FACTORS INFLUENCING COMPLIANCE TO ENVIRONMENTAL LEGISLATION ON POLYTHENE BAG BAN IN RONGAI SUB-COUNTY, NAKURU COUNTY, KENYA

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A Research project submitted to the Institute of Postgraduate Studies of Kabarak University in partial fulfillment for the Requirement of Master of Science in Environmental Science of Kabarak University

KABARAK UNIVERSITY

NOVEMBER, 2019

DECLARATION

This project is my original work and has not wholly or in parts been presented for the award of a degree in any other university.

Victor Kipkemboi Koros
GMEN/NE/0206/01/18

Signature ……

Date ……

RECOMMENDATION

To the Institute of Postgraduate Studies:

The research project entitled '' **Factors Influencing Compliance to Environmental Legislation on Polythene Bag Ban in Rongai Sub-County, Nakuru County, Kenya"** and written by **Victor Koros** is presented to the Institute of Postgraduate studies of Kabarak University. We have reviewed the research project and recommend it be accepted in partial fulfillment of the requirement for award of degree of Master of Science in Enviromental Science.

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DEDICATION

This project is dedicated to my Aunt Mary Chepsergon who inspired and initiated my academic journey. To my loving wife Beatrice and our children Emmanuel and Kyler, thank you for the encouragement, prayers and moral support not forgetting my mentor Dr. Kiplimo Sirma I cannot thank you enough, God bless you.

ABSTRACT

Polythene bags have been preferred for packaging purposes because they are light in weight, cheap and resistant to degradation. Despite the benefits, poor disposal of polythene causes degradation of soil, water, land and air resources leading to health problems**.** Burning polythene releases Greenhouse gases mainly Carbon dioxide, associated with Climate change. Furthermore, polythene kills wild game, livestock and aquatic organisms. The adverse effects of polythene bags in the country led to introduction of legislation in the year 2017, banning light weight single-use polythene bags and in March 2019 on polypropylene bags as a mitigation measure. However, Reports of polythene bags presence in the Rongai Sub-County indicate lack of compliance of the legislation. Therefore, the aim of the study was to determine factors influencing compliance of environmental legislation on polythene bag ban in Rongai sub-county, Nakuru County, Kenya. The objectives aimed by this research study were to: determine the levels of awareness of the legislation; assess the perceived environmental effects of polythene bags; examine the influence of polythene bag alternatives on extent of compliance of the legislation and establish the extent to which enforcement capacity influence compliance of the legislation on polythene bag ban. This descriptive research design was employed from a target population of 147,017 (18,377 households) and 580 traders, proportionate stratified random sampling of 265 respondents in the five wards were sampled. Six Key informants were selected using purposive sampling; 5 chiefs from respective wards and one Environmental Compliance officer in the Sub-County, bringing a total of 265 in number. Instruments used for collecting data included; piloted questionnaires (0.74cronbach's alpha level) used on households and traders while interviews conducted for key informants. A focus group discussion of 5-10 members in each ward was held. Photography and Non-participant observation was adopted to add on collected information collected. Data analysis was done using computer software statistical packages for social sciences (SPSS version 22). Descriptive statistics was used to measure central tendencies with Chi-square at 5% level of significance (($\propto$=0.05) while Correlation and multiple regressions was used in inferential statistics. Familiarity on the ban of commonly used polypropylene bags was widely agreed at (χ^2=317, P<0.0001) while the least association was responses agreeing that there was sufficient awareness at (χ^2=52.4, P<0.0001). Hundred percent of the respondents significantly agreed at (χ^2=46.7, P<0.0001) that polythene bags kill livestock. 46.53 percent of the respondents agreed that cost for alternative materials carrier bags was expensive at (χ^2=156, P<0.0001). 48.16 percent agreed that Understaffing was affecting NEMA enforcement of the legislation at (χ^2=144.5, P<0.0001). In conclusion, the respondents had low awareness levels, lacked good quality alternatives and enforcement agency was found to be lacking the capacity to ensure adherence to the legislation. The study therefore recommends improved awareness campaigns of negative effects of polythene bags and incorporation of all stakeholders in the formulation of environmental policies and legislation in Kenya.

Key words: Awareness, Compliance, Polythene bag, Environmental Legislation

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ABREVIATIONS AND ACRONYMS

ANOVA	Analysis of variance
DK	Danish Kroner
EMCA	Environmental Management and Coordination Act
EU	European Union
GHG	Green House Gases
HDPE	High Density Polyethylene
KEBS	Kenya Bureau of Standards
KNBS	Kenya National Bureau of Statistics
LDPE	Low Density Polyethylene
MENR	Ministry of Environment and Natural Resources
NACOSTI	National Commission for Science, Technology and Innovation
NEMA	National Environment Management Authority
NRF	National Research Fund
POPs	Persistent Organic Pollutants
SDG	Sustainable development goals
SPSS	Statistical Packages for Social Sciences
UNDP	United Nations Development Program
UNEP	United Nations Development Program
WED	World Environment Day
VIF	Variable Inflation Factor
VLDP	Very Low Density Polyethylene
RoK	Republic of Kenya

OPERATIONAL DEFINITION OF KEY TERMS

Awareness: This is to be cognizant or have knowledge of the Environmental legislation banning polythene bags and its importance (Mitchell, 2007), the definition was adopted in the study.

Compliance: This is the act of conforming to the prescribed Environmental legislation prohibiting the use of polythene bags as prescribed by the law (RoK, 2009).

Ecosystem: This is a complex and dynamic interaction among and between the living and non-living organisms affecting each other and introduction on pollutants such as polythene bags impairs the balance (Kühn, Rebolledo, & van Franeker, 2015).

Environment: According to this research, is the totality of nature and natural resources, including the cultural heritage and human infrastructure essential for socio-economic activities (RoK, 2007),

Polythene: Polythene paper is a polymer manufactured by polymerization of ethylene (ethene) gas under suitable condition of temperature and pressure. High pressure produces low density polythene (plastics) while high pressures produce the linear low density polythene (polythene carry bags) (Odian, 2004).

Polythene bag ban: This is an official government order prohibiting the manufacture, distribution and use of single use polythene bags in Kenya. (RoK, 2017)

Pollution: Introduction of harmful substances through physical, chemical or Biological processes to the environment those are harmful to the Environment, in this case polythene bags (RoK,2009).

CHAPTER ONE
INTRODUCTION

1.1 Introduction

This chapter briefly highlights the background information of the study and states the problem of study. It also presents purpose of study, the research objectives and hypothesis. Furthermore, it describes the significance, the scope, limitations and assumptions made in the research study.

1.2 Background of the study

Human depend on natural resources for a living, a fundamental role played by the Environment in provision of social, economic and ecological benefits but this important role is threatened by pollutants among them polythene debris (Ijaiya & Joseph, 2014). Polythene bags have been preferred for packaging purposes because they are light in weight, cheap and resistant to degradation (Kakoti, 2017). Despite of the benefits, poor disposal of polythene causes degradation of soil, water, land and air resources leading to health problems such as respiratory infections. An estimated 79% of the polythene waste ever produced lie in dumpsites, landfills or scattered in the environment (UNEP, 2018b).

Burning polythene releases carbon dioxide (CO_2) gas, a major Green House Gas (GHG) responsible for climate change, death of terrestrial and aquatic organisms occur through ingestion, entanglement and smothering from polythene (Joseph, Kumar, Majgi, Kumar, & Prahalad, 2016). United Nations envisages a clean and healthy environment and strives to achieve this through Sustainable Development goals (SDG), a blueprint to guide nations in restoration efforts of the environment towards sustainability of resources for development. Hence, there is need for strict enforcement of environmental regulation, creation of awareness and sourcing for alternatives (Grover, Chandra, & Khurana, 2015).

UNEP reported that of almost 75% of the total plastic waste generated globally in 2015 was packaging polythene and found in landfills, dump sites and littering Environment. Plastics are mainly non biodegradable. This packaging polythene are meant for single use and accounted for 47% of total waste generated across the world in 2015 and has presented a great challenge in solid waste management leading to environmental health hazards and economic loses (UNEP, 2018b). Polythene was identified as a major Environmental problem and European Union directives (EU) 2015/720 compelled nations to reduce consumption of light weight

polythene led European member states to adopt a number of measures including legislative, fee, tax and voluntary measures to address the Environmental problems associated with polythene (EU, 2015). This was due to concerns raised on pollution by plastics and polythene in the Oceans. The directive on polythene bags legislations saw awareness campaigns on the legislation and its importance that led to reduction in single use polythene bags among the traders and consumers in member states such as France, Germany and Belgium (Kasidoni, Moustakas, & Malamis, 2015). Bangladesh was the first country in 2002 that strictly enforce polythene ban after rampant flooding in its cities caused by polythene debris clogging drainage system leading to damage and destruction of homes, this improved the compliance rates and the flooding was reduced (Peppa, 2016).

In India, cost of alternatives to polythene bags in the country proved to be a challenge to compliance of the legislation on polythene ban; this led to government involvement in ensuring the alternative materials are easily available which enhanced compliance and reduced the problem of solid waste management in Delhi (Kasidoni et al., 2015). Nigeria introduced polythene ban because of problems on solid waste management in its cities, mainly from non-biodegradable polythene materials. Awareness was considered key to success of the environmental legislation on polythene ban (Jambeck et al. 2018).

Polythene burning caused air pollution in Rwanda which is an health hazard and was blamed for clogging of drainage systems causing flooding in the city and the awareness of the legislation on polythene ban was meant to inform the traders and the community on the importance of obeying to address the challenges the country was facing and reduce its resistance (Kubana, 2016). Rwanda Government was criticized by her Citizens for its sternness in enforcement of the legislation hence termed as a repressive approach and believed to have coerced the country to be compliant and the country referred as the "Cleanest city in Africa" unlike Uganda that imposed the ban but because of lack of capacity such as personnel, financial resources and lack of public participation the country still has challenges related with plastics and polythene manufacturers are reported to be exporting to other countries including Kenya (Kardish, 2014).

Kenya has been faced with challenges of solid waste management which polythene constitutes the greatest volume causing flooding during rainy seasons by blocking of storm drainages, death of livestock when ingested, release of CO_2 when burned and becoming an eyesore in tourism industry, hence there is need for creation of awareness of the legislation

and enforcement in order to rid the country of the problems (Muriithi, 2017). The Government of Kenya through Gazette notice No. 2536 of August 2017 (Appendix IX) banned the manufacture, distribution and use of single-use polythene bags (RoK, 2009). This was an attempt to rid the country of its associated threats to; Humans health, aquatic and terrestrial ecosystems and the negative economic impacts it poses to the country. This led to an unintended outcome of production of poor quality polypropylene alternative bags which cannot be used severally and are disposed after single use, this led to legal Gazette notice No. 2334 of March 2019 (Appendix VIII), banning its manufacture, distribution and use (RoK, 2009). The Bans was criticized for job losses and revenues but praised for presenting opportunities such as plastic and polythene recycling, creation of new markets for manufacturing eco-friendly bags and saving on taxes that goes to polythene clean up, therefore improving the economy and health of both humans and animals in the community (Wahome, 2017).

Non-compliance of the legislation on polythene bag ban in Kenya has been reported. Traders and members of community Rongai were arrested by NEMA officer in possession of polythene bags, checks on goods transported by road have led to confiscation of consignments of polythene bags imported from neighboring countries and were being distributed in towns including Nakuru for use (Murathe, 2017). Rongai Sub-County has been faced by a myriad of problems arising from polythene bags poor disposal, Polythene bags have caused flooding of towns and leaving stagnant water arising from clogged drainage channels leading to spread of water borne diseases and creating conducive breeding grounds for vectors that spread diseases such as malaria (Wachira, Wairire, & Mwangi, 2014). In a study conducted to investigate the extensiveness of polythene bags in the rumen of slaughtered livestock in abattoirs found out that livestock ingest polythene bags while feeding, with prevalence from the study show over 50% of livestock (Lange *et al*., 2018), most of them being emaciated, a characteristic health effect of ingestion of polythene by livestock.

The presence of polythene bags in towns of Kenya demonstrated through arrest of five hundred (500) offenders during inspection by NEMA compliance officers and three hundred (300) prosecuted (NEMA, 2019), among those found using polythene bags were from Nakuru county in Rongai Sub-County (Murathe, 2017). This indicates noncompliance despite of its environmental and health effects. Rongai Sub-County is a peri-urban area at the outskirts of Nakuru and was selected for the research because it was reported that the community and

traders are still using polythene bags despite of the ban which is against the legislation. Therefore, because limited information on reasons for non-compliance in Rongai Sub-County, this study was aimed at examining factors influencing compliance to environmental legislation on polythene bag ban in Rongai Sub-county of Nakuru County.

1.3 Statement of the problem

The Government of Kenya through gazette notice No. 2334 and 2536 banned the manufacture, distribution and use of single-use polythene bags (RoK, 2017). This was an attempt mainly to avert the environmental, health and economic challenges posed by polythene bags. However, those used for industrial primary packaging at the source of the product were exempted from the ban. The legislations success was compromised as indicated by reports of availability of the polythene bags in Rongai Sub-County. National Environment Management Authority (NEMA) Officials on carrying out impromptu inspections in the Country have led to arrests (NEMA, 2019). The reasons for this non compliance to the Environmental legislation are not known, however, literature has information linking the following: lack of awareness of environmental legislations, lack of information of effects of polythene in the environment, alternative products to polythene bags and enforcement capacity of the legislation by the relevant agencies (Mitchell, 2007). Based on literature review, limited research has been done in Kenya and by extension in Rongai Sub-county to determine factors influencing compliance to the legislation on polythene ban, this study led to investigation on the extent to which the following influences compliance: Lack of awareness of the legislation on polythene ban, lack of information on perceived environmental effects of polythene, influence of polythene bag alternatives and enforcement capacity by NEMA compliance officers in Rongai Sub-County.

1.4 Purpose of the study

The broad objective of the study was to investigate factors influencing compliance of environmental legislation on polythene bag ban in Rongai sub-county, Nakuru County, Kenya.

1.5 Specific objectives of the study

The study sought to achieve the following specific objectives

1. To determine the extent to which awareness levels influence compliance of Polythene bag ban legislation in Rongai sub-county.
2. To assess perceived environmental effects of polythene bags influence on compliance in Rongai sub-county.
3. To examine the extent to which polythene bag alternatives influence compliance to the Polythene bag ban legislation in Rongai Sub-county.
4. To establish the extent to which the NEMA enforcement capacity influence compliance to environmental legislation in Rongai sub-county.

1.6 Hypotheses

The following were the Null hypothesis

$H_{01:}$ Lack of awareness of the environmental legislation on polythene bag ban has no significant influence on its compliance in Rongai sub-county.

H_{02}: The perceived environmental effects of polythene bags have no significant influence on compliance to the polythene bag legislation in Rongai sub-county.

H_{03}: The polythene bag alternatives have no significant influence on compliance to the legislation on polythene bag ban in Rongai Sub-County.

H_{04}: The enforcement capacity by NEMA does not significantly influence compliance of polythene bag ban legislation in Rongai Sub- County.

1.7 Significance of the study

This study on factors influencing compliance to the environmental legislation on polythene bag ban will be fundamental in Environmental law and legislation reforms that will promote achievement of vision 2030 on Environment. One of its flagship projects is polythene eradication in Kenya (RoK, 2007).The study will further support sustainable development goal 13, calling for action against climate change, goal 14, ensuring polythene and plastics free water bodies and ultimately goal 3, enhancing good health and well-being in the globe (UN, 2015).

1.8 Scope of the study

The study was conducted in Rongai Sub-County; Nakuru County where data from randomly selected households heads and traders were obtained on factors influencing compliance to polythene ban legislation and their challenges as far as embracing the ban is concerned. The Sub - County NEMA officer and 5 Chiefs were the key informants on the status of the legislation in Rongai Sub-County. The research study took place from the month of June to July 2019.

