THE IMPACT OF GARBAGE RECYCLING ON ENVIRONMENTAL CONSERVATION IN UGANDA; A CASE STUDY OF KAMPALA DISTRICT, RUBAGA DIVISION, NALUKOLONGO ZONE

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DECLARATION

We declare that this research report is our original work and has not been submitted to any academic institution for any award or otherwise.

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APPROVAL

This is to certify that this research report was under my supervision and it is now ready for submission.

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DEDICATION

We extend our sincere dedication to our parents for their financial and moral support as well as their constant prayers they have passed to us throughout my life.

We would still like to extend our sincere appreciation to our supervisor MADAM NAMBAZIIRA JULIET for her support and guidance she provided us with during the compilation of this report, we have indeed bothered her a lot but she tirelessly helped us out.

ACKNOWLEDGMENT

We would like to express our deepest gratitude to the Almighty God for the gift of life, knowledge, wisdom and understanding.

Special regards to our beloved family for the financial and moral support they have rendered to us throughout the entire life and we are as well profoundly indebted to our academic supervisor MADAM NAMBAZIIRA JULIET for the wonderful supervision and intellectual guidance provided to us from the inception to the end of this research report. Thank you a lot madam.

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ABSTRACT

The study was conducted on the topic entitled "The Impact of Garbage Recycling on Environmental Conservation in Uganda; a Case Study of Kampala district, Rubaga Division, Nalukolongo Zone"

The study objectives were to find out the benefits of garbage recycling towards environment conservation in Nalukolongo zone, to establish how garbage recycling enhances environment conservation and proper management of environment, and to suggest the appropriate measures for environment conservation in Nalukolongo zone in Rubaga division.

From the study findings presented chapter four of this study, it was revealed that majority of the respondents were in agreement that recycling is preserving our environment for the future, Recycling is the answer to all those plastics littered over the streets, it was also evidenced that by using recycled materials for manufacturing applications, the quantity of energy utilized is very less. Furthermore garbage recycling can help protect our environment and Garbage recycling helps reduce landfill.

This study indicates that solid waste in Nalukolongo Zone negatively impact on the environment if proper management systems are not put in place. Recycling presents an opportunity for extracting economic and environmental benefits from waste. The benefits derived from small-scale waste recycling by groups in Nalukolongo Zone range from reducing the amount of solid waste collected for disposal, improving community health and sanitation, restricting environmental pollution, promoting environ- mental awareness and creating employment and additional income-generating activities.

We recommend the enactment and implementation of a policy on source separation of solid wastes and solid waste management legislation to support waste recycling and its application, political support is urgently needed if small-scale recycling programmes are to succeed. The Ministry of Environment and Natural Resources in collaboration with that of Agriculture should assume a leading role in exploring further options for use of water hyacinth as organic compost manure for farming.

CHAPTER ONE

1.0 Introduction

This chapter presents the background of the study, problem statement, objectives of the study and scope of the study as follows;

1.1 Background of the study

Poor Waste Management is drawing increasing attention, as citizens observe that too much garbage is lying uncollected in the streets, dustbins, causing inconvenience and environmental pollution, and being a risk for public health. Although government authorities apply all the means at their disposal, the piles of wastes only seem to grow from day to day. The word "waste" refers to something that is "no longer serving a purpose", something "without value" (Yusuf 2019)

In Nalukolongo zone alone, Domestic Waste generation rates range between 0.8kg and I kg per capita per day. The population of Nalukolongo zone is estimated at 0.7 million. The average estimate of waste per capita generation per day is 0.8kg. This makes the total collection to be 3 million x 0.8kg = 5600,000kg per day. Domestic Waste generation is higher among high income earners populations. On average the collection is 45-50% of this and so on a daily basis collection amounts to 375 tones or 37,500kg of waste collected a day Nalukolongo zone (KCCA Annual Report, 2018).

Each household in Nalukolongo zone on average generates approximately I tone of Domestic Waste per year. And it's the responsibility of KCCA to collect these wastes and dispose off them at Kitezi. But In an era of shrinking Kampala City Council Authority (K.C.CA.) budgets, corruption embezzlement and a restriction of the scope of the KCCA Jurisdiction, the problem is likely to intensify unless alternate approaches can be developed. The private formal sector is seen as a key participant in the waste management activities, including collection, transportation, recycling, composting, and disposal of waste (KCCA Annual Report, 2018).

In the State of the Environment Uganda 2008 report, NEMA attributes the acceleration of deforestation to expanding farmland, a population boom and increasing urbanisation. It says

unless the situation is reversed, the knock-on effect will be catastrophic, contributing to and exacerbating soil degradation, declining food security, disease and conflict. Uganda has already lost two-thirds of its forests in the last 20 years and could have lost all of its forested land by 2050, which would have severe repercussions for its poorest people according to environmentalists.

Deforestation has already seen Uganda's 5 million hectares (12.3 million acres) of forest in 1990 dwindle to 3.5 million by 2005. Annet Nakyeyune, an environmentalist at Makerere University, adds that the poorest people living in rural areas, such as Nalukolongo zone , would be hardest hit. Desertification due to deforestation is likely to "tamper with the country's food security because rainfall will be erratic, floods rampant," she said. Nakyeyune also warned that water sources will disappear, water catchment areas will dwindle, agricultural productivity will be badly hit and livelihoods destroyed as a result. Disease will also inevitably increase.

The situation is being blamed partly on Uganda's booming population, which is growing at a rate of 3.2% per annum. Areas around the capital city - Kampala, have lost more than 78% of forest land since 1990. NEMA also says that as only 10% of Uganda's population has access to electricity and 89% of rural Ugandans use firewood to cook it will be an uphill struggle to reverse this alarming trend.

