2-tailed)		.000
	N	110	110
Waste Management	Pearson Correlation	.142**	1
	Sig. (2-tailed)	.000	
	N	110	110

**. Correlation is significant at the 0.01 level (2-tailed).

Pearson correlation result from table 4.11 above showed the relationship between reverse logistics and waste management. The Pearson coefficient (r = 142**, p = 0.00 < 0.01) shows a positive relationship (14.2%) between reverse logistics and waste management. Therefore, this means that when reverse logistics practices (Product recovery, management of excess inventory and waste collection and transportation among others) are practiced it should lead to improved waste management significantly; implying that companies that practice circular economy practices have contributed to improving waste management by adopting and instituting better reverse logistics paradigms.

4.7.2 Recycling and Waste Management

Table 4.11: Recycling and Waste Management

		Recycling	Waste Management
Recycling	Pearson Correlation	1	.109**
	Sig. (2-tailed)		.000
	N	110	110
Waste Management	Pearson Correlation	.109**	1
	Sig. (2-tailed)	.000	
	N	110	110

**. Correlation is significant at the 0.01 level (2-tailed).

Pearson correlation result from table 4.11 above showed the relationship between recycling and waste management. The Pearson coefficient (r = 109**, p = 0.00 < 0.01) shows a positive relationship (10.9%) between recycling and waste management. Therefore, this means that when there is increased recycling of products, waste management significantly is improved in the same direction; implying that companies and firms that have embraced or practiced recycling practices have enormously achieved waste management practices.

CHAPTER FIVE
SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.0 Introduction

This chapter presents a summary of major findings of this study, sets out the relevant conclusions and makes recommendations for practice and suggestions for further research based on the findings of this study. The study sought to the impact of circular economy practices on waste management in Uganda.

5.1 Summary of main findings

The study sought to find out the impact of circular economy practices on waste management in Uganda. The researcher based the study on two main concepts, circular economy practices and waste management using constructs of reverse logistics and recycling. The study was guided by the following objectives; examine the effect of reverse logistics practices on waste management, assess the effect of recycling on waste management and finally assess the relationship between circular economy and waste management in Uganda. The study revealed that there was a positive relationship between predictors of circular economy practices and waste management. Results were depicted using frequencies and correlations were carried and results presented according to the objectives below;

5.1.1 The effect of reverse logistics practices on waste management in Uganda

Findings on the effect of reverse logistics practices on waste management reveal that majority of respondents 72.7% agreed to the statement our firm accepts returns of products sold to our customers. Findings further reveal that majority of respondents 77.3% agreed to the statement that our company tracks the volume of products returned and subsequently resold to customers. Findings further revealed that majority of respondents 79.1% agreed that our firm has in place designated return centers for our products. Finally, further revealed that majority of respondents 81.8% agreed to the statement our company has products transportation plan to ensure that goods are recycled and resold to customers although some of the respondents were not sure and others disagreed respectively.

The findings of the study are in agreement with Aming'a, Marwanga & Annan, (2024) are of the view that reverse logistics support of a circular economy is changing the linear business version of materials movement to a closed-loop of products and materials flow. Employing reverse logistics helps a business organization in reducing, reusing, and recycling waste and

promotes a good public image. There are many activities in the reverse logistics area that companies require in order to retain returned materials, and viable places for the returned products must be distinguished, i.e., assembly line, delivery, and refabrication lines.

Furthermore, Mostafa, (2020) is also of the view that different types of products in the reversal movement in reverse logistics systems can be directly reused, repaired, refurbished, remanufactured, recycled, incinerated, or landfilled, which we called reverse logistics activities. During reverse logistics activities, incineration and landfilling are the last options when the returned product provides no value (waste) to the organization. Thus, waste disposal with energy recovery minimizes the volume of landfills by using the caloric content of the generated waste. Increasing energy through incineration could also produce economic benefits if that energy is utilized for new purposes.

