UNIVERSITY OF NAIROBI

DEPARTMENT OF SOCIOLOGY AND SOCIAL WORK

THE SOCIAL ECONOMIC HAZARDS OF PLASTIC PAPER BAGS LITTER IN PERI-URBAN CENTRES OF KENYA; A CASE STUDY CONDUCTED AT ONGATA RONGAI TOWNSHIP OF KAJIADO COUNTY

THEURI DONALD WACHIRA

C50/66506/2011

SUPERVISOR: DR G.G.WAIRIRE

A RESEARCH REPORT SUBMITTED IN PARTIAL FULFILMENT FOR THE AWARD OF MASTERS OF ARTS DEGREE IN ADVANCED DISASTER MANAGEMENT, UNIVERSITY OF NAIROBI

NOVEMBER, 2013

DECLARATION

This Research Report is my original work and has not been presented for the award of any degree in any other university.

Signed…… Date……

Theuri Donald Wachira

C50/66506/2011

This research project has been submitted for examination with my approval as a university supervisor

Signed…… Date……

Supervisor; Dr. G. G. Wairire

Lecturer, Department Of Sociology and Social Work

University of Nairobi

LIST OF ACCRONYMS AND ABBREVIATION

A	Agree
D	Disagree
EPHC	Environment Protection Heritage Council
FGD	Focused Group Discussion
HDPE	High Density Polyethylene
IETC	International Environment Technology Centre
ITDG	Intermediate Technology Development Group
KIPPRA	Kenya Institute for Public Policy Research and Analysis
LDPE	Low Density Polyethylene
LLDPE	Low Low Density Polyethylene
M	Moderate
MSW	Municipal Solid Waste
NEMA	National Environment Management Authority
SA	Strongly Agree
SD	Strongly Disagree
UNEP	United Nation Environment Programme
USA	United States of America
WHO	World Health Organization

ABSTRACT

Plastic paper bags litter is a major environmental and public health problem, particularly in the urban and peri-urban areas of Kenya. Due to the many problems caused by plastic litter the main objective of the study was to establish on the social - economic hazards occasioned by plastic bags litter in peri- urban centres of Kenya. The research adopted a descriptive research design .This approach allowed the researcher to gather information, summarize, present and interpret it for the purpose of clarification. The study used questionnaires to collect empirical data from the obtained sample size. Each item in the questionnaire was developed to address a specific objective and research questions. The analysis was done as per questionnaires that were used to collect data and the results presented in tables and figures to highlight the major findings. They are also presented sequentially according to the research questions of the study.

The study found out that the condition of plastic paper bag littering has gone from bad to worse due to unchecked littering. Besides visual pollution, plastic paper bag litter is non-biogradable and thus accumulates. Its disposal method is a challenge as plastic paper bag waste recycling is not economically viable. Plastic paper bag litter contributes to blockage of sewers and drainages, poses threat to biotic species and abiotic components when incinerated, buried or damped. Furthermore, when filled with rainwater, plastic paper bags litter become breeding grounds for mosquitoes, which cause malaria. In landfills, it acts as a habitat for vectors that transmits pathogens like flies and rodents.

There is no immediate alternative paper bag that is likely to replace plastic paper bag in the near future. Due to the enormous environmental problems caused by the plastic paper bags litter, the study recommended that immediate public awareness be made to the consumers on the hazards that are occasioned by the plastic paper bags. Other strategies to curb the behavior of litter-louting include the reduction in manufacturing of plastic paper bag, re-use, recycling and re-collection of the plastic paper bag litter. Other measures to curb the behavior of plastic paper bag litter are, establishment of litter collection points in strategic litter generating points, imposing stiff penalties to litter- louters, imposing a tax on any plastic paper bag produced and putting a place mechanisms and processes of plastic paper bag collection at county levels.

TABLE OF CONTENTS

DECLARATION.....ii
LIST OF ACCRONYMS AND ABBREVIATION.....iii
ABSTRACT.....iv
TABLE OF CONTENTS.....v
LIST OF FIGURES.....viii
LIST OF TABLES.....ix
CHAPTER ONE.....1
INTRODUCTION.....1
1.1 Background of the study.....1
1.2 Statement of the problem.....5
1.3 Objective of the Study.....6
1.4 Research Questions.....7
1.5 Justification of the study.....7
1.6 Scope and Limitations of the Study.....8
1.7 Definitions of Key Terms.....9
CHAPTER TWO.....10
LITERATURE REVIEW.....10
2.1 Introduction.....10
2.2 Plastic bag Litter Definition.....10
2.3 The Origin and Global Spread of Plastic Carrier Bag.....10
2.4 Use of Plastic Carrier Bags.....11
2.5 Causes of plastic bags littering.....11
2.6 Magnitude of bag litter.....13
2.7 Awareness levels of plastic bag littering.....14
2.8 Extent of plastic Paper bag littering.....14
2.9 Hazards paused by plastic bags litter.....15
2.10 Solutions to the Plastic Problem.....17
2.11 Policy Instruments for Plastic Bag Management in Kenya.....20
2.12 Theoretical Framework.....23
2.13 Conceptual Framework.....24

CHAPTER THREE 27
RESEARCH DESIGN AND METHODOLOGY 27
3.1 Introduction 27
3.2 Research Design 27
3.3 Study area 28
3.4 Target population 29
3.5 Sample Size 29
3.6 Sampling Procedure 30
3.7 Data Collection Procedure/Instruments to be used 30
3.8 Validity 31
3.9 Reliability 31
3.10 Data analysis 32
3.11 Ethical Considerations 32
CHAPTER FOUR 34
DATA ANALYSIS AND INTERPRETATION 34
4.1 Introduction 34
4.2 Demographic Characteristics 34
4.2.1 Gender of the respondents 34
4.2.2 Distribution of Age Group 35
4.2.3 Length of stay in Rongai 36
4.2.4 Way of disposing plastic Paper Bag litter 37
4.2.5 Average no of bags used each week 38
4.2.6 Plastic products use 39
4.2.7 Reason why people prefer to use the plastic bag 39
4.2.8: Social-economic problems of Plastic Paper Bag in the ecosystem 40
4.2.9 Places where plastic carrier bag litter commonly found at Ongata Rongai 41
4.2.10: The effects of charging for plastic bags 41
4.2.11: The Use of Plastic Paper Bag by Age 42
4.2.12 Association of Plastic Paper Bag littering with gender 43
4.2.13 Social class associated with plastic bag littering 43
4.3 Causes of plastic Paper Bag littering 44
4.3.1 Own opinion 46

4.3.2 Causes of plastic bag litter in Ongata Rongai 46
4.3.3 FGD on causes of plastic waste 47
4.4 Extent of Plastic Paper Bag pollution 47
4.5 Effects of plastic paper Litter at Ongata Rongai 52
4.6 Possible solutions 53
4.6.1 Opinion on possible solutions 55
4.6.2 Plastic Waste Management Initiatives 55
4.6.3 Challenges faced when implementing the action plan 57
4.6.4 The key elements of the comprehensive strategy 57
4.6.5 Recommendation 57
CHAPTER FIVE 58
SUMMARY, CONCLUSIONS AND RECOMMENDATIONS 58
5.1 Introduction 58
5.2 Summary of Findings 58
5.3 Conclusion 60
5.4 Recommendation 61
5.5 Suggestion for Further Studies 62
REFERENCES 63
APPENDICES 68
Appendix I: Questionnaire 68
Appendix II: Key informant schedule guide 75
Appendix III: Interview schedule for FGDs 76
Appendix IV: Regulatory Bodies Governing control of plastic Litter In Kenya 77
Appendix V: Pictures for the Study 78

LIST OF FIGURES

Figure 2.1 Conceptual Frameworks 26
Figure 4.1: Gender Response 35
Figure 4.2: Plastic Paper Bag Usage by Age 36
Figure 4.3: length of stay at Ongata Rongai 37
Figure 4.4: Plastic products use 39
Figure 4.5: Reasons of Plastic Paper Bag Use 40
Figure 4.6: Awareness levels of social-economic problems of Plastic Paper Bag in the ecosystem 40
Figure 4.7: Places where plastic litter is commonly found 41
Figure 4.8: The Use of Plastic Paper Bag by Age 42
Figure 4.9: Association of Plastic Paper Bag littering with gender 43
Figure 4.10: Social class and plastic Paper bag Use 44
Figure 4.11: Plastic Paper bag Waste Levels 49
Figure 4.12: Plastics Production In Kenya 50
Figure 4.13: plastic bag use in kenya 51

LIST OF TABLES

Table 4.1: Way of disposing plastic Paper Bag litter 37
Table 4.2: Average no of bags used each week 38
Table 4.3: Effects of charging for plastic bags 42
Table 4.4: Rating of Causes of plastic Paper Bag littering By Criteria 45
Table 4.5: Rating of Extent of Plastic Paper Bag pollution 48
Table 4.6: Effects of plastic paper bags 52
Table 4.7: Possible solutions 54
Table 4.8: Ten-point Action Plan: Mid-2005 Status as Reported by KAM 56

CHAPTER ONE
INTRODUCTION

1.1 Background of the study

Plastic shopping bag was designed and made from plastic by Swedish Engineer Mr Sten Gustaf Thulin in 1960s (http.//www:answerbag.com/q_view 1905324, accessed on 13 June 2010).The design was patented worldwide by Celloplast; well-established company in plastics processing in 1965 (Cherrier,2006). Cherrier (2006) noted that the Company's patent position gave it a virtual monopoly on plastic shopping bag and associated materials production, and the company set up manufacturing plants across Europe and in USA. Cherrier (2006) further indicated that other companies saw the attraction of the plastic bag and associated products, too, and the USA petrochemicals group Mobil overturned Celloplast's USA patent in 1977.The Dixie Bag Company of College Park, Georgia, owned and operated by Jack W. McBride, was one of the first companies to exploit this new opportunity and it introduced plastic carrier bags to all major shopping stores. The Dixie Bag Company, along with similar firms such as Houston Poly Bag and Capitol Poly, were instrumental in the manufacturing, marketing and perfecting of plastic bags in the 1980s. Kroger, a Cincinnati-based grocery chain in USA, began to replace its other paper shopping bags with plastic bags in 1982. It was followed by its rival, Safeway. From the mid-1980s onwards, plastic bags became common for carrying groceries from the store to vehicles and homes throughout the developed world (Aadland, 2006).