1.2 Problem Statement

Despite several efforts, legal and institutional frame works that are in place to enhance proper waste management, there is still persistent poor waste management in Nalukolongo zone. Legal frame works like the constitution Article 245 (a) provides measures intended-To protect and preserve the environment from abuse, pollution and degradation," The National Environment (Waste Management) Regulations, S.I. No 52/1999 the Local Government Act 1997. All have provisions of how all wastes shall be properly managed but People seem not be hearing about the way wastes are handled. This is attributed to ignorance about the likely dangers of poor waste, lack of proper institutional arrangements, poor technologies like modern trucks and the lack of the capacity by the council to handle the wastes generated.

For instance, studies (Daily Monitor 21st June 2021) indicate that each person in Nalukolongo zone produces 2 Kg of solid waste per day. This waste is hardly collected and even what is collected is not sorted. Furthermore, there are limited appropriate technologies and practices for waste management and also the limited capacity among stakeholders in addressing waste management issues.

This state of affairs has far reaching implications on community livelihoods and environment posing great health risks for instance: solid waste at informal disposal sites produces toxic gases, bad odor and creates air pollution. This has led to diseases like cholera, diarrhea, hence increasing public expenditure on drugs. Properly managed waste is wealth because it has got enormous opportunities and this would make house hold energy conserved.

Therefore the study sought to address the impact of garbage recycling on environmental conservation in Uganda a case study of Nalukolongo Zone.

1.3 Objectives of the study

General Objective

To assess the impact of garbage recycling on environmental conservation in Uganda, Kampala district, Rubaga division, Nalukolongo Zone.

1.3.2 Specific objectives

i. To find out the benefits of garbage recycling towards environment conservation in Nalukolongo zone.
ii. To establish how garbage recycling enhances environment conservation and proper management of environment.
iii. To suggest the appropriate measures for environment conservation in Nalukolongo zone in Rubaga division.

1.4 Research Questions

i. What are the benefits of garbage recycling towards environment conservation in Nalukolongo zone?

ii. How is garbage recycling enhancing environment conservation and proper management of environment?
iii. What are the appropriate measures for environment conservation in Nalukolongo zone in Rubaga division?

1.5 Scope of the study

1.5.1 Content Scope

The study investigated the benefits of garbage recycling towards environment conservation in Nalukolongo zone, garbage recycling enhances environment conservation and proper management of the environment and appropriate measures for environment conservation in Nalukolongo zone in Rubaga division.

1.5.2 Time Scope

Conducting this project was encouraged from a period of 2018 – 2021 and this was a period when KCCA was employing waste management strategies in Kampala which seem to be ineffective (Jennipher Musisi, 2020).

The project covered a period of three months (August – November, 2022) and the researchers managed to conduct all research activities within the same period to come up with vivid findings to which appropriate conclusions and recommendations will be made.

1.5.3 Geographical Scope

The study was conducted in Nalukolongo zone which is located along Masaka-Kampala road in Rubaga division in Kampala district Uganda.

1.6 Significance of the study

i. This project is basically developed to phase out charcoal burning and use of charcoal by Ugandans basically those of Nalukolongo zone.

ii. This project will be of beneficial to the community in helping them access garbage recycling at low prices hence this will reduce charcoal burning and phase out deforestation.

iii. The project will help Nalukolongo zone residents to get employments from garbage recycling, from which the society will be trained on how to collect wastes and be recycled.

iv. The project will control both soil and air pollution through the restricted dumping of wastes materials in the environment.

v. The community members will be enlightened on how garbage recycling is significant towards a clean and health environment from well managed pollutants and wastes.

vi. The concerned policy makers will have proper actions undertaken while implementing project activities and shall generate effective policies towards environment conservation and protection.

vii. The researchers will be able to gain skills and knowledge regarding project implementation activities and planning via different activities being conducted as a team in the field.

viii. The project will also help in promoting hygiene and proper sanitation among the community members of Nalukolongo zone, rubaga division and other places in the country since they will be able to identify the benefits of proper waste management

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter presents a review of related literature that was conducted by other researchers and authors in line of the objectives of this study and it is as follows;

2.1 Benefits of garbage recycling towards environment conservation

Environment Protection Agency (2001) points out the benefits of recycling to include conservation of resources for children's future prevents emissions of many greenhouse gases and water pollutants, saves energy supplies valuable raw materials to industry thus creates jobs, stimulates the development of greener technologies and reduces the need for new landfills.

Nabuzaale (2009) argues that recycling is the answer to all those plastics littered over the streets. This approach has worked in many developed countries which do not restrict the use of plastics on average, a person in the developed country generates more than a hundred fold the plastic waste an average Ugandan does.

The Global Foundation of Recycling, in 2017, reported that people should make the utmost use of natural resources in merely 8 months. They made new products by raw material extraction by cutting trees and mining. Therefore, they understood that the recycling process helps conserve the most essential raw materials to be used in the future (Environment, 2020)

Less is always more organization revealed that there is a positive recycling impact to conserve natural resources, the format is as follows: (Environment, 2020). 1. The recycled 1 ton of plastic can save 16.8 oil barrels; 2. By recycling 1 ton office papers can save 18 trees, can reduce oil 474 gallons, and save water of 7,400 gallons; 3. 1 ton steel can be recycled to save 1.78 oil barrels and avoid the landfill space of 4 cubic yards.

