GREEN SUPPLY CHAIN MANAGEMENT AND ENVIRONMENTAL SUSTAINABILITY IN UGANDA; CASE STUDY OF MUKWANO INDUSTRIES

BY

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DECLARATION

I, declare that this research report is my original work. It has never been submitted to any institution of higher learning for any award.

Sign:..... **Date:** 22/12/2014.....

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APPROVAL

This research report has been conducted under our supervision as University Supervisors and it is now ready for submission to the examinations board of Kyambogo University as partial fulfillment for the requirements of the award of Master of Business administration with our due approval.

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DEDICATION

I dedicate this work to my beloved parents who indoctrinated in me life time virtues that compel me to everlasting success. Thanks very much for the care, love, protection and grooming me into a useful citizen.

May the Almighty God bless you abundantly.

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LIST OF ACRONYMNS

GSCM	Green supply chain management
ISO	international standards organisation
NEMA	National Environment Management Authority
SCM	supply chain management
VOC	Emissions of volatile organic compounds

ABSTRACT

The study focused on, ***"Green supply chain management and environmental sustainability in Uganda: A Case Study of Mukwano Industries".*** The study was guided by the following specific objectives to: To establish the relationship between equipment modification and the reduction of emissions in Mukwano industries. To establish the relationship between input substitution and reduction of consumption of hazardous material in Mukwano industries. To establish the relationship between onsite recovery and implementation of the practice of recycling in Mukwano industries. The study used a case study research design that utilized a purposive sampling design and a total of 59 respondents. The data was presented, analysed and interpreted using SPSS.The key findings were that there was a strong significant positive relationship between green supply chain management (GSCM) practices and environmental performance where equipment modification has led to reduction of emissions and wastes, input substitution has reduced the consumption of hazardous material. Then onsite recovery has facilitated the establishment of waste treatment plant and a biogas facility which compliments on the energy usage. The findings from this study clearly show the importance of legislation and regulations to the adoption of GSCM practices in Mukwano Industries. Therefore, GSCM implementation has also been highly influenced by external pressures including regulations and the desire to maintain corporate image. The study deduced that, Green Supply Chain Management (GSCM) has appeared as an environmental innovation which integrates environmental concerns into supply chain management. In recommendation, Manufacturers need to understand the potential positive impact that green supply chain practices can have of different dimensions of performance and consequently, be more pro-active in their adoption of such practices. And also there should be specific legislation to compel industrialists to adopt green supply chain management.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

As a move to avert the extremes of the environment, the world over is embracing the practice of green supply chain management, Navneet (2011), Manufacturing Research Consortium (MRC) of Michigan State University in the U.S.(1996) and CCICED Annual General Meeting (2011) suggest that a green supply chain aims to minimize the environmental impacts of the products end-of-use by tracking and controlling the raw material procurement, in order to ensure compliance with environmental rules and regulations starting from the stage of product Research &Development.

Green supply chain management is defined as integrating environmental thinking into supply-chain management, including product design, material sourcing and selection, manufacturing processes, delivery of the final product as well as end-of-life management of the product after its useful life, Navneet, (2011). Environmental issues are increasingly becoming important in managing any business today. While there are environmental regulations domestically, there are also growing demands by the overseas buyers for more and more environment-friendly products, (http://www.iisd.org/business/tools/bt_green_pro.aspx accessed 8th September 2014)

The 2002 World Summit on Sustainable Development stated that relevant authorities at all levels should: "promote public procurement policies that encourage development and diffusion of environmentally sound goods and services. In her Article, "developing strategies for Green Supply chain Management, Dayna,(2008) finds that indeed many organizations have introduced 'greening' requirements to both upstream and downstream supply chain activities —purchasing clauses, targets, practices, and technologies. In fact automotive firms frequently require suppliers

to certify to ISO 14001 (Toyota and Ford), Starbucks Coffee as well as Ben and Jerry's require raw material suppliers to meet guidelines for sustainable farming.

Other organizations have introduced purchasing requirements that ensure suppliers avoid specific materials such as chemicals that may be deemed hazardous to the environment (DuPont, Seventh Generation, and organic supply chains). An increasing number of supply chains invest in recycling systems intended to retrieve waste or used product from customers. A study showed that companies certified to the standard are 40% more likely to assess their supplier's environmental credentials, with 50% likely to require that their suppliers undertake specific environmental practice, Robb, (www.sustainabledevelopmentingovernment accessed 4 June 6, 2014)

These companies that have adopted green supply chain management are convinced that being environmentally conscious is a win-win for the business and environment, (Otago management review 2009). Purba and Diane (2005) agree that green supply chain management promotes efficiency and synergy among business partners and their lead corporations, and helps to enhance environmental performance, minimize waste and achieve cost savings and this in turn enhance the corporate image, competitive advantage and marketing exposure of the firm.

The situation in Uganda is to the extent that there has been increasing intervention of the Government in ensuring minimization of the impact of Business activities on the environment, through environmental regulations evidently through National Environmental Management Authority (NEMA). And significantly through the constitution of Uganda 1995. In response to this, companies have responded through practicing green procurement evidenced on packaging with words like, recycle or reuse, (Kalubanga, 2012).

1.2 Statement of the Problem

Environmental issues are complex, numerous and continually evolving, and an ad hoc approach to solving environmental problems is no longer appropriate. World over along the global value chain companies have recognized Green supply chain management as a direct and effective mechanisms to address environmental problems,(CCICED Annual General Meeting, 2011)Mukwano industries despite adopting green supply chain management practices it continues to grapple with environmental issues in the market and with stakeholders who at times have threatened to close the company. In a letter dated December 10, 2010 by Dr. Gerald from NEMA, to Mukwano Industries, the company had a high rate of pollution and the workers were exposed to a hazardous environment and it stated that in parts of the wetland where Mukwano releases its waste, NEMA encountered scotched vegetation. They found raw sewage oozing out of the factory contaminating the water used by car washers at the nearby Kinawataka washing bay in fact they had never carried out an environmental audit ever since the factory opened in 1986 thus violating the requirements of the National Environmental Management Act 1998, (www.ugandapicks.com accessed 24 June 2014)

It is therefore because of this background that the researcher was compelled to establish the effectiveness of the green supply chain management practices adopted by Mukwano industries.

1.3 General Objective

The purpose of this study was to establish the effectiveness of Green Supply Chain Management practices adopted by Mukwano Industries on enhancement of Environmental sustainability.

1.4 Specific Objectives were:

1. To establish the relationship between equipment modification and the reduction of emissions in Mukwano industries.
2. To establish the relationship between input substitution and reduction of consumption of hazardous material in Mukwano industries.
3. To establish the relationship between onsite recovery/ reuse and implementation of the practice of recycling in Mukwano industries.

1.5 Research questions were:

1) What is the relationship between equipment modification and reduction of emissions in Mukwano industries?
2) What is the relationship between input substitution and reduction of consumption of hazardous materials in Mukwano industries?
3) What is the relationship between onsite recovery and implementation of recycling in Mukwano industries?

1.6 Scope of the Study

The research Study was limited to a population of the staff in the departments of procurement & logistics, Engineering, quality assurance, Manufacturing and environmental health of Mukwano industries in Kampala, Uganda.

The study was also limited to three objectives, for which six variables were considered and these were equipment modification, input substitution and onsite recovery as independent variables

and reduced emissions, reduced consumption of hazardous material and recycling as dependent variables.

This research study was carried out in a time frame limited to two months.

1.7 Significance of the Study

This study will be a back ground into more research work on green supply chain management in Uganda.

The results of this study if adopted will help the government of Uganda to set up measures or standards for companies to practice green supply chain management.

It will also help Mukwano Industries to adopt the practice of green supply chain management knowing the business benefits they can get.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter presents the theory that guided the study and reviews the literature. The theoretical review presented literature on Green supply chain management and supply chain management. The chapter also cited literature on practices of green supply chain management including equipment modification, input substitution and on site recovery and on the other hand reduced air emission, reduced consumption of hazardous material and recycling.

2.2 Theoretical review

The research was guided by the ecological modernization theory which is geared towards achieving industrial development and environmental protection through innovation and technological development or modernity, (Janicke, 2008 and Murphy and Cwuldson, 2000).

2.2.1 Green Supply Chain Management (GSCM)

(Lenny, 2008) defines GSCM as the formal system that integrates strategic, functional and operational procedures and processes for employee training and for monitoring, summarising and reporting environmental supply chain management information to stakeholders of the firm. "Green supply chain management consists of the purchasing function's involvement in activities that include reduction, recycling, reuse and the substitution of materials."This implies that GSCM is focused on supplier performance, audits, design, waste minimisation, training, reporting to top management and goal setting. The entire supply chain is managed as a green system and every process focuses on environmental management and risk control.

According to Ma *et al,* (2010), for a company to invest in GSCM, it has to have environmental goals which include: reducing the consumption of energy, water and natural resources;

increasing the use of clean and renewable energy sources; decreasing waste production and pollution emissions; and improving the treatment of waste by-products.

A well designed and implemented green supply chain management system confines the wastes within the industrial system so as to conserve energy and prevent the dissipation of harmful materials into the environment Johnny *et al,* (2009) and presents advantages which include; Reduced energy and water consumption (which can reduce costs), Improve resource use efficiency, Reduce waste (which can reduce waste disposal costs), Reduce environmental health impacts of goods and services.

Ma *et al,* (2010), point out that green supply chain have drivers. These include;

- The market demand: Companies are minimizing their environmental impacts and/or selling environmentally friendly products in the bid to capture the increasing demand for environmentally friendly products.
- Regulatory Pressure: whereby in China, there are new government policies that prohibit manufacturing of products from environmentally destructive materials and polluting processes. For that reason, companies that utilize environmentally destructive and/or polluting processes will not be able to sell their goods, and company owners may be subject to financial penalties and criminal prosecution.
- Economic Competitiveness: here, they argue that energy and raw material prices are significantly raised and also operating costs can be increased due to environmental factors.

According to Lenny, (2008), in most companies green supply chain strategies are rhetoric and outpacing real action. Fewer than 25% say their companies always or frequently take climate change into consideration in making supply chain decisions. Only 21% thought the opportunities

for new product/market far outweighed the risks. For consumer goods makers, high-tech players, and other manufacturers, 40-60% of carbon footprint resides upstream in the supply chain—from raw materials, transport, and packaging to the energy consumed in manufacturing processes and the figure can be 80% or more for retailers. Zhu and Sarkis and Sarkis *et al* reviewed number of studies that considered institutional theory as a key driver in adopting GSCM and found that companies were mainly influenced by external drivers to adopt GSCM practices. These include: (i) legislation and regulations issued by governments; and (ii) customer requirements.

Although some companies are doing little or nothing towards environmental sustainability, others are actually doing a lot. According to Ma *et al,* (2010), leading companies in China are implementing green supply chain strategies. In recognition of the challenges that environmental factors can pose to their businesses, the leaders of an increasing number of multinational companies are integrating environmental management into core corporate strategy. A carbon disclosure project report, (2010), found that, of more than 1,200companies in sectors ranging from consumer staples and industrials to materials, 63 percent of the companies surveyed had a corporate climate change strategy. Also over 90 percent of these companies had either a board committee or another executive body overseeing the implementation of climate change strategy to ensure that it was effectively turned into action within the company.

According to BearingPoint's 2008 Supply Chain Monitor, 35% of companies have already established a Green Supply Chain. The bigger the company, the greater the level of interest in Green Supply Chain: 54% of companies with turnover in excess of $700 million claim to have established a Green Supply Chain, (http://www.bearingpoint.com/ accessed on 2nd September 2014)

This has triggered a number of organizations to introduce 'greening' requirements to both upstream and downstream supply chain activity—purchasing clauses, targets, practices and technologies Dayna, and Danny, (2008). The main objective of a Green Supply Chain is to find the right balance between economic and ecological optimization (http://www.bearingpoint.com/ accessed on 2nd September 2014).

2.2.2 Supply chain management

Supply Chain Management (SCM) is an integrated approach to planning, implementing and controlling the flow of information, materials and services from raw material and component suppliers through the manufacturing of the finished product for ultimate distribution to the end customer. It includes the systematic integration of processes for demand planning, customer relationship collaboration, order fulfilment/delivery, product/service launch, manufacturing/operations planning and control, supplier relationship collaboration, life cycle support, and reverse logistics and their associated risks, (http://supplychain.broad.msu.edu/msscm/definition/ accessed 3rd September 2014)

Ideally, SCM will attempt to centrally control or link the production, shipment and distribution of a product, (http://www.investopedia.com/terms/s/scm.asp accessed 3rd September 2014). By managing the supply chain, companies are able to cut excess fat and provide products faster. This is done by keeping tighter control of internal inventories, internal production, distribution, sales and the inventories of the company's product purchasers. SCM is based on the idea that nearly every product that comes to market results from the efforts of various organizations called the supply chain. Although these supply chains have existed for

ages, until recently most companies have paid only scant attention to them. (http://www.investopedia.com/terms/s/scm.asp accessed 3rd September 2014).

GSCM has its roots in both environment management and Supply Chain Management (SCM) literature. Adding the 'green' component to SCM involves addressing the influence and relationships between SCM and the natural environment. Sotiris, (2000) suggests that within the organization, the supply chain refers to a wide range of functional areas which include Supply Chain Management-related activities such as inbound and outbound transportation, warehousing, and inventory control. Sourcing, procurement, and supply management fall under the supply-chain umbrella, too. Forecasting, production planning and scheduling and scheduling, order processing, and customer service all are part of the process as well. Significant to our study, Toke L.K *et al*, (2010) are of the view that the waste and emissions caused by the supply chain have become the main sources of serious environmental problems including global warming and acidic rains. They continue with an elaborate discussion of the of the supply chain activities and how GSCM practices can be incorporated as follows;

i) Purchasing and In-Bound Logistics

This involves the acquisition of materials from suppliers to meet the needs of producing the organizational product or service. Purchasing includes duties such as vendor selection, material selection, outsourcing, negotiation, buying, delivery scheduling, inventory and materials management, and to some extent, involvement in design. The green factor is thus introduced to practice Green purchasing. This has a number of environmentally based initiatives that may be incorporated into the purchasing function; these are summarized as follows; Supplier Environmental Questionnaires; Supplier Environmental Audits and Assessments; Environmental Criteria on Approved Supplier List; Require Suppliers to undertake independent Environmental

Certification; Jointly Develop Cleaner Technology/Processes with Supplier(s); Engage Suppliers in Design for Environment product/process innovation; Reduce packaging waste at the customer/supplier interface ; Reuse/Recycling of materials requiring co-operation with supplier; Reuse initiatives (including buy-backs and leasing); Conduct LCA with cooperation from suppliers; Seek to influence legislation in cooperation with suppliers; Create supply "club" to collaborate on environmental issues ; Coordinate minimization of environmental impact over full supply chain ; Build environmental criteria into supplier contract conditions; Audit Supplier Environmental Performance.