Plastic bags are made from LDPE,(http.//www.answerbag.comp/q.view 1905324 26, Retrieved 17 April 2012.) .One of the main problems of polyethylene is that without special treatment it is not readily biodegradable, and thus accumulates. In Japan getting rid of plastics in an environmentally friendly way was the major problem discussed until the Fukushima disaster in 2011. It was listed as a $90 billion market for solutions. Since 2008 Japan has rapidly increased the recycling of plastics, but still has a large rate of plastic wrapping that goes to waste, (Strife, 2010). Strife (2010) indicated that during the 1980s and 1990s it was shown that many endangered marine species including birds that habituate in the marine environment were at extra hazard of suffocation from swallowing plastic bags litter or waste. In 2009 it was discovered by a resident of Hawaii upon returning from a ship race that degraded plastics bags were a major cause for marine life destruction .Plastic bags were found to constitute a significant portion of the

floating marine debris in the waters around southern Chile in a study conducted between 2002 *and 2005. If washed out to the rivers by runoff water, it can be drained to lakes and seas, thus,* plastic bags can be carried long distances to oceans and lakes, and can strangle marine animals (Clover, 2007)

Plastic carrier bags are sometimes called single-use bags, referring them as tools for carrying shopping goods from stores to homes. The use of plastic carrier bag created new alternatives and opportunities for carrying groceries at home as well as problems for waste and disposal (Mesthane, 1986). Each year millions of discarded plastic shopping bags end up as litter in the environment when improperly disposed of. Due to their durability, plastic bags waste in form of litter takes centuries to decompose. On land, waste plastic bags are one of the most prevalent types of litter in inhabited areas. Waste plastic bags when carried by run-off water can clog drainage systems and contribute to flooding, as occurred in Bangladesh in 1988 and 1998 and almost annually in Manila .Littering is often a serious problem in developing countries, where waste collection infrastructure is less developed than in wealthier nations.

The trade in plastic bag is an international business for capitalists, (Giddens, 2006). Giddens (2006) proposed that, capitalism was not created to save the earth; it was created to turn nature into wealth, as fast as possible through the creative dynamics of exploitation and non-preservation which are both disruptive to the society and the natural world. Capitalists belief in the culture of accumulation of wealth and do not believe they owe anything to nature, (Waste Digest, 2006). In this regard, those engaged in the business of plastic bag trade are in pursuit of making profit from the business and they disregard harmful effects of plastic bags to the biotic and abiotic components in the ecosystem that are related to its disposal.

Plastic bag littering is prevalent in urban settings. Urbanization initiates a long term historical process of detaching individuals from comprehensive and familiar shared networks of interrelations embedded in rural folk communities marked by greater degree of functional interdependence, (Graves, 1984). Rapid rate of urbanization has given rise to the concept of over-urbanization, (Amani, 1992). Amani (1992) stated that as migrants flock to urban areas, the diversity and heterogeneity of urban areas increase and new arrivals often identify more closely with their native villages or with such social cultural groupings as tribes, race or religion than

with the urban life and what the city can offer. They ignore the norms and values of hygiene and discard plastic bag litter in the environment.

Peri-urban and urban are characterized by unplanned, large sizes of urban settlements, high population density, anonymous and specialized interrelationship (Wirth, 1938). Wirth (1938), reasoned that the greater the number of people interacting in the urban set up, the greater the potential for differentiation, bringing about lesser dependence on particular persons, less intimate relations, more freedom from the personal and emotional control of intimate groups, and no individual alliance to a single group. Because of a high degree of differentiation, no common set of values exists in the urban areas. As a consequence of these factors, urban dwellers develop characteristic personality attributes and attitudes. Because of the many lifestyles and kinds of people, they develop a "*relativistic perspective*", they become secularized and free from intimate ties; they lack a strong sense of integration and participation, thus, the city or urban areas are characterized by *anomie*. Individuals in urban set up feel lonely, sense friction and irritation, and experience personal frustration and nervous tension, (Wirth, 1938).For these reasons, Wirth (1938), suggested that the incidence of personal disorganization and disorder tend to be higher in cities than in rural communities.

The use of Plastic carrier bag by consumers is a form of social change, (Park, 1975). Accordingly plastic shopping bags are not only durable, versatile and convenient, but also inexpensive, easy to store and transport on account of their thinness and lightness. Plastic carrier bag is popular to the consumers because they are "functional", light weight, strong, inexpensive and hygienic. Because plastic carrier bags are cheap, there is excessive consumption and a tendency of mis-use. In peri-urban centres of Kenya, an individual shopper uses about 3 new plastic carrier bags per day because they are "given free". While it is "free" to the customer, the cost of plastic bag is passed on to the consumer in form of "consumption cost" by the retailers and other supermarkets (UNEP, 2005).

The use and availability of plastic bags has increased significantly in recent while collection and disposal of plastic bag litter continue to be a growing problem in Kenya. Thin non-reusable bags

are indiscriminately dumped and not collected for recycling or disposal since they have little commercial value, (Kikang, 2010).

A study by United Nations, (UNEP, 2005) indicates that the problem is severe in slum and peri-urban areas where waste collection services are inadequate. The report recommends that there is need to draw up Plastic Bag Regulations for Prohibition on the supply of carry bags. The aim of the regulations should be to restrict the production of non-reusable plastic shopping bags and to promote re-use and recycle. The report also indicates that at least two million plastic bags are now being handed out each year to people shopping at supermarkets and kiosks in Nairobi alone. Plastics bag litter present a serious environmental problem as it is uneconomical to have them recycled. The total plastic bag consumption in Nairobi is 211,316 tons per year, a figure that takes into account both the imported plastic bag products (27,813 tons per year) and a local production level of 192,836 tons per year less annual plastic exports estimated at 9,333 tons per year. Out of this annual plastic bag consumption of 211,316 tons per year, 38,516 tons per year (18%) are retained and reused while 172,800 tons per year (82%) are indiscriminately dumped into the environment with serious environmental consequences.

The city of Nairobi is inhabited by over 3 million inhabitants who generate a combined total of over 2,400 tons per day of solid wastes, out of which 20% comprises of plastics. This amount of solid waste generation is getting worse by the day as a result of increasing population that is fuelled by large-scale rural-urban migration into the city. A Japan International Co-operation Agency (JICA) study estimated that about 1,450 tons of Municipal Solid Waste (MSW) was generated daily in Nairobi in the late 1990s (UNEP 2005). The study put the Municipal Solid Waste (MSW) per capita generation at the time at 0.67kg/day, which translates to about 245 kg per person per year. A recent study by Intermediate Technology Development Group, (ITDG,) puts the daily solid MSW generation at a relatively higher value of 2,400 tones. The study estimates a per capita solid waste generation of about 253kg per person per year. This figure falls within the range specified by International Environment Technology Centre (IETC) for African urban centres. The City Council of Nairobi estimates for daily waste generation is between 1,600 to 2,400 tons which appears to be a projection based on the JICA study. The corresponding

estimate of per capita generation is 0.65kg/person day and is again based on the JICA study (Maranga, 2005).

1.2 Statement of the problem

The problem with plastic paper bag is that the bags most used by consumers are designed for single use, (NEMAnews, 2007). Ninety-nine percent of carrier bags used around the world follow the cradle to grave cycle (Clover, 2007). This use pattern means that carrier bags, like most other consumer goods, finish their lives decomposing in landfills,(NEMA,2005) .There are several social, economic and environmental hazards associated with plastic bag littering, (UNEP, 2005). According to the report, plastic bag litter causes, visual, noise and thermal pollution that affects sectors like tourism. Plastic bag litter also bocks drainage that occasion "traffic clogging" and urban flooding. Waste plastic litter blocks gutters and drains that creates serious water flooding, causes death to animals and marine life when ingested and it takes approximately 20 to 1000 years for waste plastic carrier bag to decompose. When filled with rainwater, plastic bag litter has been breeding grounds of mosquitoes, (KIPPRA, 2006).The most destructive by-product of plastic carrier bag litter when incinerated, is the emission of "*dioxins*" and "*furans*", which are persistent organic pollutant in the environment (Lindens, 2010). Their health impacts include cancer and acting as "*endocrine disruptors*" that affects the reproductive system of human and other living organisms, (NEEMA news, 2005).

The disposal methods of plastic paper bag pose serious environmental challenges due to its non-biogradable characteristics. Plastic paper bags are disposed of into the environment by two methods: deliberate and inadvertent littering. Deliberate littering can be everywhere in the city, parks, beaches, roads, and open spaces (Cherrier, 2006). The most popular agent that aid in inadvertent littering is wind. Because their low weight and flimsiness plastic bag litter discarded in the environment are easily carried by wind and blown everywhere especially on trees, drains and ponds. Even when disposed of properly in bins, plastic bags frequently are taken by the wind and end up as litter. Not only is litter aesthetically displeasing, but it can also cause environmental hazards. Littered plastic bag contain Municipal Solid Waste (MSW) .The contents of the Municipal Solid Waste contained in plastic bag litter can have negative impacts on the social and natural environment (Ritch, 2009).The Environment Protection Heritage Council

(EPHC) report says that the threat to animals is through ingestion and entanglement by plastic litter, and that both marine, livestock, and wildlife are at risk. Likewise, humans are affected when littered plastic bag waste blocks drainage and sewer systems, leading to health hazards. (Waste Digest, Jan-July 2007).

It is observed that the current behavioral practices of littering by the residents of the Ongata Rongai are largely unsustainable. Plastic bag littering at Ongata Rongai is an indicative of material possession and irresponsible wasteful. Consequently, majority of the residents suffer from "affluenza" as they consume more that they actually need, (Waste Digest, July-December 2006). It is estimated that in Nairobi, the release level of plastic bag is over 11 million plastic carrier bags per year, with supermarkets contributing 73% (Bahri, 2005).