It helps provide Importance to People such as the landfill space gets filled quickly, and within some years, there will be no additional space to dump the waste materials. Recycling is the best method to control and manage the waste generated. Producing the fresh and new products

require the use of natural resources in sizeable quantities. Hence, recycling can curtail the raw material need and helps reduce the consumption of energy. Also, recycling helps preserve natural resources that will help our future generations.

It Saves Energy:

By using recycled materials for manufacturing applications, the quantity of energy utilized is very less. In case the below mentioned recycled materials are used, a significant quantity of energy can be saved: In the case of Paper recycled: 62% reduced, energy can be consumed; In the case of Aluminum recycled: 94% reduced, energy can be consumed; In the case of Cardboard recycled: 27% reduced, energy can be consumed; In the case of Plastic and glass recycled: 37% reduced, energy can be consumed (Environment, 2020)

Recycling can help protect our Environment:

To produce new products, there is a need to extract raw materials. Thereafter, they should be refined, cultured, and processed. The process creates water and air pollution to generate greenhouse gases, which are emitted during all these manufacturing processes, to cause global warming and environmental problems. In such cases, recycling can decrease the raw material needs, thus decreasing pollution. Moreover, it saves energy, while reducing the release of greenhouse gases, to help tackle climate change Elly (2013).

Helps Reduce Landfill:

The EPA- Environmental Protection Agency projects that recycling 37% of created waste, will decrease the landfill space by 65%. This is because, by using the recycling method, a reduced quantity of waste reaches the landfill (Agunwamba, 2018).

Recycling is Preserving Our Environment for the Future; the recycling efforts of the residents and businesses in the St. Louis-Jefferson Solid Waste Management District are improving our environment every day. Through these efforts, the diversion of municipal solid waste from landfills has increased in the District from 10 percent in 1990 to 45 percent in 2003, and the results are clear: cleaner air and water, less pollution, more forested land and open space and reduced greenhouse gases environment, (2020).

Everyone knows recycling means less trash going to our landfills. But the greatest environmental benefits of recycling are related not to landfills, but to the conservation of energy and natural resources. By decreasing the need to extract and process virgin materials from the earth, recycling can also eliminate the pollution associated with the first two stages of a product's development: material extraction and processing. Recycling reduces, and in many cases eliminates, these pollutants Jackson & Elly (2013). Instead, divert that material for recycling and capture the energy and resources already used to make that product. Since recycled materials have been refined and processed once, manufacturing the second time around is much cleaner and less energy-intensive.

2.2 Contributions of garbage recycling in enhancing environment conservation and proper management of environment

Reduces air and water pollution

In 2003, recycling reduced overall air emissions by 16,550 tons and reduced waterborne wastes by 2,710 tons Environment Protection Agency (2020). Air emissions exclude carbon dioxide and methane which are greenhouse gases. By decreasing the need to process virgin materials from the earth, recycling can eliminate the pollution associated with the first two stages of a product's development: material extraction and processing. Mineral mining and processing pollute the air, land and water with toxic materials, such as ammonia, carbon dioxide, carbon monoxide, methane and sulfur dioxide. Recycling reduces, and in many cases eliminates, these pollutants. In addition, recycling keeps materials out of landfills where they can introduce leachate into groundwater and surface waters.

Recycling saves natural resources

By using recycled materials instead of trees, metal ores, minerals, oil and other raw materials taken from the earth, recycling-based manufacturing helps to conserve limited natural resources. Therefore, sound conservation practices help to reduce the need to expand logging and mining operations. By recycling over 116,000 tons of paper in the district last year, over 1.8 million trees did not need to get cut down. By recycling 85,000 tons of steel in 2003, district residents saved 106,000 tons of iron ore, 59,000 tons of coal and 5,000 tons of limestone.

Recycling saves energy

Products made using recovered (rather than virgin) materials use significantly less energy. Energy is saved by reducing the need to extract and process raw materials in order to manufacture new products. Less energy used means less burning of fossil fuels such as coal, oil and natural gas. Most of the energy used in industrial processes and related transportation involves burning fossil fuels. When burned, these fuels release pollutants, such as sulfur dioxide, nitrogen oxide and carbon monoxide, into the air. The 953,900 tons of paper, glass, metals, plastics and other materials recycled in 2003 saved enough energy to power 124,000 homes for one year.

Recycling reduces greenhouse gas emissions

By reducing air and water pollution and saving energy, recycling offers an additional environmental benefit: it reduces heat trapping greenhouse gases, such as carbon dioxide, methane, nitrous oxide and chlorofluorocarbons, that may contribute to global climate change. Recycling and composting reduce greenhouse gas emissions by 1) decreasing the energy needed to make products from raw material, 2) reducing emissions from incinerators and landfills, which are major sources of methane gas emissions in the U.S. and 3) slowing the harvest of trees, thereby maintaining the carbon dioxide storage benefit provided by forests. In 2003, recycling in the district reduced greenhouse gas emissions by over 536,000 metric tons of carbon equivalent, which is comparable to the carbon emissions from 405,000 cars.

2.3 Appropriate measures for environment conservation

Strengthening Environmental policy; this refers to the commitment of an organization to the laws, regulations, and other policy mechanisms concerning environmental issues and sustainability. These issues generally include air and water pollution, solid waste management, biodiversity, ecosystem management, maintenance of biodiversity, the protection of natural resources, wildlife and endangered species. Policies concerning energy or regulation of toxic substances including pesticides and many types of industrial waste are part of the topic of environmental policy. This policy can be deliberately taken to direct and oversee human activities and thereby prevent harmful effects on the biophysical environment

and natural resources, as well as to make sure that changes in the environment do not have harmful effects on humans (MC Cormick, John, 2001).