5.1.2 The effect of reverse logistics practices on waste management in Uganda

Findings on the effect of recycling on waste management revealed that majority of respondents 90.9% agreed to the statement our firm has a vehicle that moves to collect wastes in different locations. Findings further revealed that majority of respondents 86.4% agreed to the statement that waste collection through retailers has tremendously contributed to waste reduction. Findings also revealed that majority of respondents 89.1% agreed to the statement that product collection practices minimize environmental risks and hazards. Finally, findings revealed that majority of respondents 86.4% agreed to the statement that our firm embraces recycling practices in order to reduce the amount of waste sent to landfills although some of the respondents were not sure and others disagreed respectively.

The findings of the study are in agreement with Kountouris, (2022) who observed that in these contemporary times, recycling of waste is a must say concept that acts as a lever in ensuring that waste related problems are avoided thus promotion of a healthy environment. Recycling is defined as the process to change waste, used or returned products into new products to prevent waste of potentially useful materials, reduce the consumption of fresh raw materials, reduce energy usage, and reduce air pollution.

Furthermore, Lavee, Regev & Zemel, (2009), is of the view that aiming to meet sustainable resource use policy objectives and reduce waste production, national governments and international organizations encourage household waste recycling, through behavioural interventions, information campaigns and pecuniary incentives. Target 12.5 of the

Sustainable Development Goals for example calls for reducing waste generation through recycling, while the EU's Waste Framework Directive (2008/98/CE) aspired to increase municipal waste recycling rates among member states to 50% by 2020.

Recycled materials can be converted into new products that can be consumed as paper, plastic and glass (Zhu *et al.,* 2008). The difference between recycling and remanufacturing practices is that the recycled products are not usable and it is not a must that the finished product must be of the original form or utility. In other words, the materials from the products to be recycled become raw materials to produce other products (De brito, Dekker and Flapper, 2005). Recycling as well as reusing recycled materials proves to be advantageous for many reasons as it reduces the amount of waste sent to landfills, conserves natural resources, saves energy, reduces green gas emission and helps create new jobs (Ellram, 2006).

5.1.3 The relationship between circular economy and waste management

5.1.3 Correlation Coefficients

5.1.3.1 Reverse logistics and waste management

Findings on correlation coefficients showed the relationship between reverse logistics and waste management. The Pearson coefficient ($r = 142^{**}$, $p = 0.00 < 0.01$) shows a positive relationship (14.2%) between reverse logistics and waste management. Therefore, this means that when reverse logistics practices (Product recovery, management of excess inventory and waste collection and transportation among others) are practiced it should lead to improved waste management significantly; implying that companies that practice circular economy practices have contributed to improving waste management by adopting and instituting better reverse logistics paradigms.

5.1.3.2 Recycling and waste management

Pearson correlation also showed the relationship between recycling and waste management. The Pearson coefficient ($r = 109^{**}$, $p = 0.00 < 0.01$) shows a positive relationship (10.9%) between recycling and waste management. Therefore, this means that when there is increased recycling of products, waste management significantly is improved in the same direction; implying that companies and firms that have embraced or practiced recycling practices have enormously achieved waste management practices.

5.2 Conclusions

Conclusively, it should be noted that products and materials approaching the end-of-life stage are regenerated through resource recovery and reuse (RRR). Efficiency is achieved when by-products or waste are retrieved for use in other production processes. CE ecologically makes the world clean and livable by meeting bottlenecks of resource scarcity and waste disposal (Homrich et al 2018). Value creation for sustainability calls for great innovation, creativity and adaptation to maintain the value of products, materials and resources at the highest level of utility in the economy for as long as possible (EC 2015).

CE not only builds resilience, it also creates opportunities for delivering economic, social and environmental benefits. Within the circular value chain, organizations retain and regenerate values to products, making them secondary raw materials through reverse logistics. The closed-loop cycles of reuse, remanufacturing, and recycling regulates consumer behaviour to sustainable levels (Peattie and Belz, 2013). Regenerative value is created by practicing sustainability in human resources, procurement, technology and firm infrastructure.

5.3 Recommendations of the study

The study recommends that manufacturing firms should adopt circular economy practices fully since it is important for manufacturers, government agencies, policy makers, managers and researchers by highlighting a number of issues that act as barriers to implementation of circular economy practices.