With the out- bound logistics one of the issues in delivery (and production) is the use of just-in-time (JIT) practice. This practice is meant to reduce inventory, thus eliminating costs and waste. For example, less storage and warehouse space is needed. This practice reduces the necessary overhead and resource consumption needed to manage this inventory. Thus, JIT seems to be an environmentally sound practice.

ii) Production

Closed-loop manufacturing is one of the internal measures that can be used to improve the environmental performance of the internal supply chain. The philosophy of zero-emissions is what drives closed-loop manufacturing practice. Closed-loop manufacturing is a process of producing products with no negative environmental impact. This internal loop helps to lessen some waste streams that flow from the production function, but may require additional energy and resources to function and maintain. As part of the source-reduction philosophy closed-loop manufacturing, a related issue to the zero-emissions philosophy is substitutability, which has become much more popular with design for the environment linkages. For example, substitutes for environmentally toxic materials such as solvents with aqueous solution for processes and

powders paint for liquid paint are examples of using substitutes to reduce and eliminate emissions.

iii) **Distribution and Out-Bound Logistics**

The distribution and out-bound logistics function is meant to address the organization-customer relationship issues. Customer relationships are greatly influenced by green marketing policies. Some studies have found that ultimate individual consumer interest in the environment and environmentally sound products is quite substantial.

The design of a logistics network and its planning are two of the more strategic issues facing logistics managers in this function. Warehousing generates much of the packaging waste in the supply chain. Standardized reusable containers, good warehouse layouts, easy information access all cut storage and retrieval movements and save on operating costs and are environmentally sounder. Freight consolidation functions and "break-bulk" operations carried out in warehouses also have the potential of utilizing transport capacity more efficiently, thus minimizing the environmental impact of the out bound transport system. Examples of typical logistics decisions include options such as direct shipping or hub-and-spoke, central warehouse or distributed network, intermodal or single mode, and third party services or private fleet. Some of the design and management criteria that support environmental planning in this area include fewer shipments, less handling, shorter movements, more direct routes, and better space utilization.

2.3 Conceptual framework

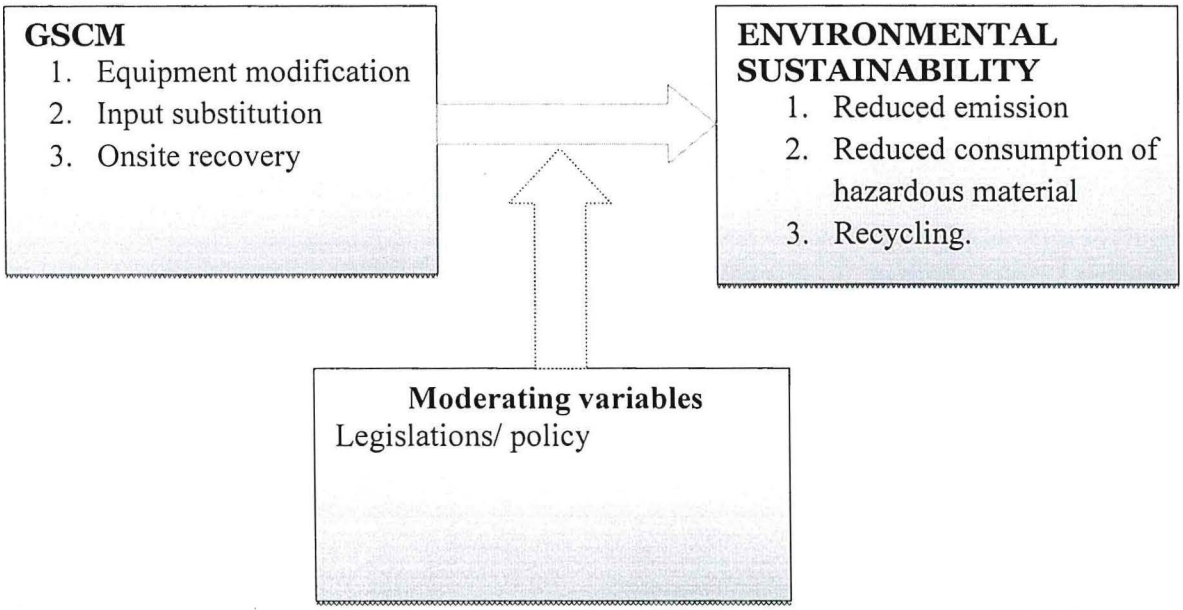


Figure 1: Conceptual framework, as guided by the ECOLOGICAL MODERNIZATION THEORY, (Janicke, 2008).

2.3.1The effectiveness of equipment modification in the reduction of emissions

By analysing the flow of materials and energy in a company, one tries to identify options to minimize waste and emissions out of industrial processes through source reduction strategies. This can be achieved by equipment modification, (www.testiwiki.com accessed 13th September 2014). Equipment Modification is one of the Cleaner Production basic principles which involve modification of the production equipment so as to run the processes at higher efficiency and lower rates of waste and emission generation, (www.unido.org, accessed 16th/09/2014). Equipment modification is also defined as the changing or altering of the design and construction of an existing device or piece of equipment, (www.katsnet.org, accessed 16th/09/2014).

Equipment modification is to improve the existing equipment so less material is wasted. This can be achieved by adjusting the speed of an engine, to optimize the size of a storage tank, to insulate hot and cold surfaces, or to improve the design of a crucial part of the equipment, (http://www.vncpc.org, accessed 13th September 2014).

Modification can be in form of dry to dry machine which reduces the amount of perc used in a cleaning process. Retrofitting a vented system to a no vent system which is an equipment modification reduces air emission and per consumption,(http://infohouse.p2ric.org/ref/16/158 accessed 16/09/2014).

Today pollution prevention is emphasized at the source as is reuse and recycling. In order to be environmentally conscious and economically efficient as possible all types of wastes including hazardous wastes, solid wastes, air emissions and water discharge should be targeted for reduction,(http://infohouse.p2ric.org/ref/16/15886accessed16/09/2014).

Manzan and Miyake, (2013), argue that the evolution of production models with environmental concerns started from the idea of mitigating the pollution effects caused by the production process, and then evolved to encompass changes in the production process aiming the saving of natural resources and use of less toxic substances thus the need for equipment modification and technology change. Technology change involves replacement of the technology, processing sequence and/or synthesis pathway in order to minimize the rates of waste and emission generation during production, (www.unido.org, accessed 16th/09/2014).

These wastes from industries include solid wastes, air pollutants, and wastewaters. However, the three categories of wastes are closely interrelated, both as they impact the environment and as they are generated and managed by individual industrial facilities. Moreover, the principles of

pollution prevention must be implemented to the most complete extent possible, (www.testiwiki.com accessed 13th September 2014).

Pollution prevention and waste reduction should have positive impacts on business and industry such as economic returns for reduced costs in raw material, waste treatment and disposal. Elimination of wastes reduces liabilities. Companies that reduce their wastes also improve their public image in the community,(http://infohouse.p2ric.org/ref/16/15886accessed 16/09/2014).

Carbon offsetting and carbon emissions are some of the reasons for the need to modify equipment in industries. In manufacturing industries, measuring your carbon emissions not only reveals where you're currently at, but also is helpful in identifying areas for improvement and it's a way to track the industry's progress as far as reduction of emission during manufacturing is concerned, (www.cotap.org, accessed 16th/09/2014). Offsetting the amount which you are not able to avoid empowers you to take full responsibility for your carbon pollution, which is your contribution to climate change. However, carbon offsetting should not be done in place of taking steps to reduce one's carbon emissions. Rather, carbon offsetting and carbon emissions reduction should be done in tandem. The Industrial Technology Research Institute (ITRI) has modified a technology used to calculate carbon emission declaration over the product life cycle from material extracting to final disposal in manufacture, (www.itri.org, accessed 16th/09/2014). The technology leads to energy saving, emission reduction throughout the supply chain, and reduction of production costs.

Emissions of volatile organic compounds (VOCs) cause serious problems to our environment and human health. Traditionally VOCs are treated by using energy-consuming incineration. Consider of the high activity and energy saving, Industrial Technology Research Institute (ITRI) successfully developed a novel VOCs nano-catalyst (the Low-Temperature VOCs Catalyst),

which could remove more than 90% of the VOCs emitting from hi-tech industries at a temperature below 200°C, (www.itri.org, accessed 16th/09/2014). The VOCs nano-catalyst meets VOCs regulations and reduces on the annual VOCs treatment cost (both of catalyst material cost and operating energy cost are low then the commercial technology).

2.3.2. The effectiveness of input substitution in reducing the consumption of hazardous material

The basic idea of promoting waste minimization is simply that it makes more sense not to produce hazardous waste rather than develop extensive and expensive treatment schemes to ensure the safe management of the waste once it has been produced, (www.unomah.com accessed 16th/09/2014). To this effect input Substitution is the replacement of a substance, process, product or service by another that maintains the same functionality, (http://www.agriculturesnetwork.org accessed 16th September 2014). Substitution should aim over the whole life cycle of the replacement to obviate any negative impacts on human health or the environment and improve resource efficiency. It should also be recognized that substitution will only be successful where the socioeconomic requirements of all the stakeholders can be satisfied, (UK chemical stake holder forum 2010).

Production of goods and services involves transforming resources—such as labor power, raw materials, and the services provided by facilities and machines—into finished products. (http://www.fep.up.pt/docentes/moutinho/micro/besanko-ch06). This involves creation wastes some of which are hazardous. A hazardous waste is a waste with properties that make it dangerous or capable of having a harmful effect on human health or the environment. (http://www.epa.gov/osw/inforesources/pubs/orientat/rom31.pdf). Hazardous waste is generated from many sources, ranging from industrial manufacturing process wastes, to batteries, to

fluorescent light bulbs. Hazardous waste may come in many forms, including liquids, solids, gases, and sludge. Hazardous waste is extremely expensive to dispose of and the cost is continually rising, (www.unomah.comaccessed 16th/09/2014). GSCM involves the flow of finances, logistics, and information, as well as the ability to integrate relationships and green technology, and to reduce the use of hazardous products in the production process, (Ming-Lang *et al*,2010)

AkzoNobel's approach on the use of substances that are considered to be hazardous in its products is subject to a number of driving forces: among them, concern for man and the environment, available technology, legislation and regulations, market forces, product specifications, availability of alternatives and customer acceptance. (https://www.akzonobel.com/system/images accessed 16th September 2014). Input Substitution may be seen as one element in the management of business risk, but one which specifically supports the overall objectives of reducing or avoiding negative impacts on human health or the environment and improving resource efficiency, while maintaining functionality, (UK chemical stake holder forum, 2010).

To meet the needs of sustainable development, ITRI has devoted to develop novel green energy and environment technologies for a better future. The energy and environment topics that ITRI focuses on are renewable energy, energy efficiency, alternative energy, energy management and policy, clean environment, and natural resources, (www.itri.org, accessed 16th/09/2014).

Manufacturers need to be sure that the supply of any alternative substance or product will not disrupt their business. Any substitution that requires the use of material that is only produced in small quantities by a single supplier in a politically unstable region of the world is unlikely to be acceptable, (UK chemical stake holder forum, 2010). Engaging with the supply chain(s) should

be part of any substitution plan to ensure the market is prepared for the change. Stopping the supply of a given substance to replace it with an alternative will only work if the supply chain is in agreement. Without clear communication and appropriate plans to meet customers' needs, the supply chain may simply seek an alternative source for the targeted substance, (Ohio state university, 2014).

Substitution may have social and/or economic consequences for the consumer which can be difficult to predict, but are crucial to whether the planned substitution will be acceptable to the end user. The economic case is usually simpler to evaluate; in general terms - increasing the product price whilst increasing its performance could be good business whereas increasing the price whilst maintaining, or decreasing, product effectiveness is likely to reduce sales, (UK chemical stake holder forum, 2010).

Chemical wastes can be reduced substantially by substituting non-hazardous or less toxic materials in chemical processes or experiments. A simple substitution would be the use of water based solutions in place of solvent based ones. Another practice would be the use of non-halogenated solvent such as ethanol in place of halogenated ones like trichloroethylene or chloroform in an experiment or process, (Ohio state university, 2014). In this regard substitution of fossil fuels provides permanent GHG emission reductions, while se-questration or conservation of carbon is temporary only. Thus substitution allows for a viable transition towards a society that is less dependent on energy and materials that cause higher GHG emissions, (Gustavsson *et al*, 2004).

Material substitution takes place for example if solid wood products, particleboards etc. are used to substitute other materials and products such as concrete and steel products, gypsum boards etc. This substitution might lead to a reduction of greenhouse gas emissions not only because concrete, steel, and gypsum are more energy and GHG intensive than wood, but also because wood residues from logging and processing and wood-based products at the end of their lives are used for energy generation, (Gustavsson et al, 2004). A typical input substitution would arise as follows; the greenhouse gas emissions could be divided into four different categories of material substitution. First, emissions from fossil fuel use over the life cycle of the products. This includes different steps, such as production, transportation, end-use and waste management of a product. Second, replacement of fossil fuels by biomass associated with the wood use. This includes for example residues from logging, wood processing industries, and end-consumers. Third, carbon stock changes in forests and products. Such changes can be complex over time, but in a longer time perspective the changes might be quite limited when sustainable forest management is practiced. Finally, greenhouse gas emissions associated with industrial process reactions, such as in cement and steel production. In the substitution analysis, these categories of net emissions should be considered consistently with appropriate accuracy and comprehensiveness, (Gustavsson et al, 2004).

2.3.3 The effectiveness of onsite recovery/ reuse in implementing the practice of recycling

One way to prevent waste, improve our communities, and increase the material well-being of our citizens is to take useful products discarded by a process which no longer needs them for another useful one, (http://loadingdock.org accessed 16/09/2014). Onsite recovery is one of the green manufacturing practices which involves reuse of the wasted materials in the same process or for another useful application within the company, (www.unido.org, accessed 16th/09/2014). A

strong resource recovery program addresses all three pillars of sustainability: environment i.e. reduces energy and water consumption, releasing fewer greenhouse gases, society i.e. creates cleaner air and water while creating jobs for the people who handle and process the recovered materials, and economy i.e. reduces utility costs while converting "waste" into a tradable commodity, (Biennial sustainability report, 2012).

To reduce on an industry's carbon emissions, reuse and recycle is one of the strategies that must be employed. It has been estimated that 29% of U.S. greenhouse gas emissions result from the "provision of goods," which means the extraction of resources, manufacturing, transport, and final disposal of "goods" which include consumer products and packaging, building components, and passenger vehicles, but excluding food. By buying used products and reselling or recycling items you no longer use, you dramatically reduce your carbon emissions from the "provision of goods." (www.cotap.org, accessed 16th/09/2014). In addition to reuse and recycling, whenever you can, advocate for clean alternatives to fossil fuels, such as wind, solar, geothermal, and appropriately designed hydroelectric and biomass energy projects so as to reduce on an industry's carbon emissions. Biodegradable cushion materials are green product designs that can be reusable and minimize waste treatment costs. These materials developed by the Industrial Technology Research Institute (ITRI) can replace traditional plastic foam since they are environmentally friendly cushions or protection materials and are non-toxic, (www.itri.org, accessed 16th/09/2014). The purpose of recycling market development is to create an environment where previously discarded materials are recovered and transformed into new products and materials, adding value and providing jobs for the community, (Michael, 1995).

2.3.4 Summary of literature review

Equipment modification and reduction in emissions.