Ensuring Ecosystem Management; Ecosystem management is a conservation practice that lets conservationists within a particular field compare and argue their conservation plans. The general idea is that in a forum where many ideas are discussed and numerous perspectives are shared, the best ideas will rise to the surface. Not all ecosystem management groups are able to come to consensus, and often, the ideas of one group are in direct opposition to the suggestions or needs of another group. However, the United States Forest Service has adopted ecosystem management practices as its official policy for managing national forests with many positive environmental outcomes across the United States Mark (2002).

Agro ecosystems Analysis; as sustainability and environmental costs have become more important to consumers and farmers, conservationists are looking at ways in which individual farmers can view their activities within a larger framework. Agro ecology is a complex system that requires sustainable solutions that mesh with the conservation efforts of sustainable environmental, socio-economic, and urban development systems. Agro ecosystems analysis attempts to classify agricultural activities by region and resource needs. An example of agro ecosystem analysis is determining how a large farm and a nearby urban center can work together to conserve water and minimize their collective environmental impact Aledare (2010).

Soft Systems Analysis; Soft Systems Analysis is a method of conservation management that uses words, diagrams and images to explain complex conservation ideas and techniques across disciplines. Since effective conservation depends on many groups working together across government or agency jurisdictions, soft systems analysis gives conservation groups a common language in which to discuss management activities and goals. Multiple perspectives are valued in soft systems analysis since the more comprehensive and inclusive communication is, the more effective the outcomes Rushefsky (2002).

Become one of the pioneers of waste processing/ waste to energy technology in Africa. KCCA is keen to evaluate waste processing technologies in order to find a lasting sustainable solution for its waste management needs. A suitable waste processing technology will also reduce the quantum of waste required to be disposed thereby limiting the need for landfills. Prospective

bidders will be encouraged to suggest the most suitable treatment technologies and processes. While there are a few examples of such projects in Africa, few projects have been commercialized at the scale envisaged in Kampala.

Opportunity to design Kampala's waste management value chain; Kampala is one of the fastest growing cities in the world and will have significant waste disposal and management needs in the future. An early engagement with Kampala and KCCA will ensure that the partnering firm will be able to lend its expertise towards Kampala's waste management strategy. To this end, both sites will be made available to concessionaire. The concessionaire will be expected to design the most efficient and effective waste treatment and disposal value chain including an upgrade or closure of the existing landfill and development of waste treatment facility and, if necessary, a new landfill. Any other facilities envisaged in the Project design including Transfer Station will be developed by the concessionaire.

CHAPTER THREE

METHODOLOGY

3.0 Introduction

This chapter presents the research design, study population, sample size, sampling design and procedures, sampling techniques, data sources, data collection methods and instruments, data analysis and procedures, data quality control and limitation of the study.

3.1 Research Design

According to Kothari (2003), research design refers to a blue print for collection, measurement and analysis of data, with maximum control over the factors that may interfere with the validity of findings. The researchers employed a descriptive survey design to examine the effectiveness of garbage recycling on environment conservation in Nalukolongo Zone, Rubaga Division Kampala District.

The researcher used this de sign because it was appropriate in gathering data from a sample at a particular time in order to obtain attitudes and interests of various groups of people (Amin, 2005). The researchers obtained richer information basically from respondents comprised of only those concerned groups that is to say community members and local administrators of Nalukolongo Zone, Rubaga Division.

This research project considered a qualitative approach which helped the researchers in establishing clear in-depth information and investigations regarding the study variables through interviews and focus group discussions held by the researchers with the participants in the field. Besides, the qualitative approaches were also be used to gain objectivity in the data collected.

3.2 Study Population

Doneryei (2007) defines population as units for which findings of the survey are meant. The study population comprised of community members and local administrators in Nalukolongo Zone, Rubaga Division and they provide all the required information through interviews and discussions that were held. The study population consisted of respondents comprising of

community members such as house wives, business people, Boda Boda riders, LCI Chairman, councilors, environmentalist, among other respondents.

3.3 Sample Size, Sampling Procedures

According to Punch (2005), sample size refers to a subset of the population and comprises of some members selected from the population as a representative. The study sample size consisted of 25 respondents who participated in the study. According to Amin (2012), sampling refers to the process of selecting elements from the population in such a way that the selected sample elements represent the population for data collection. For this study, simple random sampling technique was used while selecting participants to participate in the study as a way of avoiding bias. This provided equal chances to respondents to participate in the study.

Table 3.1: Sample Size.

Category	**Sample Size**
Councilors	1
House wives	10
LCI Chairman	1
Boda Boda Drivers	5
Business people	7
Environmentalists	1
Total	**25**

3.4 Sampling Techniques

According to Moore et al (2006), Simple random sampling provides an equal and unsystematic chance of selection of both variables. Simple random sampling helped the researchers balance representation of demographics of the population such as age, sex, religion and others. The choice of this technique helped the researchers to get unbiased data. The researchers mainly selected the respondents purposively and randomly based on given descriptive characteristics and basically, the respondents were supposed to be community members or residents of Nalukolongo Zone, Rubaga Division. Simple random sampling were employed and it is

confirmed to be effective since it provides a great opportunity for attaining vivid information required in respect to the matter being researched about and for this case, the researchers used community members as the main targeted population.

For the case of local administrators and environment officers, the researchers employed purposive sampling technique while selecting respondents who participated in the study.

3.5 Data Sources

Primary Data; This involved first-hand information that is attained directly from the respondents with the aid of data collections instruments that is to say conduct of focused group discussions, questionnaires and interview guide. Primary data availed the researchers with factual information regarding the impact of garbage recycling on environment conservation in Nalukolongo Zone, Rubaga Division.