Enhancing Plastic Circularity using Technology: The study recommends that a transition towards a circular economy in plastic waste management requires innovation and application of new technologies. Technology application should provide a fundamental basis to rethink plastics manufacturing and packaging, envisioning a more effective system to achieve better economic and environmental outcomes.

Revise Waste Management Policies: The study recommends that there is need to ensure harmonization of waste management legislations and polices that address plastic circularity along the value chain to have a comprehensive and wholistic approach to plastic waste management.

There is need to re-introduce incentives for plastic recycling, such as zero tax on imported technologies, including machinery and equipment for recycling, material recovery infrastructure for companies and businesses involved in plastic circularity along the value

chain. This would encourage new investment in plastic circular economy in the country, create more jobs and reduce on the impacts of wastes on the environmental health in line with the Sustainable Development Goal No. 12.

The study also recommends that there is need to transition to a circular economy needs application of technologies that support the whole plastic value chain. Therefore, all actors in plastic waste management could invest in technologies that start from design to the recycling level.

Finally, the study recommends that there is need to ensure implementation of waste management in the country, need to develop legislations and policies in waste management, including in plastic circular economy along the value chain.

5.4 Areas for further research

Although this study has generated meaningful findings, the researcher believes more research and works be done in the following areas;

- ✓ Recycling/ reprocessing and waste management
- ✓ Technology integration in waste management
- ✓ Enhancing Plastic Circularity using Technology which leads to adoption of waste management.
- ✓ Disposal and collection strategies adopted to minimise waste.

References

Abdissa, G., Ayalew, A., Dunay, A., & Illés, C. B. (2022). Role of reverse logistics activities in the recycling of used plastic bottled water waste management. *Sustainability*, *14*(13), 7650.

Adami, L., & Schiavon, M. (2021). From circular economy to circular ecology: a review on the solution of environmental problems through circular waste management approaches. *Sustainability*, *13*(2), 925.

Allwood, J. M. (2014). Squaring the circular economy: the role of recycling within a hierarchy of material management strategies. In *Handbook of recycling* (pp. 445-477). Elsevier.

Aming'a, M., Marwanga, R., & Annan, J. (2024). Is it practical to uphold both resilience and sustainability of supply chains using closed-loop supply chain models considering circular economy? An empirical investigation from Kenya. *Cogent Business & Management*, *11*(1), 2315666.

Avilés-Palacios, C., & Rodríguez-Olalla, A. (2021). The sustainability of waste management models in circular economies. *Sustainability*, *13*(13), 7105.

Barles, S. (2014). History of waste management and the social and cultural representations of waste. In *The basic environmental history* (pp. 199-226). Cham: Springer International Publishing.

Bjørn, A., & Hauschild, M. Z. (2013). Absolute versus relative environmental sustainability: What can the cradle-to-cradle and eco-efficiency concepts learn from each other?. *Journal of Industrial Ecology*, *17*(2), 321-332.

Buda, G. (2022). Seven Businesses Using Principles of Circular Economy in Sub-Saharan Africa: Results of Field Research in Uganda. *Hungarian J. Afr. Stud.*, *16*, 5.

Castellani, P., Ferronato, N., & Torretta, V. (2022). Setting priorities to achieve Sustainable Development Goals through appropriate waste management systems in Uganda. *Environmental Development*, *44*, 100764.

Castellani, P., Ferronato, N., & Torretta, V. (2022). Setting priorities to achieve Sustainable Development Goals through appropriate waste management systems in Uganda. *Environmental Development*, *44*, 100764.

Chew, C., & Brink, G. (2018). *Qualitative research: Issues and methods* (5th edition). Routledge

Chioatto, E., & Sospiro, P. (2023). Transition from waste management to circular economy: the European Union roadmap. *Environment, Development and Sustainability*, *25*(1), 249-276.

Ddiba, D., Andersson, K., Rosemarin, A., Schulte-Herbrüggen, H., & Dickin, S. (2022). The circular economy potential of urban organic waste streams in low-and middle-income countries. *Environment, Development and Sustainability*, *24*(1), 1116-1144.

Ddiba, D., Andersson, K., Rosemarin, A., Schulte-Herbrüggen, H., & Dickin, S. (2022). The circular economy potential of urban organic waste streams in low-and middle-income countries. *Environment, Development and Sustainability*, *24*(1), 1116-1144.