Plastic bag litter at Ongata Rongai is noticeable by the bright colours and persistence in the environment, (Waste Digest, July-December 2005) .The ever increasing plastic litter generation in Ongata Rongai Township has by far outstripped the ability of the Kajiado County Council to collect and dispose of the waste in safe and acceptable manner. There is inadequate collection of waste with at least 55 per cent coverage, (NEMAnews2005). The uncollected waste is burnt, buried or dumped haphazardly in unfit places. These disposal methods have serious long term consequences on the environment.

1.3 Objective of the Study

The main objective of the study was to establish the social - economic hazards of plastic bags litter in peri- urban centres of Kenya. Specifically, the study sought;

1. To establish the methods of plastic paper bag littering by the residents of Ongata Rongai Township
1. To explore the magnitude of plastic bag littering at Ongata Rongai.
2. To examine the hazards paused by plastic bags litter to the environment, animals and human population in Ongata Rongai.
3. To establish some possible solutions to the plastic bag litter problem in Ongata Rongai.

1.4 Research Questions

The research questions that guided this study were:

1. What are the behavioral methods of plastic littering employed by residents of Ongata Rongai Township?
2. What is the magnitude of plastic bags littering in Ongata Rongai Township?
3. What are the hazards of plastic bags litter to the society in Ongata Rongai?
4. What are the possible solutions to the plastic problem in Ongata Rongai?

1.5 Justification of the study

Plastic carrier bags have emerged as one of the most successful products worldwide in recent decades. They gained increasing popularity amongst consumers and retailers due to the fact that they are functional, lightweight, strong, cheap and a hygienic way of transporting food and goods. It is estimated that currently between 500 billion and one trillion plastic bags are used globally each year, (UNEP, 2005). Even flimsy plastic bags, which have been identified as the most prevalent post-consumer plastic waste, offer one spectacular advantage in that they are manufactured from as little material as possible without loss of functionality thereby exhibiting some element of efficiency in resource utilization.

Although they have excelled in functional and some environmental aspects, plastic carrier bags have become one manifestation of present-day linear mode of production and consumption. As much as millions of plastic bags are consumed in Kenya, they end up in the litter stream soon after use. Strong focus has been placed worldwide on the environmental implications of plastic bags as they are: commonly given away for free in large numbers; designed as single-use disposable products; persistent in the environment resulting in adverse ecological and visual litter impacts; potentially non- replaceable by other substitutes and methods; and neglected by recycling schemes (NEMA news 2006). As regards their persistence, currently used plastic bags are known to take between 20 and 1 000 years to decompose. Plastic bag litter economic impacts include wasted resources in the form of useful material locked in landfills; aesthetic deterioration of landscapes and waterways; threats to Wildlife, marine life, and toxic gas emissions through open burning. Flimsy plastic bags are also associated with *'flying toilets'*, another growing concern in the slum. The study sought to explore and inform about the status of the hazards

caused by plastic bag litter in the peri-urban centres of Kenya focusing on Ongata Rongai Township.

The study is also important as it contributed to the generation of knowledge on causes, extent, effects and possible solutions of plastic bags problem in the peri-urban of Kenya. Research information also provide data to assist researchers, development practitioners, academicians, policy makers, planners and programme implementers as well society to understand the problems brought about by the plastic litter and the possible solutions which can be used as a measure to contain the problem. The findings of this study are also useful to the ministry of environment in formulating policy relevant to plastic bags waste. The findings are also expected to be useful to the Kenyan Government as it may help to implement policies that would address on the environmental problems of plastic bags.

1.6 Scope and Limitations of the Study

The study was conducted in Ongata Rongai. The study only examined the causes, extent, effects, possible solution of plastic bags and policy guidelines on plastic bag litter problem. The study was generalized to the entire population of Ongata Rongai and it disregarded diversity of Ongata Rongai residents that may have contributed to plastic paper bag littering . The study did not explore on the challenges faced by the central government in the management of Municipal Solid waste. A good example is the roadside market in Kware which is not only an eyesore with plastic paper bag litter, but a health hazard which is there due to political reasons .The central government has also clearly neglected Rongai, despite its ever growing urban population. The Township area has never been granted any status and it is quite unclear what Rongai is today.

The major limitation that impacted on the study is that Ongata Rongai has poor public infrastructures like bitumen roads, street lightings, sewage systems, and litter bins The lack of goods infrastructure restricted the study to only along the main tarmac road and in conditions of day lighting.

1.7 Definitions of Key Terms

Capitalism: An economic system based on the private ownership of wealth, which is invested and reinvested in order to produce profit.

Contamination: The presence of minor and unwanted constituents in a material, physical body or natural environment

Dioxins: Highly toxic hydro-carbon which is associated with allergic skin reactions, cancer defects and miscarriages

Disaster: An event causing great damage, injury or loss of life.

Furans: Organic hydro-carbons which are colorless, flammable but slightly soluble in water with *a boiling point close to room temperature*

Hazard: A risk of harm or danger

Littering: The behavior of discarding waste in a public place.

Municipal solid waste: Non liquid waste materials arising from domestic activities, trade and commercial activities.

Plastic carrier bag: Plastic carrier bags also called single-use bags are commonly used by shoppers to carry items from stores to homes

Pollution: The introduction of contaminants into the natural environment that causes adverse change.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

This chapter highlights the major themes under which literature review for the study was done. They include the definition of plastic bag litter, origin and global spread of plastic bag, the use of plastic bag, causes of littering, awareness level of waste plastic bag littering , extent of plastic bag littering, hazards paused by the plastic bag litter , solutions to the problems of plastic bag litter and the policy instrument for plastic bag management in Kenya.

2.2 Plastic bag Litter Definition.

Littering is a condition where waste is strewn or scattered about; resulting in condition of disorder or untidiness (Random House Unabridged Dictionary, 1997). Accordingly plastic bag litter consists of waste plastic carrier bag that has been disposed of improperly, in an inappropriate location by means of throwing the waste plastic bag onto the ground as opposed to disposing of them properly. The distinction between dumping and littering is defined by volume, the location of the disposed waste or the method of waste disposal, (Collins Thesaurus Dictionary, 2002). Littering is therefore a behavior of discarding waste carelessly and deliberately without concerns of repercussions to biotic and abiotic well being. Plastic litter can harm the environment and have a potentially negative impact on human health, (MSW and Handling Rules, 2000).

2.3 The Origin and Global Spread of Plastic Carrier Bag.

Plastic shopping bag was designed and made from plastic by Swedish engineer Sten Gustaf Thulin in 1960s .The design was patented worldwide by Celloplast; well-established company in plastics processing in 1965 (Cherrier,2006). The Company's patent position gave it a virtual monopoly on plastic shopping bag production, and the company set up manufacturing plants across Europe and in the US. Other companies saw the attraction of the plastic bag, too, and the US petrochemicals group Mobil overturned Celloplast's US patent in 1977.The Dixie Bag Company of College Park, Georgia, owned and operated by Jack W. McBride, was one of the first companies to exploit this new opportunity to bring convenient products to all major shopping stores. The Dixie Bag Company, along with similar firms such as Houston Poly Bag

and Capitol Poly, was instrumental in the manufacturing, marketing and perfecting of plastic bags in the 1980s. Kroger, a Cincinnati-based grocery chain in USA, began to replace its other paper shopping bags with plastic bags in 1982. It was followed by its rival, Safeway. From the mid-1980s onwards, plastic bags became common for carrying daily groceries from the store to vehicles and homes throughout the developed world (Aadland, 2006).

2.4 Use of Plastic Carrier Bags.

Plastic bags are made from low density polyethylene, (http.//www.answerbag.comp/q.view 1905324 26, Retrieved 17 April 2012.). Plastic carrier bags also called single-use bags are commonly used by shoppers to carry items from stores to homes, (Mesthane, 1986). Plastic bags are not only durable, versatile and convenient, but also inexpensive, easy to store and transport on account of their thinness and lightness. Plastic carrier bag is popular to the consumers because they are "*functional*", light weight, strong, inexpensive and hygienic, (Clapp, 2008). Because plastic carrier bags are cheap, there is excessive consumption and a tendency of mis-use (Clapp, 2009). In peri-urban centres of Kenya, an individual shopper uses about 3 new plastic carrier bags per day because they are "*given free*". While it is "*free*" to the customer, the cost of plastic bag is passed on to the consumer in form of "*consumption cost*" by the retailers and other supermarkets (UNEP, 2005).

2.5 Causes of plastic bags littering.

Littering in peri-urban areas can be attributed to a number of root causes. First and foremost are externalities in production and consumption: this is to mean that no one is paying for the adverse impacts the waste plastics bag litter are causing on the environment. Costs for proper collection and disposal are not factored in the product costs of the materials, (Clapp 2008,). As a result, plastic bags have become overly cheap fuelling present-day use and throw away consumerism, a human behavior called litter-louting, (Chambers Dictionary 2000) .It is a form of anti-social and collective behavior, (Persons, 1951). According to Persons (1951) collective behavior occurs when large number of people is involved spontaneously to a common behavior. A study conducted in USA to assess the behavior of street littering indicates that 80 percent of the people claimed that "everybody drops something like a piece of paper, tin or something, on the street, (Miller, 2011).

The two-stage process model of littering behavior describes the different ways in which people collectively `1litter. The model was proposed by Chris Sibley and James Liu and differentiates between two types of littering: active and passive (Sibley, 2003). . The model states that, all things being equal, passive littering will be more resistant to change because of diffusion of responsibility in a group. Diffusion of responsibility can manifest itself in a group of people who, through action or inaction, allow events to occur which they would never allow if they were alone, a phenomena referred to as, "*groupthink*" (Janis, 1972). According to Janis, group members try to minimize conflict and reach a consensus decision without critical evaluation of alternative ideas or viewpoints, and by isolating themselves from outside influences. Loyalty to the group requires individuals to avoid raising controversial issues or alternative solutions, and there is loss of individual creativity, uniqueness and independent thinking. The dysfunctional dynamics of the groupthink is to produce an illusion of invulnerability by ignoring or underrating the environmental consequences of collective plastic bag littering. Antecedent factors such as group cohesiveness, faulty group structures, and situational context play into the likelihood of whether or not groupthink will impact the decision-making process.