1.9 Limitations and Delimitation

This study was constrained by limited related studies conducted in Kenya; however, the researcher overcame the limitation by using studies done in other African countries and the rest of the world. Despite the fact that the study was confined in Rongai Sub-County; it is believed that the recommendations from the study would be generally applicable and of importance to the rest country. Lack of cooperation from members of Rongai community for fear of victimization and this was overcome by constant assurance of confidentiality of the information given and that it will solely be used for academic purposes only. The rapport that was created with the Rongai Sub-County public administration was important because it improved the confidence of participation by the community.

1.10 Assumptions of the study

The research study was based on the following assumptions;

i. Lack of awareness of the environmental legislation on polythene ban affects its compliance level.
ii. The environmental problems linked to polythene bags are being experienced in the community.
iii. The introduction of affordable and good quality alternative carrier bags leads to improved compliance level.
iv. Enforcement capacity of the regulatory agencies is fundamental in eradication of polythene bags.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

This chapter highlights polythene products, Introduces regulatory instrument of polythene bag management and explains factors influencing compliance; awareness, effects of polythene products in both terrestrial and aquatic ecosystem. Furthermore, it explains how polythene affects human health, animals and aquatic life. It further points out information on the strategies adopted and results in various countries to manage polythene products. Finally, it gives a review of the theory and a diagrammatic depiction of conceptual framework.

2.2 Polythene Products

Polythene paper is a polymer manufactured by polymerization of ethylene (ethene) gas under suitable condition of temperature and pressure (Odian, 2004). Ethylene gas is obtained through fractional distillation of crude petroleum (The Open University, 2016). Through the process of polymerization Low Density Polyethylene (LDP), High Density Polyethylene (HDPE) and Very Low Density Polyethylene (VLDP) are produced (Grover, Chandra, and Khurana, 2015). Polythene (VLDP) is very light and cheap, in its production, therefore in the last decade they have been used in the manufacture of polythene carrier bags commonly known as plastic bags, plastic bottles and containers. The single use polythene bags are non-biodegradable and most of them end up in landfills, poorly managed dumpsites and others littering in the environment causing serious pollution (UNEP, 2018b). Control of manufacture, distribution and use of Polythene bags are vital to environmental health of the world.

Polythene bags management strategies adopted by countries across the globe are different. Regulatory instrument involves the use of legislations in conjunction with other techniques such as creation of awareness on the legislation, informing public of negative impacts from polythene bags, promotion and research on polythene alternatives and strengthening the enforcement agencies, hence referred as cross cutting technique (Muktar, 2018).

2.3 Awareness of Polythene bag ban legislation.

Legislations and policies can be developed that provide partial or complete ban of use of polythene bags**. C**omplete ban of use of polythene, it calls for change in behavior of consumers by complying with the legislations and accepting a paradigm shift in using alternative carrier bags that are biodegradable; this can be achieved through awareness

programs. For Examples, United Kingdom resorted to fighting polythene bags through awareness programs dubbed “Bags for Life” and encouraged the use of alternatives that are more biodegradable leading to reduced consumption (Synthia & Kabir, 2014). In Australia Environmental education aims at training learners on legislation put in place to protect the environment and how it leads to prudent utilization of natural resources and conservation (Almeida, Moore, & Barnes, 2018). This has led to the success of the ban on use of polythene bags. Bangladesh was the first country in 2002 to introduce polythene ban and use awareness strategy widely after rampant flooding in its cities caused by polythene bags pollutant debris clogging drainage systems causing flooding that caused destruction of lives and property (Peppa, 2016).

In Africa, Nigeria conducted education and awareness of the legislation of polythene and plastics ban, this led to change in mind of those who were opposed to the legislation (Muktar, 2018).The inclusion of Environmental education programs in schools curriculum in all levels of education sector will help the students understand their roles and the impact of polythene bags pollution have in the environment and the role the legislations play as far as conserving the environment is concerned. Environmental based clubs are recommended because they are instrumental in Environmental education and promote compliance of legislation through outreach programs that create impact to the community. This research sought to establish whether lack of awareness can be attributed to non-compliance of polythene bag ban legislation in Rongai Sub-County.

2.4 Effects of polythene bags on Environment

The legislation on polythene bag ban is meant to address myriad of problems associated with the use, therefore, when the community is informed of the problems associated with polythene they will embrace the legislation unlike when they are ignorant (UNEP, 2018b). The following are effects associated with polythene bags use and poor disposal.

2.4.1 Terrestrial ecosystem

Globally, solid waste management has been a problem in most cities and urban areas with polythene products (polythene bags, plastic bottle and plastic containers) making up a substantial volume, especially in developing nations where dumping of polythene products causes noise and visual pollution. The pollution is an eyesore especially in countries that have tourism industry, which is a competitive industry making it loose the market to other cleaner tourist destinations in the globe (Muriithi, 2017).

Polythene bags used are mostly non-biodegradable and when poorly disposed it leads to their accumulation thus affecting the environment. Although polythene paper is a pollutant to the soil, it has some importance in the Agricultural sector where colored polythene is used for mulching improving the yields, the crops mature earlier due to increase in temperature as a result of heat trapped by the polythene paper (Ahmed, Baiyeri, and Echezona, 2013). On the contrary, however, polythene in the soil affects water percolation and absorb the solar radiation which leads to increase in the soil temperature and this affects the moisture contents and subsequently affecting the properties of agricultural land (Ayinla and Eleke, 2010). During rainy seasons there are incidences of floods in major towns and cities caused by non biodegradable polythene products that are washed down the drainage systems blocking the drainage system. The stagnant water creates habitats for pathogens that causes diseases such as *Vibrio cholerae* causing cholera and malaria caused by mosquitoes breeding in the flooded water (Kakoti, 2017).

Polythene products dumped in the long run disintegrate into micro particles that are ingested by microorganism which affect their digestive system causing death, mainly decomposers of organic materials in the ecosystem, subsequently affecting the soil characteristics such as porosity, fertility and soil temperature. Therefore the soil becomes nonproductive leading to loss of biodiversity (Browne, *et al*, 2013). The legislation is geared towards promotion of clean and safe terrestrial ecosystem.

2.4.2 Aquatic ecosystems

Aquatic ecosystem has been modified by micro polythene particles caused by pollution of the polythene products. The microbes attach themselves to the polythene particulates affecting the natural aquatic ecosystem processes (Reisser *et al*., 2014). Polythene particulates cause the dispersion of light affecting the photosynthesis of the aquatic plants, resulting in the death of aquatic plants. A number of marine organisms and birds have suffered through entanglement, smothering and ingestion of polythene particulates as they search for food and nesting materials. Some get entangled by the debris while trying to investigate and while others due to ‘playful’ behaviors are caught up. This leads to death because they are not able to acquire food and escape from predators leading to being exposed to dangers (Kühn, Rebolledo, & Van Franeker, 2015). The environmental legislation compliance is meant to protect the aquatic ecosystems from its negative impacts

2.4.3 Human health

In homesteads and food production industries, hot foodstuffs are packaged in polythene and plastic containers which contaminate the food with dangerous chemicals such as styrene and phthalates described as carcinogenic agent while bisphenol associated with developmental and health problem to infants and children (Joseph *et al*., 2016).

Burning of polythene materials in dump sites releases high volume of CO_2 to the atmosphere. CO_2 gas is a greenhouse gas and it causes increase in temperatures of the earth causing global warming resulting in climate change hence affecting the ecosystem and human health. (Grover *et al*, 2015). Burning of polythene products result in release of persistent organic pollutants (POPs) such as dioxin which affect human healthy by causing respiratory diseases (Williams, 2017). Community having information on polythene effects on the environment play an important role in accepting the Environmental legislations, reports of presence of polythene bags is an indicator of non-compliance and this research sought to establish whether it was due to lack of information on the perceived effects of polythene in Rongai sub-county.

2.5 Polythene bag Alternatives influence on polythene bag ban legislation

In 2004, Luxembourg came up with an initiative called Eco-sac project, which brought together Ministry of Environment, trade confederations and non-profit organization in an attempt to find an eco-friendly alternative to polythene bags. This project led to adoption of re-usable bag named "Okot-Tut" that saw 85% drop in the use of polythene after 9 years (UNEP, 2018). This is a demonstration that the success of polythene bag ban in any country is dependent on initiatives of coming up with an alternatives to replace the non-biodegradable polythene.

Partial ban was implemented in France in 2016 and it aimed at eradicating non-biodegradable and thin polythene bags and to promote the manufacture of biodegradable polythene bags. This partial ban was designed to maintain the economy without affecting the environment adversely and promoting the bio-based industries due to their economic potentials (Peppa, 2016). Rwanda was the first country to ban polythene bags in 2008; the country faced noncompliance because of lack of recommended materials and this led to illegal introduction of polythene through black market, to control and stop the smuggling of polythene, Rwanda Government invested in promoting the alternatives in the country and this led to improved compliance to the polythene ban (Danielsson, 2017b).

In most countries that have adopted the ban of polythene bags have realized the adoption of alternative non-biodegradable bags through promotion of this bags (Synthia & Kabir, 2014). In Kenya, the alternative materials that were recommended and approved by Kenya bureau of standards for use in the production of carrier bags are canvas, cloth and polypropylene materials (Wangui, 2017). However this led to introduction of poor quality polypropylene in the market leading to a further notice, banning its manufacture and distribution (See Appendix VIII). The Government of Kenya did not put effort and emphasis especially on promoting polythene bag alternatives in the county. The presence of polythene bags in Rongai Sub-County indicates non-compliance and this research sought to establish whether it is occasioned by lack of alternatives to polythene bags.

2.6 Influence of enforcement on Polythene bag ban Legislation.

UNEP in an article raised concerns on the risk of failure of polythene bag ban legislation in Kenya due to smuggling going on in the Country and this problem can be solved through better capacity enhancement of the enforcement authority in the country (UNEP, 2018a). Rwanda was the first country to enforce the ban on polythene bags in 2008 employing what was termed as a repressive approach that in early stages faced rebellion, but finally achieved the desired success when alternative carrier bags was adopted (Danielsson, 2017b). The enforcement of the environmental legislation is paramount

NEMA has been carrying out impromptu inspections ones in a while in towns and trading centers and this led to arrests of individuals in possession of polythene and premises still using as packaging materials for their customers, this reports of presence of polythene bags are an indicator of non-compliance and this research was done to establish whether it is due to lack of enforcement capacity of the legislation in Rongai sub-county by NEMA or not.

2.6.1 Strategies for polythene bags management in other Countries

Strategies applied by other countries in managing the use of polythene carrier bags are diverse and apart from Regulatory approach the other is economic instruments that involve taxation and consumer fee (Peppa, 2016). The following highlights this instrument used by sampled countries and the outcomes.

2.6.1.1 Taxation

Two types of taxation were applied; Production and Consumer taxation. In Denmark they introduced “green” tax in production of polythene bags at the rate of 22 Danish Kroner (DK) per kilogram in 1994. This was meant to reduce its production resulting in reduction in the supply to the market. This was not achieved because producers shifted the cost of tax to the

retailers who passed it to the consumers (Gerrity, 2015). In 2002, Ireland introduced a direct tax of 0.22 Euros called “PlasTax” on single use polythene to the consumer, this was in line with the policy that was meant to curb littering and instill responsibility in handling polythene paper disposal (Peppa, 2016). The strategy applied led to reduction in the use of polythene bag by 94% within a period of four years (Foster, 2013).

2.6.1.2 Consumers Fee

In 2003 South Africa, they introduced polythene ban and direct fee to plastic bag users, using plastic bags of less than 30 microns in thickness(Ryan, 2017). This decision was taken after polythene bags became a nuisance in the county and were referred as “New national flowers” this posed threat to tourism sector and the risks to marine environment and Organisms. The strategy did not succeed hundred percent because the customers became used to the fee and continued the use of polythene bags (Ryan, 2017).

2.7 Theoretical Framework

This study adopted the Ronald B. Mitchell compliance theory of Environmental laws that seeks to explain noncompliance, violation and failure to change behavior (Mitchell, 2007). According to Mitchell, lack of compliance to environmental legislations and law is due to the following underlying concerns; costs and benefits, financial resources, Administrative resources, technological resources, enforcement and facilitation. This study therefore was guided by this theory in investigating factors influencing compliance to Environmental legislation on polythene bag ban in Rongai Sub-county.

2.8 Conceptual Framework

After conducting the literature review and defining the problem, a conceptual framework was considered, it involved the theorizing of the relationship witnessed among the independent, dependent and the intervening variables of the research study. The conceptual framework in figure 1 portrays a relationship between the variables that aims at achieving compliance on the legislation on polythene bag ban.

In this study the legislation on polythene bags is influenced by the level of awareness among the residents of Rongai. Information on the health effects caused by polythene to the community members makes them to obey the ban. The enforcement capacity in terms of capacity is crucial and alternatives to plastic bag usage. The involvement in policy implementations at grass root levels is important because the community will get to be involved and finally appreciate role of the legislation in the Country and the Environment. In

return, the government policies will be complied to and a clean and healthy environment will be realized (Dobbelt, 2017).

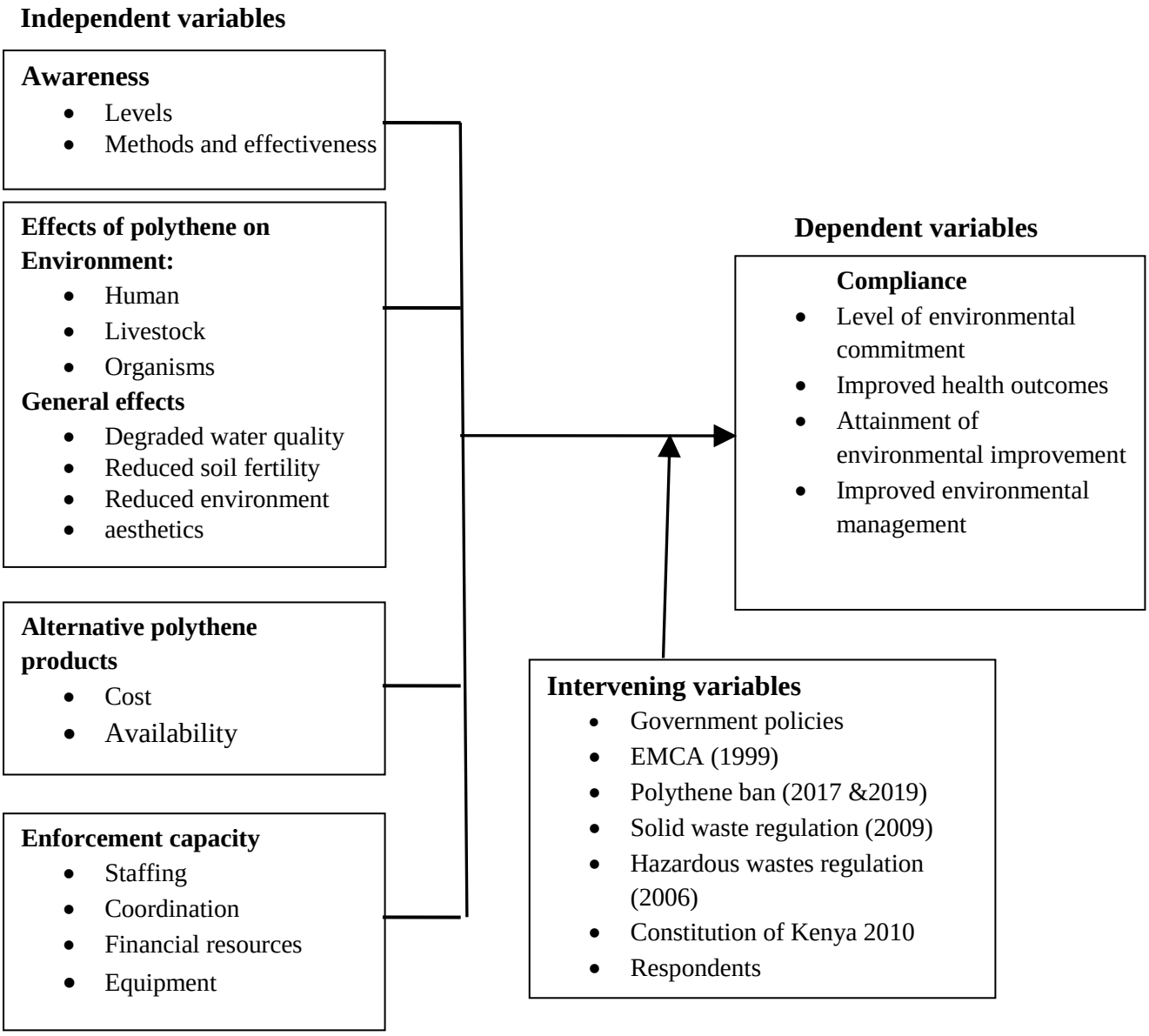

Figure 1: Conceptual Framework
(Research, 2019)

CHAPTER THREE
RESEARCH DESIGN AND METHODOLOGY

3.1 Introduction

This chapter highlights the methodology that was used in the research study and it gives the research design, study area, target population along with, sampling procedures and sample size, data collection and instruments used in collecting data. The next section discusses the reliability and validity of the studying instruments, data analysis and ethical issues observed during the research.