Debrah, J. K., Teye, G. K., & Dinis, M. A. P. (2022). Barriers and challenges to waste management hindering the circular economy in Sub-Saharan Africa. *Urban Science*, *6*(3), 57.

Degli Antoni, G., & Marzetti, G. V. (2019). Recycling and waste generation: an estimate of the source reduction effect of recycling programs. *Ecological Economics*, *161*, 321-329.

Dias, K. T., & Braga Junior, S. S. (2016). The use of reverse logistics for waste management in a Brazilian grocery retailer. *Waste Management & Research*, *34*(1), 22-29.

Frölich, N., & Schellhammer, K. S. (2024). Questionnaire design and sampling procedures for business and economics students: a research-oriented, hands-on course. *International Journal of Mathematical Education in Science and Technology*, *55*(6), 1330-1348.

Gelan, E. (2021). Municipal solid waste management practices for achieving green architecture concepts in Addis Ababa, Ethiopia. *Technologies*, *9*(3), 48.

Geme, T., Nijman, E., Ntawuhiganayo, E. B., & Negesa, D. (2023). Stakeholder knowledge and perceptions of the circular economy in Ugandan cities. *Frontiers in Sustainability*, *4*, 1117814.

Geme, T., Nijman, E., Ntawuhiganayo, E. B., & Negesa, D. (2023). Stakeholder knowledge and perceptions of the circular economy in Ugandan cities. *Frontiers in Sustainability*, *4*, 1117814.

Ghosh, S. K. (Ed.). (2020). *Waste management as economic industry towards circular economy*. Springer.

Gustafsson, J. (2017). Single case studies vs. multiple case studies: A comparative study. *Halmstad University, Sweden*.

Haas, W., Krausmann, F., Wiedenhofer, D., & Heinz, M. (2015). How circular is the global economy?: An assessment of material flows, waste production, and recycling in the European Union and the world in 2005. *Journal of industrial ecology*, *19*(5), 765-777.

Hancock, D. R., Algozzine, B., & Lim, J. H. (2021). Doing case study research: A practical guide for beginning researchers.

Hara, K., & Yabar, H. (2012). Historical evolution and development of waste management and recycling systems—analysis of Japan's experiences. *Journal of Environmental Studies and Sciences*, *2*, 296-307.

Hirpe, L., & Yeom, C. (2021). Municipal solid waste management policies, practices, and challenges in Ethiopia: a systematic review. *Sustainability*, *13*(20), 11241.

Hunziker, S., & Blankenagel, M. (2024). Cross-sectional research design. In *Research Design in Business and Management: A Practical Guide for Students and Researchers* (pp. 187-199). Wiesbaden: Springer Fachmedien Wiesbaden.

Indarta, Y., Ambiyar, F., Ranuharja, F., & Dewi, I. P. (2023, May). Check for updates Measuring Validity of Interactive Presentation Media Using Content Validity Index (CVI). In *Proceedings of the 9th International Conference on Technical and Vocational Education and Training (ICTVET 2022)* (Vol. 747, p. 240). Springer Nature.

Izah, S. C., Sylva, L., & Hait, M. (2023). Cronbach's Alpha: A Cornerstone in Ensuring Reliability and Validity in Environmental Health Assessment. *ES Energy & Environment*, *23*, 1057.

Joshi, C., Seay, J., & Banadda, N. (2019). A perspective on a locally managed decentralized circular economy for waste plastic in developing countries. *Environmental Progress & Sustainable Energy*, *38*(1), 3-11.

Kakembo, F., & Kakembo, G. B. (2021). *Developing the Circular Economy in Uganda: Prospects for Academia-Public-Private-Partnerships*. Bonn-Rhein-Sieg University of Applied Sciences.

Kalubanga, M., & Mbekeka, W. (2024). Compliance with government and firm's own policy, reverse logistics practices and firm environmental performance. *International Journal of Productivity and Performance Management*, *73*(5), 1427-1478.

Kharola, S., Ram, M., Goyal, N., Mangla, S. K., Nautiyal, O. P., Rawat, A., ... & Pant, D. (2022). Barriers to organic waste management in a circular economy. *Journal of Cleaner Production*, *362*, 132282.