Similarly, the dynamics of "group shift" contributes significantly to littering behavior. Groupshift contributes to littering behavior more so when a large group of people are involved simultaneous littering behavior occasioned by deficiency of litter deposing facilities. It is catalyzed by prejudice to the people involved in littering, (Myers, 1970). In peri-urban areas where large group of people live together, social loafing has been contributing the littering behavior. The phenomena of social loafing occurs when people among the group exerts less effort to achieve a goal when they work in a group than when they work alone. Other probable causes of littering are a disorder of remembering, learning and retaining information on hazards of plastic bag. As a disorder or in more severe cases this may be described as "amnesia", **(**Maddox, 2011).

Ikiara (2004) notes that Negligent or lenient law enforcement by urban Council contributes to littering behavior in peri-urban areas. To this can be added the city council's by-laws, which have proved to be ineffective to deter littering, illegal dumping and open burning of waste. An additional factor is low public awareness on the responsible disposal of plastic bag waste. This has resulted in plastic carrier bag littering in open areas and affecting their recyclability.

In addition to intentional littering, almost half of plastic litter on roadways is now a result of accidental or unintentional litter that falls off from improperly secured trash, recycling collection vehicles and pickup trucks. Population levels, traffic density and proximity to waste disposal sites are factors known to correlate with higher litter rates. Government neglect, the inability of governments to remove litter in a timely manner, is also a reason why humans are tempted to litter, (Ikiara, 2004). Additionally, ignorance of the laws that regulate the proper disposal of hazardous waste may have an impact on proper disposal. Other causes are inconvenience, entitlement and economic conditions. The largest number of illegal dumps is found in townships without municipal trash hauling. The presence of litter invites more littering.

2.6 Magnitude of bag litter

The population of planet Earth is over seven billion people. With this rapidly growing population comes a massive amount of plastic bag waste that the Earth is not capable of handling. While more techniques and improvements to the recycling process arise, so do more people and more plastic bag waste. There are many benefits and effective ways of recycling, but recycling always seems to be losing the environmental race. The current state of the environment calls for a new, drastic approach to aid recycling, and other waste management processes towards the ultimate goal of maintaining a healthy and livable environment, not only for this generation, but for generations to come. Hazards caused by plastic bag pollution create everlasting, detrimental effects upon the environment. The extent of harm created by plastic bag litter is not widely recognized by recipients. Instead, plastic bags have solidified their way into the habitual nature of a grocery store visit. Unrecognized by the public, plastic bags are one of the largest portions of waste in the world today. Efforts to sway individuals to adopt reusable bags have been underway for some time. Transitions of reusable bags into shoppers' habits have not been significant enough to reduce the distribution rates of plastic bags. Even with initiatives to get customers to bring reusable bags by offering incentives and rewards for their usage, there has been no significant decline in distribution and consumption (UNEP Report, 2005).

Plastic bag litter is an environmental issue in many countries around the world. Ordinary municipal landfills are the source of many chemical substances entering the soil environment (and often groundwater), emanating from the wide variety of refuse accepted, especially

substances illegally discarded there. There have also been some unusual releases of polychlorinated dibenzodioxins, commonly called *dioxins*, (Beychok, 1987). Dioxins have been considered highly toxic and able to cause reproductive and developmental problems, damage the immune system, interfere with hormones and also cause cancer. The suspected effects in adults are liver damage, and alterations in heme metabolism, serum lipid levels, thyroid functions, as well as diabetes and immunological effects (Sweeney, 2000)

2.7 Awareness levels of plastic bag littering.

The manner in which people dispose waste plastic wastes is worrying. The amount of plastic bag litter wastes keeps on increasing due to the increase of population and life style of the people. In Kenya, since the introduction of plastic industries that manufacture plastic carrier bags and other plastic packaging materials, littering has been on increase. Portable water in plastic packaging in form of sachets or bottles are discarded into the streets with impunity. According to the estimation there about 2 million people in Kenya actively involved in activities related to the use of portable water in plastic packaging. Out of this population each individual throw out one plastic sachet or bottle amounting to 2 million of plastic sachets or bottles per day, which is very huge. All these indiscriminating disposal of plastic wastes find their way into gutters which then block the flow of water whenever it rains which then causes flooding. There is no well organized way of disposal of solid wastes. People dispose the wastes in their own ways, wherever they find it necessary to dispose them. In some cases, people gather the plastics waste and set fire on the waste to burn the plastic waste which they pollute the air (Clover, 2007).

Plastics bags are used on a daily basis throughout the world. Plastic bags are light, sturdy and easy to carry. They are cheaper than paper. From the mid 1980s, the use of plastic bags became common for carrying daily groceries from the store to vehicles and homes. Although thin plastic shopping bags are still an option for consumers in the Republic of Ireland, if they choose to pay the levy: “peer pressure makes people ashamed to do shopping and pay for plastic bags” (Allen, 2003).

2.8 Extent of plastic Paper bag littering

A house hold survey was conducted to assess the quantity and composition of household solid waste discharge in form of plastic carrier, (Ikiara, 2004).According to the report, the data was

collected from 130 households using interview technique. The average household solid waste generation rate was 281.27 grammes per household per day. Regarding plastic paper bag waste, the average plastic waste generation rate was 17.4 grammes per day, plastic packaging and plastic containers dominated with the high percentage (95.64 %) of plastic waste. Plastic shopping bags were especially identified as the major component accounting for 45.72% of total plastic waste. Relevant factors such as household income and household size were found to have an existing correlation to plastic waste generation .The household habits and behaviours of plastic waste discharge indicated inappropriate practices and unhygienic disposal methods. The study indicates the need to adopt right disposal and recycling techniques to avoid health hazards such as pollution and contamination.

2.9 Hazards paused by plastic bags litter

Hazardous materials contained within litter and illegally dumped rubbish can leach into water sources, contaminate soil and pollute the air. Plastic bag carriers containing hazardous waste are the most often dumped in Kenya. Many of these discarded plastic bag carriers end up illegally dumped on public lands (Akullan, 2006). Plastic bag litter has become a breeding ground for insect vectors which can transmit disease to humans. Mosquitoes, which breed in stagnant water, can transmit West Nile Virus and Malaria. When plastic bag carrier litters are burned they smolder for long periods of time emitting hundreds of chemical and compounds that pollute the air causing respiratory illnesses. Additionally the residue left behind can harm the soil and leach into groundwater.

Plastic wastes find their way into the water bodies thus polluting the water. The plastics then float on the surface of the water bodies, thus preventing direct sunlight for the water organisms. Marine animals are killed by plastic waste that finds their way in water bodies as they mistakenly eat plastics as food. Since plastics are indigestive material and stay inside them, they cause pains and this leads to death. After the decay of the animal, the ingested plastic is freed back to the environment again to continue causing problems. These bags are very dangerous for sea life, especially those of the mammal variety. Any hunting mammal can easily mistake the size, shape, and texture of the plastic bag for a meal and find its airway is cut off. Needless deaths of animals from plastic bags are increasing every year (Romer, 2008).

Visual pollution is a major effect of litter. In recent years it has come to signify a wider range of disruptions to environmental quality. Thus litter billboards, cell towers and auto junkyards are said to constitute visual pollution; noise excessive enough to cause psychological or physical damage is considered noise pollution; and waste heat that alters local climate or affects fish populations in rivers is designated thermal pollution. Discarded Plastic wrapping such as paper cups or beverage cans can hold rainwater, providing breeding locations for mosquitoes. In addition, a spark has the potential to hit a piece of litter like a paper bag which could start a fire.
The blocking of the gutters and drains by plastic wastes causes flooding whenever it rains, because the rain water cannot get access to flow and the stagnation of the rain water created by plastic wastes provide breeding place for mosquitoes, which later cause malaria to the people. The plastic wastes do not affect only the people but also domestic animals such as sheep, goats, cows and fowls. These animals die through the taking in of plastic waste along as they graze in the fields. Again, when plastic waste litters the farm lands, they entangle the crops preventing them to grow. Plastic bag litter cover the soil, preventing air penetration into the soil, and then killing the soil organisms that help to tilt the farmlands (Waste Digest, 2006).

Porpoises are the most common victim of marine plastic bag litter, (Miller, 2011) .Miller (2011 postulates that porpoises eat sea nettles and jelly fish. They often mistake plastic bag litter in the seas or oceans for food and swallow. If they survive the swallowing of the bag, it is unlikely that they are able to continue with normal digestion and thus eventually die a slow and painful death from toxicity or intestinal blockage. The environmental balance of the aquatic life is thrown off by the rate of plastic bags finding their way into the mouths and intestinal tracts of sea mammals causing deaths. As one species begins to die off at an abnormal rate, every other living organism in the marine ecosystem is impacted. There are either too many or too few marine organisms after being impacted by plastic litter and changes within the environment continue to kill off yet more organisms.

The indefinite period of time that it takes for the average plastic bag to breakdown can be literally hundreds of years. Every bag that ends up in the woodlands of the country threatens the natural progression of wildlife. Because the break down rate is so slow the chances that the bag will harmlessly go away are extremely slim. Throughout the world plastic bags are responsible

for suffocation deaths of woodland animals as well as inhibiting soil nutrients. The land litter that is made up of plastic bags has the potential to kill over and over again. It has been estimated that one bag has the potential to unintentionally kill one animal per every three months due to unintentional digestion or inhalation. If you consider the number of littered plastic bags ranges from 1.5 million to 3 million depending on location, this equals a lot of ecosystem sustaining lives lost. Without the balance of the ecosystem food sources dry up and starvation occurs. With an increase in plastic bag use throughout the world, the eventual effects could be literally devastating even to the human population (Hasson, 2007).

Plastic wastes are non-degradable substances and made of toxic chemicals that pollute the air. Poisonous substances such as toxins are released to the air when plastic wastes are burned which are harmful and these causes respiratory problems and cancer as they are in-haled. The smoke that comes out as a results of burning plastic litter contain carbon monoxide (CO) and carbon dioxide (CO2) gases which affect the environment in general (Kikang,2010). The effects of plastic bags on the environment are really quite devastating. While burning plastic bag litter is convenient damage to the environment needs to be controlled (Kikang , 2010).