It is argued that the evolution of production models with environmental concerns started from the idea of mitigating the pollution effects caused by the production process, and then evolved to encompass changes in the production process aiming the saving of natural resources and use of less toxic substances thus the need for equipment modification and technology change. In this regard in order to be environmentally conscious and economically efficient as possible all types of wastes including hazardous wastes, solid wastes, air emissions and water discharge should be targeted for reduction. Change in Technology should involve replacement of the technology, processing sequence and/or synthesis pathway in order to minimize the rates of waste and emission generation during production.

Input substitution and reduction in consumption of hazardous materials.

Input Substitution is the replacement of a substance, process, product or service by another that maintains the same functionality. Input Substitution may be seen as one element in the management of business risk, but one which specifically supports the overall objectives of reducing or avoiding negative impacts on human health or the environment and improving resource efficiency, while maintaining functionality. Chemical wastes can be reduced substantially by substituting non-hazardous or less toxic materials in chemical processes or experiments. A simple substitution would be the use of water based solutions in place of solvent based ones. Another practice would be the use of non-halogenated solvent such as ethanol in place of halogenated ones.

Onsite recovery and recycling

One way to prevent waste, improve our communities, and increase the material well-being of our citizens is to take useful products discarded by a process which no longer needs them for another useful one. A strong resource recovery program addresses all three pillars of sustainability: environment (i.e. reduces energy and water consumption, releasing fewer greenhouse gases), society (i.e. creates cleaner air and water while creating jobs for the people who handle and process the recovered materials), and economy (i.e. reduces utility costs while converting "waste" into a tradable commodity).

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This study intended to evaluate the effectiveness of green supply chain management as an environmentally-conscious practice that integrates the entire supply chain from the point of sourcing through production to the final consumer. Since green supply chain management seeks to optimize the activities of the supply chain with the environment, in this chapter a detailed insight on the research design, area of the study, target population, sampling technique and sample selection, research instruments was availed. The data collection procedure, data analysis and the limitations to the study were also discussed.

3.2 Research Design

This study adopted a case study research design. According to (De Vaus, 2001) a case study is an in-depth study of a particular research problem. It is often used to narrow down a very broad field of research into one or a few easily researchable examples. The case study research design is also useful for testing whether a specific theory and model actually applies to phenomena in the real world, (Yin, 2012). The case study design is a useful design when not much is known about a phenomenon. The research design was both qualitative and quantitative this is because it is noted that "researchers should not only consider which is the most appropriate method for the study of their chosen topic or problem but also what combination of research methods will produce a better understanding of it" (Hansen et al, 1998). In this sense the research drew on the case study methodology which uses a combination of methods to collect data.

3.3 Area of the Study

The study was conducted at Mukwano industries (main branch) in Kampala. Mukwano is a manufacturing company that engages in all activities of the supply chain including sourcing, transportation, production, and sales & distribution. This industry is located in the city centre thus the costs of research are relatively less.

3.4 Target Population

The target population for a survey is the entire set of units for which the survey data are to be used to make inferences, Brenda, (http://srmo.sagepub.com/view/encyclopedia-of-survey-research-methods accessed 3rd September 2014). It is also defined (target population) as any set of persons or objects that possess at least one common characteristic (Busha and Harter, 1980) To this end the target population defines those units for which the findings of the survey are meant to generalize. The study targeted 70 respondents from the staff and heads of departments; that is: procurement and logistics department, engineering department, environmental health and Manufacturing. The department of procurement and logistics usually is responsible for sourcing the raw materials to be used in the manufacturing process. Thus, they possess information on the guide lines/ specifications that are environmentally conscious. The internal production process is handled by the manufacturing and engineering departments therefore they are in charge of waste management. These departments have the largest number of staff and thus will be a good representative of the population intended for this study.

However according to Krejcie and Morgan, (1970) it is suggested that from a population of70 the researcher interviews 59 respondents as illustrated below.

Table 3. 1: Distribution of target population and sample size

Department	Population size	Sample size using Krejcie and Morgan, (1970)[1]	Sampling strategy
Procurement and logistics	12	10	Purposive sampling
Engineering	20	19	Purposive sampling
Environmental health	13	10	Purposive sampling
Manufacturing	13	10	Purposive sampling
Quality assurance	12	10	Purposive sampling

3.5 Sampling Technique and Sample Selection

A purposive sampling technique (non – probability sampling technique) was used in the selection of respondents in the departments of procurement, Engineering, operations and production, research and development and sales and distribution. The main goal of purposive sampling is to focus on particular characteristics of a population that are of interest, which will best enable you to answer your research questions. (http://www.dissertation.laerd.com/purposive-sampling.phpaccessed on 3rd September 2014). Respondents to this study were chosen on a basis of specific characteristics, that is knowledge of green supply chain management. However still for the above departments, for the respondents who did possess the required knowledge for the purposes of the research, the researcher chose the respondents basing on their experience depending on how long one had served in a particular department that is to say one who had worked in a department for less than a 6months and did not possess knowledge on GSCM was not a valid respondent. This sampling technique (purposive) was used because it ensures balance of group sizes when multiple groups are to be selected.

[1] See annexture 1

3.6 Research Instruments

In this study, the research instruments used were questionnaires and interview guide, where respondents were required to fill the questionnaires with responses to simple questions.

3.7 Data Collection Procedure

Questionnaires to various departments were prepared. The researcher obtained an introduction letter from the University which helped him acquire an authorization letter from the management of Mukwano group of companies. These letters were the researcher's permits to get information from the heads of departments and the staff of the chosen departments.

3.8 Validity and Reliability of data

3.8.1 Validity

Validity refers to the extent to which research results can be accurately interpreted and Generated to other populations. Research tools were first of all prepared, presented to the supervisors who checked and ensured on their consistency and relevance. The supervisors' comments were to be used to improve the questionnaire by eliminating all errors. Pretesting of questionnaires also was done by administering questionnaires to 10 respondents within the target population but outside the sample this helped to identify the gaps and made modifications accordingly. According to Mugenda and Mugenda (2005) the researcher should ensure that that questions are relevant in order to have meaningful and reliable results represented by variables in the study.

The researcher therefore adopted the following formula below to establish validity of the research tool;

$$\text{Content validity index (CVI)} = \frac{\text{agreed items by all judges as suitable}}{\text{Total number of the items judged}}$$

$$= \frac{30}{33}$$

$$= \mathbf{0.90}$$

If the overall content validity Index of the instrument is equal 0.90 which is above the average acceptable index of 0.7 or above for the instrument to be accepted as valid (Amin, 2005).

3.8.2 Reliability

Mugenda and Mugenda (1999) defined reliability as a measure of the degree to which a research instrument yields consistent results or data after repeated trials. An instrument is reliable when it can measure a variable accurately and obtain the same results over a period of time. To achieve this, the researcher will adopt Cronbach's Alpha. Cronbach's alpha is a measure of internal consistency, that is, how closely related a set of items are as a group, (Wee and Quazi, 2005; Sarode and Bhaskarwar, 2011).

3.9 Measurement of variables

The variables will be measured using the five Linkert scale. Different variables will be measured at different levels. The variables will be measured at nominal and ordinal Scale. The nominal scale measurement was used in the first part of the questionnaire (demographics) which had items like; gender, age, level of education and experience of employees. This is premised under Mugenda and Mugenda (1999) assertion that, nominal scales are assigned only for purposes of identification but not comparison. The researcher also used the ordinal scale measurement which categorizes and ranks variables that were measured in statements like strongly agree, agree, not sure, disagree, and strongly disagree Amin, (2005).

3.10 Data Analysis

Analysing information involves examining it in ways that reveal the relationships, patterns, trends, etc. that can be found within it. That may mean subjecting it to statistical operations that can tell you not only what kinds of relationships seem to exist among variables, but also to what level you can trust the answers you're getting. It may mean comparing your information to that from other groups to help draw some conclusions from the data, (http://ctb.ku.edu/en/ accessed 11th September 2014). In this regard Data collected was presented on a tally sheet that showed the recurrent themes, key phrases used and quotes that were be incorporated into the final report. The tally sheet indicated the relative options of responses on issues concerning the six variables. The data collected was subjected to descriptive data analysis and interpretation. To achieve the above the researcher used measures of central tendency, (https://statistics.laerd.com/statistical-guides accessed 22/09/14). A measure of central tendency is a single value that attempts to describe a set of data by identifying the central position within that set of data. As such, measures of central tendency are sometimes called measures of central location. They are also classed as summary statistics. The mean (often called the average) is most likely the measure of central tendency that you are most familiar with, but there are others, such as the median and the mode, (https://statistics.laerd.com/statistical-guides accessed 22/09/14).

3.11 Limitations to the study

The researcher encountered a number of limitations during the study. Some of the respondents were indifferent and thus did not want to share information. The researcher used their colleagues who had filled the questionnaires to introduce and pass on a questionnaire to a colleague who was initially indifferent. Thus to overcome this limitation snow ball sampling came in handy.

There was also fear among the respondents for fear that probably what they had shared would not be confidential however the researcher assured them that this was an academic research.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND INTERPRETATION OF THE FINDINGS

4.0 Introduction

This chapter presents and examines the findings of the study. The information is tabulated and statistical techniques (percentages) used in investigating the "***Green Supply Chain Management and Environmental Sustainability: Case Study of Mukwano Industries (U) Ltd***". For each research question, data is descriptively, qualitatively and quantitatively presented. Finally, interpretation of results was done for the research questions answered.

4.1 Response Rate

To account for errors and failure to return, the researcher distributed 70 questionnaires of which he ensured that 59 were considered of what was collected.

4.2 Bio-data findings

The main areas of demographic information about the respondents covered were: Gender, age, department, length of service and Level of education. In order to elicit data about the demographic data of the respondents, the researcher administered questions (1) - (5) in the questionnaire whose findings are tabulated as follows;

4.2.1 Gender Composition of Respondents

The study was gender sensitive as illustrated below;

Table 4.1:Gender Composition of Respondents

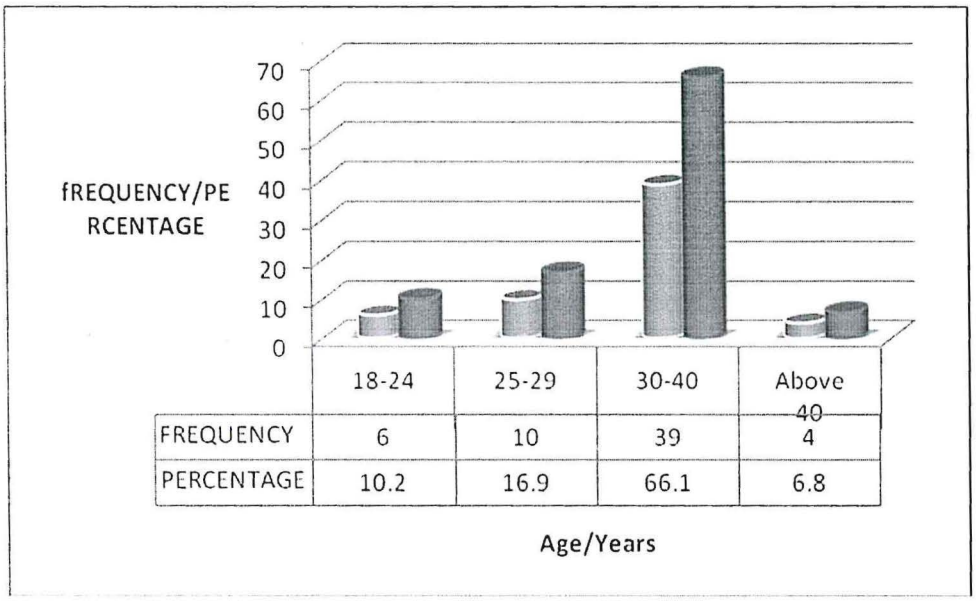
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	36	61.0	61.0	61.0
	Female	23	39.0	39.0	100.0
	Total	59	100.0	100.0	

Source: Primary Data

Table 4.1 shows that 36 (61%) of the respondents were males and 23 (39%) were females. This finding could mean that there were more females in formal employment than females at Mukwano Industries (U) Ltd. However, involvement of both sexes helped to gather more objective information.

4.2.2 Age distribution of the Respondents

Table 4.2Age distribution of respondents



Source: primary source

From the above figure, majority of the respondents 39(66.1%) were of the age between 30 and 40 years, 10 (16.9%) of the respondents were aged between 25-29years, 6(10.2%) of the respondents were aged between 18-24years while 4(6.8%) were aged 40years and above.

The implication of table 4.2 findings is that the study covered different age groups of respondents who understood differently green supply chain management and environmental sustainability: case study of Mukwano Industries (U) Ltd.

4.2.3 Departments in Mukwano industries whose employees were chosen as respondents.

Table 4.3: Departments whose employees were chosen as respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Environmental Health	10	16.9	16.9	16.9
	Engineering	19	32.2	32.2	49.2
	Quality assurance	10	16.9	16.9	66.1
	Manufacturing	10	16.9	16.9	83.1
	Procurement	10	16.9	16.9	100.0
	Total	59	100.0	100.0	

Source: Primary Data

Table 4.3 shows that, staff at Mukwano Industries worked in different departments that included; Environmental health 10 (16.9%), engineering 19(32.2%), quality assurance 10(16.9), manufacturing 10(16.9%) and procurement 10(16.9%) These had taken a considerable period working in different departments and hence they provided important information about

The company had lower, middle and top management respondents which helped to provide a basis for reliability of data as all categories of respondents who participated in the study. It was important to get the perspectives of the various job positions that provided data on green supply chain management and environmental sustainability differently.

4.2.4 Length of Service

Data on this parameter was obtained through question 4 the questionnaire; and below is their feedback.

Table 4.4Length of Service of the respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0-1years	6	10.2	10.2	10.2
	2years	17	28.8	28.8	39.0
	3years	20	33.9	33.9	72.9
	4years	10	16.9	16.9	89.8
	5years	6	10.2	10.2	100.0
	Total	59	100.0	100.0	

Source: Primary data

Results in table 4.4 suggest that 6(10.2%) of the respondents had worked at Mukwano Industries for a period between 0-1year, 17(28.8%) had served for a period of 2 years, 20 (33.9%) had served for a period of 3year, while 6(10.2%) of the respondents had worked 5 years and more. The implication of these findings is that majority of the respondents had worked for a considerable period of time (3years and more). This means that employees were familiar with the applicability of green supply chain management in the organization and its corresponding effect on environmental sustainability. This further means that the opinions of these respondents would be relied on.

4.2.5 Education Level

Question 5 in the questionnaire was used to elicit information on this variable; table 4.5 as demonstrates the finding below

Table 4.5:Levels of Education of the respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Primary	3	5.1	5.1	5.1
	Certificate	12	20.3	20.3	25.4
	Diploma	15	25.4	25.4	50.8
	Degree	20	33.9	33.9	84.7
	Post graduate	9	15.3	15.3	100.0
	Total	59	100.0	100.0	

Source: *Primary Data*

Table 4.5 shows the qualifications of employees at Mukwano Industry as; 3(5.1%) being primary school leavers, 12(20.3%) had certificates, 15(25.4percent) were diploma holders, 20(33.9%) had degrees while9(15.3%) held postgraduate qualifications. This implies that most of the company's employees were elites and therefore clearly understood the variables under investigation. This further meant that staff had technical expertise to perform their duties diligently.