3.2 Research Design

The study employed a descriptive research survey design, which portrays an accurate profile of the persons, events or situations (Sekeran & Bougie, 2009). Therefore this design was relevant in investigating factors influencing compliance to the environmental legislation on polythene bag ban in Rongai Sub-county, Nakuru County, Kenya. This design was considered because it was possible to collect data from a large population.

3.3 Location of the Study area

This study was undertaken in Rongai Sub-County in Nakuru County. According to research, the population of Rongai Sub-county was 147,017 people and covers an area of 1049.1 square Kilometer (KNBS, 2015). Rongai Sub-county (Appendix VII) was made up of five administrative wards namely; Visoi, Menegai West, Soin, Solai and Mosop wards of which were sampled in this study.

3.4 Population of the Study

The study targeted the households and traders from the administrative wards of Rongai sub-County which were as follows, Menegai West, Soin, Visoi, Mosop and Solai. RongaiSub-County has a total population of 18, 377 households and 580 licensed traders (KNBS, 2015). It also targeted key informants charged with overseeing enforcement of the legislation in Rongai Sub-county, they are; NEMA compliance office and the five Chiefs from the respective wards.

Table 1: Distribution of Study Population

Administrative unit	Population	Households	Licensed traders
Menengai West	31,499	3937	130
Soin	28,209	3526	97
Visoi	35,438	4430	142
Mosop	30,556	3820	118
Solai	21,315	2664	92
Total	**147,017**	**18,377**	**580**

Source: (KNBS, 2015)

The total household in Rongai Sub-County was found to be 18,377.

3.5 Sampling Procedure and Sample Size

3.5.1 Sampling Procedures

The researcher adopted stratified proportionate random sampling in all the five wards; this included all the community members in the five wards to enable random sampling procedure of the traders and households in the study. This was mainly to ensure randomization of respondents that gives equal chance to all (Kothari, 2004). The respondents were the primary care giver in this case parents, in their absentia any adult, persons over 18 years in that household was sampled. The shop attendants found in shops with licenses were sampled.

Rongai Sub-County was divided into 5 strata represented by the five administrative wards. In each of the stratum, a systematic random process was used to select the households and traders to be engaged as respondents. A sampling frame for both the households and the traders in Rongai was obtained from the Rongai Sub-County offices which were used to select the households and traders randomly for the research study. Purposive sampling technique was adopted in selection of key informants' for interviews and those to be engaged in Focus group discussion.

3.5.2 Sample Size

From the 18,377 and 580 targeted households and traders respectively, Nassiuma sample size formula was used to determine the sample size as shown below (Nassiuma, 2000),

$$n = \frac{NC^2}{C^2 + (N-1)e^2}$$

Where:

n=Sample size

N=Population size of Target population (Households and Traders)

C=Coefficient of variation, $20\% \le C \le 30\%$

e=the error of Sampling (0.02) $0.01 \le e \le 0.05$

Households sample size

n=18377*(30%)^2/((30%) ^{2}+ (18377-1) 0.02^2)= 143

Traders sample size

n= 580*(30%)^2/ (30%)^2+ (580-1) 0.025^2 =116

Stratified sampling allocation proportional to strata size $n_h = \left(\frac{n}{N}\right)N_h$

Table 2: Distribution of sample size

Ward	**Total population**	**Households**	**Sample size**	**Traders**	**Sample Size** $\left(\frac{n}{N}\right)N_h$
Menengai west	31,499	3937	31	130	26
Soin	28,209	3526	27	98	20
Visoi	35,438	4430	34	142	28
Mosop	30,556	3820	30	118	24
Solai	21,315	2664	21	92	18
TOTALS	**147,017**	**18377**	**143**	**580**	**116**

Source:(KNBS, 2015)

The Key informants were; Nakuru County NEMA compliance officer and Chiefs from each of the administrative wards (5). The total sample size of 265 was sampled for the study. Focus group discussion involved 5-10 selected community members including traders and households were engaged in each of the five wards, this was organized in consultation with the respective chiefs.

3.6 Instrumentation

The study used the following instruments: questionnaires, Key Informant interviews, Focus group discussion, Non-participant observation and photography.

Structured Questionnaire

This was the main tool used to gather primary data in the research study. The questionnaire was preferred because it was cheap, ideal to sample a large population and data can be easily analyzed, also the likert type questions utilized was in order to scale the responses (Mugenda & Mugenda, 2009). This method was mainly ideal in describing the phenomena of lack of compliance to the environmental legislation on polythene bags in Rongai. The researcher and research assistants administered the questionnaires to the selected respondents to avoid lack of interest witnessed mainly when the respondents are left to fill on their own.

Key informant interviews

Interview schedules were used to carry out interviews of the Key informants; this was done to enable the researcher control the discussions, this was through presenting contents found within the schedule to the respondent. Interview was important because it granted the researcher an opportunity to ask specific questions on the objectives and any other relevant details on the status of the polythene bag legislation in Rongai Sub-County. The key informants in this study were: Nakuru County NEMA compliance officer and the 5 Chiefs from the respective wards of Rongai Sub-County. Purposive sampling was used to select the Key informants because of their knowledge on governments' legislation and status as well as the challenges facing the society in implementation of the environmental legislation.

Focus group discussion

This involved discussions carried out in groups identified through the guidance of the chiefs. Focus group of 5-10 people was conducted in each of the 5 wards and involved taking into account all group were represented, youth, women and the elders so that it is a representative of the community. The Focus group discussion was conducted to explore the topic and also get to understand the challenges, success and suggestion to improve on compliance of the polythene bag legislation. The method gave an overview of the responses collected using other methods in the study

Non-Participant Observation

This is an unobtrusive method involving observation of objects and environment bearing the phenomenon of interest (Ulas, 2015). The Non-participant observation was adopted in the study area where observations were made in the natural context where the researcher took note of polythene bags present and also the eco-friendly bags in the area.

Photography

Photography were taken in the field and used in the study to augment the information collected.

Secondary data

Secondary data sources included a review of recent relevant journals, books, magazines reports and data that has been documented by Ministry of environment and natural resources, Kenya National Bureau of Statistics (KNBS) and the implementing Authority NEMA in the research.

3.6.1. Pilot Study

The researcher carried out a pilot study by choosing a group of fifteen (15) respondents that is statistically acceptable (Sekeran & Bougie, 2009). Piloting was carried out in Umoja area of Visoi ward because it reflected was the same population to be studied hence fit. The specific area of the respondents who took part in the pilot study was identified to ensure that was not sampled again in the actual study.

3.6.2 Validity of the Instrument

Validity is the accuracy and meaningfulness of inferences obtained from a research study (Mugenda & Mugenda, 2003).Validity addresses the critical issue of the relationship between a concept and its measurement (Sekeran & Bougie, 2009). This ensures that there are no

errors in data collection, coding, recording and processing. The instruments were prepared in consultation with the supervisors and a statistician who evaluated it; this was to reduce errors from inaccurate coding and ambiguities in the instrument.

3.6.3 Reliability of the Instruments

Reliability is judging the level at which an instrument produces similar results when put to test recurrently (Mugenda & Mugenda, 2003). Reliability of the research instrument was determined using the Cronbach's alpha coefficient (Kothari, 2004), this is mainly to measure the consistency of the instrument presented and has a minimum criteria value of 0.7 Criteria. In this study, the overall result of 0.74 Cronbach's alpha level indicated that the instrument was valid and fit for use in the research study.

Table 3: Reliability Statistics

Cronbach's Alpha	No. of Items
.740	25

(Research Data, 2019)

3.7 Data Collection Procedure

There researcher obtained an introduction letter from Kabarak University and applied for a research permit from National Commission for Science, Technology and Innovation (NACOSTI). The permit was then presented to the Nakuru County and Rongai Sub-County administration, NEMA Nakuru County offices and the 5 Chiefs in the respective wards. The researcher also booked appointments with key informants and liaise with the Chiefs on focus group discussion and conveying information to the members of public on the upcoming research study in the area.

The researcher adopted stratified proportionate random sampling in all the five wards; this included all the community members in the five wards to enable random sampling procedure of the traders and households in the study. This was mainly to ensure randomization of respondents that gives equal chance to all (Kothari, 2004). The respondents was mainly the care giver and in their absentia any adult, persons over 18 years in that household. The shop attendants in shops with licenses were also sampled.

In each of the stratum, a systematic random process was used to select the households and traders that were engaged as respondents. A sampling frame of the households and traders in Rongai Sub-County was obtained and used to randomly select the respondents. The

questionnaires were presented by the researcher and research assistants who also helped the illiterate in filling the questionnaire and this was mainly to reduce lack of interest by public on self-administered questionnaires. Purposive sampling technique was adopted in selecting key informants' for interviews and those to be engaged in Focus group discussion.

3.8 Data analysis techniques

The data collected was subjected to quantitative and qualitative methods of data analysis. Data preparation was done through editing, coding and entry to statistical packages for social sciences (SPSS version 22) (Bhatia, 2018). The study adopted descriptive and inferential statistics in analysis of collected data. Frequencies and percentages were used in descriptive statistics while correlation and multiple regressions were used in inferential statistics to explain relationships between the awareness levels, effects of polythene bags in the environment, polythene alternatives, and enforcement capacity to compliance of the legislation on polythene bag ban.

The regression equation was as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon$$

Whereby;

Y=Compliance to Polythene bag Legislation

β_0= Constant

X_1=Awareness level

X_2= Effects of polythene on Environment

X_3=Alternative Polythene products

X_4=Enforcement capacity

While β_1, β_2, β_3 and β_4 are coefficients of determination and ε is the term of error

Observation checklist was used in collecting qualitative data and analyzed using percentages.

Table 4: Data analysis plan

Objectives	Independent Variable	Dependent Variable	Test
To determine the extent to which the awareness levels influence compliance of Polythene bag ban legislation in Rongai sub-county.	**Awareness** • Levels • Effectiveness	• Level of environmental commitment	**Descriptive.** • Percentages **Inferential statistic** • Chi-square • Correlation • Multiple regression
To assess perceived environmental effects of polythene bags in Rongai sub-county.	**Recognition of environmental Effects on:** • Humans and organisms • Environment	• Improved health outcomes	**Descriptive** • Percentages **Inferential statistic** • Chi-square • Correlation • Multiple regression
To examine the extent to which alternative products to polythene bags influence compliance to the Polythene bag ban legislation in Rongai Sub-county.	**Alternative polythene products** • Cost • Availability	• Attainment of environmental improvement	**Descriptive** • Percentages **Inferential statistic** • Chi-square • Correlation • Multiple regression
To establish the extent to which the enforcement capacity by NEMA influence compliance to environmental legislation in Rongai sub-county.	**NEMA capacity** • Staffing • Coordination • Financial resources • Equipment	• Improved environmental management	**Descriptive** • Percentages **Inferential statistic** • Chi-square • Correlation • Multiple regression

3.9 Ethical consideration

The researcher before undertaking data collection obtained an introductory letter from Kabarak University and made an application for a research permit from the Ministry of Education via the National Commission of Science, Technology and Innovation which was issued on 26th June, 2019 (NACOSTI/P/19/23579/31158). The permit was then presented to the Nakuru County commissioner, Rongai Sub County, the chiefs and the key informant. The researcher also assured each respondent that data collected was to be treated with utmost privacy and confidentially and that it was only to be used for purpose of the Academic research under study.

CHAPTER FOUR
DATA ANALYSIS, PRESENTATION, AND DISCUSSION

4.1 Introduction

This chapter presents the analysis of results, discussions, and interpretation of the factors that influence compliance to the environmental legislation on polythene bag ban in Rongai Sub-County.

4.2. General and Demographic Information

4.2.1 General Information

The residents of Rongai Sub-County were requested to respond to questions presented to them in the form of a questionnaire. Research expectation was that the respondents would cooperate and readily provide information; the response rate was 95%. According to Mugenda, a response rate above 50% is considered adequate while 60% good and above 70% is considered very good (Mugenda & Mugenda, 2003). Based on this criterion, a response rate of 95% is excellent and therefore acceptable. The 95% response rate was achieved through the help of research assistants who were trained on the instruments to be able to assist the respondents when there is need.

Table 5: Response rate

Administered questionnaires	Questionnaires filled and returned	Response rate (%)
259	245	95

(Research Data, 2019)

The problems encountered in the field were; fear of victimization and high expectation from the public which were solved by constantly assuring the respondents that the responses were confidential and meant for academic purposes only.

4.2.2 Demographic Data

The demographic characteristics in the study included; gender, age, education level, and income.

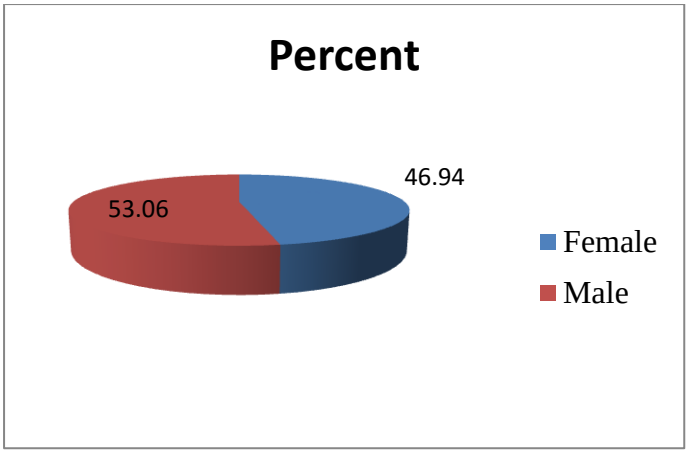

Figure 2: Response rate (Research, 2019)

The proportion of the study population was composed of 53% male and 47% female respondents as indicated in figure 2.

Table 6: Gender by Age

	Age (Years)				
GENDER	**18-24**	**25-33**	**34-41**	**Over 41**	**Total**
Female	38	43	20	14	115
	15.51%	17.55%	8.16%	5.71%	46.94%
Male	53	38	20	19	130
	21.63%	15.51%	8.16%	7.76%	53.06%
Total	91	81	40	33	245
	37.14%	33.06%	16.33%	13.47%	100%

(Research Data, 2019)

The majority (37 percent) of respondents in the study were aged between 18-24 years and composed of 15.51 percent female and 21.63 percent female. Those respondents aged between 25-33 years were second in terms of numbers (33 percent) which was composed of 15.51 percent female and 21.63 percent male and those aged between 25-33, 17.55 percent were male. Respondents aged over 41 were the least (13 percent) in both genders with 5.71 percent female and 7.76 male respondents as shown in the table 6.