There is no way to strictly limit the effects of plastic bags on the environment because there is no disposal method that will really help eliminate the problem. While reusing them is the first step, most people either don't or can't re-use them based on store policies. Plastic bags are not durable enough to stand up to numerous trips to the store so often the best that citizens can do is reuse them when following pooper scooper laws. The biggest problem with this is that once they have been soiled they end up in the trash, which then ends up in the landfill or burned. Either solution is very poor for the environment. Burning emits toxic gases that harm the atmosphere and increase the levels of carbon monoxide and carbon dioxide in the air while landfills hold them indefinitely as part of the plastic waste problem throughout the globe (Ikiara, 2004).

2.10 Solutions to the Plastic Problem

Governments, communities and individuals needs to behave in a more sustainable ways. One of the ways that individuals can embrace this sense of sustainability is through the reusable shopping bags (Bjerkli, 2005). In 2008, Whole Foods Inc. eliminated the plastic bag as an option

for customers and has since seen sales of reusable bags skyrocket by 300%. Other grocers have promoted the use of reusable bags through giveaway promotions and "trendy" bag designs. Home Depot distributed 500,000 free reusable shopping bags last April on Earth Day, and Wal-Mart similarly gave away one million. One line of bags features tags that read, ''Saving the World One Bag at a Time''. Getting people to actually use the bags is another matter, which at least in some cases requires changing deeply ingrained behavior. At present, many of the bags go unused remaining stashed in consumers' closets or in the trunks of their cars, (Cherrier, 2006).

Effective collection of plastic waste can be done by identifying the sources of plastics wastes, the contributors of the plastic wastes. There are two main sources in which plastic wastes find their way to pollute the environment and these are post-consumer plastics (used by people) and post-industrial plastics (from the industries). The plastic wastes can be collected for recycling from people in residential areas by putting recycling plastic waste bins in vantage places for easy collection later and also collecting from the roadside. With the industrial plastic wastes, these can be collected from the industries plastic waste bins (Goodman, 2008).Certain public areas such as parks have litter bins which are placed alongside paths frequently walked by visitors. This encourages people to avoid littering, as littering creates an unhealthy and aesthetically unpleasant social environment. Bins in outdoor locations or other busy public areas are usually mounted to the ground or floor. This discourages theft of litter bins, and also reduces vandalism by making it harder for the bins to be physically moved or maneuvered.

In the past, terrorists have left bombs in bins. The bomb is much less likely to be spotted than an unattended bag and the metal bins provide extra shrapnel that injures people nearby when it detonates. For this reason there are no bins in most railway stations, most airports and many shopping centers' in the United Kingdom, or if they are provided they are just a bin bag hanging from a metal hoop, **(**Macafee, 2001). Apartment buildings often have dust flumes in which residents can dispose of their waste in stainless steel waste containers. These chutes usually lead to some large receptacle or waste-disposal complex in the basement.

A number of factors are critical in influencing the effectiveness of the reduce, re-use and recycle (3R) approach (Bahri, 2005). These include an enabling policy framework; education and raising

awareness of all concerned stakeholders; and capacity building and technology support, including human resources, technology, finance and other inputs. A critical aspect that cuts across the above three factors relates to the acceptance and implementation of this 3R strategy and related policies by principle stakeholders such as the urban councils, the Ministry of Local Government, business associations, and the residents of the city of the urban and peri-urban. A number of problems exist in facilitating the smooth uptake of 3R policies and strategies based on lessons learnt in the developed world. Key among them is the gaps in information and practical application of sustainable solutions; access to appropriate and useful information; and of translating problems faced by industry into research priorities; and the implementation of innovative research outputs on the ground. Anticipated barriers to the concrete implementation of 3 R policies are related to policy, information, capacity building, financial and socio-cultural priorities. Ways and means for overcoming these barriers have been presented in this strategy for purposes of increasing the wide spread adoption of the 3 R philosophy (Bahri, 2005)

Plastic waste management is basically a welfare and development matter and it is commonly accepted that public participation is essential for its success. Stakeholder participation entails the involvement of all categories of people on the identification of their felt needs, mobilization of resources, and deciding on the direction and execution of programs and projects. It should take place at all levels of planning and management, including training, problem identification, implementation, monitoring and evaluation. Awareness, on the other hand, is the process of awakening and raising people's sensitivity to concerns, in this case the plastic waste management problem in the urban and peri-urban areas. Awareness can be created through formal and non-formal education with the assistance of both the print and electronic media. This strategy will form part of the Rapid Results Initiative (RRI) sponsored by the Ministry of Local Government (Hudson, 2004).

According to Hudson (2004), environmental education with respect to plastic waste management, both formal and non-formal, is vital to changing people's attitudes to appreciating a clean and safe environment, and leads to their empowerment in enabling them to manage their wastes sustainably. It also creates responsibility among the different communities, increases environmental accountability and governance and encourages the rational use of environmental

resources. There is need to create a mechanism for stakeholder participation and dialogue so as to empower and enable the public participates in sound environmental practices.

The relationship between public awareness and demand for sound environmental management may be challenging. A lot of information is required for the grass root population to understand and appreciate the importance of managing plastic wastes in an environmentally sound manner. The public also needs to know what their rights and responsibilities are in as far as plastic waste recycling is concerned. Extensive and intensive sensitization is essential in enabling people to bring sound environmental practices into focus. An extensive program of sensitization of the general public is required that targets the different strata of society. Two levels of sensitization are proposed. The first is to inform people generally about the dangers of dumping plastics into the environment and the second should target specific individuals, groups and sectors so as to enable them maximize the plastic waste recycling opportunity for job creation. General sensitization activities should aim at ensuring that more of the population has access to essential plastic waste management information. This may necessitate further development and dissemination of reader friendly materials in English and Swahili, information packs and briefing materials to different stakeholders; and a massive media campaign. A citywide information system should therefore be created to provide answers to routine questions and common constraints by linking dispersed plastic data/information custodians, to a set of information seekers (Changshe, 2009).

2.11 Policy Instruments for Plastic Bag Management in Kenya.

Management of plastic shopping bag is a general problem in Kenya, (KIPPRA, 2006). The report indicates that the collection ratio, that is, the proportion of solid waste generated that is collected is low. Second, marked inequality in the geographical service distribution characterizes the service particularly in Nairobi with the western suburbs well serviced by private firms and the City Council of Nairobi, while the eastern part is hardly serviced. Third, there is widespread indiscriminate dumping in illegal dumpsites and waste pickers litter the city with unusable waste materials without control. Fourth, there is only one official dumpsite (City Council of Nairobi owned and operated) and it full and a nuisance to adjacent residential areas. Fifth, the city has no transfer facilities. This situation holds true for almost all the urban areas in Kenya.

Solid waste management for plastic bags is problems in Kenya largely a result of lack of a waste management framework to guide improvement of standards ,efficiency, and collection of plastic bag waste (UNEP,2005).The UNEP Report (2005) indicates that issues of solid waste management and sanitation have for long time relied on the Local Government Act (cap 265) and Public Health Act (Cap 242) .The local government act allows local authority to establish and maintain municipal solid waste management services while the public health act requires the City Council to provide these services. The Acts, however, neither set standards for the services nor require waste reduction or recycling. This anomaly according to UNEP Report (2005) was bridged by the enactment of the Environmental Management and Coordination Act (1999). The Act not only removed the monopoly of the Local Authorities in solid waste management but also made provisions for the use of economic instruments for solid waste management and promoting waste reduction and recycling.

At the moment, there are no policy guidelines on the management of waste plastic bag in Kenya. However, based on KIPPRA study (2006), a number of policy instruments were advanced for implementation by NEMA which has potential in the management of plastic bags in Nairobi an Kenya as a whole a whole. These policy instruments are Command and Control Instruments, economic instruments, voluntary or information based instruments, and proposed policy instruments ‘package .

2.11.1 Command and Control instruments (CACS).

This instrument has two proposals for the policy guidelines with their advantages and disadvantages. The policy guidelines recommend for the outright bans for plastic bag and enactment of minimum film thickness standards. The proposal indicates that outright bans on the manufacture, distribution and trade of plastic bags have been applied in a number of developing countries like Eritrea, Somaliland, Rwanda and Bangladesh with a varying degree of success. The proposal recommends that before bans are implemented, alternatives must be available so as to avoid the problems encountered in Somaliland for carrying shopping goods. The proposal further indicates that the option of imposing the use of plastic bag in Kenya is not feasible as plastic bag industry is a vibrant and rapidly growing sector. The sector has created job opportunities and a form of revenue generation for the government. The proposed policy guidelines on the minimum film thickness standards indicates that the approach was used in

India and South Africa and was found feasible way of taking care of such bags. In Kenya, the need for such standard is justified. A minimum standards of 10 microns for HDPE and 15 microns for LDPE and LLDPE HAS already been developed and gazetted by Kenya Bureau of Standards (KBS).The major bone of contention with the policy guideline is the level of standard , since this will have a direct impact on the type of bags to be phased out.

2.11.2 Economic instruments.

This policy guideline includes levy and subsidies. The recommendation on levy indicates that a well designed levy has considerable potential to address the problem of wasteful production and consumption of plastic bag in Kenya. While questions arise with regards to its acceptability and enforceability, the proposal indicates that the experiences of South Africa and Ireland show that it is practically enforceable and has desirable outcomes. However, a large segment in Kenya stakeholders believe that recycling minimizes the need to reduce production and consumption of plastic bags. The policy on subsidies indicates that recycling schemes all over the world rely on government subsidies because of limited market for recycling products. In Kenya, targeted subsidies for sectors such as those involved in recycling, development of a managed disposal system and production of environmental friendly alternative carrier bags has great potential.

2.11.3 Voluntary or information based instruments.

The proposal suggests awareness campaign and voluntary agreement s as policy guidelines to be adopted in Kenya. The proposal indicates that awareness campaigns and environmental education are very important support instruments for both pre and post-consumer measures. The suggestion of voluntary agreements for code of practice for retailers and manufactures can produce considerable success in tackling the problem in Kenya.

2.11.4 Proposed policy instruments ‘package.

The policy guideline is a package, which is a combination of command -and -control, economic and voluntary / information .This policy guideline can be applied to tackle the problem of plastic bags in Kenya because of the nature of the problem.