Kharola, S., Ram, M., Goyal, N., Mangla, S. K., Nautiyal, O. P., Rawat, A., ... & Pant, D. (2022). Barriers to organic waste management in a circular economy. *Journal of Cleaner Production*, *362*, 132282.

Khoa, B. T., Hung, B. P., & Hejsalem-Brahmi, M. (2023). Qualitative research in social sciences: data collection, data analysis and report writing. *International Journal of Public Sector Performance Management*, *12*(1-2), 187-209.

Ko, S., Kim, W., Shin, S. C., & Shin, J. (2020). The economic value of sustainable recycling and waste management policies: The case of a waste management crisis in South Korea. *Waste Management*, *104*, 220-227.

Kopnina, H. (2018). Circular economy and Cradle to Cradle in educational practice. *Journal of integrative environmental sciences*, *15*(1), 119-134.

Kountouris, Y. (2022). The influence of local waste management culture on individual recycling behavior. *Environmental Research Letters*, *17*(7), 074017.

Kulaylat, A. N., Tran, L., Kulaylat, A. S., & Hollenbeak, C. S. (2023). Regression analysis. In *Translational Surgery* (pp. 157-163). Academic Press.

Kuno, N., & Arani, W. (2024). Reverse Logistics and Performance of Plastic Bottling Firms in Mombasa County, Kenya. *International Journal of Supply Chain Management*, *9*(4), 23-31.

Lavee, D., Regev, U., & Zemel, A. (2009). The effect of recycling price uncertainty on municipal waste management choices. *Journal of Environmental Management*, *90*(11), 3599-3606.

Lee, P., Sims, E., Bertham, O., Symington, H., Bell, N., Pfaltzgraff, L., ... & O'Brien, M. (2017). *Towards a circular economy: waste management in the EU; study*. Europ. Union.

Liviu, M., Razvan, P., & Alina, M. (2021). The relationship between the circular economy and sustainable waste management in European Union. *Journal of Business Administration Research*, *4*(1).

Lopez, M. (2023). The effect of sampling mode on response rate and bias in elite surveys. *Quality & Quantity*, *57*(2), 1303-1319.

Maxwell, J. A. (2019). Qualitative research design: An interactive approach (4th ed.). SAGE Publications.

Menikpura, S. N. M., Gheewala, S. H., Bonnet, S., & Chiemchaisri, C. (2013). Evaluation of the effect of recycling on sustainability of municipal solid waste management in Thailand. *Waste and Biomass Valorization*, *4*, 237-257.

Mohajan, H. K. (2021). Cradle to cradle is a sustainable economic policy for the better future. *Annals of Spiru Haret University. Economic Series*, *21*(4), 569-582.

Mostafa, N. (2020). Logistics of waste management with perspectives from Egypt. *Waste Management in MENA Regions*, 171-191.

Neuman, W. L. (2014). Social research methods: Qualitative and quantitative approaches. Pearson.

Nguyen, K. A., Resweber, C., & Karhadkar, S. S. (2023). Study population: Who and why them?. In *Translational Surgery* (pp. 121-125). Academic Press.

Obilor, E. I. (2023). Convenience and purposive sampling techniques: Are they the same. *International Journal of Innovative Social & Science Education Research*, *11*(1), 1-7.

Obilor, E. I. (2023). Convenience and purposive sampling techniques: Are they the same. *International Journal of Innovative Social & Science Education Research*, *11*(1), 1-7.

Ogwang, P., & Mwesigwa, D. (2023). A Review on the Commercialization of Scrap within the Perspective of the Circular Economy in Uganda.

Polit, D. F., & Beck, C. T. (2020). *Nursing research: Generating and assessing evidence for nursing practice* (11th ed.). Wolters Kluwer.

Riazi, M., Ghanbar, H., & Rezvani, R. (2023). Quantitative and Qualitative data coding and analysis: A systematic review of the papers published in the Journal of Second Language Writing. *Iranian Journal of Language Teaching Research*, *11*(1), 25-47.