Table 7: Gender by ward

Table of Gender by Ward						
GENDER	**MENENGAI WEST**	**MOSOP**	**SOIN**	**SOLAI**	**VISOI**	**Total**
Female	25	26	13	23	28	115
	10.2%	10.61%	5.31%	9.39%	11.43%	46.4%
Male	22	26	20	18	44	130
	8.98%	10.61%	8.16%	7.35%	17.96%	53.06%
Total	47	52	33	41	72	245
	19.18%	21.22%	13.47%	16.73%	29.39%	100%

(Research Data, 2019)

The distribution of the respondents by gender across the four administrative units of Rongai was fairly balanced where the ratio of male to the female respondent was approximately 1:1 except in Visoi ward where the male respondents were higher; 44 while that of female was lower 28 as shown in the table 7. This indicated that the researchers obtained an almost balanced response from both genders which was important for this descriptive research survey of the factors influencing compliance to polythene bag ban in the region because the different genders interact with the environment in different ways and the impacts of environmental changes affect them differently hence the need to engage both genders (Elmhirst, Resurreccion, & Resurreccion, 2012).

Table 8: Gender by Education level

GENDER	**EDUC. LEVEL**				**Total**
	Illiterate	**Primary**	**Secondary**	**Tertiary**	
Female	4	22	49	40	115
	1.64%	9.02%	20.08%	16.39%	47.13%
Male	1	12	63	53	129
	0.41%	4.92%	25.82%	21.72%	52.87%
Total	5	34	112	93	244
	2.05%	13.93%	45.9%	38.11%	100%

(Research Data, 2019)

According to table 8, majority of the respondents (45.9 percent) had secondary level as their highest level of education, which constituted 20 percent female and 25.82 percent male.

Those respondents with a tertiary level of education were 38 percent in total with a composition of 16 percent female and 21.72 percent male. It was also found that 13.93 percent had primary level as their highest level whereby women 9 percent were the majority in this category while the male was 4.92 percent. Illiterate respondents were approximately 2 percent majority being women. The education levels of the respondents' majority being women are low. According to research environmental, concern and awareness are directly linked to education (Report, 2015). Therefore, this can be a factor contributing to the lack of compliance to the environmental legislation on the polythene bag ban in Rongai Sub-County.

Table 9: Gender by Income

GENDER	**Income(Ksh)**				**Total**
	Less than 10,000	**10,000 -20,000**	**20,000-40,000**	**> 40,000**	
Female	66	39	7	3	115
	26.94%	15.92%	2.86%	1.22%	46.94%
Male	55	43	17	15	130
	22.45%	17.55%	6.94%	6.12%	53.06%
Total	121	82	24	18	245
	49.39%	33.47%	9.8%	7.35%	100%

(Research Data, 2019)

Majority of the respondents, approximately 50 percent, had an income of fewer than ten thousand shillings with 27% female and 22 percent male. Those respondents earning between 10,000 Ksh and 20,000 Ksh constituted 33 percent of the population comprising of 16 percent female and 17% male. Respondents earning above 40,000Ksh were the minority (7 percent) and composed of 65% Male and 1 percent women. Gender disparity is evident in income between Ksh 20,000 to Ksh 40,000 where men are dominant 13 percent while women are approximately 4 percent. The cost of compliance of environmental legislation has been identified as a deterrent to an individual or a state, hence can be linked to non-compliance of environmental legislation (Mitchell, 2007).

4.3 Findings for Objective, Research questions/Hypothesis

4.3.1 Findings on Awareness levels of Polythene bag ban Legislation.

The researcher carried out the study to test the hypothesis that there was a lack of awareness on environmental legislation on polythene bag ban in Rongai Sub-County and the table 10 shows the responses.

Table 10: Awareness level of Polythene bag ban legislation

	SD	D	UN	A	SA	χ^2	P> χ^2
The familiarity of the legislation on polythene ban	2.86	0.41	3.67	55.1	37.96	306	<0.0001
The familiarity of the ban on commonly used polypropylene bags	1.22	1.22	5.31	58.37	33.88	317	<0.0001
I am aware of fine charged for possession of polythene	4.9	10.2	10.2	46.53	28.16	146	<0.0001
I am aware of the imprisonment term for possession of polythene bag	8.98	11.84	13.06	40.41	25.71	84	<0.0001
The awareness program conducted was sufficient	11.84	16.73	12.65	37.14	21.63	52.4	<0.0001
The polythene bag legislation on polythene ban is positive	0.82	2.04	3.67	46.94	46.53	292	<0.0001

(Research Data, 2019)

The response on being familiar with the commonly used polypropylene bag ban by the respondents was widely agreed by 58.37% and strongly agreed by 33.88% of the respondents at (χ^2=317, P<0.0001). This was an indication that most of the respondents were familiar with the legislation that outlawed the use of polythene bags in Kenya.

The statement on being aware of the polythene bag ban was agreed significantly at (χ^2=306, P<0.0001) by the respondents. It was found out that the majority were still using them as the main carrier bags. The respondents agreed at (χ^2=146, P<0.0001) that they were familiar of the punishment for use of banned polythene bag, but they did not know the details of the fine charged as well as the imprisonment term. In Rwanda information on punitive measures for contravening legislation on polythene were passed clearly to the public which acted as a deterrent (Kardish, 2014).Whether the awareness program was conducted sufficiently, it was

agreed but with the least association at (χ^2=52.4, P<0.0001). This was significant despite the 28.57 percent of the respondents who were against while some 12.65 percent were not aware

The response on the fact that the legislation on the polythene bag ban was positive was significantly agreed at (χ^2=292, P<0.0001). This was an indication that the respondents appreciated the role played by the legislation as far as environmental protection is concerned. Awareness levels are important because it is directly related to compliance of the legislation by the community. Awareness helps the community to understand the fragility of the environment and the need to take steps of conserving.

The researcher sought to know how the respondents got to know about the polythene bag ban and the results are shown in table 11.

Table 11: How did you get to know of the polythene ban?

	Frequency	Percent	χ^2	P> χ^2
Documentaries and others	4	1.64		
Media	207	84.84		
Public baraza	13	5.33	818.54	<.0001
Public baraza and media	4	1.64		
Talk	12	4.92		
Talk and documentaries	4	1.64		

(Research Data, 2019)

The majority of the respondents 207 (84.8 percent) agreed significantly (χ^2=818.54, P<0.0001), indicating that they got to know about the polythene bag ban through the media, Media has been instrumental in the fight against environmental issues that have led to climate change. The battle of combating climate change for it to be won or lost is dependent on Radio broadcasts, newspapers and mobile phones. Individuals at the household or global level usually make effective decisions on climate change based on information from media (Besley & Shanahan, 2014). This is an indication that media was an instrumental tool for dissemination of environmental information on the polythene bag ban in Rongai Sub-County; this was confirmed by the NEMA compliance officer that both print and electronic media were used in the creation of awareness.

The research study in summary established that all the questions posed were significant with the most associative aspect of awareness on polythene bag ban being the familiarity of the legislation while the least saw the inadequacy of the awareness program conducted. Therefore the null hypothesis that Lack of awareness on the environmental legislation on polythene bag ban does not influence its compliance in Rongai sub-county is rejected.

4.3.2 Findings on perceived effects of Polythene bags in the Environment

The researcher sought to assess the perceived effects of polythene bags in the environment and presented some questions and the results obtained were shown in the table below.

Table12: Effects of polythene in the Environment.

	SD	D	UN	A	SA	χ^2	P> χ^2
Polythene bags kill livestock				28.16	71.84	46.7	<0.0001
Polythene bags burning cause respiratory diseases	0.41	2.04	14.69	33.88	48.98	216	<0.0001
Polythene reduces soil fertility	2.04	1.22	7.76	34.29	54.69	274	<0.0001
Polythene causes water pollution	0.41		5.71	34.29	59.59	221	<0.0001
Polythene smoke components cause cancer in human	0.82	2.45	17.55	29.8	49.39	201	<0.0001
Polythene kill aquatic organisms	0.82	2.04	9.39	36.73	51.02	251	<0.0001
Polythene littering affects the beauty of the environment		0.41		25.31	74.29	208	<0.0001

(Research Data, 2019)

All the respondents (100 percent) significantly agreed at (χ^2 =46.7, P<0.0001) that polythene bags were responsible for death of livestock in Rongai sub-County. This was also echoed during the focus group discussion that polyethylene bags ingestion by livestock had led to low income due to emaciated livestock. NEMA compliance officer pointed to research on the extensiveness of polythene bags in livestock rumen that was conducted by NEMA in abattoirs across the forty-seven counties in Kenya concluding that over 50% of livestock ingest polythene while feeding (Lange et al., 2018).

The statement that polythene bags burning cause respiratory diseases was agreed (χ^2 =216, P<0.0001). However, there were 14.69 percent of the respondents who were unaware of this while 2 percent disagree; this meant that sensitization was not adequate in details on this aspect of polythene. It was reported that there was reduced open burning since the implementation of the polythene leading to reduced smoke especially from Gioto dumpsite.

Polythene bags causing water pollution was agreed at (χ^2=221, P<0.0001) by 59.59 percent of the respondents who strongly agreed and 34.29 percent agreeing on the same statement as demonstrated through research that polythene bags has caused blockage of drainage systems leading to inundation of sewage to freshwater sources causing water-borne disease such as cholera (Kakoti, 2017).

The statement that polythene bags reduces soil fertility was agreed 34.29 percent and strongly agreed by 54.69 percent at (χ^2=274, P<0.0001) Research conducted has indicated polythene poorly disposed of negatively affect soil fertility leading to low yields (Ayinla & Eleke, 2010). From the results, 7.76 percent of the respondents were unaware while approximately 3 percent disputed that poorly disposed polythene materials affects soil fertility.

Responses of polythene smoke components causing cancer to human was significantly agreed at (χ^2=201, P<0.0001) with 49.39 percent strongly agreeing and 29.8 percent of the respondents which was in agreement with studies showing that polythene contaminates food with dangerous materials such as styrene which is a carcinogenic agent(Joseph et al., 2016). Statement on polythene killing aquatic organisms was significantly agreed (χ^2=251, P<0.0001) this was strongly agreed by 51.02 percent and agreed by 36.73 percent of the respondents while 9.39 percent were unaware. Approximately 3 percent of the respondents disagreed on the statement even though polythene has been found to kill aquatic organisms through entanglement, ingestion and smothering (Kühn et al., 2015).

The assertion that polythene littering affects the beauty of environment was agreed significantly (χ^2=251, P<0.0001) by 74.29 percent and 25.31 respondents who strongly agreed and agreed respectively, the environmental aesthetics has been pointed out to be affected largely by polythene bags becoming an eyesore in Lake Nakuru national park, a classical example is South Africa polythene nuisance in the Country and its parks which was nicknamed "New national flowers" that led to its ban so as to attract tourists who have preference for cleaner destinations. According to NEMA, cleanliness was a big challenge that motivated the introduction of the polythene bag ban in Kenya.

A open question on whether polythene bags were present or not was posed to the respondents and the responses were as shown in the table below

Table 13: Presence or absence of polythene

Polythene bags	Frequency	Percent	χ^2	P> χ^2
No	169	70.12	39.045	<.0001
Yes	72	29.88		

(Research Data, 2019)

The respondents were asked whether the banned polythene bags were present in Rongai Sub-County and 72 (29.88 percent) of the respondents said agreed "Yes" at (χ^2 =39.045, P<0.0001). This was a confirmation from an interview of Nakuru County NEMA compliance officer that despite the success achieved of complete eradication of clear polythene bags from supermarkets countrywide, they were still being used by small scale traders. The inspection carried out by NEMA that led to the arrest of individuals including those from Nakuru County demonstrated that the banned polythene bags were not yet completely eradicated (Murathe, 2017).

Sources of Polythene

The researcher attempted to inquire about the sources of polythene bags. This was obtained using an open-ended question and the results were as indicated in the table below.

Table 14: Sources of polythene bags

Polythene bag sources	Frequency	Percent
Black market	6	7.59
Bread companies	10	12.65
Enforcement	2	2.53
Factory	3	3.8
Lack of co-ordination	2	2.53
Market	2	2.53
Neighbouring countries	3	3.8
Packaging	2	2.53
Shopping canters	12	15.19
Traders	20	25.32
Wholesalers	1	1.27
Industries	1	1.27
Unknown	15	19.09

(Research Data, 2019)

According to table 14, majority of the respondents (over 40 percent) were convinced that the traders, in general, were the main sources of polythene bags in the area while 19 percent indicated that they do not know the sources. Neighboring countries were blamed by 3.8

percent of the respondents as the source of polythene bags; this had been demonstrated through inspections on the road checks where some consignments of banned polythene bags intercepted destined for Kenyan major towns, Nakuru included (Bwire, 2018). Bread companies were mentioned by 12.65 percent of the respondents as the main source of polythene bags that are littering the area, this was clarified through focus group discussions that apart from the clear the flat polythene bags, the polythene bags used for packaging bread are poorly disposed hence the need to find creative ways of packaging bread and avoid use of polythene materials.

In summary, the study found that all the questions were significant with the most associative aspect on the influence of polythene effects to compliance was that polythene bags reduces soil fertility while the least was evident in statement that polythene bags kill livestock. Therefore, the null hypothesis that the perceived environmental effects of polythene bags do not influence compliance with the polythene bag legislation in Rongai Sub-County is rejected.

4.3.3 Findings on influence of Carrier bags Alternatives

The study was aimed at determining the extent to which polythene bag alternatives influences compliance to Polythene bag ban legislation in Rongai Sub-County. The following results were as shown in table 15. Economics in this case is the manufacture, distribution and use of eco-friendly alternative bags to polythene bag.

Table 15: Carrier bags alternatives and its economics

	SD	D	UN	A	SA	χ^2	P> χ^2
Familiarity with alternative materials for carrier bags	3.3	7.8	11.4	46.9	30.6	164.0	<.0001
Informed well on recommended alternatives to polythene bags	6.1	10.6	9.8	47.4	26.1	143.0	<.0001
Cost of alternative bags is cheaper to the cost of polythene bags	30.6	46.5	7.4	8.2	7.4	156.0	<.0001
Cost of the polythene bag is cheaper than alternative bags	6.6	6.2	8.2	43.0	36.1	159.0	<.0001
Materials for making eco-friendly bags are easily available.	14.7	21.2	25.3	27.4	11.4	22.7	<.0001
Alternative carrier bags are made in Rongai sub-county	24.9	28.2	27.4	12.7	6.9	45.2	<.0001

(Research Data, 2019)

The findings in table 15 indicates that the majority of the residents 46.94 percent responded significantly (χ^2=164; P<.0001) that are acquainted with at least some of the alternative carrier bag materials used. This was contrary to 47.35 percent of the respondents who agreed significantly (χ^2=143; P<.0001) that they have not been informed adequately on the types of recommended alternatives carrier bags despite having been identified (Wangui, 2017). The success of polythene ban in Rwanda was dependent on the sharing of information and knowledge on the available resources that can be used for alternative bags (Danielsson, 2017b).

When asked whether the cost for alternative materials is cheap, 46.53 percent of the respondents agree that it was not (χ^2=156, P<0.0001) This information was supported by a confirmation that the hindrance to the adoption of polythene bag ban legislation was due to expensive alternatives 43.03% compared to polythene bags. Luxembourg was successful in eradication of polythene bag ban because of an initiative Eco-Sac project named "Okot-Tut" that came up with a cheap alternative that was affordable and durable (UNEP, 2018b). During the interviews and focus group discussions, it was identified that the resources for making eco-friendly carrier bags were available but the finances and skills were lacking hence the need for collaborations and partnership.