4.3 GREEN SUPPLY CHAIN MANAGEMENT

4.3.1 Equipment modification

The first objective of this study was to establish the relationship between equipment modification, what it entails and whether it's adopted as a reactive or proactive green supply chain management measure. To what extent do you agree with the following statements? Please indicate your answer by using, (SA, A, N, D, SD) SA- strongly agree, A-agree, N- neutral, D-disagree, SD-strongly disagree

Table 4.6: Identify whether respondents understand and practice the theme of equipment modification

		Responses								
N0	**Equipment modification**	**SA F/%**	**A F/%**	**N F/%**	**D F/%**	**SD F/%**	**Min**	**Max**	**Mean**	**Standard deviation**
1	Equipment modification is practiced in Mukwano industries	(46) 78.0%	(10) 16.9%	(03) 5.1%	(0) 0%	(0) 0%	1	3	1.27	.552
2	It is company policy to measure carbon emissions and identify areas of improvement.	(32) 54.2%	(24) 40.7%	(03) 5.1%	(0) 0%	(0) 0%	1	4	1.56	.749
3	It is company policy to adopt measures that are environmentally conscious.	(38) 64.4%	(18) 30.5	(03) 5.1	(0) 0%	(0) 0%	1	3	1.41	.591
4	The company has modified and has changed technology in some production processes so as to produce more efficiently and minimize wastes.	(45) 76.3%	(14) 23.7	(0) 0%	(0) 0%	(0) 0%	1	2	1.24	.429
5	The top management thinks it's important to prevent pollution at source so that the impacts on environment are low.	(37) 62.7	(16) 27.1	(06) 10.2	(0) 0%	(0) 0%	1	3	1.47	.679
6	This practice is specifically adopted because the company is solely interested in maintaining brand image.	(30) 31.6	(29) 30.5	(8) 8.4	(11) 11.6	(17) 17.9	1	3	1.20	.518
7	Equipment modification is mainly influenced by pressures from local authorities and regulatory frame work.	(50) 84.7	(6) 10.2	(3) 5.1	(0) 0%	(0) 0%	1	4	1.44	.876
	Total								**9.59**	**4.394**

The findings in the table 4.6 indicate that, majority of the respondents 94 % (78%+16.9%) agree with the view that Equipment modification is practiced in Mukwano industries. On the other hand no one disagreed with the view that Equipment modification is practiced in Mukwano

industries, 5.1% were not sure whether they. The implication of the above finding is that, the majority and biggest percentage of staff is aware of the practice of equipment modification which is one of the green manufacturing practices intended to reduce emissions and minimise energy usage.

The findings further revealed that, majority of the respondents 94.7 % (54.2%+40.7%) agree that it is company policy to measure carbon emissions and identify areas of improvement and no respondent disregarded the same. while 5.1% were not sure. The implication of the above finding is that, whereas the company is big and would be predominantly occupied with how to reduce costs, they are also cautious of their activities' effect on the environment and that is why they periodically measure carbon emissions to ensure that they are within the set standards.

Table 4.6 further reveals that, It is company policy to adopt measures that are environmentally conscious 64.4% of the respondents strongly agreed, 30.8% agreed, 5.0% were not sure, 0% agreed and 0% strongly agreed that company policy to adopt measures that are environmentally conscious. The results act to collaborate the findings above. These results illustrate that the company has a clear environmental policy that ensures that an integration of environmental thinking in the production activities is achieved.

The findings in the table 4.6 indicate that, majority of the respondents in 96.6% (73.3%+23.3%) agree with the view that the Company has modified and has changed technology in some production processes so as to produce more efficiently and minimize wastes. On the other hand 0% of the respondents disagreed with the same. The implication of the above finding is that, the

company is taking proactive measures to ensure that adverse impacts to the environment are not only minimised at the source but also costs are reduced and since wastages are reduced.

The findings in the table 4.6 indicate that, majority of the respondents 89.8% (62.7%+27.1%) agree with the view that The top management thinks it's important to prevent pollution at source so that the impacts on environment are low, no one of the respondents disagreed with the view that The top management thinks it's important to prevent pollution at source so that the impacts on environment are low.10.1% were not sure. The implication of the above finding is that in a company like Mukwano, to achieve reduction of pollution cannot be a success without the support of top management since they the ones to create funds. So top management support is the most important aspect in achieving the objectives of a green supply chain management.

The findings in the table 4.6 indicate that, majority of the respondents 94.9 % (84.7%+10.2%) agree with the view that This practice is specifically adopted because the company is solely interested in maintaining brand image. On the other hand % (5.1%) was not sure. This implies that management is aware that if the company activities create negative effects on the environment, it will create bad publicity and hence bad image so the company strives to adopt measures that are environmentally sustainable.

The findings in the table 4.6 also indicate that, Equipment modification is mainly influenced by pressures from local authorities and regulatory frame work whereby majority of the respondents agreed in % (76% + 13.6%) whereas 5.1% were not sure. On the other hand 6.8% disagreed with the statement. This implies that it is also true that Mukwano adopts a reactive approach to environmental concerns responding to them only when necessary.

Table 4.7 Relationship between equipment modification and reduction of emissions.

Effectiveness of equipment modification in contribution to reduced emissions	N	Response					Minimum	Maximum	Mean	Standard deviation
		SA F/%	A F/%	N F/%	D F/%	SD F/%				
There are reduced levels of air emissions in Mukwano industries.	59	(28) 47.5	(22) 37.3	(5) 8.5	(4) 6.8	(0) 00%	1	4	1.75	0.883
The company carries out regular environmental audits to check on the levels of emissions.	59	(30) 50.8	(04) 6.8	(10) 16.9	(15) 25.4	(0) 00%	1	4	2.17	1.302
There's increased compliance with environmental standards in mukwano industries	59	(25) 42.4	(16) 27.1	(18) 30.5	(18) 30.5	(0) 00%	1	4	1.885	1.350
The company has realized reduced consumption of energy	59	(39) 66.1	(5) 8.5	(5) 8.5	(10) 16.9	(0) 00%	1	4	2.41	1.036
Obsolete technology has been replaced with more efficient technology which has significantly reduced on emissions.	59	(38) 64.4	(06) 10.2	(7) 11.9	(08) 13.6	(0) 00%	1	4	1.75	1.123
The company's image in the eyes of the consumers has improved.		(38) 64.4	(07) 11.9	(7) 11.9	(7) 11.9	(0) 00%	1	4	1.71	1.084
The company shares a strong relationship with NEMA		(29) 49.2	(15) 25.4	(4) 6.8	(11) 18.6	(0) 00%	1	4	1.95	1.151
Total									13.625	7.929

Source: Primary data

From table 4.7, results show that respondents generally agreed with items related to the Effectiveness of equipment modification in contribution to reduced emissions having mean ≤ (less or equal) to 5. It was revealed that are reduced levels of air emissions in Mukwano industries (mean =1.75), the company carries out regular environmental audits to check on the levels of emissions (Mean =2.17), respondents also agreed that there's increased compliance with environmental standards in Mukwano industries (Mean = 2.17), it also found out that Obsolete technology has been replaced with more efficient technology which has significantly reduced on emissions (Mean =1.885), the study further showed that the company's image in the

eyes of the consumers has improved (Mean =1.71). It also found out that the company shares a strong relationship with NEMA (Mean = 3.87). The company shares a strong relationship with NEMA (mean =1.95)

Table 4.8 the correlations between equipment modification and reduction of emissions.

Correlations

		The company has modified and has changed technology in some production processes so as to produce more efficiently and minimize wastes.	Obsolete technology has been replaced with more efficient technology which has significantly reduced on emissions.
The company has modified and has changed technology in some production processes so as to produce more efficiently and minimize wastes.	Pearson Correlation	1	.914(**)
	Sig. (2-tailed)		.000
	N	59	59
Obsolete technology has been replaced with more efficient technology which has significantly reduced on emissions.	Pearson Correlation	.914(**)	1
	Sig. (2-tailed)	.000	
	N	59	59

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

To test for the effect of equipment modification on reduction of emissions, the researcher used correlations. There is a significant correlation with a 91.4%. This means that for every equipment modified in Mukwano industries there is corresponding change of 91.4% where obsolete technology is replaced with more efficient one. And whenever this happens there are reduced emissions in Mukwano industries.

4.4 Input substitution

This question sought to identify whether respondents understood and practiced the theme of input substitution, what it entails and whether it's adopted as a reactive or proactive green supply chain management practice?

Table 4.9: Level of knowledge on Input substitution in Mukwano industries.

		Responses								
N 0	**Input substitution**	**SA F/%**	**A F/ %**	**N F/%**	**D F/%**	**SD F/%**	**MIN**	**MAX**	**Mean**	**Standard deviation**
1	Involves replacement of a substance, process, product or service by another that maintains the same functionality	(44) 74.6 %	(13) 22.0 %	(2) 3.4%	(0) 0%	(0) 0%	1	4	1.29	.527
2	There's need to substitute input material with renewable material or materials which have longer service life time production.	(48) 81.4	(10) 16.9	(1) 1.7	(0) 0%	(0) 0%	1	3	1.20	.446
3	The purpose is to replace toxic input with material that is less harmful to humans and the environment	(42) 71.2	(10) 16.9	(03) 5.1	(04) 6.8	(0) 0%	1	4	1.47	.878
4	The practice can be a success even if the substitute alters the functionality.	(15) 25.4	(2) 3.4	(2) 3.4	(10) 16.9	(30) 50.8	1	5	3.64	1.700
5	The practice of input substitution happens in mukwano industries all the time and am aware of some materials that have been substituted.	(35) 59.3	(15) 25.4	(7) 11.9	(2) 3.4	(0) 0%	1	4	1.59	.833
6	The practice was adopted because of pressures from NEMA.	(41) 69.5	(10) 16.9	(1) 1.7	(0) 0%	(07) 11.9	1	5	1.68	1.306
7	The employees/ workers have complained of consuming toxic and hazardous material.	(35) 59.3	(13) 22	(4) 6.8	(7) 11.9	(0) 0%	1	4	1.71	1.035
	The suppliers are evaluated on specific environmental criteria.	(15) 25.4	(19) 32.2	(15) 25.4	(5) 8.5	(5) 8.5	1	5	2.42	1.206
	Total								**15**	**7.931**

The findings in the above table 4.9 indicate that, majority of the respondents 96.6% (74.6%+22.0%) agree the view that Involves replacement of a substance, process, product or service by another that maintains the same functionality. On the other hand no respondents disagreed with the view that 3.4% were not sure. The implication of the above finding is that most respondents understand the aspirations of the practice of input substitution which involves

replacement of a substance, process, product or service by another that maintains the same functionality to increase efficiency and or minimise wastes and reduce emissions.

The findings in table 4.9 revealed that, majority of the respondents98.3 % (81.4%+ 16.9%) agreed that there's need to substitute input material with renewable material or materials which have longer service life time production, and none of the respondents disagreed that, there's need to substitute input material with renewable material or materials which have longer service life time production while 5.1% were not sure. The implication of the above finding is that, the respondents understand the details and extent to which input substitution should be done.

The findings in the above table 4.9 indicate that majority of the respondents agreed 88.1 %(71.2% +16.9%) that the purpose of input substitution is to replace toxic input with material that is less harmful to humans and the environment. 5.1% were not sure and 6.8% respondents disagreed. These findings reveal that majority of the respondents have seen this practice in Mukwano industries and are aware of its intentions and purpose.

Table 4.9 further reveals that the practice cannot be a successful the substitute alters the functionality, 25.4% of the respondents strongly agreed, and 3.4% agreed, 3.4% were not sure, 16.9% disagreed and 50.8% strongly disagreed that the practice can be a success even if the substitute alters the functionality. The results imply that majority the respondents are aware that for input substitution to be achieved, the substituted input should not alter or interfere with the existing functionality.

Table 4.9indicate that, the practice was adopted because of pressures from NEMA majority of the respondents where %(69.5%+16.9%) agree with the view. On the other hand no respondents disagreed but11.9%strongly disagreed with the view that 1.7% were not sure. The implication of the above finding is that pressures from regulatory authorities influence decisions in Mukwano industries, and further implies that there are still environmental issues in the company which compel NEMA to intervene.

Table 4.9 indicate that, the majority of respondents agree that the suppliers are evaluated on specific environmental criteria where % (25.4%+32.2%) strongly agreed and agreed respectively. However 25.4% were not sure. On the other hand (8.5 %+8.5) disagreed with the view. This implies that the majority are aware of the suppliers being evaluated on particular a environmental criterion which prevents the supply of materials which have hazardous or toxic elements. However 25.4% are not sure meaning they either not aware of the practice or management has done little to communicate to staff on the practices.

4.4.1 Reduced consumption of hazardous material (effectiveness of input substitution contributes to the reduction in consumption of hazardous material in Mukwano industries)

This question aims at determining the extent to which input substitution contributes to the reduction in consumption of hazardous material in Mukwano industries

Table 4.10: Reduced consumption of hazardous material

Effectiveness of input substitution in enhancing reduction in consumption of hazardous material	N	Response					Minimum	Maximum	Mean	Standard deviation
		SA F/%	A F/%	N F/%	D F/%	SD F/%				
There is reduced consumption of hazardous, material in mukwano industries because the raw material suppliers are evaluated on particular environmental criteria.	59	(28) 47.5	(11) 18.6	(10) 16.9	(05) 8.5	(05) 8.5	1	5	4.55	0.857
The company carries out environmental audits to check on the impacts of the different activities on the environment.	59	(30) 50.8	(10) 16.9	(0) 00%	(10) 16.9	(9) 15.3	1	5	3.88	0.998
The numbers of accidents due to toxic materials in the factory have reduced.	59	(30) 50.8	(10) 16.9	(9) 15.3	(10) 16.9	(0) 00%	2	4	4.14	1.015
The environmental audits have been carried out and we have acquired ISO certifications because we are within the established environmental standards.	59	(33) 55.9	(11) 18.6	(10) 16.9	(5) 8.5	(0) 00%	2	4	3.87	0.661
The management has implemented environment management systems which help us track the environmental impacts of our inputs/ raw material.	59	(20) 33.9	(15) 25.4	(7) 11.9	(17) 28.8	(0) 00%	2	5	4.45	0.869
It is important to note that Environmental concerns are not a priority in Mukwano industries because there are other pressing issues.	59	(10) 16.9	(7) 11.9	(10) 16.9	(22) 37.3	(10) 16.9	1	5	3.25	1.347
A waste treatment plant is the most appropriate solution for hazardous waste management.	59	(29) 49.2	(5) 8.5	(6) 10.2	(13) 22.0	(6) 10.2	1	5	2.36	2.000
Total									26.5	7.747

Source: primary data

From table 4.10, results show that respondents generally agreed with items related to Effectiveness of input substitution in enhancing reduction in consumption of hazardous material having mean $\leq$ (less or equal) to 5. It was revealed that There is reduced consumption of hazardous, material in Mukwano industries because the raw material suppliers are evaluated on particular environmental criteria (mean =4.55), The company carries out environmental audits to check on the impacts of the different activities on the environment, (Mean =3.88), respondents

also agreed that The numbers of accidents due to toxic materials in the factory have reduced, (Mean =4.14), it also found out that the environmental audits have been carried out and we have acquired ISO certifications because we are within the established environmental standards (Mean =3.87), the study further showed that management has implemented environment management systems which help us track the environmental impacts of our inputs/ raw material. (Mean = 4.45). It also found out that the It is important to note that Environmental concerns are not a priority in Mukwano industries because there are other pressing issues, (mean =3.25) the study further showed that A waste treatment plant is the most appropriate solution for hazardous waste management, (mean=2.36).