Rodríguez, S. A. E., Gallegos, G. M. C., Ortiz-Paniagua, C. F., & Tapia, G. G. (2023). Reverse Logistics: A view from the circular economy and the business environment. *CIENCIA Y UNIVERSIDAD*, (46).

Romero-Hernández, O., & Romero, S. (2018). Maximizing the value of waste: From waste management to the circular economy. *Thunderbird International Business Review*, *60*(5), 757-764.

Rugasira, J., Agaba, M., Byarugaba, J. M., Makumbi, R., Kyatuheire, J., & Asiimwe, J. (2022). Reverse logistics and environmental sustainability in selected manufacturing entities in Kampala district, Uganda. *Kabale University Interdisciplinary Research Journal*, *1*(3), 5-21.

Setia, M. S. (2016). Methodology series module 3: Cross-sectional studies. *Indian Journal of Dermatology*, *61*(3), 261-264.

Sithanant, T., Chaiyasoonthorn, W., & Chaveesuk, S. (2023, October). Interview Guide Development for Qualitative Research on Exploring Acceptance of Autonomous Vehicles in Thailand. In *2023 15th International Conference on Information Technology and Electrical Engineering (ICITEE)* (pp. 340-346). IEEE.

Srivastava, D. A. K. (2024). Questionnaire & Interview In Research: Tool & Technique. *Legal Research Methodology, Dr. Ashish Kumar Srivastava (Ed.), Satyam Law International, New Delhi*.

Sukmawati, S. (2023). Development of quality instruments and data collection techniques. *Jurnal Pendidikan Dan Pengajaran Guru Sekolah Dasar (JPPGuseda)*, *6*(1), 119-124.

Sukmawati, S., Salmia, S., & Sudarmin, S. (2023). Population, sample and selection of participant's/key informants (qualitative). *Edumaspul: Jurnal Pendidikan*, *7*(1), 131-140.

Teshome, F. B. (2021). Municipal solid waste management in Ethiopia; the gaps and ways for improvement. *Journal of Material Cycles and Waste Management*, *23*, 18-31.

Tomić, T., & Schneider, D. R. (2020). Circular economy in waste management–Socio-economic effect of changes in waste management system structure. *Journal of environmental management*, *267*, 110564.

Turner, D. P. (2020). Sampling Methods in Research Design. *Headache: The Journal of Head & Face Pain*, *60*(1).

Valenzuela, J., Alfaro, M., Fuertes, G., Vargas, M., & Sáez-Navarrete, C. (2021). Reverse logistics models for the collection of plastic waste: A literature review. *Waste Management & Research*, *39*(9), 1116-1134.

Walz, G., Zeilfelder, F., & Rießinger, T. (2023). Descriptive statistics. In *Foundations of Mathematics: A Preparatory Course* (pp. 347-365). Berlin, Heidelberg: Springer Berlin Heidelberg.

Wang, X., & Cheng, Z. (2020). Cross-sectional studies: strengths, weaknesses, and recommendations. *Chest*, *158*(1), S65-S71.

Waqas, M., Honggang, X., Khan, S. A. R., Ahmad, N., Ullah, Z., & Iqbal, M. (2021). Impact of reverse logistics barriers on sustainable firm performance via reverse logistics practices. *LogForum*, *17*(2), 213-230.

Wiel, A. V. D., Bossink, B., & Masurel, E. (2012). Reverse logistics for waste reduction in cradle-to-cradle-oriented firms: waste management strategies in the Dutch metal industry. *International Journal of Technology Management*, *60*(1-2), 96-113.

William, F. K. A. (2024). Mastering Validity and Reliability in Academic Research: Meaning and Significance. *International Journal of Research Publications*, *144*(1), 287-292.

Yang, Y., Boom, R., Irion, B., Van Heerden, D. J., Kuiper, P., & De Wit, H. (2012). Recycling of composite materials. *Chemical Engineering and Processing: Process Intensification*, *51*, 53-68.