Respondents totaling above 60 percent, significantly agreed (χ^2=22.7, P<0.0001) that the materials for making alternative carrier bags are not easily available in Rongai Sub-County This was contrary to focus group discussions and key interviews who were in agreement that materials for making eco-friendly bags are available, this was supported by findings from observations that find out that Sisal, Bananas, and reeds were found within the Rongai Sub-County. This was an indicator of gaps in their knowledge on alternative materials. It was also clear that compliance to polythene bag ban legislation was slow because 24.9 percent strongly disagree, 28.16 percent disagree while 27.35 percent were unaware whether eco-friendly carrier bags are made in Rongai Sub-County or not**.**

Table 16: kind of carrier bags used

What kind of carrier bag do you use	Frequency	Percent	χ^2	P> χ^2
Canvas	38	15.51		
Cloth	57	23.27		
Grass basket	19	7.76	163.6	<0.0001
Polypropylene	122	49.8		
Sisal basket	9	3.67		

(Research Data, 2019)

From the table 16, 122 (approximately 50 percent) of the respondents agreed significantly (χ^2 =163.6, P<0.0001) that they are using the propylene bags despite the ban and confirmed that they are of poor quality and not durable. Those respondents using cloth were 57 (23.27 percent), those using canvases were 38 (15.51 percent), grass baskets 19 (7.76 percent) and the least were those using sisal baskets 9 (3.67 percent). This was an indication that little was done in production and promotion of good quality alternatives carrier bags such as sisal baskets because sisal is a cash crop grown in plantations in some parts of Rongai Sub-County.

Plate 1: A variety of carrier bags sold in a shop at Kampiya Moto trading center

Plate 2: A trader in Visoi ward, Lengenet trading center using clear Polythene for packaging

In summary, the study established that all the statements were significant with the most associative aspect on the influence of alternatives to compliance being familiarity with alternative materials for making eco-friendly bags while the least was that alternative eco-friendly bags are made in Rongai. The null hypothesis that the polythene bag alternative has no significant influence on compliance to the legislation on polythene bag ban in Rongai Sub-County is therefore rejected.

4.4.4 Findings on Enforcement capacity of NEMA

According to Mitchell's Compliance theory of Environmental laws, enforcement and facilitation are key in ensuring that Environmental legislations are successful (Mitchell, 2007). The researcher sought to determine the enforcement capacity by NEMA and its influence on the compliance of polythene bag ban legislation in Rongai Sub-County. The results are as shown in table 17.

Table 17: NEMA capacity to ensure compliance of polythene bag ban Legislation

	SD	D	UN	A	SA	χ^2	P> χ^2
NEMA Lack Financial allocations to ensure enforcement of polythene ban legislation	12.2	12.2	24.1	37.6	13.9	59.1	<.0001
Political interference affects the enforcement of plastic ban legislation by NEMA	16.7	39.2	29.0	11.4	3.7	97.9	<.0001
NEMA Lacks adequate staffing that has affected the enforcement of polythene bag ban legislation enforcement	5.3	6.9	20.0	48.2	19.6	144.5	<.0001
Lack of equipment affects NEMA ability to enforce polythene bag ban legislation	8.6	11.4	19.6	46.5	13.9	115.8	<.0001
Absence of enforcement officers in effects compliance of the polythene bag ban legislation	3.7	8.2	9.0	51.4	27.8	193.0	<.0001
NEMA is carrying out co-ordination of enforcement of environmental legislation in Rongai Sub-County	18.4	29.5	27.9	18.4	5.7	44.0	<.0001

(Research Data, 2019)

The statement that NEMA lacks adequate financial allocation was agreed by 37.55 percent of the respondents significantly (χ^2 =59, P<0.0001) as shown in table 17. These sentiments were echoed by NEMA compliance officers that the agency was not receiving funds for its operation. On political interferences, majority of the respondents (39.18 percent) disagreed

and this was in line with key informant interview carried out indicated that political interference was minimal.

The statement that staffing was affecting NEMA enforcement of the legislation was agreed by the majority 48.16 percent of the respondents at (χ^2 =144.5, P<0.0001), this was in agreement with the research that found out Nakuru County being a vast county of eleven Sub-Counties, Rongai being one of them had four staff members. The absence of enforcement officers affecting compliance negatively was agreed by 51.43 percent of respondents significantly (χ^2 =193, P<0.0001), this was a strong indication that enforcement was key in ensuring compliance as demonstrated by the case of Rwanda success in polythene bag eradication (Danielsson, 2017b). Important equipment for operation of the agency was lacking, this was in agreement with 46.53 percent (χ^2 =115.8, P<0.0001) of the respondents who held that lack of office equipment such as furniture and computers hampers the execution of enforcement since no clear records were kept that can be retrieved easily due to congestion in the office.

The statement that coordination of enforcement of environmental legislation was being carried out by NEMA in Rongai was disagreed by 29.51 percent which was contrary to NEMA key informant who indicated that the agency was carrying out co-ordination activities mainly through the county government and carries out joint inspections.

Table 18: Challenges of enforcement of Polythene bag ban legislation

Challenges	Frequency	Percent
Corruption	8	14.29
Lack of awareness	19	33.93
Lack of enforcement	12	21.43
Ignorance	6	10.71
Lack of alternatives	11	19.64

(Research Data, 2019)

The respondents were asked to give the challenges that are facing polythene bag legislation compliance in Rongai and results were as in table 18. 33.93 percent of the respondents believed that lack of awareness was responsible for non-compliance which was in agreement that awareness is key in the success of environmental legislations (Muktar, 2018).

Enforcement was identified as a challenge by 21.43 percent of the respondents who blamed lack of enforcement officers in the area; this was also in agreement with NEMA compliance officer that they are understaffed. Rwanda was successful in eradicating polythene bags by putting a dedicated team of enforcers in the entire country and its exit and border points (Kardish, 2014).

Lack of affordable and durable polythene bag alternatives was blamed by 19.64 percent of the respondents, an innovation of good polythene bag alternatives has been found to greatly improve compliance and eradication of polythene bags (UNEP, 2018b). Corruption was indicated by 14.29 percent of the respondents as a contributing factor of non-compliance, they blame the law enforcers for being compromised, and sentiments which were shared by NEMA compliance officer that it has forced them to carry impromptu checks (Murathe, 2017). Ignorance was named by 10.71 percent of the respondents as a challenge impeding compliance of the legislation in Rongai Sub-County which calls for heightening of awareness.

NEMA compliance officer pointed out of the trans-boundary movement of polythene bags within the East Africa region as a challenge and this was being addressed through coming up with agreements to combat polythene in the region and joint enforcement among the law enforcers in the region (Bwire, 2018). The NEMA compliance officer reported of impersonators taking advantage of the Ban to extort unsuspecting traders of money, the officer also mentioned that they were cognizant of re-emergence of clear flat bags in the country despite their success in eradicating them from Supermarkets in the country which has improved the general cleanliness in the country, and gave classical example of Gioto dumpsite which is not visible anymore because of reduced solid waste and smoke during burning of wastes which were majorly polythene

The law enforcers were reported that they were taking possession of banned polythene bags as a crime and could not successfully prosecute an offender. The judiciary was reported to be lenient on the offenders and they were not applying the law as it should be and releasing offenders on small fines which were affordable.

The researcher observed that the there was greater improvement in the cleanliness of the trading centers despite the fact that they did not designated dumping site. The Gioto dumpsite pictured in plate 3 portray a huge volume of waste dumped previously before the polythene bag ban, but plate 4 shows the same dumping site clear of wastes. According to NEMA, the

Environmental legislation has successfully eradicated over 80% of the polythene bag (NEMA, 2019).

Plate 3. Gioto in 2016 before the polythene bag ban legislation

Source: (Joseph et al., 2016)

Plate 4: Gioto in 2019 after the polythene bag legislation

Observations made for two (2) hours in purposively selected trading centers in the Rongai showed that most of the polythene bags were found in the trading centers away from the tarmac. The researcher summarized the data to give percentages. The results were; Lengenet

trading center in visoi ward had 45 percent of total persons carrying polythene bags as indicated in plate 2, while Kampi ya Moto in Soin ward had 35 percent and 20 percent in Solai. There was none in Mosop and Menengai west. The shops were selling mainly nonwoven propylene bags which was observed to be the main carrier bags used in the area by individuals though some mixed them with woven bags as shown in plate 1.

In summary, the study established that all questions posed were significant with the most associative aspect in enforcement to compliance being absence of NEMA enforcement officers in Rongai Sub-County at (χ^2 =193, P<0.0001) while the least association was evidenced in the co-ordination of enforcement by NEMA in the Sub-County. The null hypothesis that the enforcement capacity by NEMA does not significantly influence compliance of polythene bag ban legislation in Rongai Sub-County, Nakuru County is therefore rejected

4.4.5 Significance of Compliance to the Environment

The following statements on the importance of compliance to the environmental legislation on polythene bag ban were put before the respondents and the table 18 summarizes the results.

Table 19: Significance of Compliance

	SD	D	UN	A	SA	χ^2	P> χ^2
Legislation implemented leads to improved environmental attainment	0.4	0.4	2.5	34.3	62.5	377.5	<.0001
The legislation will lead to improved health outcomes		1.6	4.1	33.1	61.2	377.5	<.0001
The legislation will lead to improved solid waste management	1.2	2.5	4.9	35.1	56.3	298.4	<.0001
The polythene bag ban legislation will lead to a beautiful environment	0.4	2.5	1.6	30.2	67.8	298.4	<.0001
Polythene bag ban leads to improved environmental resources (water, soil, and air)	2.0	1.2	4.1	29.4	63.3	353.8	<.0001
Strengthening enforcement of environmental legislation will lead to improved environmental management	0.8	0.4	2.9	35.1	60.8	360.1	<.0001

(Research Data, 2019)

Table 19 sought to establish the significance of compliance to the legislation and 62.45 percent respondents strongly agreed significantly (χ^2=377.5, P<0.0001) that it will lead to improved environmental attainment. The respondents were also convinced that the legislation will lead to improved health outcomes with 61.22 percent of the respondents being strongly in agreement at (χ^2=377.5, P<0.0001). Responses on the legislation improving solid waste management were agreed at (χ^2=298.4, P<0.0001) by 56.33 percent of the respondents who strongly agree. The statement that the polythene bag ban legislation will lead to a beautiful environment was strongly agreed at (χ^2=298.4, P<0.0001) with the majority of the respondents (67.76 percent) strongly agreeing.

The statement that polythene bag ban will improve environmental resources namely water, air and soil was strongly agreed at (χ^2=353.8, P<0.0001) with those who 'strongly agree' being the majority at 63.27 percent and on the statement that enforcement will lead to improves environmental management was agreed at (χ^2=360.1, P<0.0001) with the majority (60.82 percent) being those who strongly agreed. The statements on the significance of compliance are relevant to the study because the responses were all within the statistically set level of significance 0.05.

Inferential Statistics

Inferential statistics make inferences about a population by using data obtained from the population with a view of reaching a conclusion that can be generalized.

Correlation analysis

Correlation coefficients are measurements of association between two variables. The positive correlation is an indicator of the extent to which the variables increase or decrease in parallel while a negative correlation portrays the extent to which one variable increases while the other decreases. Correlation, in summary, is a measure of the extent of association between the ordering of two random variables under study. Significant correlation in itself does not indicate causality but rather indicate common linkage in a sequence of events (Gogtay & Thatte, 2017). The study analyzed the relationships existing between the independent and dependent variables and the results tabulated as summarized below.

Table 20: Correlation Statistics

Objective	Awareness level	Perceived polythene bag effects	Alternative polythene products	Enforcement	Compliance
Awareness level	1				
Perceived polythene bag effects	.382 .000	1			
Alternative Polythene products	.428 .000	.215 .001	1		
Enforcement capacity	.232 .000	.196 .002	.264 .000	1	
Compliance	.168 .008	.449 .000	0.151 .018	0.150 0.018	1

(Research Data, 2019)

A correlation analysis was computed to determine whether the awareness levels had an influence on compliance with the environmental legislation on the polythene bag ban and indicated a positive and significant relationship (r=0.168, $\propto$ = 0.001). This implies that awareness was an important factor as far as compliance is concerned. The correlation analysis to determine whether the perceived polythene bag effects influenced compliance to the environmental legislation showed the existence of a relationship (r=0.449, $\propto$ 0.001), this inferred that perceived polythene bag ban effects on the environment were significant to enhancing compliance of the environmental legislation.

The correlation analysis sought to determine whether alternative polythene bag products had a relationship with compliance of the environmental legislation and showed a positive and significant relationship (r=0.151, $\propto$=0.001), this suggested that alternative polythene products are a significant factor in compliance to the environmental legislation. Finally, correlation analysis was computed to determine whether enforcement capacity had a relationship with compliance and yielded a positive and significant relationship (r=0.150, $\propto$=0.001), this indicated that enforcement capacity was a significant factor in promoting compliance of the environmental legislation. In conclusion, it can be summarized that all the variables were all significant to the research study to varying degrees of influence.

Regression Analysis

A simple multiple linear regression model was used in the prediction of increased levels of compliance in the study. The prediction was based on the four independent variables; awareness level, perceived polythene bag effects, alternative polythene products, and enforcement capacity.

Analysis of Variance

The table below gives the results on the analysis of the variance (ANOVA). The results indicated that the overall model was statistically significant. It further indicated that the independent variables were predictors for compliance; this was also supported by an F statistic of 15.81 percent and a p-value (0.000) which is less than the conventional 0.05 level of significance. The results from the above were as indicated below.

Table 21: ANOVA statistic

Source	**DF**	**SS**	**MS**	**F**	**(P) Sig.**
Regression	4	4.8314	1.2079	15.81	.000
Residual	240	18.3398	0.0764		
Total	244	23.1712			
S = 0.276434		R-Sq = 20.9%		R-Sq (adj) = 19.5%	

(Research Data, 2019)

From the results in table 20, the coefficient for determination also called the R square was found to be 20.9 percent. This implies that awareness level, perceived polythene bag effects, polythene bag alternative products, and enforcement capacity explain 20.9 percent of the variations in the dependent variable which is the compliance to the environmental legislation in Rongai Sub-County, Nakuru County. The result suggests that the model used to link the relationships of the variables was relevant to the research study.

Regression Coefficients

From the table 22 below, the regression coefficients indicate that awareness level was not significant in this analysis method because the p-value was not within the prescribed range of less than 0.05.The table further indicates that perceived polythene bag effects and compliance are positively and significantly related (β_2=0.434, p=0.000). The alternatives to polythene bags were established to be related positively with compliance (β_3=0.047). The research also found that enforcement capacity is positively related to compliance (β_4=0.043, p=0.340)

Table 22: Regression coefficients

Variables	Coef	SECoef	T	P	VIF
(Constant	2.533	0.362	7.00	0.000	
Awareness level	-0.029	0.050	-0.56	0.573	1.384
Perceived polythene bag effects	0.434	0.062	7.02	0.000	1.190
Alternatives to polythene bags	0.047	0.053	0.88	0.378	1.270
Enforcement capacity	0.043	0.045	0.96	0.340	1.109

(Research Data, 2019)

The optimal model for the study is best displayed using regression equation shown below

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon$$

Therefore,

Compliance of Environmental legislation = 2.533 + (-0.029 awareness level) + 0.434 Perceived polythene bag effects is + 0.047 Polythene bag alternatives + 0.043 enforcement capacity

The regression model above shows that the perceived polythene bag effects on the environment were the only significant independent β_2= 0.434 (p-value = 0.000 which had a p-value less than $\propto$=0.05, this means that the null hypothesis stating that there are no perceived environmental effects of polythene bags in Rongai sub-county was rejected. This implies that for each unit increase on awareness of effects of polythene bags, there is up to 0.434 increases in compliance level of the environmental legislation. However, the other independent variables do not mean that they were not relevant. Alternative polythene bag products had a positive coefficient of β_3 = 0.047 implying that for each unit increase on alternatives of polythene bags, there is up to 0.047 increases in compliance levels. The effect of polythene bag alternatives is indicated by the t-test value of 0.88 meaning that the effect of polythene alternative surpasses that of the error by 0.88. Therefore, the null hypothesis that the polythene bag alternative does not influence compliance with the legislation on the polythene bag ban in Rongai Sub-County is rejected.