Secondary Data; This data was obtained through review of relevant literature from publications such as the published reports, articles, newspapers, internet and others. Secondary data provided a broadened view on the study variables and assisted a lot in exploring a clearing understanding on the concepts the researchers were focusing on in regard to garbage recycling on environment conservation in Nalukolongo Zone as written by other scholars and authors. This helped the researchers to analyze the research gaps which will be addressed by the findings and recommendations drawn.

3.6 Data Collection Methods and Instruments

3.6.1 Data Collection Methods

The study considered the following methods;

Self-Administered Questionnaires; A questionnaire is a research instrument consisting of a series of questions and other prompts for gathering information from respondents Abuja (2001). This technique helped to collect primary data through setting a number of questions, which give to a cross section of respondents. The questions were open ended and closed ended questions with the questionnaire mainly based on predetermined and standardized questions. Self-

administered questionnaires were used by the researchers because they are cheap to distribute and process. They were more flexible and help to save time.

Documentary Review;

Documentary review is a systematic collection, documentation, analysis and interpretation, and organisation of data as a data collection method in research. The researchers reviewed documents on environment conservation and biomass energy and these include Literature from text books, Research reports, and project reports, Newspapers as well as the Internet. These helped the researchers to compare findings with those of other earlier authors.

3.6.2 Data Collection Instruments

Self-Administered Questionnaires; A questionnaire is a research instrument consisting of a series of questions and other prompts for gathering information from respondents Abuja (2001). This technique helped to collect primary data through setting a number of questions, which give to a cross section of respondents. The questions were open ended and closed ended questions with the questionnaire mainly based on predetermined and standardized questions. Self-administered questionnaires were used by the researchers because they are cheap to distribute and process. They were more flexible and help to save time.

Documentary analysis guide

Documentary review was used to collect secondary data. Documents on environment conservation and garbage recycling were reviewed and these include Literature from text books, Research reports, and project reports, Newspapers as well as the Internet. These helped the researchers to compare findings with those of other earlier authors.

3.7 Data collection procedure

The study group got a letter from the faculty of education, Muteesa I Royal University, which introduced them to the field and enabled in the effective collection of information.

3.8 Data Analysis and Presentation

During the process of data processing, the researcher ensured that the data collected is designed and put in a meaningful form so that it looks simpler and easier for interpreting and reading by the readers. This involved synchronizing the attained field data in form of narrations, discussions and assertions provided by the respondents from the field which is presented in the project report. All these were used in order to promote accuracy of data collected and it also helped the researcher to check on the gaps in the data collection methods and easy classification.

3.9 Ethical Considerations

The following ethical considerations were maintained.

i. Kept a representable and professional attitude in the field. The researchers ensured that they stay professional enough by performing their field activities without going contrary to its mission but rather stick on the intended purpose.
ii. Pledged total confidentiality and delivered on that promise. Maintaining confidentiality is based on the principle of trust and commitment to what the researchers were promising and all works were done with utmost confidentiality.

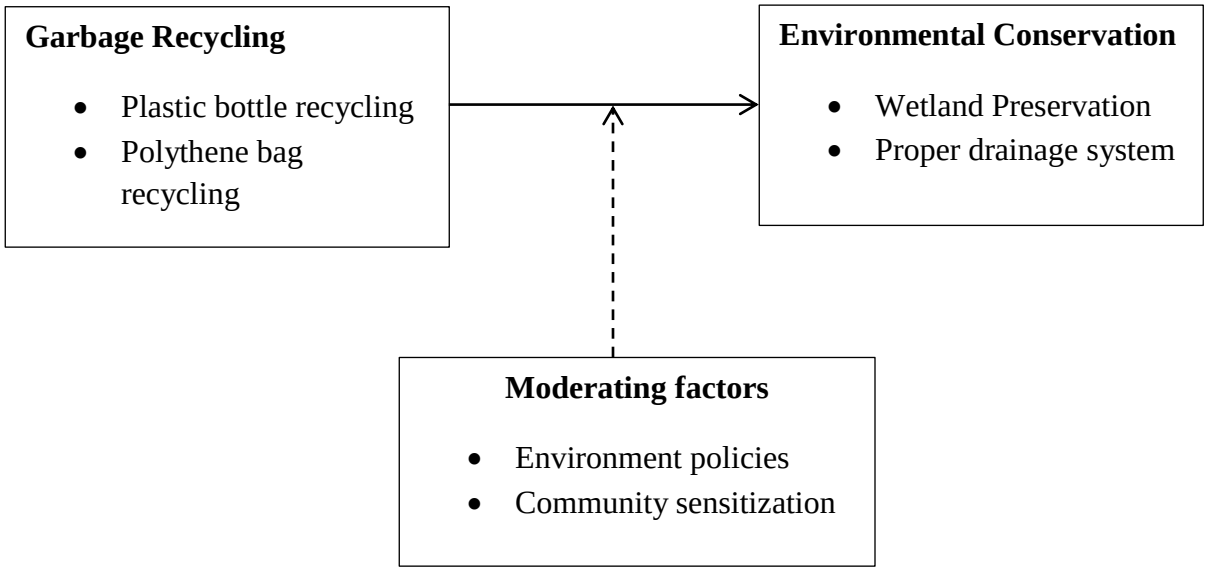
3.10 Limitation of the Study

The researchers encountered difficulties in obtaining statistical data to support the study. This is due to high levels of confidentiality regarding sensitive information. However, researchers convinced those in possession of such required data that the study, to which the data were required, was purely academic and all information provided was to be used and kept with high degree of confidence.