Appendices

Appendix I: Questionnaire for Firms/ Companies

Dear Respondent,

I am called by names **KYATUHAIRE Believein** a student of Uganda Christian University-Mukono, pursuing a Bachelor's Degree in Procurement and Logistics Management conducting a research study on the topic **"*The Impact of Circular Economy Practices on Waste Management in Uganda*".** Findings from this study will therefore be submitted to Uganda Christian University-Mukono as partial fulfilment for the award of Bachelor's Degree in Procurement and Logistics Management. The information required in this study is purely for academic purposes only and will be treated with utmost confidentiality. As a person of exclusive competence and experience in this field, you have been identified to contribute ideas to the study by way of responding to the questions contained in this instrument. Your consent to provide responses to these questions will be of great gratitude and support to the study.

Section A: Bio Data of Respondents

Please kindly tick in the appropriate box provided.

1. Your position in the organization _____

2. What is your Gender?
   Male ☐ Female ☐

3. What is your age bracket?
   18-25 years ☐ 26-33 years ☐ 34-41 years ☐ 42 years and above ☐

4. What is your highest Education Level?
   No Education ☐ Certificate ☐ Diploma ☐ Degree ☐ Masters ☐

5. What is your marital status?
   Single ☐ Married ☐ Separated ☐ Widowed ☐

Section B: Firms/ Company Characteristics

6. Which sub sector does your firm or company operate in?
   Food ☐ Plastics ☐ Beverages ☐ Others Specify: _____

7. Number of years in existence of the firm (Age of the Firm)?
   Less than 1 year ☐ 2-4 years ☐ 5 years and above ☐

8. Number of employees in the firm?
   Less than 40 ☐ Between 50-100 ☐ 100 and above ☐

Section C: Effect of reverse logistics practices on waste management

1. In your own opinion, what do you understand by reverse logistics and waste management? _____
   _____
   _____
2. In your own view, does your company accept returns of goods?
   _____
   _____
   _____
3. In your own opinion, how does your company or business manage returns of products and control waste?
   _____
   _____
   _____
4. Does your company have in place periodic waste collection and transportation?
   Yes ☐ No ☐
5. If yes or no kindly support your answer in question 3 above? _____
   _____
   _____
6. In this question, using the following table and the scale provided below, please tick on the statements which best describes your opinion on the effect of reverse logistics practices on waste management. **Scale:** Strongly Disagree (SD) =1. Disagree (D) =2 Neutral (N) =3, Agree (A) =4 and Strongly Agree (SA) = 5.

Code	Parameters on reverse logistics and waste mgt	SD	D	N	A	SA
C_1	Our firm accepts returns of products sold to our customers.					
C_2	Our company tracks the volume of products returned and subsequently resold to customers.					
C_3	Our company is keen on the supply chain of products in reverse logistics.					
C_4	Our company has products transportation plan to ensure that goods are recycled and resold to customers.					
C_5	Our firm has in place designated return centers for our products.					
C_6	Our firm also has in place waste management policy on products returned to the company.					
C_7	The quality of products returned to the company is assessed to ensure that they are fit for reuse.					
C_8	The firms' decision on reverse logistics practices is influenced by government policies.					

Section D: The effect of recycling on waste management

1. In your own opinion, what do you understand by recycling of products and waste management? _____
   _____
2. how are products in your company renewed or recycled?
   _____
   _____
   _____
3. In your own opinion, how does your company or business manage excess waste?
   _____
   _____
   _____
4. Does your company have in place periodic waste collection and treatment plan?
   Yes ☐ No ☐
5. If yes or no kindly support your answer in question 3 above? _____
   _____
   _____
6. In this question, using the following table and the scale provided below, please tick on the statements which best describes your opinion on the effect of recycling on waste management. **Scale:** Strongly Disagree (SD) =1. Disagree (D) =2 Neutral (N) =3, Agree (A) =4 and Strongly Agree (SA) = 5.

Code	Parameters on recycling and waste management	SD	D	N	A	SA
D_1	Some of our firm's waste products are collected by the retailers.					
D_2	Our firm has a vehicle that moves to collect wastes in different locations.					
D_3	Waste collection through retailers has tremendously contributed to waste reduction.					
D_4	Our firm puts in place collection facilities near its customers for collection and disposal of waste products.					
D_5	Recycled materials can be converted into new products that can be consumed as plastic and glass.					
D_6	Product collection practices minimize environmental risks and hazards.					
D_7	Collection of waste products by manufactures has contributed to reduction in waste accumulation.					
D_8	Recycling practices save the environment from potential deterioration.					
D_9	Our firm embraces recycling practices in order to reduce the amount of waste sent to landfills.					