4.5 Onsite recovery

This question seeks to identify whether respondents understand and practice the theme of onsite recovery/reuse, what it entails and whether it's adopted as a reactive or proactive green supply chain management practice.

Table 4.11: The level of knowledge on Onsite recovery among employees in Mukwano.

N0	Onsite recovery/ reuse	Responses SA F/%	A F/%	N F/%	D F/%	SD F/%	MIN	MAX	Mean	Standard deviation
1	The practice aims at reducing energy and water consumption, releasing fewer greenhouse gases	(42) 71.2 %	(10) 16.9%	(06) 10.2%	(1) 1.7%	(0) 00%	1	4	1.42	.747
2	There is creation of cleaner air and water while creating jobs for the people who handle and process the recovered materials	(45) 76.3 %	(9) 15.3	(5) 8.5	(0) 00%	(0) 00%	1	3	1.32	.628
3	By onsite recovery management reduces utility costs while converting "waste" into a tradable commodity	(45) 76.3	(05) 8.5	(9) 15.3	(0) 00%	(0) 00%	1	3	1.32	.743
4	The practice involves utilizing material discarded as useless by one process to be useful in another.	(43) 72.9	(7) 11.9	(4) 6.8	(05) 8.5	(0) 00%	1	4	1.51	.954
5	Onsite recovery is practiced because there are frequent government inspections on the firm.	(39) 66.1	(04) 6.8	(07) 11.9	(04) 6.8	(05) 8.5	1	5	1.885	1.350
6	The recovered material is recycled and sold	(14) 23.7	(17) 28.8	(18) 30.5	(10) 16.9	(0) 00%	1	4	2.41	1.036
7	The recovered material is destroyed or taken to a landfill.	(32) 54.2	(17) 28.8	(10) 16.9%	(0) 00%	(0) 00%	1	3	1.63	.763
8	The company is compelled to recover materials due to legislation and pressures from customers.	(40) 54.2 %	(17) 28.8%	(10) 16.9%	(0) 00%	(0) 00%	1	4	1.51	.878
9	The materials recovered are plastics, solid wastes and waste water.	(26) 44.1	(12) 20.3	(6) 10.2	(15) 25.4	(0) 00%	1	4	2.17	1.248
	Total								**15.175**	**8.347**

Source: Primary data

The findings in the table 4.11indicate that, majority of the respondents88.1 % (71.2%+16.9%) agreed the view that the practice aims at reducing energy and water consumption, releasing fewer greenhouse gases. On the other hand 1.7% of the respondents disagreed with the view that. 10.2% were not sure whether they. The implication of the above finding is that, the practice aims

at reducing energy and water consumption, releasing fewer greenhouse gases and the staffs are aware of this fact.

The findings in the above table indicate that, majority of the respondents 91.6% (76.3%+15.3%) agreed the view that there is creation of cleaner air and water while creating jobs for the people who handle and process the recovered materials. On the other hand none of the respondents disagreed with the view.8.5% were not sure. The implication of the above finding is that, while on site recovery is practiced it helps in creating clean air and water. This not only helps in creating a friendly environment for both staff and surrounding environment but also helps creating jobs for people.

The findings in the table 4.11 indicate that, majority of the respondents 84.8 % (76.3%+8.5%) agreed the view that by onsite recovery management reduces utility costs while converting "waste" into a tradable commodity. On the other hand 0% of the respondents disagreed with the view. 15.3% were not sure. The implication of the above finding is that the staff understands clearly the intentions of onsite recovery and also that the recovered material is converted into useful commodity.

The findings in the above table indicate that, majority of the respondents 84.8% (72.9%+11.9%) agreed the view that The practice involves utilizing material discarded as useless by one process to be useful in another. On the other hand 8.5 % of the respondents disagreed with the view were 6.8% not sure whether they. The implication of the above finding is that, for onsite recovery to be an effective GSCM practice the recovery has to be on site. By the majority of staff agreeing with the statement this means that they are familiar with this practice.

The findings in the above table indicate that, majority of the respondents 72.9% (66.1%+6.8%) agreed the view that Onsite recovery is practiced because there are frequent government inspections on the firm. On the other hand 15.3% (8.5%+6.8%) of the respondents disagreed with the view. 11.9% were not sure whether they. The implication of the above findings is that among other practices onsite recovery to be influenced by frequent government inspections means that the management has adopted a reactionary approach to tackle environmental issues.

The findings in the above table indicate that, majority of the respondents 52.5% (23.7%+28.8%) agreed the view that the recovered material is recycled and sold. On the other hand 16.9% of the respondents disagreed with the view. 30.5 % were not sure whether they. The implication of the above finding is that, since the majority of the respondents agree that recovered material is recycled and sold, management is conscious about the environment thus taking a materials management approach to the environment by reducing on usage of raw material reducing impacts on the environment.

The findings in the above table indicate that, majority of the respondents 83% (54.2%+28.8%) agreed the view that the recovered material is destroyed or taken to a landfill. On the other hand 0% of the respondents disagreed with the view. 16.9% were not sure whether they. The implication of the above finding is that, during the process of destruction and taking recovered material to the landfill emissions are released into the air affecting the company's environmental performance.

The findings in the above table indicate that, majority of the respondents 82.7% (54.2%+28.8%) agreed the view that The company is compelled to recover materials due to legislation and

pressures from customers. On the other hand none of the respondents disagreed with the view. 16.9% were not sure whether they. The implication of the above finding is that, The Company is compelled to recover materials due to legislation and pressures from customers.

The findings in the above table indicate that, majority of the respondents % (44.1%+20.3%) agreed the view that the materials recovered are plastics, solid wastes and waste water. On the other hand 25.4% of the respondents disagreed with the view. 10.2% were not sure whether they. The implication of the above finding is that, the materials recovered are plastics, solid wastes and waste water however the finding that 25.4% disagreed with the statement implies that there are materials recovered like oil.

4.5.1Effectiveness of onsite recovery in enhancing the practice of recycling.

Recycling

This question aimed at determining the relationship between onsite recovery and implementation of recycling in Mukwano industries.

Table 4.12:The effectiveness of onsite recovery on recycling

Effectiveness of onsite recovery in the implementation of recycling.	N	Response					Minimum	Maximum	Mean	Standard deviation
		SA F/%	A F/%	N F/%	D F/%	SD F/%				
The practice of onsite recovery has ensured that waste material on site is reused by recycling the material into useful products that are sold.	59	(40) 67.8	(8) 13.6	(1) 1.7	(10) 16.9	(0) 00%	1	4	1.68	1.136
The material recovered onsite is recycled and sold off as chicken and animal feed which has reduced on pollution on the environment.	59	(30) 50.8	(6) 10.2	(14) 23.7	(9) 15.3	(0) 00%	1	4	2.03	1.174
This practice has reduced on the demand of raw material like wood because we reuse waste from one process as fuel in another and this helped in preservation of biomass/ forests.	59	(32) 54.2	(09) 15.3	(7) 11.9	(11) 18.6	(0) 00%	1	5	2.25	1.636
The recovered material has necessitated management to establish a waste treatment plant where solid and waste water is treated for reuse.	59	(30) 50.8	(9) 15.5	(12) 20.3	(8) 13.6	(0) 00%	1	5	2.31	1.578
Establishing a recycling plant is too costly and management thinks it is cheaper to dump wastes elsewhere.	59	(13) 22.0	(8) 13.6	(29) 49.2	(9) 15.3	(0) 00	1	9	3.83	.2534
More jobs have been created on the premises because management has hired people to recover waste material which it recycles	59	(27) 45.8	(5) 8.5	(6) 10.2	(16) 27.1	(5) 8.5	1	5	2.44	1.500
Recycling is not necessary, it's costly and requires establishing new production lines which the company may not afford.	59	(13) 22.2	(4) 6.8	(13) 22.2	(29) 49.2	(0) 00%	1	4	3.76	1.590
Total									18.3	8.8674

Source: primary data

From table 4.11, results show that respondents generally agreed with items related to Effectiveness of onsite recovery in the implementation of recycling having mean ≤ (less or equal) to 5. It was revealed that The practice of onsite recovery has ensured that waste material

on site is reused by recycling the material into useful products that are sold, (mean =1.68), The material recovered onsite is recycled and sold off as chicken and animal feed which has reduced on pollution on the environment, (Mean =2.03), respondents also agreed that This practice has reduced on the demand of raw material like wood because we reuse waste from one process as fuel in another and this helped in preservation of biomass/ forests, (Mean =2.25), it also found out that the recovered material has necessitated management to establish a waste treatment plant where solid and waste water is treated for reuse (Mean =2.31), the study further showed that Establishing a recycling plant is too costly and management thinks it is cheaper to dump wastes elsewhere (Mean =3.83). It also found out that More jobs have been created on the premises because management has hired people to recover waste material which it recycles (mean =2.44) the study further showed that Recycling is not necessary, it's costly and requires establishing new production lines which the company may not afford., (mean=3.76).

Table 4.13The effectiveness of onsite recovery on enhancing the practice of recycling

Correlations

		The practice involves utilizing material discarded as useless by one process to be useful in another.	This practice has reduced on the demand of raw material like wood because we reuse waste from one process as fuel in another and this helped in preservation of biomass/ forests.
The practice involves utilizing material discarded as useless by one process to be useful in another.	Pearson Correlation	1	.855**
	Sig. (2-tailed)		.000
	N	59	59
This practice has reduced on the demand of raw material like wood because we reuse waste from one process as fuel in another and this helped in preservation of biomass/ forests.	Pearson Correlation	.855**	1
	Sig. (2-tailed)	.000	
	N	59	59

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

The results in table 4.13 illustrate that there is a significant effect of onsite recovery on the practice of recycling where upon testing on whether the discarded material is recovered from one process and used in this has led to reduction in demand for raw material like wood that is used as fuel. There is a high correlation coefficient of 85.5% and correlation has been significant with 0.01 levels between the two variables. This means that each time discarded material from one process is reused in another; there is an 85.5% change. In fact of the one of the respondents' revealed that actually the solid waste and waste water that is recovered is used to produce biogas with supplements the other energies.

Table 4.14Regression analysis to illustrate the relationship between green supply chain management and environmental sustainability

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.695[a]	.482	.454	.973

a. Predictors: (Constant), The practice aims at reducing energy and water consumption, releasing fewer greenhouse gases, The company has modified and has changed technology in some production processes so as to produce more efficiently and minimize wastes., The purpose is to replace toxic input with material that is less harmful to humans and the environment

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	48.556	3	16.185	17.090	.000[a]
	Residual	52.088	55	.947		
	Total	100.644	58			

a. Predictors: (Constant), The practice aims at reducing energy and water consumption, releasing fewer greenhouse gases, The company has modified and has changed technology in some production processes so as to produce more efficiently and minimize wastes., The purpose is to replace toxic input with material that is less harmful to humans and the environment

b. Dependent Variable: There's increased compliance with environmental standards in mukwano industries

From the results above indicate that the predictor variables of green supply chain management explain 69.5% (r) of variations in environmental sustainability. This means that with every change in technology, replacement of toxic material, there is a corresponding change 69.5% in the dependent variable which is environmental performance and consequently sustainability.

CHAPTER FIVE

CONCLUSSION AND RECOMMANDATION

5.0 Introduction

This chapter gives a discussion of the findings of the study, a summary of the findings, conclusion and recommendations which are in line with the objectives of the study as well as suggestions for future research.

5.1 Summary of findings

The study established a number of findings as below;

The study evidently revealed that equipment modification is practiced in Mukwano industries table 4.6 and this has helped in reduction of emissions and reduced on energy consumption and that there is increased compliance with environmental standards. Respondents agreed that the company's image in the eyes of the consumers has improved and that the company shares a strong relationship with NEMA table 4.7.

From table 4.10, results show that respondents generally agreed with items related to Effectiveness of input substitution in enhancing reduction in consumption of hazardous material. It was revealed that; there is reduced consumption of hazardous material in Mukwano industries because the raw material suppliers are evaluated on particular environmental standards; The company carries out environmental audits to check on the impacts of the different activities on the environment.

Respondents also agreed that the numbers of accidents due to toxic materials in the factory have reduced. It also found out that the environmental audits have been carried out and we have acquired ISO certifications because we are within the established environmental standards

Results revealed that respondents generally agreed with items related to Effectiveness of onsite recovery in the implementation of recycling having mean ≤ (less or equal) to 5. It was revealed that the practice of onsite recovery has ensured that waste material on site is reused by recycling the material into useful products that are sold The material recovered onsite is recycled and sold off as chicken and animal feed which has reduced on pollution on the environment, respondents also agreed that This practice has reduced on the demand of raw material like wood because we reuse waste from one process as fuel in another and this helped in preservation of biomass/ forests, it also found out that the recovered material has necessitated management to establish a waste treatment plant where solid and waste water is treated for reuse.

The study showed that there is a positive and significant link between GSCM practices and environmental performance and thus sustainability. They further revealed that there is a consistent relationship between the independent variable and dependent variables, where equipment modification has led to reduction of emissions and wastes, input substitution has reduced the consumption of hazardous material. Then onsite recovery has facilitated the establishment of waste treatment plant and a biogas facility which compliments on the energy usage.

The results also illustrated that the GSCM are adopted because the company desires to maintain it's corporate or brand image.The findings further demonstrated the importance of legislation and regulations to the GSCM by Mukwano industries. The fear of legislation associated with compliance with environmental standards and regulations were outstanding drivers of GSCM. .It's believed that these are defensive and reactionary drivers of practices and performance.

5.2 Discussion of the major findings

5.2.1 The effectiveness of equipment modification in the reduction of emissions in Mukwano industries.

The findings in the table 4.6 indicate that, majority of the respondents 94.9 % (78%+16.9%) agree the view that Equipment modification is practiced in Mukwano industries. On the other hand no one disagreed with the view that Equipment modification is practiced in Mukwano industries, 5.1% were not sure whether they. The implication of the above finding is that, the biggest percentage of staff is aware of the practice of equipment modification which is one of the green production measures whose main aim is to reduce on energy wastage, waste and emissions. It is said without the support of the employees, an environmental program will rarely succeed. It is imperative to engage and consult with employees before starting and during the development and implementation phase of an environmental program. Employees also have a better understanding of the areas where savings can occur and of small improvements that have the potential to make a big difference, Gracie and Kuehnel, (http://green.hotelscombined.com, accessed 8th/10/2014)

The findings further revealed that, majority of the respondents 94.9 % (54.2%+40.7%) agree that It is company policy to measure carbon emissions and identify areas of improvement and no respondent disregarded the same. while 5.1% were not sure. The implication of the above finding is that, whereas the company is big and would be predominantly occupied with how to reduce costs, they are also cautious of their activities' effect on the environment and that is why they periodically measure carbon emissions to ensure that they are within the set standards. David Simchi-Levi, (2008) emphasised that the supply chain creates one of the biggest carbon

footprints through the production, storage and transportation of goods. The ability to determine the carbon footprint for the entire supply chain and make strategic decisions based on ecology but not only on cost is an important consideration.