2.12 Theoretical Framework.

This study was be informed by structural –functional theory of social change, theory of social disorganization, anomie or strain theory and learning theory of behaviorism**.**

2.12.1 Structural –functional Theory of Social Change.

Social change refers to modifications of the way people seek ultimate meaning in life (Gerth, 1953). According to Gerth (1953), these modifications may include, introduction of new techniques, new ways of making a living, and changes in place of residence, new innovations, ideas and social values. Many sociologists view social change as a change in the structure of society or alteration of the social structure (Ginsberg, 1958). Others stress that social change is not only a change in the structure, but also in the functioning of society, (Allen, l97l). Social change is also conceptualized as the process of planned or unplanned qualitative or quantitative alterations in social phenomena, (Vago, 1996).

According to Vago (1996), Structures refers to a set of relatively stable and patterned relationships of social units and function refers to the consequences of any social activity that make for the adaptation or adjustment of a given structure or its components parts. In the society, the principle structures are usually considered to be societies' institutions: the family, the government, economic system, religion and education. Each structure and each part within the large structure is conceived to have a function in assisting the society to operate and preserve it intact.

The structural-functional approach distinguishes between latent function and manifest functions of social relationship (Merton, 1957). According to Merton, (1957), manifest functions are those that are built into the social system by design. Like manifest goals, they are well understood by group members. Latent functions are by contrast unintentional and often unrecognized. They are unanticipated consequences of the system that has been set up to achieve other ends.

2.12.2 Anomie or Strain Theory

Anomie refers to contradiction between the cultural goals of achieving wealth and the social structure's inability to provide legitimate institutional means for achieving the goals (Merton, 1938). Merton, (1938) proposed that individuals adapt to the problem of anomie by conformity,

innovation, ritualism, retreatism, and rebellion. Conformers pursue their cultural goals through legitimate institutional means. Innovators pursue their cultural goals through illegitimate means. Ritualism is the adaptation of individuals who do not "take no chances". They do not pursue cultural goals but they follow institutional means to obtain them. Retreatists do not employ legitimate institutional means to obtain their goals and they drop out. Rebels reject both the cultural goals and the legitimate institutional means of achieving their goals.

the process of social change can provide the e impetus for social disorganization by creating conditions for conflicting interest and values, conflicting status and role obligations, faulty socialization, and faulty social communication .Bohn (1997) suggests that in many instances, indeed, social change is disruptive, and an underlying condition for social disorganization. Thus, social disorganization entails the breakdown of the organizational structure, the various elements in society become "out of joint," and the influence of social norms on particular groups or individuals is weakened. The result is that the collective purposes of society are less fully realized than they could be under a different, better organized system. Value and norm conflicts, mobility, weak primary relations, lack of group cohesiveness, and other ingredients of social disorganization can lead to deviance and crime (Beccaria, 1975). When there is no provision of a shared set of priorities among these competing obligations, the individual's behavior becomes unpredictable and socially disruptive, and regardless how it is judged, it remains disorganizing.

2.12.3 Learning Theory

The theory explains behavior and its prevention with the concepts of positive reinforcement, negative reinforcement, extinction, punishment or imitation, (Bohn, 1996).According to this theory, behavior is learned through imitation or modeling.

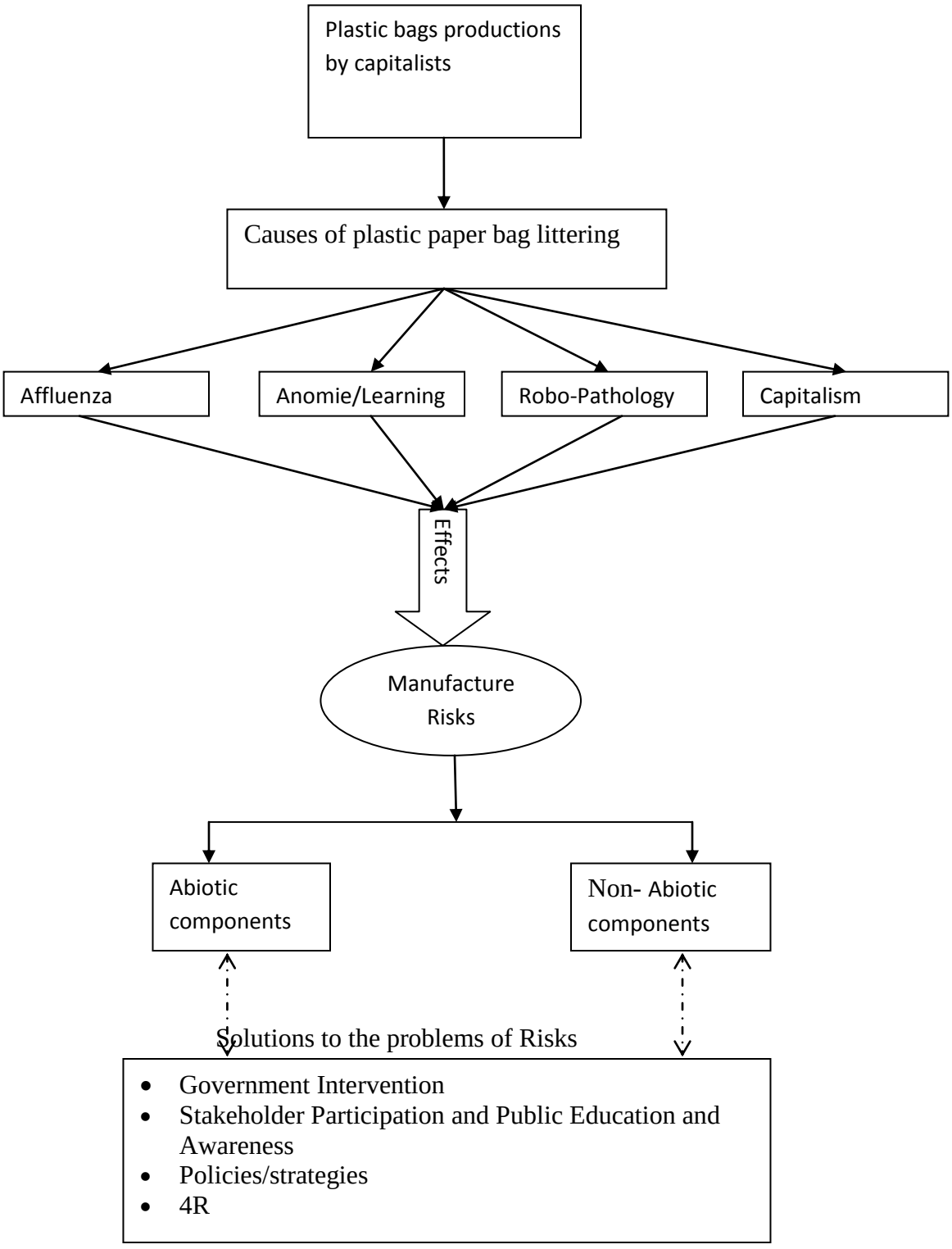
2.13 Conceptual Framework

The anti-social behavior of plastic bag littering is hinged on individual's social background, the environment in which people live, the behavior of other people, the level of modernization and the means of society's social control. People learn how to litter by observing others acquire the behavior of plastic bag littering by observing from significant others, through social learning or

due to lack of choices. The behavior can be un-learned through positive reinforcement, negative reinforcement or through extinction.

The technological change that is taking place in the society fuelled by capitalism exposes man to a number of risks which turns to hazards when they threaten human life, properties and the environment. These risks include plastic bag litter and the associated latent dysfunctional characteristics of waste plastic bag in form of environment pollution, water pollution and air pollution. Cumulatively, these risks make mankind vulnerable to calamities. When hazards occasioned by plastic bag litter impacts on vulnerable communities living in the peri-urban centres of Kenya, disasters of various magnitude in form of floods, environment induced sicknesses and other calamities results. Plastic bag litter (hazards) is often blamed for the disasters, yet in many situations the underlying cause of urbanization, disorganized societies, improper solid waste management, population explosion and unsafe conditions people live in at the peri-urban centers make them dispose of plastic bag in form of littering and subject to risks paused by the plastic bag litter.

Figure 2.1 Conceptual Frameworks



CHAPTER THREE
RESEARCH DESIGN AND METHODOLOGY

3.1 Introduction

Research methodology is an approach and a set of supporting methods and guidelines to be used as a framework for carrying out the research Mugenda (1999). Mugenda (1999) explains that research methodology applies to ways the researcher comes close to problems and seeks answers to those problems. The author further argues that the success in the research depends on whether the researcher specifies what to find out and the best way to do it. According to Mugenda and Mugenda (1999), research methodology includes research design, population and sample, data collection procedures, data analysis procedures and measurement of variables.

This chapter outlines the methodology that was used in the research study. It describes the type of research design that was used, the population of the research study, target population, sample size, sampling design, and finally pre-testing of the research study. It further describes the data collection instruments, procedures used in collecting the data, data analysis and presentation of the research findings.

3.2 Research Design

Research design is a comprehensive master plan of the research study to be undertaken, giving a general statement of the methods to be used. The function of a research design is to ensure that requisite data in accordance with the problem at hand is collected accurately and economically, (Adams (1985). Adams (1985) describes research design as an understanding of conditions for collection and analysis of data in a way that combines their relationships with the research to the economy of procedures. Adams (1985) suggests that research design deals with the detailing of procedures that will be adopted to carry out the research study.

This study employed a descriptive research design; Bogdom (1992) defines descriptive research as a process of collecting data in order to answer questions concerning the current status of the study subject. Descriptive research designs are used in preliminary and exploratory studies to allow researchers to gather information, summarize, present and interpret it for the purpose of

clarification, (Borg,1989). According to Borg (1989), the purpose of descriptive research is to determine and report the way things are. Borg (1989) noted that descriptive research is intended to produce statistical information about aspects of education that interest policy makers and educators. The steps involved in descriptive research are: formulating the objectives of the study, designing the method of data collection, selecting the sample, data collection and analyzing the results, Borg (1989). This study fitted within the provisions of descriptive research design because the researcher employed all the steps of descriptive research in his study in evaluating the problem of plastic bag littering at Ongata Rongai Township and the social-economic hazards of plastic bag littering.