Financial constraints were also a hindrance too. The researchers faced transport costs while carrying out the study, lunch costs. However, the researchers solicited for funds from friends and family members who facilitated their capacity to continue with the project activities amidst financial constraints.

CONCEPTUAL FRAMEWORK

INDEPENDENT VARIABLE **DEPENDENT VARIABLE**



Source; Abby (2011) and modified by researchers

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND DISCUSSION OF FINDINGS

4.0 Introduction

This presents analysis and interprets the data in three sections in line with the objectives of the study. The findings have been collected from self-administered questionnaires and observation from 25 respondents of Nalukolongo Zone, Rubaga division.

4.1 Background information of respondents

The researchers used the help of respondents during the study who gave relevant information to questions that were in the questionnaire. The background information of these respondents was considered and this comprised of their gender, age group and education level. Responses on these were as shown in tables below;

4.1.1 Gender Distribution of the Respondents

The study sought to ascertain the gender of the respondents that participated in the study and results obtained are summarized in table 4.1 below;

Table 4.1 Gender

Gender	**Frequency**	**Percentage (%)**
Male	7	28
Female	18	72
Total	**25**	**100**

Source: Primary Data, 2022

Table 4.1 above shows that out of the total respondents who participated in the study, 18(72%) of them were female respondents and other 7(28%) were male. This could be interpreted that the researchers were gender sensitive as they collected views from both types of gender.

4.1.2 Age bracket

The sought to ascertain the age of the respondents that participated in the study and results obtained are summarized in table 4.2 below:

Table 4.2 age bracket

Age bracket in yrs	Frequency	Percentage (%)
Below 20 years	1	4
20-35 years	15	60
above 35 years	9	36
Total	**25**	**100**

Source: Primary Data, 2022

Table 4.2 above shows that, 15(60%) of the respondents were between 20-35 years, and 9(36%) were above 35 years, only 1(4%) were below 20 years. This implies that all types of age bracket were at least covered which makes findings reliable.

4.1.3 Level of Education

The study also further sought to ascertain the level of education of the respondents and results obtained are summarized in table 4.3.

Table 4.3 Level of Education

	Frequency	Percentage (%)
"A" and "0" Level	10	40
Certificate	6	24
Diploma	5	20
Degree	4	16
Total	**25**	**100**

Source: Primary Data, 2022

Table 4.3 above shows the level of education respondents were holding. Results obtained show that 10(40%) of them had stopped in "A" and "0" Level, 6(24%) of the respondents had

certificates, 5(20%) were holding diplomas, and lastly 4(16%) were holding bachelor's degrees; this implies that all respondents were educated and can read and write which makes findings to be relied on.

4.2 Findings on the benefits of garbage recycling towards environment conservation in Nalukolongo Zone

Table 4.4: showing findings on the benefits of garbage recycling towards environment conservation in Nalukolongo Zone

	Strongly agree	**Agree**	**Not sure**	**Disagree**	**Strongly disagree**	**Total**
Recycling is the answer to all those plastics littered over the streets	2(8%)	18(72%)	2(8%)	3(12%)	-	25(100%)
By using recycled materials for manufacturing applications, the quantity of energy utilized is very less	11(44%)	6(24%)	6(24%)	2(8%)	-	25 (100%)
Recycling can help protect our environment	22(88%)	3(12%)	-	-	-	25(100%)
Garbage recycling helps reduce landfill	15(60%)	10(40%)	-	-	-	25(100%)
Recycling is preserving our environment for the future	19(76%)	6(24%)	-	-	-	25(100%)

Source; Primary Data, (2022)

From the study findings presented in the table 4.4, it was revealed that 18(72%) of the respondents agreed that recycling is the answer to all those plastics littered over the streets, 3(12%) disagreed, 2(8%) strongly agreed, 2(8%) were not sure, this implies that the majority of

the respondents were in agreement that Recycling is the answer to all those plastics littered over the streets

From the study findings presented in the table 4.4, it was revealed that 11(44%) of the respondents strongly agreed that by using recycled materials for manufacturing applications, the quantity of energy utilized is very less, 6(24%) agreed, 6(24%) were not sure, 2(8%) disagreed, this implies that the majority of the respondents were in agreement that by using recycled materials for manufacturing applications, the quantity of energy utilized is very less

From the study findings presented in the table 4.4, it was revealed that 22(88%) of the respondents strongly agreed that recycling can help protect our environment, 3(12%) agreed, this implies that the majority of the respondents were in agreement that recycling can help protect our environment.

From the study findings presented in the table 4.4, it was revealed that 15(60%) of the respondents strongly agreed that Garbage recycling helps reduce landfill, 10(40%) agreed, this implies that the majority of the respondents were in agreement that Garbage recycling helps reduce landfill.

From the study findings presented in the table 4.4, it was revealed that 19(76%) of the respondents strongly agreed that recycling is preserving our environment for the future, 6(24%) agreed, this implies that the majority of the respondents were in agreement that recycling is preserving our environment for the future.

4.3 Findings on how garbage recycling is enhancing environment conservation and proper management of environment

Table 4.5: showing findings on how garbage recycling is enhancing environment conservation and proper management of environment.