Section E: Relationship between circular economy practices and waste management

1. In your own opinion, what do you understand by the term circular economy practices?
   _____
   _____
   _____

2. What are the common circular economy practices that you aware of that your firm practices? _____
   _____
   _____

3. In your own view, how does circular economy practices practiced by your firm helps reduce waste? _____
   _____
   _____

4. In your own opinion, how does your firm or company practice waste management? _____
   _____
   _____
   _____

5. In this proceeding question, using the following table and the scale provided below, please tick on the statements which best describes your opinion on the relationship between circular economy practices and waste management. **Scale:** Strongly Disagree (SD) =1. Disagree (D) =2 Neutral (N) =3, Agree (A) =4 and Strongly Agree (SA) = 5.

Code	Parameters	SD	D	N	A	SA
E_1	Circular economy practices lead to reduced waste.					
E_2	Remanufacturing practices minimizes environmental risks and hazards.					
E_3	Our firm packages products in reused packaging materials.					
E_3	Reusing of products is more effective than recycling as regards to environmental performance.					
E_4	Our firm deposits minimal waste on land which reduces waste pollution.					
E_5	Packaging materials used by the firm have minimal environmental threats.					
E_6	As a result of embracing circular economy practices, environment performance has significantly improved as result of reduced waste pollution.					
E_7	Our firms' innovations have greatly led to emergence of new products through circular economy practices.					

Thank you so much for your valuable time!!

Appendix II: Research Work Plan

Activity	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
	(2023)		(2024)								
Idea/ Topic Identification											
Consultation & Proposal writing											
Adjustment of Proposal and Supervision											
Data Collection											
Data Entry and Processing											
Draft Report											
Submission of Report											

Appendix III: Budget Estimate for the Study

S/No	Item	Quantity	Unit Cost	Amount
1	Printing paper	2 Reams	18,000/=	36,000/=
2	Pens	1 Packet	18,000/=	18,000/=
5.	Binding materials	Lumpsum	40,000/=	40,000/=
6.	Typing cost	Lumpsum	100,000/=	100,000/=
8.	Feeding and Transport	Lumpsum	100,000/=	100,000/=
	Grand Total			**294,000/=**

Appendix IV: Krejcie and Morgan Table for Sample Selection

N	S	N	S	N	S	N	S	N	S
10	10	100	80	280	162	800	260	2800	338
15	14	110	86	290	165	850	256	3000	341
20	19	120	92	300	169	900	269	3500	346
25	24	130	97	320	175	950	274	4000	351
30	28	140	103	340	181	1000	278	4500	354
35	32	150	108	360	186	1100	285	5000	357
40	36	160	113	380	191	1200	291	6000	361
45	40	170	118	400	196	1300	297	7000	364
50	44	180	123	420	201	1400	302	8000	367
55	48	190	127	440	205	1500	306	9000	368
60	52	200	132	460	210	1600	310	10000	370
65	56	210	136	480	214	1700	313	15000	375
70	59	220	140	500	217	1800	317	20000	377
75	63	230	144	550	226	1900	320	30000	379
80	66	240	148	600	234	2000	322	40000	380
85	70	250	152	650	242	2200	327	50000	381
90	73	260	155	700	248	2400	331	75000	382
95	76	270	159	750	254	2600	335	100000	384

Study Sample Size

Note: *From R.V. Krejcie & Morgan (1970), Determining Sample Size of Research Activities, Educational and psychological measurement, 30,608, Sage Publications.*

SCHOOL OF BUSINESS

19th Aug, 2024

TO WHOM IT MAY CONCERN

Name**: KYATUHAIRE BELIEVEIN** Reg. No S21B12/012

A bachelor's student who is seeking permission from your office to collect data for her dissertation titled

The Impact of Circular Economy Practices on Waste Management in Uganda.

We shall be grateful if you could render assistance to her in collecting the necessary data for her dissertation

The Uganda Christian University School of Business thanks you in advance

……..

Mukisa Simon Peter
Research coordinator