The design attempted to describe such things as sample of population in relation to behavior of plastic bag littering, attitudes, values and characteristics as it exist at Ongata Rongai Township. The design was concerned with the collection, organization, description and analysis of plastic bag littering data from the sample and making inference to the entire population. Its objective was to get a snapshot view of social-economic hazards of plastic carrier bag litter as it is on the ground at Ongata Rongai Township without looking at the past trends. The design provided a room for generation of findings in form of descriptive statistics such data coding, measures of central tendency, measures of dispersion, distributions and relationships to the problems .and also reliable data for presentation and analysis. The goal of the study was to acquire factual, accurate and systematic data to account on the problem as it exist on the ground.

3.3 Study area

The study was conducted in Ongata Rongai. The Town has seven settlement areas namely, Magadi Road, Kandisi, Rimpa, Nkoroi, Merisho, Olekasasi, Tuala and Maasai lodge. The area of study covers a distance of 16 squares Kms. Ongata Rongai has high density urban aggregation of population estimated to be between 66,042and 147,000.

Ongata Rongai peri-urban centre is noticeable for its serious lack of infrastructure, lighting and social amenities compared to the population it holds. Mounds of plastic bag garbage are quite common and unplanned informal businesses are mushrooming at an alarming rate. Traffic jams in Rongai are quite sickening and are caused by lack of a road network. There is only one bitumen standard road that serves the entire population of Rongai. The other existing roads are

unpaved, neglected and too narrow to allow free flow of traffic. There is also a lack of enforcement of urban by-laws. Dumped garbage by the roadside, for example cause unnecessary traffic snarl-ups, they clog drainage and pauses health risks to the residents by harboring disease causing organisms and contaminating or polluting the environment.

3.4 Target population

Population refers to an entire group of individuals, events, or objects having common observable characteristics. Gay (1981).According to Gay, (1981) target population refers to population to which the researcher wants to generalize the results of the study. Target population is also defined as all the members of a real or hypothetical set of people, events or objects to which a researcher wishes to generalize the results of the research study (Borg & Gall, 1989). The study targeted population estimated to be between 66,042and 147,000 living in the plastic carrier bag littered peri-urban centres of Ongata Rongai at Magadi Road, Kandisi, Rimpa, Nkoroi, Merisho, Olekasasi, Tuala and Maasai lodge.

3.5 Sample Size

A sample is a smaller group contained from the accessible population. Each member or case in the sample is sometimes called "respondent" or "interviewees". Gay (1981) recommends that when the target population is small (less than 1000 members), a minimum sample of 20% is adequate for educational research. If there is no estimate available of the proportion in the target population assumed to have the characteristics of interest, 50% should be used as recommended by Fisher *et al* (1983). The researcher conducted his research along Magadi Road where it is estimated that approximately 1000 plots are located. Each plot was considered as a unit. From the 1000 members of the target population, the researcher proportionated sampling to select 120 participants. The researcher also corrected information from three key informants at Rongai area. The information obtained from the key informants greatly added value to the study. The Researcher also interviewed three FGDs who were key in informing the study about the views of other people about the social economic hazards of plastic bag litter.

3.6 Sampling Procedure

Simple random sampling procedure was employed. The procedure involved allocating a number to the accessible population along magadi Road and placing the number in the container and then picking the number at random. The subjects corresponding to the numbers picked (40) were included in the sample.

3.7 Data Collection Procedure/Instruments to be used

The study used questionnaires to collect empirical data from the obtained sample size. Each item in the questionnaire was developed to address a specific objective and research questions. The kinds of questions contained in the questionnaire was be structured (closed-ended), unstructured (open- ended), or contingency questions. The structured questions had a list of all possible alternatives from which the respondents selected the answer that best described their situation while unstructured questions gave the respondent complete freedom to respond to the question in his or her words. Contingency questions are subsequent questions that the researcher employed to probe for more information. The questionnaire was administered to the respondents by the researcher. The sample of questions administered to the respondents is attached as **Annex A**

To assign meaningful number responses, variables were measured at interval or ratio scale while questionnaires rating employed Likert scale (Dankit, 2004). Likert scale was used to measure perception, altitude, values and behavior. The rating scale consisted of numbers and description which were used to rate or rank the subjective and intangible component in research. The numbers in the Likert scale were ordered such that they indicated the presence or absence of the characteristic being measured.

An interview is where a researcher goes to the respondents with a schedule or a list of questions which assists the researcher to ask questions and record replies. The researcher was be able to have a discussion from the group of regulatory bodies governing control of plastic litter in Kenya. The interview schedule is attached as Appendix IV.

3.8 Validity

Mugenda (1999) indicated that validity determines whether the research truly measures that which it was intended to measure or how truthful the research results are. In other words, does the research instrument allow you to hit "the bull's eye" of your research object? Researchers generally determine validity by asking a series of questions, and will often look for the answers in the research of others.

Mugenda (1999) describe the validity in quantitative research as "construct validity". The construct is the initial concept, notion, question or hypothesis that determined which data was to be gathered and how it is to be gathered. They also assert that quantitative researchers actively cause or affect the interplay between construct and data in order to validate their investigation, usually by the application of a test or other process. In this sense, the involvement of the researchers in the research process greatly reduced the validity of a test. Data quality was incorporated in the entire study process especially at the data collection point to include completeness of questionnaires, legibility of records and validity of responses. At the data processing point, quality control included; data cleaning, validation and confidentiality. There are three types of validity which was be addressed and stated: *Face validity* with pre-testing of survey instruments was a good way to increase the likelihood of face validity. *Content validity* the use of expert opinions, literature searches, and pretest open-ended questions to help establish content validity.

3.9 Reliability

Mugenda (1999) defines reliability as the extent to which results are consistent over time and an accurate representation of the total population under study is referred to as reliability and if the results of a study can be reproduced under a similar methodology, then the research instrument is considered to be reliable.

The most popular methods which was used in estimating reliability is the use of measures of internal consistency. The questionnaire was be pre-tested through a pilot test with individuals from similar environment that has a problem of plastic bag littering but not part of the sample population in the study to avoid double inclusion of pre-test participants in the main study. Their

feedback helped in making vital adjustments in enhancing reliability and validity of the study findings. To ascertain the reliability of the data collection instrument, the results of pilot study was examined by professionals co-opted in the study who included other researchers, and the Supervisor and modifications was be done based on the responses obtained.

3.10 Data analysis

Data analysis is the process of bringing order, structure and meaning to the mass of information collected. It involves examining what has been collected and making deductions and inferences Adams, (1985). This study employed descriptive statistics to analyze the data obtained. The social-economic data included respondents' background, causes of plastic bag littering, the extent of plastic bag litter, effects of plastic bag litter and the possible solutions to plastic bag littering. Descriptive statistics involved the collection, organization and analysis of all data relating to some population or sample under study.

For quantitative data analysis processing and editing ensured that the data collected is free from inconsistencies and any incompleteness. After cleaning, the data was coded. Coding of data involved developing a code book, pre-testing code book, coding the data and verifying the coded data. Once the data was coded, a selected few responses from the instruments were recorded and examined to identify any discrepancies in coding. Finally, content analysis which involved identify the main themes, assigning codes to the main themes, and classify responses under the main themes was to analyze qualitative data, (Chandran, 2004).

According to Chandran (2004), descriptive research design is commonly represented by use of frequency charts, graphs, and pie charts to tabulate the information gathered appropriately. Statistical Package for Social Sciences (SPSS) was be used to analyze the data. This package is known for its efficiency and ability to handle large amounts of data. Given its wide spectrum for statistical procedures purposefully designed for social science, it developed appropriate holding frame that came up with reliable results according to the responses in the questionnaires.

3.11 Ethical Considerations

Kumar, (2005), states that ethics are norms governing human conducts which have a significant impact on human welfare. It involves making a judgment about right and wrong behavior. Gay,

(1981), states that it is the responsibility of the researcher to carefully assess the possibility of harm to research participants, and the extent that it is possible; the possibility of harm should be minimized. The author further states that, the researcher must take all reasonable precautions to ensure that the respondents are in no way directly harmed or adversely affected as a result of their participation in a research project.

The researcher recognized that the issue under study was sensitive because it involved a peculiar negative behavior associated with individuals. Therefore, there was need to protect the identity of the respondents as much as possible. This means that the questionnaires do not require the respondent's names or details that may reveal their identity.

Hence the term ethics has something to do with the expected practices of community and its individual members. It describes what a society believes to be right or wrong. In this study, it was ethical to have confidentiality. Confidentiality was therefore upheld for all respondents. The names of the respondents were not to be disclosed.

CHAPTER FOUR
DATA ANALYSIS AND INTERPRETATION

4.1 Introduction

This study presents the data analysis and interpretation of the results. The analysis was done as per questionnaires that were used to the collect data. The study targeted a population of 120 respondents and they all responded giving a response rate of 100% which according to Mugenda Mugenda (1993) a response rate of more than 80% is sufficient enough for the study. Data collected from the field was sorted and later analyzed using statistical package for social sciences (SPSS) software. The results are presented in tables and figures to highlight the major findings. They are also presented sequentially according to the research questions of the study. Mean scores and standard deviations analysis was used to analyze the data collected. The raw data was coded, evaluated and tabulated to depict clearly the results obtained on the social - economic hazards of plastic bags litter at Ongata Rongai peri- urban centre in Kajiado County.