	Strongly agree	Agree	Not sure	Disagree	Strongly disagree	Total
Reduces air and water pollution	12(48%)	7(28%)	5(20%)	1(4%)	-	25(100%)
Recycling saves natural resources	17(68%)	7(28%)	1(4%)	-	-	25(100%)
Products made using recovered (rather than virgin) materials use significantly less energy	5(20%)	9(36%)	8(32%)	3(12%)	-	25(100%)
Recycling reduces greenhouse gas emissions	19(76%)	6(24%)	-	-	-	25(100%)
by reducing air and water pollution and saving energy, recycling offers an additional environmental benefit	13(52%)	8(32%)	4(16%)	-	-	25(100%)

Source; Primary Data, 2022

From the study findings presented in the table 4.5, it was revealed that 12(48%) of the respondents strongly agreed that garbage recycling reduces air and water pollution, 7(28%) agreed, 5(20%) were not sure, 1(4%) disagreed, this implies that the majority of the respondents were in agreement that garbage recycling reduces air and water pollution

From the study findings presented in the table 4.5, it was revealed that 17(68%) of the respondents strongly agreed that garbage recycling saves natural resources, 7(28%) agreed, 1(4%) were not sure, this implies that the majority of the respondents were in agreement that garbage recycling saves natural resources

From the study findings presented in the table 4.5, it was revealed that 9(36%) of the respondents agreed that products made using recovered (rather than virgin) materials use significantly less energy, 8(32%) were not sure, 5(20%) of the respondents strongly agreed, 3(12%) disagreed, this implies that the majority of the respondents were in agreement that products made using recovered (rather than virgin) materials use significantly less energy.

From the study findings presented in the table 4.5, it was revealed that 19(76%) of the respondents strongly agreed that garbage recycling reduces greenhouse gas emissions, 6(24%) agreed, this implies that the majority of the respondents were in agreement that garbage recycling reduces greenhouse gas emissions.

From the study findings presented in the table 4.5, it was revealed that 13(52%) of the respondents strongly agreed that by reducing air and water pollution and saving energy, recycling offers an additional environmental benefit, 8(32%) agreed, 4(16%) were not sure, this implies that the majority of the respondents were in agreement that by reducing air and water pollution and saving energy, recycling offers an additional environmental benefit.

4.4 Findings on the appropriate measures for environment conservation in Nalukolongo Zone in Rubaga Division

Table 4.6 showing findings on the appropriate measures for environment conservation in Nalukolongo Zone in Rubaga Division

	Strongly agree	Agree	Not sure	Disagree	Strongly disagree	Total
The government should implement strict laws regarding wastes and sanitation in the community so as to promote a clean and smart city	14(56%)	11(44%)	-	-	-	25(100%)
The local administrators and concerned authorities should ensure that the community members are properly sensitized on how they are supposed to manage their wastes and control without becoming hazardous to the community	23(92%)	2(8%)	-	-	-	25 (100%)
The local community members should handle all matters concerning wastes in a responsible manner and must consider garbage recycling to have a clean environment with a saved economy from pollutions and environment abuse	17(68%)	8(32%)	-	-	-	25(100%)
The administrators of Nalukolongo Zone must consider devising means of promoting garbage recycling which can be a great resource towards conserving the environment.	5(20%)	20(80%)	-	-	-	25(100%)

Source; Primary Data, 2022

From the study findings presented in the table 4.6, it was revealed that 14(56%) of the respondents strongly agreed that the government should implement strict laws regarding wastes and sanitation in the community so as to promote a clean and smart city, 11(44%) agreed, this implies that that the majority of the respondents were in agreement that the government should implement strict laws regarding wastes and sanitation in the community so as to promote a clean and smart city

From the study findings presented in the table 4.6, it was revealed that 23(92%) of the respondents strongly agreed that the local administrators and concerned authorities should ensure that the community members are properly sensitized on how they are supposed to manage their wastes and control without becoming hazardous to the community, 2(8%) agreed, this implies that that the majority of the respondents were in agreement that the local administrators and concerned authorities should ensure that the community members are properly sensitized on how they are supposed to manage their wastes and control without becoming hazardous to the community

From the study findings presented in the table 4.6, it was revealed that 17(68%) of the respondents strongly agreed that the local community members should handle all matters concerning wastes in a responsible manner and must consider garbage recycling to have a clean environment, 8(32%) agreed, this implies that that the majority of the respondents were in agreement that the local community members should handle all matters concerning wastes in a responsible manner and must consider garbage recycling to have a clean environment with a saved economy from pollutions and environment abuse.

From the study findings presented in the table 4.6, it was revealed that 20(80%) of the respondents strongly agreed that the administrators of Nalukolongo Zone must consider devising means of promoting garbage recycling which can be a great resource towards conserving the environment, 5(20%) agreed, this implies that that the majority of the respondents were in agreement that the administrators of Nalukolongo Zone must consider devising means of promoting garbage recycling which can be a great resource towards conserving the environment.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATION

5.0 Introduction

This chapter presents summary of findings, conclusion drawn and recommendations made by the researchers.

5.1 Summary of findings

During this research, majority of the respondents 72% were males, aged between 20 - 35 years at (60%), and had stopped in "O" and 'A" Level.

5.1.1 Findings on the benefits of garbage recycling towards environment conservation in Nalukolongo Zone

From the study findings presented chapter four of this study, it was revealed that majority of the respondents (72%) were in agreement that Recycling is the answer to all those plastics littered over the streets, whereas 76% agreed that recycling is preserving our environment for the future, it was also evidenced that (44%) agreed that by using recycled materials for manufacturing applications, the quantity of energy utilized is very less. Furthermore, 88% of respondents agreed that garbage recycling can help protect our environment and 60% agreed that Garbage recycling helps reduce landfill.

5.1.2 Findings on how garbage recycling is enhancing environment conservation and proper management of environment

From the study findings, it was revealed that (48%) of the respondents agreed that garbage recycling reduces air and water pollution, 68% agreed that garbage recycling saves natural resources, 36% agreed that products made using recovered (rather than virgin) materials use significantly less energy, 76% were in agreement that garbage recycling reduces greenhouse gas emissions, by reducing air and water pollution and saving energy, recycling offers an additional environmental benefit.