Table 4.6 further reveals that, It is company policy to adopt measures that are environmentally conscious 64.4% of the respondents strongly agreed, 30.8% agreed, 5.0% were not sure, 0% agreed and 0% strongly agreed that company policy to adopt measures that are environmentally conscious. The results act to collaborate the findings above. These results illustrate that the company has a clear environmental policy that ensures that an integration of environmental thinking in the production activities is achieved. According to, Graci and Jacqueline, (http://green.hotelscombined.com, accessed 8th/10/2014) an environmental policy statement should be written to communicate both internally and externally. They add and say that employees should be made aware of the policies and initiatives, as well as the goals and objectives of the environmental program. This information should be included in training documentation, in orientation packages for new employees, as well as other staff training methods, with the aim to integrate these policies into the organization.

The findings in the above table 4.6 indicate that, majority of the respondents in 96.6% (73.3%+23.3%) agree with the view that the Company has modified and has changed technology in some production processes so as to produce more efficiently and minimize wastes. On the other hand 0% of the respondents disagreed with the same. Technology upgrading can be interpreted as the adoption of greener technology (Cunha-E-SA and REIS 2007).The implication of the above finding is that, the company is taking proactive measures to ensure that adverse

impacts to the environment are not only minimised at the source but also costs are reduced and since wastages are reduced. Sustainable development requires private corporations to adopt "green technology", which in many cases also improves a firm's profitability Vesilind *et al,* (2006). Environmental technology preserves natural environment and resources, and using environmental science reduces the disadvantageous impacts of human activities Wikipedia, (2007).Green technologies help companies to remain environmentally sound and globally competitive, Green-Tech (2010).

The findings in the above table indicate that, majority of the respondents 89.8 % (62.7%+27.1%) agree with the view that The top management thinks it's important to prevent pollution at source so that the impacts on environment are low, no one of the respondents disagreed with the view that The top management thinks it's important to prevent pollution at source so that the impacts on environment are low.10.1% were not sure. The implication of the above finding is that in a company like Mukwano, to achieve reduction of pollution cannot be a success without the support of top management. Rajesh. K., Rituraj. C., (2012), Management support includes support for GSCM ideas and practices from top and middle level management and cooperation across organizational functions. They assert that there is a significant positive relationships between organizational learning mechanisms, organizational support and the adoption of GSCM practices, after controlling for a number of other influences including regulations, marketing, supplier, cost pressures, industry levels of the relevant practice and organizational size. Increasing pressures from a variety of directions have caused the supply chain managers to consider and initiate implementation of green supply chain management (GSCM) practices to improve both their economic and environmental performance

The findings in the above table 4.6indicate that, majority of the respondents 94.9 % (84.7%+10.2%) agrees with the view that this practice is specifically adopted because the company is solely interested in maintaining brand image. On the other hand 5.1% (5.1%) were not sure. This implies that whereas it has been found out that Mukwano endeavours to reduce pollution at source by adopting practices that are environmentally conscious, with the aim to promote company image these findings correspond with those in Testa and Irlado (2010) who proved that there is a positive relationship between adopting GSCM practices and enhanced reputation and brand image of an organization.

The findings in table 4.6 also indicate that, Equipment modification is mainly influenced by pressures from local authorities and regulatory frame work whereby majority of the respondents agreed in 89.6 % (76% + 13.6%) whereas 5.1% were not sure. On the other hand 6.8% disagreed with the statement. This implies that it is also true that Mukwano adopts a reactive approach to environmental concerns responding to them only when necessary. Zhu and Sarkis (2006) have investigated the occurrence of thirteen pressures and drivers for GSCM in automobile industry and other industries in China and results indicated that pressures and drivers for automobile industry in China are the greatest among other Chinese industries. Regulatory compliance is indicated as one from the main pressures for companies to adopt GSCM.

Table 4.6 revealed that majority of the respondents agreed that there are reduced levels of air emissions in Mukwano industries with a mean of 1.75 and that there is increased compliance with environmental standards with mean of 2.17 and majority of respondents agree that the companies image in the eyes of the consumers has improved with mean of 1.71 and that the

company shares a strong relationship with NEMA with a mean of 1.95. These findings suggest that equipment modification has enhanced environmental sustainability in Mukwano industries since the respondents are in agreement with the existence of the performance indicators. Indicators help manufacturing companies to understand environmental issues surrounding existing production systems, to define specific objectives and to monitor progress towards sustainable production, OECD, (2009).

5.1.2 The effectiveness of input substitution in reducing the consumption of hazardous material in Mukwano industries.

The findings in table 4.9 indicate that, majority of the respondents 96.6% (74.6%+22.0%) agree the view that Involves replacement of a substance, process, product or service by another that maintains the same functionality. On the other hand no respondents disagreed with the view that 3.4% were not sure. The implication of the above finding is that most respondents understand the aspirations of the practice of input substitution which involves replacement of a substance, process, product or service by another that maintains the same functionality to increase efficiency and or minimise wastes and reduce emissions. This is in line with the OECD, (2009) findings who argue that alternatives such as the introduction of goods and services should be able to fulfil the same functional need and operate as substitutes for other products. And in the same vain with the definition on , (http://www.agriculturesnetwork.org accessed 16th September 2014), Substitution should aim over the whole life cycle of the replacement to obviate any negative impacts on human health or the environment and improve resource efficiency but maintaining the same functionality.

The findings in table 4.9 indicate that majority of the respondents agreed 88.1 %(71.2% + 16.9%) that the purpose of input substitution is to replace toxic input with material that is less harmful to humans and the environment. 5.1% were not sure and 6.8% respondents disagreed. These findings reveal that majority of the respondents have seen this practice in Mukwano industries and are aware of its intentions and purpose. Akzo Nobel's approach on the use of substances that are considered to be hazardous in its products is subject to a number of driving forces: among them, concern for man and the environment, available technology, legislation and regulations, market forces, product specifications, availability of alternatives and customer acceptance. (https://www.akzonobel.com/system/images accessed 16th September 2014). Input Substitution may be seen as one element in the management of business risk, but one which specifically supports the overall objectives of reducing or avoiding negative impacts on human health or the environment and improving resource efficiency, while maintaining functionality, UK chemical stake holder forum, (2010).

Table 4.9 indicate that, the practice was adopted because of pressures from NEMA majority of the respondents where % (69.5%+16.9%) agree with the view. On the other hand no respondents disagreed but 11.9% strongly disagreed with the view that 1.7% were not sure. The implication of the above finding is that pressures from regulatory authorities influence decisions in Mukwano industries, and further implies that there are still environmental issues in the company which compel NEMA to intervene. Hoskin (2011) mentioned that government legislation is one of the major drivers influencing GSCM practices adoption in an industry and the country. This hinges on whether a company is proactive or reactive in its GSCM measures. According to Rajesh and Chandrakar, (2012), Proactive companies usually have greater implementation of

environmental practices beyond requirements of laws and regulations, while reactive companies only seek compliance with regulatory requirements.

From table 4.10, results show that respondents generally agreed with items related to Effectiveness of input substitution in enhancing reduction in consumption of hazardous material having mean ≤ (less or equal) to 5. It was revealed that There is reduced consumption of hazardous, material in Mukwano industries because the raw material suppliers are evaluated on particular environmental criteria (mean =4.55), The company carries out environmental audits to check on the impacts of the different activities on the environment, (Mean =3.88), respondents also agreed that The numbers of accidents due to toxic materials in the factory have reduced, (Mean =4.14), it also found out that the environmental audits have been carried out and we have acquired ISO certifications because we are within the established environmental standards (Mean =3.87), the study further showed that management has implemented environment management systems which help us track the environmental impacts of our inputs/ raw material. (Mean = 4.45). It also found out that the It is important to note that Environmental concerns are not a priority in Mukwano industries because there are other pressing issues, (mean =3.25) the study further showed that A waste treatment plant is the most appropriate solution for hazardous waste management, (mean=2.36).

The results reveal that there are indicators of environmental sustainability in Mukwano industries. Testa and Iraldo, (2010) proposed green practices include the sale of excess inventory, sale of scrap and used material, environmental auditing programs, commitment from senior managers and total quality environment management.One of the more widely used voluntary actions and indicators of environmental sustainability involves an environmental management system (EMS). Industrial facilities that adopt EMS systematically develop an environmental

policy, evaluate their internal processes that affect the environment, create objectives and targets, monitor progress, and undergo management review, Toshi *et al*, (2011).

5.1.3 The effectiveness of onsite recovery/ reuse in implementing the practice of recycling in Mukwano Industries

The findings in the table 4.11indicate that, majority of the respondents 84.8% (72.9%+11.9%) agreed the view that The practice involves utilizing material discarded as useless by one process to be useful in another. On the other hand 8.5 % of the respondents disagreed with the view were 6.8% not sure whether they. The implication of the above finding is that, for onsite recovery to be an effective GSCM practice the recovery has to be on site. By the majority of staff agreeing with the statement is evident that the respondents have seen this practice and therefore familiar with it.

Onsite recovery is one of the green manufacturing practices which involves reuse of the wasted materials in the same process or for another useful application within the company, (www.unido.org, accessed 16th/09/2014). A strong resource recovery program addresses all three pillars of sustainability: environment (i.e. reduces energy and water consumption, releasing fewer greenhouse gases), society (i.e. creates cleaner air and water while creating jobs for the people who handle and process the recovered materials), and economy (i.e. reduces utility costs while converting "waste" into a tradable commodity), Biennial sustainability report, (2012).

The findings in the table 4.11 indicate that, majority of the respondents 72.9% (66.1%+6.8%) agreed the view that Onsite recovery is practiced because there are frequent government inspections on the firm. On the other hand 15.3% (8.5%+6.8%) of the respondents disagreed with the view. 11.9% were not sure whether they. The implication of the above findings is that among other practices onsite recovery to be influenced by frequent government inspections

means that the management has adopted a reactionary approach to tackle environmental issue The findings also indicate that, majority of the respondents 82.7% (54.2%+28.8%) agreed the view that The company is compelled to recover materials due to legislation and pressures from customers. On the other hand none of the respondents disagreed with the view. 16.9% were not sure. The findings in the above table indicate that, majority of the respondents 82.7% (54.2%+28.8%) agreed the view that The company is compelled to recover materials due to legislation and pressures from customers. On the other hand none of the respondents disagreed with the view. 16.9% were not sure whether they. The implication of the above finding is that, The Company is compelled to recover materials due to legislation and pressures from customers. The implication of the above finding is that, The Company is compelled to recover materials due to legislation and pressures from customers. Hoskin (2011) mentioned that government legislation is one of the major drivers influencing GSCM practices adoption in an industry and the country.

The findings in the table indicate that, majority of the respondents 64.4% (44.1%+20.3%) agreed the view that the materials recovered are plastics, solid wastes and waste water. On the other hand 25.4% of the respondents disagreed with the view. 10.2% were not sure whether they. The implication of the above finding is that, the materials recovered are plastics, solid wastes and waste water however the finding that 25.4% disagreed with the statement implies that there are materials recovered like oil.

From table 4.12, results show that respondents generally agreed with items related to Effectiveness of onsite recovery in the implementation of recycling having mean $\leq$ (less or

equal) to 5. It was revealed that The practice of onsite recovery has ensured that waste material on site is reused by recycling the material into useful products that are sold, (mean =1.68), The material recovered onsite is recycled and sold off as chicken and animal feed which has reduced on pollution on the environment, (Mean =2.03), respondents also agreed that This practice has reduced on the demand of raw material like wood because we reuse waste from one process as fuel in another and this helped in preservation of biomass/ forests, (Mean =2.25), it also found out that the recovered material has necessitated management to establish a waste treatment plant where solid and waste water is treated for reuse (Mean =2.31), the study further showed that Establishing a recycling plant is too costly and management thinks it is cheaper to dump wastes elsewhere (Mean =3.83). It also found out that More jobs have been created on the premises because management has hired people to recover waste material which it recycles (mean =2.44) the study further showed that Recycling is not necessary, it's costly and requires establishing new production lines which the company may not afford., (mean=3.76).These results illustrate that onsite recovery is effective in enhancing the practice of recycling.

For a successful recycling system to be implemented, a company needs to think about several crucial elements: working and using products that are recyclable entirely or most parts of the product are and establishing a system through which used products can be collected and returned to the manufacturing unit or to another waste management site (Lee *et al.*, 1995).

The integration of the process of recycling in the supply chain of a business is called remanufacturing and refers to product recovery through reuse or recycling (Hoshino *et al.*, 1995). This is evident in Mukwano because they not only recover solid wastes and waste which is recovered to produce biogas, they also recover oils which are recycled for remanufacture to

make jelly. However, it is argued that although integrating product remanufacturing in a supply chain helps the preservation of the environment and has a good social element; it is a complex and slow process which needs to be implemented only if this would be commercially viable to be integrated (Dekker *et al.*, 2004; Durpas, 2008; Emmet and Crocker, 2008). The process should be an economically efficient and feasible process and should not negatively influence the production of goods and the profitability of the business (Johnson and Wang, 1995).

5.3Conclusions

The activities of industries and businesses are deteriorating the environment and soon a day will come when the damages done to our Earth will become irreparable. Thus, it can be concluded that GSCM is inevitable if the Earth is to be kept green and appropriate measures /practices may be adopted by the industries to minimise the detrimental effect on the environment. The study investigated the effectiveness of the GSCM practices adopted by Mukwano industries in enhancing environmental sustainability and a number of GSCM and environmental sustainability indicators were provided in the questionnaire. The results showed that the GSCM practices of equipment modification, input substitution and onsite recovery are actually practiced in Mukwano industries. The results indicated that there is a significant positive relationship between the discussed GSCM practices and environmental sustainability. However it should be noted that these results also illustrated the importance of legislation and regulation as important drivers of GSCM management.

5.4 Recommendations

Mukwano industries needs to understand the potential positive impact that green supply chain practices can have of different dimensions of performance and consequently, be more pro-active in their adoption of such practices

The government should develop a toolbox or manual to help manufacturing companies use existing indicator sets to improve their environmental performance by providing guidance and general recommendations on the use, terminology, standard processes and methodologies of indicators.

Mukwano industries should standardize methodologies for material flow analysis at the micro level as this is considered as one of the most effective tools for improving energy and resource efficiency.

NEMA should collect interesting examples of different practices of GSCM from around the world and conduct an in-depth study on processes that help achieve eco-innovation in order to draw lessons for practitioners and policy makers.

NEMA should compile the industry and policy best practices and should be freely accessible online database for knowledge sharing and networking as well as shared through workshops, conferences

5.5 Suggestions for future research

The study recommends the following for future research:

To investigate the consistency approaches by factor analysis that determines the adoption and implementation of GSCM in manufacturing industry.

To examine the relationship between supply chains and environmental performance of SMEs.

To assess the relationship between green innovation and green image of companies in Uganda

The country's authorities need to recognize the impact of legislation and regulation on the actions of manufacturers and consider how this can be utilized to further enhance green supply chain practices e.g. recycling and reuse of products and packaging.

There is a need to understand the missing links between some of the GSCM practices and some of the dimensions of performance considered in this study.

There is also a need to examine infrastructure and strategies for reverse logistics in developing countries such like Uganda.