The enforcement capacity of polythene bag legislation was found to have a positive coefficient β4 = 0.043 which implies that for each unit increase in enforcement capacity there is an up to 0.043 increase in the level of compliance to the environmental legislation. The effect of enforcement is given by the test value = 0.96 which indicates that the effect 0.96 that of the associated error.The Variable Inflation Factor (VIF) of the independent variables from the regression model were 1.34 (Awareness level), 1.190 (Perceived effects of polythene bags), 1.270 (alternatives to polythene bags products) and 1.109 (enforcement capacity) indicating that there was no concern for multicollinearity shown in table 22. The model was diagnosed by analyzing the residuals against the fits in figure 4 and the normal probability plots in figure 3, both did not show any outliers and hence the regression model fits the data well hence can be used for predictions.

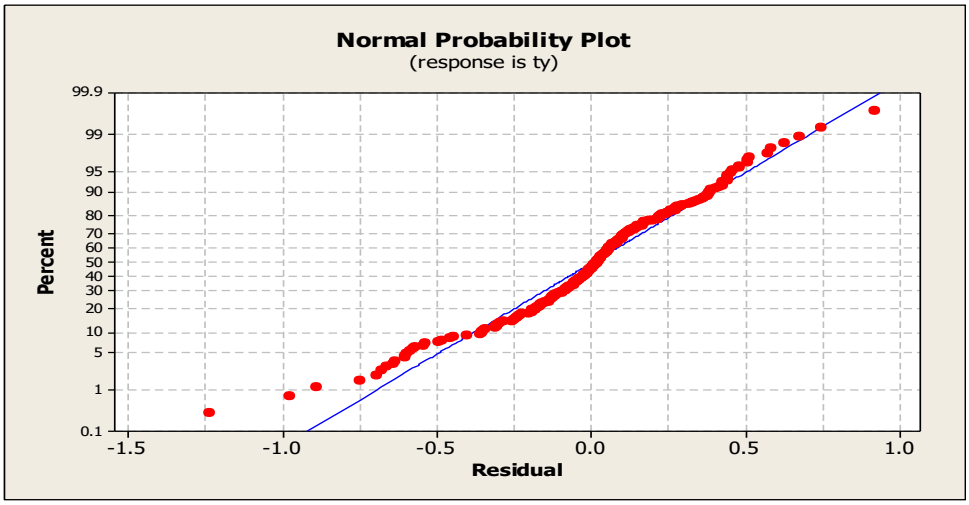

Figure 3: Normality probability plot

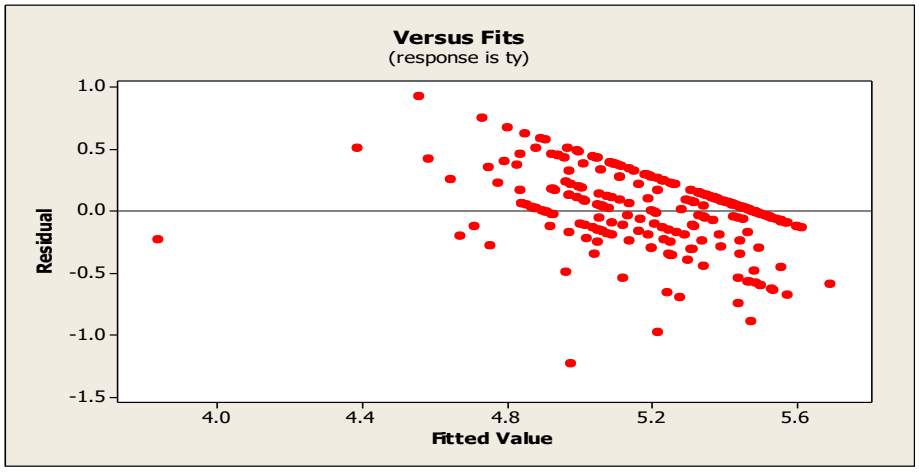

Figure 4: Normality residual versus fit plot

CHAPTER FIVE

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

5.1 Introduction

This chapter presents a summary of the findings and discussion on the factors influencing compliance with the environmental legislation of the polythene bag ban. The descriptive inferential research study conclusions and recommendations are guided by the research objectives of the study.

5.2 Summary

The study findings showed that the male respondents were 53 percent while that of female was 47 percent hence the participation by both genders was almost equal in the community. The age of Respondents in Rongai Sub-County was at the peak between the ages of 18 to 24 years and then it gradually declined. This implies that there was more youth involved in different activities including trading in the community.

The findings from the study showed that respondents with no formal education were 2.05 percent, primary level 13.93 percent, and secondary level 45.9 percent. These results indicate that the community members either had no basic education or had basic education. This suggests that the community members lack critical capacity and the ability for innovation and development to improve the live hood and that of the environment. The low levels of educations mean lack of knowledge on environmental conservations policy and legislations in the country.

The monthly income was found to be less than Ksh 10,000 shillings for approximately 50 percent of the respondents composed of 27 percent female and 22 percent male. The income levels of a community have been found to influence compliance to environmental legislation because the cost of compliance is a factor that influences compliance and especially in poor communities if the cost of compliance is high, then compliance will be compromised.

The first objective of the study was to determine the extent to which the awareness levels influence compliance of Polythene bag ban legislation in Rongai sub-county. The findings showed that they were familiar with the polythene bag ban legislation. On the details of the legislation, the respondents, however, did not have the detailed information on the legislation as indicated by majority confirming that they do not know the contents such as the sentence

term and fine charged for offenders charged to using the outlawed polythene. The majority of the respondents agreed that they were still using propylene bags. Whether the awareness program was sufficient done, there was 28.57 percent of the respondents who had the opinion that the awareness program was insufficient. The respondents recommended the use of Media for awareness campaigns and the majority of them indicated that they got information on the polythene bag ban legislation from media that included both print and electronic. However, some of the community members indicated that Chief Barazas can be the best method where they can ask questions and get feedback especially for illiterate members of the community.

The second objective of the research study was to assess the perceived environmental effects of polythene bags in Rongai sub-county. To start, a question on whether the banned polythene bags are still found in Rongai Sub-County and its possible sources was asked. There were approximately 30 percent of the respondents who confirmed that polythene bags were being used with majority pointing at the traders in the area as the main source. Studies on the perceived effects of polythene bags found out that around 15 percent of the respondents were not aware that polythene smoke occasioned from burning cause respiratory diseases, also related to this, is cancer of the lungs caused by the smoke components which around 20 percent of the respondents. This implies that the community is ignorant of important issues that motivated the country to ban the use of single-use polythene bags hence the non-compliance of the environmental legislation observed.

The third objective was aimed at determining the extent to which polythene bag alternatives influences compliance to Polythene bag ban legislation in Rongai Sub-County. The findings showed that over 20 percent of the respondents were not familiar with alternatives recommended for making carrier bags. This means that the effort put on enlightening the community on the alternatives was not satisfactory. The cost of alternative was widely accepted by the respondents approximately 80 percent, that they were expensive meaning that the rate of uptake of the alternatives was slow hence hampering total compliance to the environmental legislation. The respondents who ‘disagree' and ‘strongly' disagree that there are no materials for making eco-friendly bags were 36 percent in total while 25 percent were unaware even though Reeds, Banana leaves and commercial sisal plantation are recommended materials for making eco-friendly carrier bags that are readily found in this region. This means that there is a knowledge gap on the resources available which can be used for making eco-friendly carrier bags which will help in conserving the environment.

The fourth and final objective was to determine the enforcement capacity by NEMA and its influence on the compliance of polythene bag ban legislation in Rongai Sub-County. The findings indicated that NEMA lacks adequate funding which is an important resource to ensure that it can carry out the enforcement of the legislation and fund the operations of the agency. Lack of funds implies that the agency will not function efficiently and effective in ensuring that full compliance is achieved in the country. NEMA was also found to be understaffed, Nakuru County having eleven (11) Sub-Counties Rongai included, had four (4) members of staff meaning that the few personnel cannot be able to operate optimally across the county to enforce the legislation. The respondents thought that lack of compliance officers in the area affects compliance negatively. The NEMA offices were found to be small and poorly equipped indicating that its operations do not match the vast area it is supposed to cover of eleven (11) Sub-Counties, especially with limited mobility to supervise compliance since they had two (2) vehicles and one was operational at the time of the research, therefore their work of co-ordination of compliance is limited.

The researcher further sought to find out the challenges witnessed insofar as compliance is concerned and 33 percent of the respondents mentioned lack of awareness as an impediment among the community members, lack of enforcement officers was blamed by 21.43 percent of the respondent implying that the officers are a deterrent to the distribution and use of the outlawed polythene bag in the area. 19.64 percent of the respondents opined that lack of good quality and cheap alternatives was responsible for continual use of the banned polythene bag. Corruption was mentioned by 14.29 percent of the respondents for the challenges in compliance and blamed the law enforcers for being compromised. NEMA officer reported of poor prosecution of polythene bag ban legislation cases by the law enforcers and the judges.

5.3 Conclusion

The findings from the study indicated that the respondents were not fully aware of the polythene bag ban legislation, the awareness was not comprehensively done to enlighten the community on the contents of the environmental legislation and its importance as far as at individual level is concerned and by extension the country and the globe at large, this would make the society to support and appreciate the benefits of the legislation in conserving the environment.

The respondents confirmed that polythene bags were present in the area and lack of knowledge on some aspects of the perceived effects of polythene on the environment was recorded. Polythene bags in the society is linked to lack of information on the dangers associated with polythene bags; they range from environmental, economic and health problems which the environmental legislations are meant to address in the world against destruction, degradation, and pollution of its critical components that support life.

From the results, there was empirical evidence that the community was not familiar with the recommended materials for making eco-friendly alternative carrier bags, in spite of sisal plantations found in the area. It was also found that reeds, banana leaves, and cloth were available in the area for utilization in making quality alternative eco-friendly bags. The use of banned propylene was widespread and the cost of the poor quality alternative products was found to be a barrier in the eradication of polythene in order to conserve the environment

Finally, the findings showed that NEMA lacked the enforcement capacity and implementation of the environmental legislation was not coordinated well and this led to the proliferation of single-use polythene use and the re-emergence of poor quality carrier products in the country. The ban on propylene was challenged in court and the need to set the required standards clearly before it is implemented in order to guide the manufacture of quality alternatives. Findings from the research study indicated that all the objectives under investigation were all significant; the success of the Environmental Legislation in Kenya is dependent on the uptake of the eco-friendly alternatives.

5.4 Recommendations

The government and its agencies need put in place clear plans on ways to promote and encourage production and consumption of environmental friendly carrier bags and support research, innovation and development of alternatives eco-friendly carrier products in the

5.4.1 Policy Recommendations

The following are the policy recommendations;

i. There is a need for raising public awareness on the environmental legislation and its importance in addressing materials for carrier bags and explaining the importance of environmental legislation and the details of the consequences it attracts.

ii. Promotion of alternatives: This should be through an assessment of the availability of alternative materials and documented and this information shared with the public to encourage them to utilize them in manufacturing eco-friendly carrier bags.

iii. The government should provide financial incentives to support groups and industries that are involved in the manufacture of cheaper eco-friendly products. This will help change the habits of consumers, retailers, and manufacturers

iv. Partnerships and collaborations should be promoted where research, development, and innovation of ideas on eco-friendly products are nurtured and actualized in the country. The Ministry of Environment and Natural resources together with Non-governmental organizations and community can work together to come up with a national eco-friendly carrier bag alternatives which are of good quality and affordable.

v. There is the need for involvement of all relevant stakeholders in the formulation of legislations such as Kenya Bureau of standards which is key in the determination of the standards of the products in the country; therefore the specification for the alternative eco-friendly bags will be clear. This would have saved the agency the court cases regarding the ambiguity of recommended materials in the country.

vi. There is a need for improving NEMA Capacity and supporting the agency with adequate financial allocation to hire adequate personnel and ensure they have all the necessary equipment and facilities to carry out the agency's mandates satisfactorily in the country.

vii. A monitoring and evaluation system of the environmental legislation is important; this will help in handling both intended and unintended outcomes from the legislation. This will enable the strengthening of positive outcomes and work towards eradicating the unintended outcomes.

viii. The Ban should be included to cover all thin and small gauge polythene that are currently used to package loaves of bread, bathing soap and other goods found in the markets. The affected manufacturers should use as packaging bags materials that are biodegradable.

5.4.2 Recommendations for further research

The following are a recommendation for further research which that were identified,

1. There is the need for research on impediments of adopting eco-friendly carrier bags by manufacturers and ways they can be eradicated, this study looked at the issue through the community lenses and its findings are more indicative than conclusive because this problem has not been researched exhaustively.
2. Assessing the influence of neighboring countries polythene bag management, legislation and enforcement and how they affect compliance in Kenya.

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APPENDICES

APPENDIX I: INTRODUCTORY LETTER

Dear Participant

I am **VICTOR KIPKEMBOI KOROS** a Master of Science in Environment Science student at **Kabarak University**. I am carrying out research entitled **"Factors influencing Compliance to Environmental Legislation on polythene bag ban in Rongai Sub-County, Nakuru County, Kenya."**

The information collected through the questionnaires is designed to explain the factors that influence compliance to environmental legislation on the polythene bag ban. You are invited to be part of this research study by providing information and your opinion that will be used strictly for academic purposes only.

Participation in this research is voluntary and your confidentiality will be guaranteed, no names or information about any individual will be published

Thank you for your time and cooperation for making this research study a success.

Yours Sincerely,

Signed

Victor K. Koros

APPENDIX II: QUESTIONNAIRE

SECTION 1: SECTION 1: QUESTIONNAIRE FOR HOUSEHOLDS AND TRADERS

I am Victor KipkemboiKoros a Master's of Environment Science student at Kabarak University. I am conducting a research on **"Factors influencing compliance to environmental legislation on polythene bag ban in Rongai Sub-County, Nakuru County, Kenya"** I am kindly requesting for your time in filling in the responses to the best of your knowledge. This research is meant for academic purpose. It will try to find out factors influencing compliance to environmental legislation on polythene bag ban in Rongai Sub-County. Responses to these questions will be treated as confidential and used for academic purposes only.

Section A: General Information

1. Name.....
2. Gender Male[ ] Female[ ]
3. Age 18- 25 [ ] 26-33 [ ] 34-41 [ ] above 42 years [ ]
4. Ward.....
5. Level of Education None[ ] Primary[ ] Secondary[ ] Tertiary [ ]
6. Occupation……
7. Income. Less than 10,000 [ ] 10,000-20,000 [ ] 20,000-30,000 [ ] over 40,000 [ ]

Section B: Awareness level of Polythene bag ban legislation (Tick where appropriate)

8. Which agencies concern itself with Environmental regulations in Kenya?.....
9. Select the most appropriate response choice for the following statements/questions (1.Strongly disagree-SD, 2.Disagree-D, 3.Undecided-4.UN, Agree-A, 5.strongly agree-SA)

	1-SD	**2-D**	**3-UN**	**4-A**	**5-SA**
I am familiar of the legislation on polythene ban					
I am aware of the ban on commonly used polypropylene bags					
I am aware of fine charged for possession of polythene					
I am aware of the imprisonment term for possession of polythene bag					
The environmental legislation awareness program conducted was sufficient					
The environmental legislation on polythene bag ban is positive					

10. How did you get to know the polythene ban (Tick where necessary)

Intervention	Tick where necessary
Public Barazas	
Media	
Talks	
Documentaries	
Any other (specify)	

What awareness programs do you suggest to be adopted by NEMA to inform the public of Polythene bag ban legislation?.....

Section C: Polythene and the Environment

Are polythene bags available in Rongai Sub-County? Yes [ ] No [ ]

If yes, what is the source?.....