5.1.3 Findings on the appropriate measures for environment conservation in Nalukolongo Zone in Rubaga Division

From the study findings, it was revealed that majority of the respondents (56%) were in agreement that the government should implement strict laws regarding wastes and sanitation in the community so as to promote a clean and smart city, 92% agreed that the local administrators and concerned authorities should ensure that the community members are properly sensitized on how they are supposed to manage their wastes and control without becoming hazardous to the community, 68% of respondents agreed that the local community members should handle all matters concerning wastes in a responsible manner and must consider garbage recycling to have a clean environment with a saved economy from pollutions and environment abuse, and 80% agreed that the administrators of Nalukolongo Zone must consider devising means of promoting garbage recycling which can be a great resource towards conserving the environment.

5.2 Conclusion

This study indicates that solid waste in Nalukolongo Zone negatively impact on the environment if proper management systems are not put in place. Recycling presents an opportunity for extracting economic and environmental benefits from waste. The benefits derived from small-scale waste recycling by groups in Nalukolongo Zone range from reducing the amount of solid waste collected for disposal, improving community health and sanitation, restricting environmental pollution, promoting environ- mental awareness and creating employment and additional income-generating activities. Private and public partnership in waste management is the best option for solid waste management, particularly recycling in Nalukolongo Zone.

5.3 Recommendations

1. We recommend the enactment and implementation of a policy on source separation of solid wastes and solid waste management legislation to support waste recycling and its application, political support is urgently needed if small-scale recycling programmes are to succeed. The Ministry of Environment and Natural Resources in collaboration with that of Agriculture should assume a leading role in exploring further options for use of water hyacinth as organic compost manure for farming.

2. Public education on the advantages of using recycled products including environmental benefits in both rural and urban areas need to be promoted with the use of video shows, radio, newspapers and magazines, television programmes and public campaigns.

3. Deliberate efforts should be made by stakeholders to expand the market for recycled products. Financial and technical support is urgently required in the form of loans, donations, equipment and training by the government, NGOs and urban authorities to the groups involved in recycling and other environmental conservation activities.

4. Awareness creation to the local community for them to know the existence, and importance of women groups, in environmental conservation activities; and poverty reduction efforts. Enforcement of city by-laws, in support of women groups' initiatives.

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APPENDIX I: QUESTIONNAIRE

We are students of Muteesa I Royal University, we are currently conducting research on the impact of garbage recycling on environmental conservation in Uganda; Kampala district, Rubaga division, Nalukologo Zone. The data shall be used for academic purpose only and it will be treated with confidentiality it deserves.

You are humbly requested to respond to the statements in this questionnaire in the most truthful and objected way possible. Your participation in facilitating this study will be highly appreciated. Kindly tick in the space provided with the correct answer or supply the required information where, required, please specify and elaborate.

SECTION A: DEMOGRAPHIC INFORMATION

1. Gender

Female ☐ Male ☐

2. What is your age group?

Below 20 years ☐ 20-35 years ☐ above 35 years ☐

3. Are you educated?

Yes ☐ No ☐

3b) If YES in question 3, what is your education level?

"A" and "0" Level ☐
Certificate ☐
Diploma ☐
Degree ☐
Masters ☐

6. **Indicate your level of agreement on the following statement regarding benefits of garbage recycling towards environment conservation in Nalukolongo zone**

Instruction: (1-Strongly Agree (SA), 2- Agree (A), 3-Not Sure (NS), 4-Disagree (D), Strongly Disagree (SD)

S/N	Element	**Extent of agreement.**				
		SA	A	NS	DA	SDA
1	Recycling is the answer to all those plastics littered over the streets					
2	By using recycled materials for manufacturing applications, the quantity of energy utilized is very less					
3	Recycling can help protect our Environment					
4	Garbage recycling Helps Reduce Landfill					
5	Recycling is Preserving Our Environment for the Future					

7. Indicate your level of agreement on the following statement regarding how garbage recycling is enhancing environment conservation and proper management of environment

Instruction: (1-Strongly Agree (SA), 2- Agree (A), 3-Not Sure (NS), 4-Disagree (D), Strongly Disagree (SD)

S/N	Element	**Extent of agreement.**				
		SA	A	NS	DA	SDA
1	Reduces air and water pollution					
2	Recycling saves natural resources					
3	Products made using recovered (rather than virgin) materials use significantly less energy					
4	Recycling reduces greenhouse gas emissions					
5	By reducing air and water pollution and saving energy, recycling offers an additional environmental benefit					

Indicate your level of agreement on the following statement regarding appropriate measures for environment conservation in Nalukolongo Zone in Rubaga Division

Instruction: (1-Strongly Agree (SA), 2- Agree (A), 3-Not Sure (NS), 4-Disagree (D), Strongly Disagree (SD)

S/N	Element	**Extent of agreement.**				
		SA	A	NS	DA	SDA
1	The government should implement strict laws regarding wastes and sanitation in the community so as to promote a clean and smart city					
2	The local administrators and concerned authorities should ensure that the community members are properly sensitized on how they are supposed to manage their wastes and control without becoming hazardous to the community					
3	The local community members should handle all matters concerning wastes in a responsible manner and must consider garbage recycling to have a clean environment with a saved economy from pollutions and environment abuse					
4	The administrators of Nalukolongo Zone must consider devising means of promoting garbage recycling which can be a great resource towards conserving the environment.					

THANK YOU FOR YOUR PARTICIPATION