The effect of considering social responsibility in companies' objective on companies' overall supply chain performance could lead to a clear frame of sustainability.

References

Berry, M.A. and Rondinelly, D.A. (1998). "*Proactive Corporate Environmental Management: A New Industrial Revolution.*"Academy of Management Executive, Vol. 12, n.2, pp 38-50.

Carter, C.R. and Carter, J.R. (1998)."*Interorganizational determinants of environmental purchasing: Initial evidence from the consumer products industrie.s*" Decision Sciences, Vol. 29, n.3, pp. 659-684.

CCICED Annual General Meeting, (2011). *Practices and innovation of green supply chain.*

Enarsson, L. (1998). "*Evaluation of suppliers: how to consider the environment.*"International Journal of Physical Distribution and Logistics Management, Vol. 28, n.1, pp. 5-17.

Fineman, S. and Clarke, K. (1996). "*Green Stakeholders: Industry Interpretations and Response.*" Journal of Management Studies, Vol. 33, n.6, pp. 715-730.

L.K., Toke., R.C, Gupta, and MilindDankas, (2010). "*Green supply chain management; critical research and practices*". Dhaka, Bangladesh.

Lambert., D.M., M.C., Cooper, and J.D. Pagh. (1998). "*Supply chain management: Implementation issues and research opportunities.*"International Journal of LogisticsManagement 9.Pages 1-20.

Lenny .,S.C., Koh, (2008). "*The future of supply chain management:Interplay between the digital and green agenda*". Supply chain management and information systems consortium.

Ma., Jun, Ray., Cheung, Wang., Jingjing, and Ruan., Qingyuan. (October, 2010). "*Greening Supply Chains in China: Practical Lessons from China based Suppliers in Achieving Environmental performance.*" WRI working paper. World resources institute, Washington, DC.

Maxwell, J., Rothenberg, S., Briscoe, F. and Marcus, A. (1997). "*Green Schemes: Corporate Environmental Strategies and their Implementation.*" California Management Review, Vol. 39, n. 3, pp. 118-134.

The National Environment Management Authority, NEMA Act. (1998).

The UNEP report. (2010). "*Waste and Climate Change. Global Trends and Strategy Framework.*"International Environmental Technology Centre.Osaka/ Shiga.

UNEP Report. (July, 2007). "*Caring for Climate: Tommorrow's Leadership Today. Climate change, Environmental responsibility & Examples of Corporate Leadership.*" Published by The UN Global Compact, UNEP. Geneva.

Waddock, S.A., Bodwell, C. and Graves, S.R. (2003): "*Responsibility: The New Business Imperative.* "Academy of Management Executive, Vol. 16, n.2, pp. 132-148.

Winsemius, P. and Guntram, U. (1992): "*Responding to the Environmental Challenge.*" Business Horizons, Vol. 35, n.2, pp. 12-20.

Zhu, Q., Sarkis, J. and Geng, Y. (2005): "*Green supply chain management in China: pressures, practices and performance.*" International Journal of Operations and Production Management, Vol. 25, n.5, pp. 449-468.

Zaltman, G., and Zaltman, L., (2008): "*PazarlamaMetaforları*", çev. Şensoy, Ü., Optimist Yayınları, BirinciBasım,İstanbul

http://globalscgroup.com/,*Green Supply Chains and Corporate Social Responsibility (CSR)* Posted on December 15, 2011.by Vivek

Kocabasoglu, C., Prahinski, C., &Klassen, R. (2007).*Linking forward and reverse supply chain investments: The role of business uncertainty.* Journal of Operations Management, 25(6), 1141-1160.

Ram Bhool, M.S., Narwal, (2013) *"an analysis of drivers affecting the implementation of green supply chain management for the indian manufacturing industries"* IJRET: International Journal of Research in Engineering and Technology eISSN: 2319-1163 | pISSN: 2321-7308

http://www.bearingpoint.com/ en-other/7633-1360/green-supply-chain-management/ accessed on 2nd September 2014.

http://www.dissertation.laerd.com/purposive-sampling.phpaccesssed on 3rd september 2014.

Brenda G. Cox (http://srmo.sagepub.com/view/encyclopedia-of-survey-research-methods accessed 3rd September 2014).

krejcie and morgan, (1970) *determining sample size for research activities,* educational and psychological measurement 1970, 30, 607-61.

What Is Supply Chain Management?*,http://supplychain.broad.msu.edu/msscm/definition/ accessed 3rd September 2014.Definition of 'Supply chain* management http://www.investopedia.com/terms/s/supplychain.asp accessed 3rd September 2014.

Matthew.,Kalubanga, (2012), *sustainable procurement: Concept, and practical implications for the Procurement Process.* International Journal of Economics and Management Sciences Vol. 1, No. 7, 2012, pp. 01-07

http://www.ehow.com/facts_5072593_definition-product-packaging.html.*Accessed 9th/09/2014.*

en.wikipedia.org/wiki/Ecodesign.Accessed 9th/09/2014.

http://www.ehow.com/info_12307339_green-packaging-market-size.html.*Accessed 9th/09/2014.*

http://www.doeni.gov.uk/...packaging/definition. *Accessed 9th/09/2014.*

http://www.entrepreneur.com/encyclopedia/packaging. Accessed 9th/09/2014.

Paine. F. A., and Paine. H. Y. (1992). "A Hand Book of Packaging. Oxford world's Classics."Springer Science & Business Media.ISBN- 0216932106, 9780216932104.

Inga. B., Hakan. R., and lindhqvist. T. (2003).*"Eco-Design in the Balistic States Industry: Feasibility Study."* Nordic Council of Ministers.ISBN – 9289309598, 9789289309592.

Kamran Assadi.(April, 2013). *"Eco-design."* http://nupe.co.uk/an-interview-with-sustainable-design-company-moorbi/Accessed 9th/09/2014.

Cass. K., Flynn. P., Hong. A., and Rosseter. M.(May 12th, 2011)."Designing a Sustainable Packaging Program: Results and Recommendations."15.915 – Sustainability Lab.

Sustainable Packaging Coalition. (August 2011). *"Definition of Sustainable Packaging."*Version 2.A Project of Green blue.

http://www.epa.gov/greenchemistry/whats_gc.html. Accessed on 8th/09/2014.

Reyes Joel. (July 31, 2009). *"Eco-Friendly Packaging Concepts."*Accessed at http://designreviver.com/inspiration.Accessed on 9th/09/2014.

GaafarAbdalkrim.(2013). *"The Role of Packaging in Consumers' Perception of Product Quality at the point of Purchase."*European Journal of Business & Management. ISSN: 2222-1905, 2222-2839. Vol. 5, No. 4.

United Nations Environmental Programme. (July, 2005).*"Cleaner Production – Key Elements."*UNEP Production & Consumption Branch.Accessed athttp://www.uneptie.org/pc/cp/understanding_cp/home.htm#definition.Accessed on 8th/09/2014.

Hamner. W. Burton. (1995). *"Environmental Management Systems - Specification with Guidance for Use"*.InternationalStandardOrganization, ISO/DIS 14001.Asian Institute of Management.

Robert K. Yin, (2012), "*application of case study research*" SAGE publications, 1412989167, 9781412989169

Ming-Lang Tseng, Ru-Jen Lin and Anthony SF Chiu, (2010, *Green supply chain management with lingistic preferences and incomplee information.* Graduate School of Business & Management, Lung Hwa University of Science and Technology, Taiwan Department of Industrial Engineering, De La Salle University, Manila

http://infohouse.p2ric.org/ref/16/15886 accessed 16/09/2014, *introductionto pollution and waste reduction.* An excerpt from clearing the air on clean air.Strategies for perc cleaners. University of Tennesse centre for industrial services.

MugendaandMugenda (1999), *quantitative and qualitative research.* African Centre for Technology Studies, **1999** - Research - 256 pages. ... **1999**: ISBN: 9966411070, 9789966411075:

Busha, C. H. and Harter, S. P. (1980).*Research Methods in Librarianship: Techniques and Interpretation.* Orlando, FL: Academic Press, Inc.

Mugenda, O. M. and Mugenda, A. G. (1999).*Research Methods: Quantitative and Qualitative Approaches.* Nairobi: Acts Press.

Mugenda ,M and Mugenda, G. (1999*). Research Methods: Qualitative and Quantitative Approaches.* Nairobi: Acts Press

George, D. and Mallery, P. (2003).*SPSS for Windows step by step: A simple guide and reference.* (4th ed.). Boston: Allyn and Bacon.

http://www.katsnet.org/publications/fund_book/glossary.html. Accessed 16th/09/2014.

http://www.unido.org/en/what-we-do/environment/resource-efficient-and-low-carbon-industrial-production/cp/cleaner-production.html. Accessed 16th/09/2014.

http://www.cotap.org/reduce-carbon-emissions.html. Accessed 16th/09/2014.

https://www.itri.org.tw/eng/econtent/research/research05.html. Accessed 16th/09/2014

Testa&Irlado(2010), *"shadows and lights of GSCM; determinants and effects of those practices based on multinational study"* Journal of cleaner production vol.18, no 10 pp 953-962.

Manzan Ronaldo, and Miyake. D. Ikuo. (2013). *"A Study on Alternative Approaches to Instill Environmental Concerns in the Domain of Production Management of Industrial Firms."*Journal of Technology Management & Innovation, Vol.8, No.3, Santiago. ISSN 0718-2724.

Sonya Graci and Jacqueline Kuehnel, *how To Increase Your Bottom Line By Going Green*, (http://green.hotelscombined.com accessed 8th/ 10/2014)

David Simchi-Levi, Ph.D, (2008) *'Going green in the supply chain' Professor of Engineering Systems*, MIT,USA

Wikipedia., 2014. *Environmental technology*. 08.10.2014, Retrieved from http://en.wikipedia.org/wiki/Green_technology

Cunha-e-Sá, M.A. and Reis, A.B., 2007.The optimal timing of adoption of a green technology.*Environmental and Resource Economics*, 36(1), 35-55.

Chen, Y., Okudan, G.E. and Riley, D.R., 2010. Sustainable performance criteria for construction method selection in concrete buildings.*Automation in Construction*, 19 (2), 235–244.

Green-Tech., 2010.*Environmental management systems*. 18.10.2014, Retrieved from http://www.green-tech.com/ems.htm

Rajesh. K., Rituraj. C., (2012) *"Overview of Green Supply Chain Management: Operation and Environmental Impact at Different Stages of the Supply Chain"* International Journal of Engineering and Advanced Technology (IJEAT) ISSN: 2249 – 8958, Volume-1, Issue-3

Zhu, Q. &Sarkis, J. 2006, "An inter-sectoral comparison of green supply chain management in China: Drivers and practices", *Journal of Cleaner Production,* vol. 14, no. 5, pp. 472-486, viewed 4 March 2012, www.sciencedirect.comhttp://www.sciencedirect.com/science/article/pii/S0959652605000065

Wee, Y. S. andQuazi, H. A., (2005). *Development and validation of critical factors of environmental management, Industrial Management Data System,* 105(1), 96-114.

OECD, (2009), "*sustainable manufacturing and eco-innovation framework, practices and measurement*" synthesis report.

APPENDICES

APPENDIX A: SPPSS OUTPUT

Equipment modification is practiced in Mukwano industries.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	46	78.0	78.0	78.0
	Agree	10	16.9	16.9	94.9
	Not sure	3	5.1	5.1	100.0
	Total	59	100.0	100.0	

Source: *Primary data*

It is company policy to measure carbon emissions and identify areas of improvement.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	32	54.2	54.2	54.2
	Agree	24	40.7	40.7	94.9
	Disagree	3	5.1	5.1	100.0
	Total	59	100.0	100.0	

Source: *Primary data*

It is company policy to adopt measures that are environmentally conscious.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	38	64.4	64.4	64.4
	Agree	18	30.5	30.5	94.9
	Not sure	3	5.1	5.1	100.0
	Total	59	100.0	100.0	

Source: *Primary data*

The company has modified and has changed technology in some production processes so as to produce more efficiently and minimize wastes.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	45	76.3	76.3	76.3
	Agree	14	23.7	23.7	100.0
	Total	59	100.0	100.0	

Source: *Primary data*

The top management thinks it's important to prevent pollution at source so that the impacts on environment are low.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	37	62.7	62.7	62.7
	Agree	16	27.1	27.1	89.8
	Not sure	6	10.2	10.2	100.0
	Total	59	100.0	100.0	

Source: *Primary data*

This practice is specifically adopted because the company is solely interested in maintaining brand image.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	50	84.7	84.7	84.7
	Agree	6	10.2	10.2	94.9
	Not sure	3	5.1	5.1	100.0
	Total	59	100.0	100.0	

Equipment modification is mainly influenced by pressures from local authorities and regulatory frame work.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	44	74.6	74.6	74.6
	Agree	8	13.6	13.6	88.1
	Not sure	3	5.1	5.1	93.2
	Disagree	4	6.8	6.8	100.0
	Total	59	100.0	100.0	

Involves replacement of a substance, process, product or service by another that maintains the same functionality

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	44	74.6	74.6	74.6
	Agree	13	22.0	22.0	96.6
	Not sure	2	3.4	3.4	100.0
	Total	59	100.0	100.0	

There's need to substitute input material with renewable material or materials which have longer service life time production.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	48	81.4	81.4	81.4
	Agree	10	16.9	16.9	98.3
	Not sure	1	1.7	1.7	100.0
	Total	59	100.0	100.0	

The purpose is to replace toxic input with material that is less harmful to humans and the environment

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	42	71.2	71.2	71.2
	Agree	10	16.9	16.9	88.1
	Not sure	3	5.1	5.1	93.2
	Disagree	4	6.8	6.8	100.0
	Total	59	100.0	100.0	

The practice can be a success even if the substitute alters the functionality.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	15	25.4	25.4	25.4
	Agree	2	3.4	3.4	28.8
	Not sure	2	3.4	3.4	32.2
	Disagree	10	16.9	16.9	49.2
	Strongly Disagree	30	50.8	50.8	100.0
	Total	59	100.0	100.0	

The practice of input substitution happens in mukwano industries all the time and am aware of some materials that have been substituted.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	35	59.3	59.3	59.3
	Agree	15	25.4	25.4	84.7
	Not sure	7	11.9	11.9	96.6
	Disagree	2	3.4	3.4	100.0
	Total	59	100.0	100.0	

The practice was adopted because of pressures from NEMA.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	41	69.5	69.5	69.5
	Agree	10	16.9	16.9	86.4
	Not sure	1	1.7	1.7	88.1
	Strongly Disagree	7	11.9	11.9	100.0
	Total	59	100.0	100.0	

The employees/ workers have complained of consuming toxic and hazardous material.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	35	59.3	59.3	59.3
	Agree	13	22.0	22.0	81.4
	Not sure	4	6.8	6.8	88.1
	Disagree	7	11.9	11.9	100.0
	Total	59	100.0	100.0	

The suppliers are evaluated on specific environmental criteria.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	15	25.4	25.4	25.4
	Agree	19	32.2	32.2	57.6
	Not sure	15	25.4	25.4	83.1
	Disagree	5	8.5	8.5	91.5
	Strongly Disagree	5	8.5	8.5	100.0
	Total	59	100.0	100.0	

OBJ 3

The practice aims at reducing energy and water consumption, releasing fewer greenhouse gases