Select the most appropriate response choice for the following statements/questions (1.Strongly disagree-SD, 2.Disagree-D, 3.Undecided-4.UN, Agree-A, 5.strongly agree-SA)

	1-SD	2-D	3-UN	4-A	5-SA
Polythene bags kill livestock					
Polythene bags cause respiratory diseases					
Polythene reduces soil fertility					
Polythene causes water pollution					
Polythene smoke components cause cancer in human					
Polythene kill aquatic organisms					
Polythene littering affects beauty of environment					

Section D: Carrier bags Alternatives and its economics

Select the most appropriate response choice for the following statements/questions (Strongly disagree-SD, Disagree-D, Undecided-UN, Agree-A, strongly agree-SA)

	1-SD	2-D	3-UN	4-A	5-SA
I am familiar with alternative materials for making carrier bags					
I have been informed adequately on the types of recommended alternatives to polythene bags					
The cost of alternative carrier bags is cheaper compared to cost of polythene bags					
The cost of polythene bag is cheaper than the cost of alternative carrier bags					
Materials for making eco-friendly bags are easily available in Rongai sub-county.					
Alternative carrier bags are made in Rongai sub-county					

What kind of carrier bag do you use ? Polythene bag [ ] Canvas [ ] Cloth [ ] Grass baskets [ ] Sisal [ ] Polypropylene [ ]

Section E: NEMA capacity to ensure compliance of polythene bag ban Legislation

Select the most appropriate response choice for the following statements/questions (1.Strongly disagree-SD, 2.disagree-D, 3.undecided-UN, 4.agree-A, 5.strongly agree-SA)

	1-SD	2-D	3-UN	4-A	5-SA
NEMA lack financial allocations to ensure enforcement of plastic ban legislation					
NEMA undertakes partnerships with businesses and community to enhance compliance of the legislation					
NEMA lacks adequate staffing that has affected enforcement of plastic ban legislation enforcement					
Lack of equipments affects NEMA ability to enforce polythene bag ban legislation					
Absence of NEMA enforcement officers in Rongai affects compliance of the polythene bag ban legislation					
NEMA is carrying out co-ordination of enforcement of environmental legislation in Rongai Sub-County					

Any other challenges of obeying polythene bag ban legislation in Rongai Sub-County (Specify)…….. ……..

Section F: Compliance of Polythene bag ban Legislation

Select the most appropriate response choice for the following statements/questions (1.Strongly disagree-SD, 2.Disagree-D, 3.Undecide-UN, 4.Agree-A, 5.strongly agree-SA)

	1-SD	**2-D**	**3-UN**	**4-A**	**5-SA**
The polythene ban legislation if well implemented leads to improved environmental attainment					
When we obey polythene bag ban legislation it will lead to improved health outcomes					
Polythene ban legislation will lead to improved solid waste management in Rongai					
The plastic ban legislation will lead to beautiful environment					
Polythene bag ban leads to reduced environmental health problems					
Strengthening enforcement of environmental legislation will lead to improved environmental management					

SECTION 2: INTERVIEW GUIDE FOR KEY INFORMANTS

I am Master of Environment Science student at Kabarak University. I am conducting a research on **"Factors influencing compliance to environmental legislation on polythene bag ban in Rongai Sub-County, Nakuru County**. I am kindly requesting for your time in giving the responses to the bestof your knowledge. This research is meant for academic purpose. It will try to factors influencing compliance to environmental legislation on polythene bag ban inRongai Sub-County.Responses to these questions will be treated as confidential and used for academic purposes only.

Name of the Respondent.....(optional)

1. Gender.....
2. Occupation

   County Government Official [ ] NEMA Officer [ ]

   Other specify.....
3. Ward……..
4. Are the people of Rongai community aware of the polythene bag ban?
5. What are the effects of polythene bags in Rongai.
6. In your own opinion, what are the major challenges in Implementing the Polythene ban legislation
7. What are the solutions to this problems in your own opinion
8. In your own opinion, did the legislation formulation subjected to public participation according to the law?
9. What are methods for public participation and are they effective in your opinion?
10. Are the legislation properly enforced.
11. What are the challenges facing the enforcement of the legislation?
12. What are the achievements recorded so far in the implementation.

SECTION 3: GUIDE FOR FOCUS GROUP DISCUSSION

1. Name of the ward……
2. Is the community aware about the polythene ban legislation?
3. What are the effects of polythene in Rongai Sub-county?
4. What are the sources of polythene bags in Rongai?
5. Where are alternatives carrier bags made in Rongai?
6. What are the alternative materials used to make carrier bags in Rongai?
7. What are the benefits of legislation on polythene ban to Rongai community?
8. What are the challenges experienced in obeying the legislation?
9. Is the government doing enough to ensure compliance of the legislation?
10. In your opinion, what are your suggestions for achieving compliance of the legislation

APPENDIX II: OBSERVATION CHECKLIST

The following observation checklist will be used in obtaining pertinent information to the study"**Factors Influencing Compliance to Environmental Legislation on Polythene Bag Ban inRongai Sub-County, Nakuru County, Kenya**"

DATE: …….. WARD:……..DURATION……...

Site Location:		
Areas of Observation	**Frequency**	**Comments**
Polythene ban legislation compliance Individuals carrying polythene bags		
Individuals carrying recommended carrier bags		
Traders selling recommended carrier bags		
Effects of polythene bags Littered polythene bags		
Other areas: Wastes dumpsites		

APPENDIX III: KABARAK UNIVERSITY RESEARCH AUTHORIZATION

KABARAK UNIVERSITY

Private Bag - 20157
KABARAK, KENYA
http://kabarak.ac.ke/institute-postgraduate-studies/

Tel: 0773 265 999
E-mail: directorpostgraduate@kabarak.ac.ke

BOARD OF POSTGRADUATE STUDIES

6th June, 2019

The Director General
National Commission for Science, Technology & Innovation (NACOSTI)
P.O. Box 30623 – 00100
NAIROBI

Dear Sir/Madam,

RE: VICTOR KIPKEMOI KOROS- REG. NO. GMEN/NE/0206/01/18

The above named is a Master of Science in Environment Science student at Kabarak University. He is carrying out research entitled ***"Factors Influencing Compliance to Environmental Legislation on Polythene Ban in Rongai Sub- County, Nakuru County, Kenya".*** He has defended his proposal and has been authorized to proceed with field research.

The information obtained in the course of this research will be used for academic purposes only and will be treated with utmost confidentiality.

Please provide him with a research permit to enable him to undertake his research.

Thank you.

KABARAK UNIVERSITY
DIRECTOR
POST GRADUATE STUDIES
06 JUN 2019
PRIVATE BAG - 20157, KABARAK

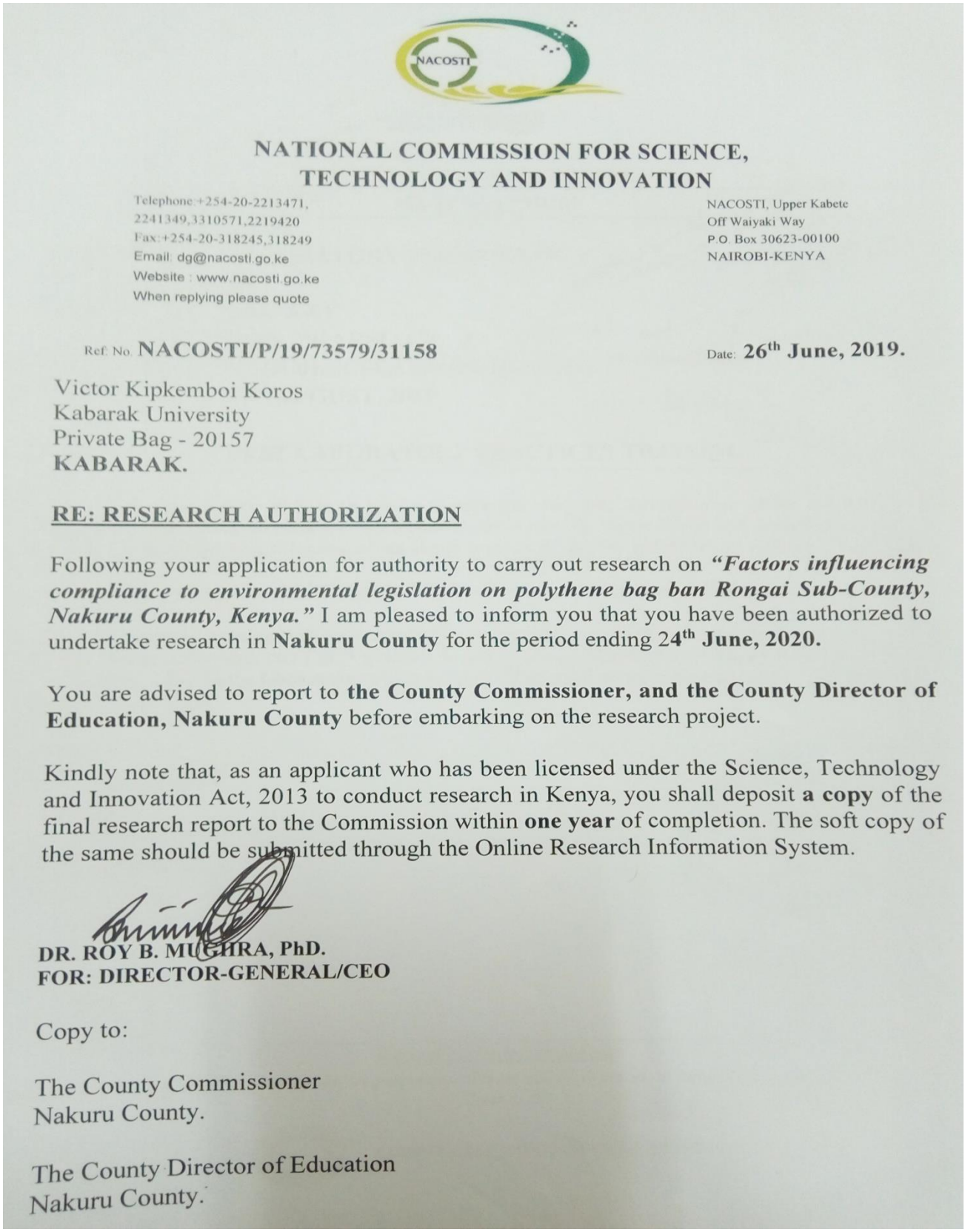
Yours faithfully,

Dr. Betty Jeruto Tikoko
DIRECTOR, POSTGRADUATE STUDIES

Kabarak University Moral Code

As members of Kabarak University family, we purpose at all times and in all places, to set apart in one's heart, Jesus as Lord. (1 Peter 3:15)

APPENDIX IV: NACOSTI RESEARCH AUTHORIZATION



NATIONAL COMMISSION FOR SCIENCE,
TECHNOLOGY AND INNOVATION

Telephone:+254-20-2213471,
2241349,3310571,2219420
Fax:+254-20-318245,318249
Email: dg@nacosti.go.ke
Website : www.nacosti.go.ke
When replying please quote

NACOSTI, Upper Kabete
Off Waiyaki Way
P.O. Box 30623-00100
NAIROBI-KENYA

Ref. No. **NACOSTI/P/19/73579/31158**

Date: **26th June, 2019.**

Victor Kipkemboi Koros
Kabarak University
Private Bag - 20157
KABARAK.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on ***"Factors influencing compliance to environmental legislation on polythene bag ban Rongai Sub-County, Nakuru County, Kenya."*** I am pleased to inform you that you have been authorized to undertake research in **Nakuru County** for the period ending 24th **June, 2020.**

You are advised to report to **the County Commissioner, and the County Director of Education, Nakuru County** before embarking on the research project.

Kindly note that, as an applicant who has been licensed under the Science, Technology and Innovation Act, 2013 to conduct research in Kenya, you shall deposit **a copy** of the final research report to the Commission within **one year** of completion. The soft copy of the same should be submitted through the Online Research Information System.

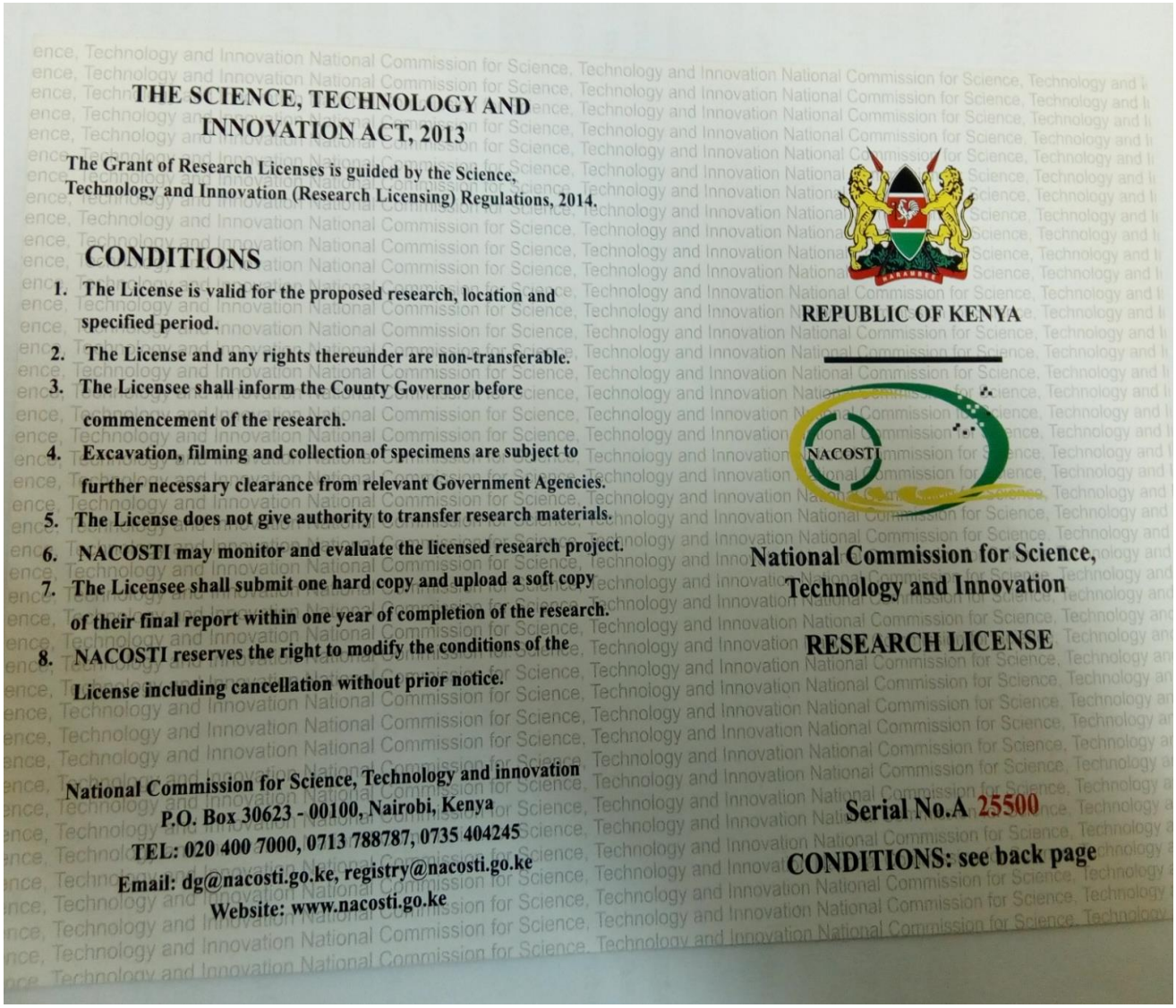
DR. ROY B. MUGHIRA, PhD.
FOR: DIRECTOR-GENERAL/CEO

Copy to:

The County Commissioner
Nakuru County.

The County Director of Education
Nakuru County.

APPENDIX V: NACOSTI RESEARCH PERMIT



THE SCIENCE, TECHNOLOGY AND INNOVATION ACT, 2013

The Grant of Research Licenses is guided by the Science, Technology and Innovation (Research Licensing) Regulations, 2014.