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	42	71.2	71.2	71.2
	Agree	10	16.9	16.9	88.1
	Not sure	6	10.2	10.2	98.3
	Disagree	1	1.7	1.7	100.0
	Total	59	100.0	100.0	

There is creation of cleaner air and water while creating jobs for the people who handle and process the recovered materials

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	45	76.3	76.3	76.3
	Agree	9	15.3	15.3	91.5
	Not sure	5	8.5	8.5	100.0
	Total	59	100.0	100.0	

By onsite recovery management reduces utility costs while converting "waste" into a tradable commodity

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	45	76.3	76.3	76.3
	Agree	5	8.5	8.5	84.7
	Not sure	9	15.3	15.3	100.0
	Total	59	100.0	100.0	

The practice involves utilizing material discarded as useless by one process to be useful in another.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	43	72.9	72.9	72.9
	Agree	7	11.9	11.9	84.7
	Not sure	4	6.8	6.8	91.5
	Disagree	5	8.5	8.5	100.0
	Total	59	100.0	100.0	

Onsite recovery is practiced because there are frequent government inspections on the firm.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	39	66.1	66.1	66.1
	Agree	4	6.8	6.8	72.9
	Not sure	7	11.9	11.9	84.7
	Disagree	4	6.8	6.8	91.5
	Strongly Disagree	5	8.5	8.5	100.0
	Total	59	100.0	100.0	

The recovered material is recycled and sold

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	14	23.7	23.7	23.7
	Agree	17	28.8	28.8	52.5
	Not sure	18	30.5	30.5	83.1
	Disagree	10	16.9	16.9	100.0
	Total	59	100.0	100.0	

The recovered material is destroyed or taken to a landfill.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	32	54.2	54.2	54.2
	Agree	17	28.8	28.8	83.1
	Not sure	10	16.9	16.9	100.0
	Total	59	100.0	100.0	

The company is compelled to recover materials due to legislation and pressures from customers.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	40	67.8	67.8	67.8
	Agree	12	20.3	20.3	88.1
	Not sure	3	5.1	5.1	93.2
	Disagree	4	6.8	6.8	100.0
	Total	59	100.0	100.0	

The materials recovered are plastics, solid wastes and waste water.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	26	44.1	44.1	44.1
	Agree	12	20.3	20.3	64.4
	Not sure	6	10.2	10.2	74.6
	Disagree	15	25.4	25.4	100.0
	Total	59	100.0	100.0	

Section ;c

There are reduced levels of air emissions in Mukwano industries.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	28	47.5	47.5	47.5
	Agree	22	37.3	37.3	84.7
	Not sure	5	8.5	8.5	93.2
	Disagree	4	6.8	6.8	100.0
	Total	59	100.0	100.0	

The company carries out regular environmental audits to check on the levels of emissions.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	30	50.8	50.8	50.8
	Agree	4	6.8	6.8	57.6
	Not sure	10	16.9	16.9	74.6
	Disagree	15	25.4	25.4	100.0
	Total	59	100.0	100.0	

There's increased compliance with environmental standards in mukwano industries

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	25	42.4	42.4	42.4
	Not sure	16	27.1	27.1	69.5
	Disagree	18	30.5	30.5	100.0
	Total	59	100.0	100.0	

The company has realized reduced consumption of energy

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	39	66.1	66.1	66.1
	Agree	5	8.5	8.5	74.6
	Not sure	5	8.5	8.5	83.1
	Disagree	10	16.9	16.9	100.0
	Total	59	100.0	100.0	

Obsolete technology has been replaced with more efficient technology which has significantly reduced on emissions.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	38	64.4	64.4	64.4
	Agree	6	10.2	10.2	74.6
	Not sure	7	11.9	11.9	86.4
	Disagree	8	13.6	13.6	100.0
	Total	59	100.0	100.0	

The company's image in the eyes of the consumers has improved.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	38	64.4	64.4	64.4
	Agree	7	11.9	11.9	76.3
	Not sure	7	11.9	11.9	88.1
	Disagree	7	11.9	11.9	100.0
	Total	59	100.0	100.0	

The company shares a strong relationship with NEMA

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	29	49.2	49.2	49.2
	Agree	15	25.4	25.4	74.6
	Not sure	4	6.8	6.8	81.4
	Disagree	11	18.6	18.6	100.0
	Total	59	100.0	100.0	

There is reduced consumption of hazardous, material in mukwano industries because the raw material suppliers are evaluated on particular environmental criteria.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	28	47.5	47.5	47.5
	Agree	11	18.6	18.6	66.1
	Not sure	10	16.9	16.9	83.1
	Disagree	5	8.5	8.5	91.5
	Strongly Disagree	5	8.5	8.5	100.0
	Total	59	100.0	100.0	

The company carries out environmental audits to check on the impacts of the different activities on the environment.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	30	50.8	50.8	50.8
	Agree	10	16.9	16.9	67.8
	Disagree	10	16.9	16.9	84.7
	Strongly Disagree	9	15.3	15.3	100.0
	Total	59	100.0	100.0	

The numbers of accidents due to toxic materials in the factory have reduced.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	30	50.8	50.8	50.8
	Agree	10	16.9	16.9	67.8
	Disagree	10	16.9	16.9	84.7
	Strongly Disagree	9	15.3	15.3	100.0
	Total	59	100.0	100.0	

The environmental audits have been carried out and we have acquired ISO certifications because we are within the established environmental standards.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	33	55.9	55.9	55.9
	Agree	11	18.6	18.6	74.6
	Not sure	10	16.9	16.9	91.5
	Disagree	5	8.5	8.5	100.0
	Total	59	100.0	100.0	

The management has implemented environment management systems which help us track the environmental impacts of our inputs/ raw material.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	20	33.9	33.9	33.9
	Agree	15	25.4	25.4	59.3
	Not sure	7	11.9	11.9	71.2
	Disagree	17	28.8	28.8	100.0
	Total	59	100.0	100.0	

It is important to note that Environmental concerns are not a priority in Mukwano industries because there are other pressing issues.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	10	16.9	16.9	16.9
	Agree	7	11.9	11.9	28.8
	Not sure	10	16.9	16.9	45.8
	Disagree	22	37.3	37.3	83.1
	Strongly Disagree	10	16.9	16.9	100.0
	Total	59	100.0	100.0	

A waste treatment plant is the most appropriate solution for hazardous waste management.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	29	49.2	49.2	49.2
	Agree	5	8.5	8.5	57.6
	Not sure	6	10.2	10.2	67.8
	Disagree	13	22.0	22.0	89.8
	Strongly Disagree	6	10.2	10.2	100.0
	Total	59	100.0	100.0	

The practice of onsite recovery has ensured that waste material on site is reused by recycling the material into useful products that are sold.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	40	67.8	67.8	67.8
	Agree	8	13.6	13.6	81.4
	Not sure	1	1.7	1.7	83.1
	Disagree	10	16.9	16.9	100.0
	Total	59	100.0	100.0	

The material recovered onsite is recycled and sold off as chicken and animal feed which has reduced on pollution on the environment.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	30	50.8	50.8	50.8
	Agree	6	10.2	10.2	61.0
	Not sure	14	23.7	23.7	84.7
	Disagree	9	15.3	15.3	100.0
	Total	59	100.0	100.0	

This practice has reduced on the demand of raw material like wood because we reuse waste from one process as fuel in another and this helped in preservation of biomass/ forests.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	32	54.2	54.2	54.2
	Agree	9	15.3	15.3	69.5
	Disagree	7	11.9	11.9	81.4
	Strongly Disagree	11	18.6	18.6	100.0
	Total	59	100.0	100.0	

The recovered material has necessitated management to establish a waste treatment plant where solid and waste water is treated for reuse.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	30	50.8	50.8	50.8
	Agree	9	15.3	15.3	66.1
	Disagree	12	20.3	20.3	86.4
	Strongly Disagree	8	13.6	13.6	100.0
	Total	59	100.0	100.0	

Establishing a recycling plant is too costly and management thinks it is cheaper to dump wastes elsewhere.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	13	22.0	22.0	22.0
	Agree	8	13.6	13.6	35.6
	Disagree	29	49.2	49.2	84.7
	9	9	15.3	15.3	100.0
	Total	59	100.0	100.0	

More jobs have been created on the premises because management has hired people to recover waste material which it recycles

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	27	45.8	45.8	45.8
	Agree	5	8.5	8.5	54.2
	Not sure	6	10.2	10.2	64.4
	Disagree	16	27.1	27.1	91.5
	Strongly Disagree	5	8.5	8.5	100.0
	Total	59	100.0	100.0	

Recycling is not necessary, it's costly and requires establishing new production lines which the company may not afford.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	13	22.0	22.0	22.0
	Not sure	4	6.8	6.8	28.8
	Disagree	13	22.0	22.0	50.8
	Strongly Disagree	29	49.2	49.2	100.0
	Total	59	100.0	100.0	

APPENDIX B: TABLE FOR SAMPLE DETERMINATION

Population size	Sample size	Population size	Sample size	Population size	Sample size	Population size	Sample size	Population size	Sample size
10	10	100	80	280	162	800	260	2800	338
15	14	110	86	290	165	850	265	3000	341
20	19	120	92	300	169	900	269	3500	246
25	24	130	97	320	175	950	274	4000	351
30	28	140	103	340	181	1000	278	4500	351
35	32	150	108	360	186	1100	285	5000	357
40	36	160	113	380	181	1200	291	6000	361
45	40	180	118	400	196	1300	297	7000	364
50	44	190	123	420	201	1400	302	8000	367
55	48	200	127	440	205	1500	306	9000	368
60	52	210	132	460	210	1600	310	10000	373
65	56	220	136	480	214	1700	313	15000	375
70	59	230	140	500	217	1800	317	20000	377
75	63	240	144	550	225	1900	320	30000	379
80	66	250	148	600	234	2000	322	40000	380
85	70	260	152	650	242	2200	327	50000	381
90	73	270	155	700	248	2400	331	75000	382
95	76	270	159	750	256	2600	335	100000	384

Krejcie, Robert V., Morgan, Daryle W., "Determining Sample Size for Research Activities", Educational and Psychological Measurement, 1970.

APPENDIX C: QUESTIONNAIRE

Dear respondent:

My name is Bazibu Emmanuel a student of Kyambogo University, pursuing a Masters Degree in Business Administration and am carrying out a research on **"GREEN SUPPLY CHAIN MANAGEMENT AND ENVIRONMENTAL SUSTAINABILITY: CASE STUDY OF MUKWANO INDUSTRIES (U) LTD"**. I have been permitted to conduct this academic research and you have been selected as one of the respondents and I kindly request you to spare some few minutes and answer the questions. The information obtained will be kept confidential and is for academic purposes and I honestly do appreciate your participation in the study.

INSTRUCTIONS

i. You are kindly requested to tick the boxes provided using black or blue ink pens to answer optional questions.

ii. Where you think you should include additional information use the spaces provided.

Respondent's profile

1. Gender: Male ☐ Female ☐
2. Age : 18 to 24 ☐ 25 to 29 ☐ 30 to 40 ☐ above 40 years ☐
3. Which department do you work.....position held.....
4. For how long have worked for this organization.....
5. What is your level of education? No formal education ☐ certificate ☐ degree ☐ Masters ☐

SECTION B: GREEN SUPPLY CHAIN MANAGEMENT

6. Equipment Modification.

   This question seeks to identify whether respondents understand and practice the theme of equipment modification, what it entails and whether it's adopted as a reactive or proactive green supply chain management measure. To what extent do you agree with the following statements? Please indicate your answer by using, (SA, A, N, D, SD) SA-strongly agree, A-agree, N- neutral, D- disagree, SD-strongly disagree

Equipment modification	SA	A	N	D	SD
Equipment modification is practiced in Mukwano industries.					
It is company policy to measure carbon emissions and identify areas of improvement.					
It is company policy to adopt measures that are environmentally conscious.					
The company has modified and has changed technology in some production processes so as to produce more efficiently and minimize wastes.					
The top management thinks it's important to prevent pollution at source so that the impacts on environment are low.					
This practice is specifically adopted because the company is solely interested in maintaining brand image.					
Equipment modification is mainly influenced by pressures from local authorities and regulatory frame work.					

7. Input substitution

This question seeks to identify whether respondents understand and practice the theme of input substitution, what it entails and whether it's adopted as a reactive or proactive green supply chain management practice? To what extent do you agree with the following statements? Please indicate your answer using, (SA, A, N, D, SD) SA- strongly agree, A-agree, N-neutral, D- disagree, SD-strongly disagree

indicate your answer by using, (SA, A, N, D, SD) SA- strongly agree, A-agree, N- neutral, D-disagree, SD-strongly disagree.

Onsite recovery/ reuse	**SA**	**A**	**N**	**D**	**SD**
The practice aims at reducing energy and water consumption, releasing fewer greenhouse gases					
There is creation of cleaner air and water while creating jobs for the people who handle and process the recovered materials					
By onsite recovery management reduces utility costs while converting "waste" into a tradable commodity					
The practice involves utilizing material discarded as useless by one process to be useful in another.					
Onsite recovery is practiced because there are frequent government inspections on the firm.					
The recovered material is recycled and sold					
The recovered material is destroyed or taken to a landfill.					
The company is compelled to recover materials due to legislation and pressures from customers.					
The materials recovered are plastics, solid wastes and waste water.					

SECTION C: ENVIRONMENTAL SUSTAINABILITY.

9. **Reduced emissions**

This question aims to determine the extent to which equipment modification contributes to the reduction of emissions in Mukwano industries. To what extent do you agree with the following statements .Please indicate by ticking according to the scale below, (SA, A, N, D, SD) SA- strongly agree, A-agree, N- neutral, D- disagree, SD-strongly disagree.

Effectiveness of equipment modification in contribution to reduced emissions	**SA**	**A**	**N**	**D**	**SD**
There are reduced levels of air emissions in Mukwano industries.					
The company carries out regular environmental audits to check on the levels of emissions.					
There's increased compliance with environmental standards in mukwano industries					
The company has realized reduced consumption of energy					
Obsolete technology has been replaced with more efficient technology which has significantly reduced on emissions.					
The company's image in the eyes of the consumers has improved.					
The company shares a strong relationship with NEMA					

	establish a waste treatment plant where solid and waste water is treated for reuse.					
5	Establishing a recycling plant is too costly and management thinks it is cheaper to dump wastes elsewhere.					
6	More jobs have been created on the premises because management has hired people to recover waste material which it recycles					
7	Recycling is not necessary, it's costly and requires establishing new production lines which the company may not afford.					

...Thank you...

APPENDIX E: INTERVIEW GUIDE

1. Do you practice equipment modification in Mukwano industries?
2. What factors have compelled you to practice equipment modification?
3. What benefits have you realised by practicing equipment modification?
   - To the company
   - To the employees
   - To the environment
4. Do you practice input substitution in Mukwano industries? And for what purpose?
5. What factors have compelled you to practice input substitution?
6. How has input substitution affected:
   - The company
   - Employees
   - The environment
7. Do you practice onsite recovery/ reuse and what does it entail?
8. What factors have compelled you to adopt onsite recovery?
9. What has been the impact of onsite recovery on,
   - Company
   - Employees
   - Environment
10. Do you have a clear environmental policy