CONDITIONS

1. The License is valid for the proposed research, location and specified period.
2. The License and any rights thereunder are non-transferable.
3. The Licensee shall inform the County Governor before commencement of the research.
4. Excavation, filming and collection of specimens are subject to further necessary clearance from relevant Government Agencies.
5. The License does not give authority to transfer research materials.
6. NACOSTI may monitor and evaluate the licensed research project.
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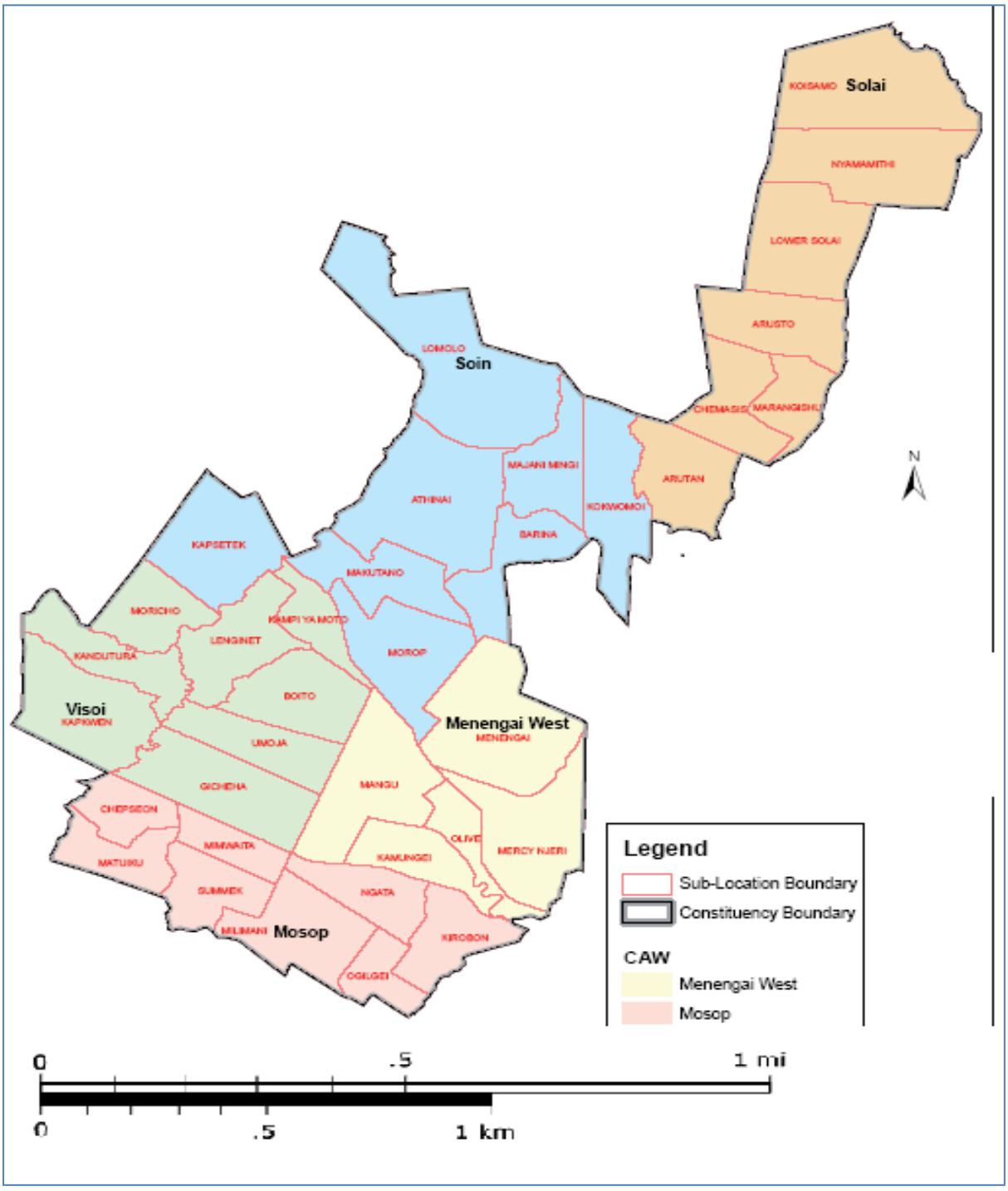
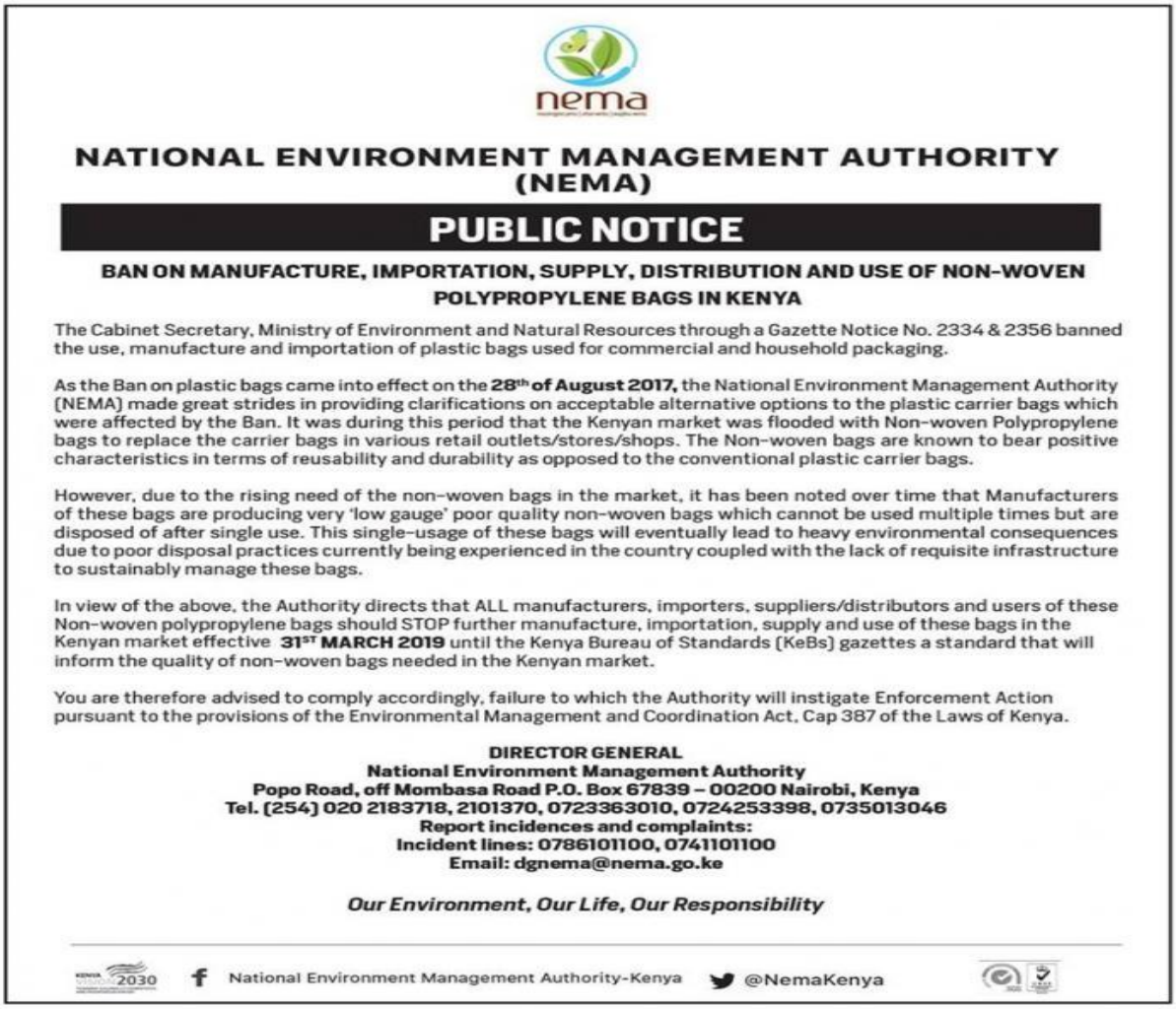
APPENDIX VI: NACOSTI RESEARCH PERMIT.

APPENDIX VII: MAP OF RONGAI SUB-COUNTY



(KNBS, 2015)

APPENDIX VIII: LEGAL NOTICE ON POLYTHENE BAGS BAN BY THE GOVERNMENT 2019/3



NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY (NEMA)

PUBLIC NOTICE

BAN ON MANUFACTURE, IMPORTATION, SUPPLY, DISTRIBUTION AND USE OF NON-WOVEN POLYPROPYLENE BAGS IN KENYA

The Cabinet Secretary, Ministry of Environment and Natural Resources through a Gazette Notice No. 2334 & 2356 banned the use, manufacture and importation of plastic bags used for commercial and household packaging.

As the Ban on plastic bags came into effect on the **28th of August 2017,** the National Environment Management Authority (NEMA) made great strides in providing clarifications on acceptable alternative options to the plastic carrier bags which were affected by the Ban. It was during this period that the Kenyan market was flooded with Non-woven Polypropylene bags to replace the carrier bags in various retail outlets/stores/shops. The Non-woven bags are known to bear positive characteristics in terms of reusability and durability as opposed to the conventional plastic carrier bags.

However, due to the rising need of the non-woven bags in the market, it has been noted over time that Manufacturers of these bags are producing very 'low gauge' poor quality non-woven bags which cannot be used multiple times but are disposed of after single use. This single-usage of these bags will eventually lead to heavy environmental consequences due to poor disposal practices currently being experienced in the country coupled with the lack of requisite infrastructure to sustainably manage these bags.

In view of the above, the Authority directs that ALL manufacturers, importers, suppliers/distributors and users of these Non-woven polypropylene bags should STOP further manufacture, importation, supply and use of these bags in the Kenyan market effective **31ST MARCH 2019** until the Kenya Bureau of Standards (KeBs) gazettes a standard that will inform the quality of non-woven bags needed in the Kenyan market.

You are therefore advised to comply accordingly, failure to which the Authority will instigate Enforcement Action pursuant to the provisions of the Environmental Management and Coordination Act, Cap 387 of the Laws of Kenya.

DIRECTOR GENERAL
National Environment Management Authority
Popo Road, off Mombasa Road P.O. Box 67839 – 00200 Nairobi, Kenya
Tel. (254) 020 2183718, 2101370, 0723363010, 0724253398, 0735013046
Report incidences and complaints:
Incident lines: 0786101100, 0741101100
Email: dgnema@nema.go.ke

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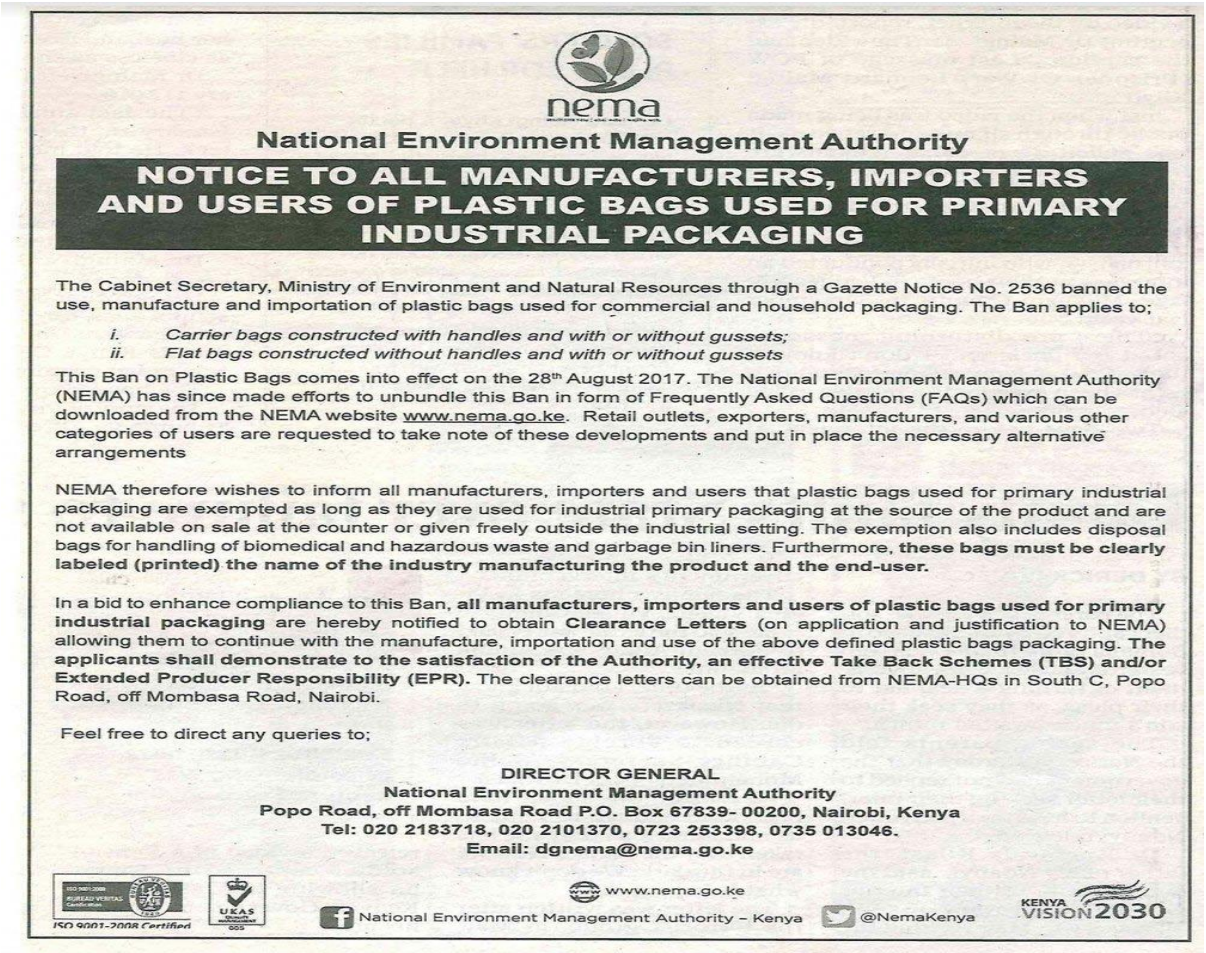
(RoK, 2017)

APPENDIX IX: LEGAL BAN NOTICE OF POLYTHENE BY GOVERNMENT 2017/8



nema

National Environment Management Authority

NOTICE TO ALL MANUFACTURERS, IMPORTERS AND USERS OF PLASTIC BAGS USED FOR PRIMARY INDUSTRIAL PACKAGING

The Cabinet Secretary, Ministry of Environment and Natural Resources through a Gazette Notice No. 2536 banned the use, manufacture and importation of plastic bags used for commercial and household packaging. The Ban applies to;

i. *Carrier bags constructed with handles and with or without gussets;*
ii. *Flat bags constructed without handles and with or without gussets*

This Ban on Plastic Bags comes into effect on the 28th August 2017. The National Environment Management Authority (NEMA) has since made efforts to unbundle this Ban in form of Frequently Asked Questions (FAQs) which can be downloaded from the NEMA website www.nema.go.ke. Retail outlets, exporters, manufacturers, and various other categories of users are requested to take note of these developments and put in place the necessary alternative arrangements

NEMA therefore wishes to inform all manufacturers, importers and users that plastic bags used for primary industrial packaging are exempted as long as they are used for industrial primary packaging at the source of the product and are not available on sale at the counter or given freely outside the industrial setting. The exemption also includes disposal bags for handling of biomedical and hazardous waste and garbage bin liners. Furthermore, **these bags must be clearly labeled (printed) the name of the industry manufacturing the product and the end-user.**

In a bid to enhance compliance to this Ban, **all manufacturers, importers and users of plastic bags used for primary industrial packaging** are hereby notified to obtain **Clearance Letters** (on application and justification to NEMA) allowing them to continue with the manufacture, importation and use of the above defined plastic bags packaging. **The applicants shall demonstrate to the satisfaction of the Authority, an effective Take Back Schemes (TBS) and/or Extended Producer Responsibility (EPR).** The clearance letters can be obtained from NEMA-HQs in South C, Popo Road, off Mombasa Road, Nairobi.

Feel free to direct any queries to;

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Popo Road, off Mombasa Road P.O. Box 67839- 00200, Nairobi, Kenya
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