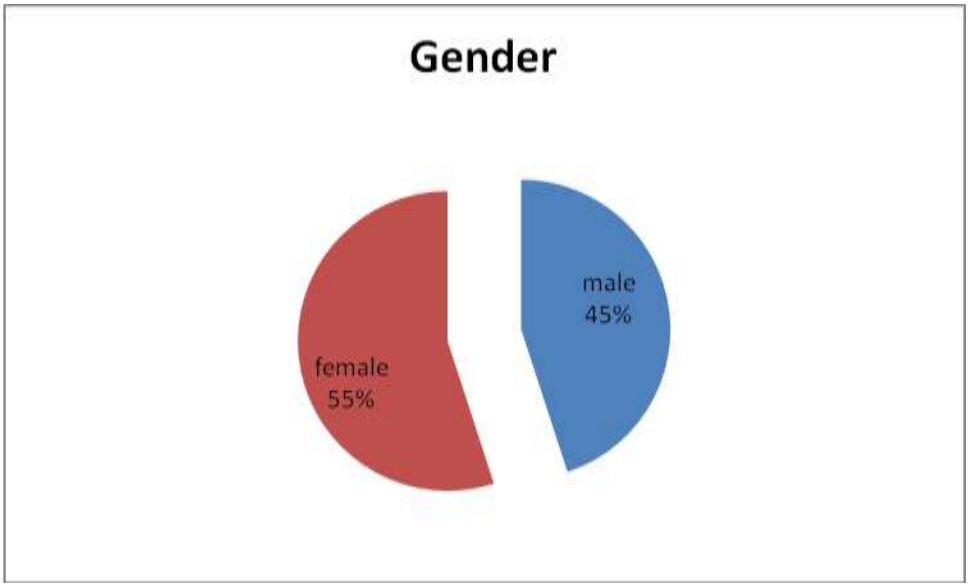
4.2 Demographic Characteristics

The study sought to establish the information on the respondents employed in the study with regards to the gender, age, how long they have stayed in Ongata Rongai. These bio-data points at the respondents' appropriateness in answering the study questions.

4.2.1 Gender of the respondents

The respondents were asked to show their gender. This was expected to guide the researcher on the conclusions regarding the degree of congruence of responses with the gender characteristics. Figure 4.1 below shows the study finding.

Figure 4.1: Gender Response

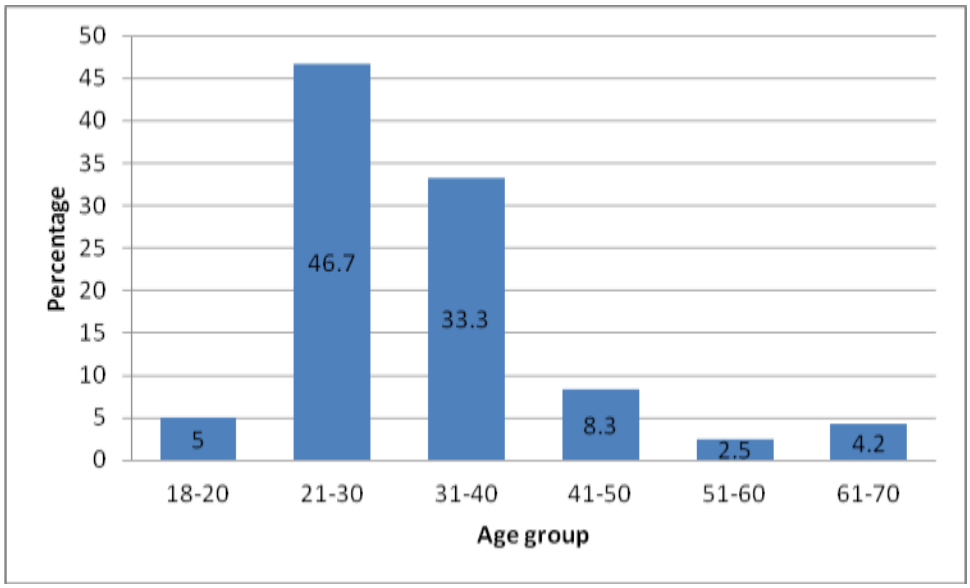


The results as in the figure 4.1 show that majority of the respondent were female at 55% while male was 45%. The results of gender distribution indicate that female gender is more than men in Ongata Rongai. It can be attributed by number of factors such as environment gender adaptation, gender urbanization and natural sex ratio theory of 1:5. Generally in any society, if the ratio of men: women remain at 1:1; the society is likely to experience a strain in the co-existence equilibrium.

4.2.2 Distribution of Age Group

The respondents were asked to disclose their age. The figure below shows the study finding:

Figure 4.2: Plastic Paper Bag Usage by Age

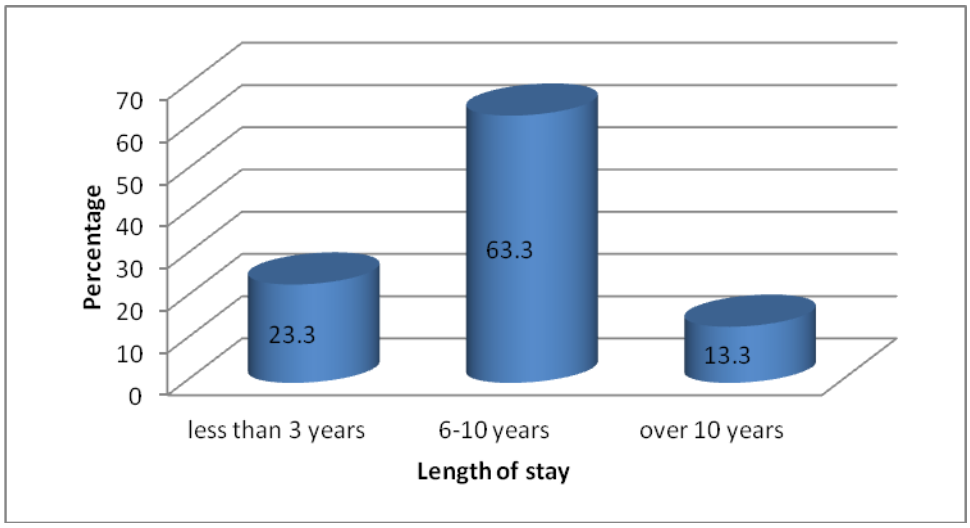


The results presented in figure 4.2 show that a large proportion of 46.7% the respondents were aged between the ages of 21 to 30 years; this was followed by a significant percentage 33.3% that were aged between 31-40 years. 8.3% were aged 41-50 years, 5% were aged 18-20 years 4.2% were aged 61-70 while 2.5% were aged between 51-60 years. The conclusion drawn from the above table indicates that the majority of the Ongata Rongai residents are primarily young people who should be given adequate considerations in finding solutions to plastic paper bag littering.

4.2.3 Length of stay in Rongai

The respondents were asked to indicate their length of stay as a residence of Rogai. Figure 4.3 shows the study findings.

Figure 4.3: length of stay at Ongata Rongai



From the figure above, 63.3 % of the respondents said they had stayed in Rongai for 6-10 years, 23.3% had stayed in Rongai for less than 3 years while 13.3% had been residents for over 10 years. This is indication that majority the residents interviewed had stayed in Rongai for over 6 years and therefore were in a position to give accurate information on the socio economic effects of plastic litter in the peri urban center.

4.2.4 Way of disposing plastic Paper Bag litter

The respondents were asked to indicate their way of disposing plastic litter. Table 4.1 shows the study findings.

Table 4.1: Way of disposing plastic Paper Bag litter

Description	No. of respondents	Percentage
Re use	11	9.2
Discard as litter	59	49.2
Burying	24	20
Burning	26	21.7
Total	**120**	**100**

From the results in table above, 49.2% of the respondents indicated that they dispose their litter by discarding it, 21.7% indicated they burn their plastic litter, 20% burry their plastic litter while 9.2% re use they plastics. The above data indicates that the most prevalent method of plastic paper bag littering at Ongata Rongai is deliberate littering.

4.2.5 Average no of bags used each week

The respondents were asked to indicate the Average no of bags used each week. The table below shows the study findings.

Table 4.2: Average no of bags used each week

Description	Frequency	Percent
0-5	16	13.3
6-10	35	29.2
10-15	12	10
16-20	19	15.8
21-25	25	20.8
25+	13	10.8
Total	**120**	**100**

The results in table above shows that majority 29.2% of the respondents use an average of 6-10 plastic bags in a week, 20.8% use 21-25% of plastic bags in a week, 15.8% use 16-20 plastic bags in a week, 13.3% use 0-5 plastic bags in a week, 10.8 use 25 and more plastic bags in a week while 10% use 10-15 plastic bags in a week.

4.2.6 Plastic products use

The respondents were asked to indicate which kind of plastics products they used excessively. The figure below shows the study findings.

Figure 4.4: Plastic products use

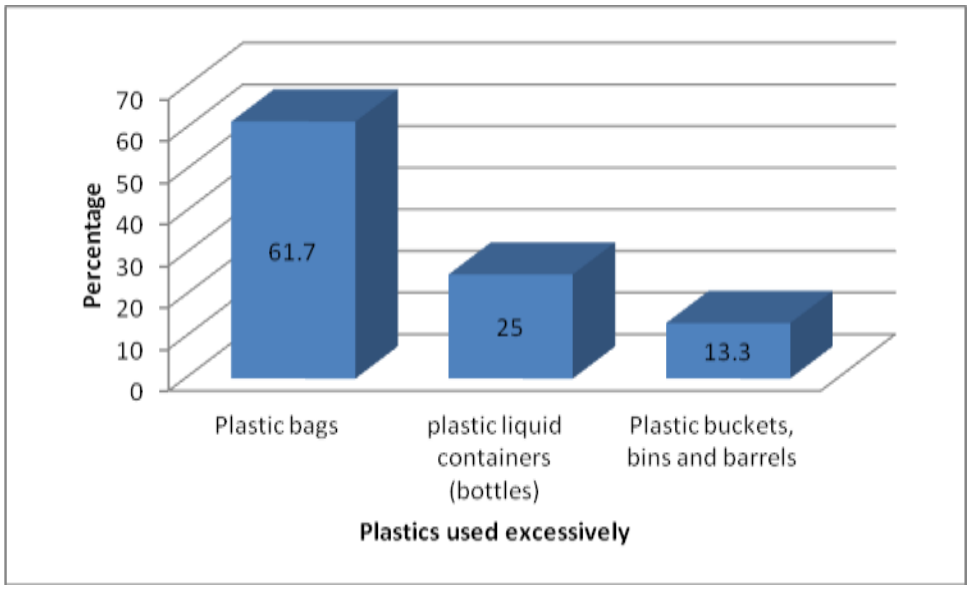
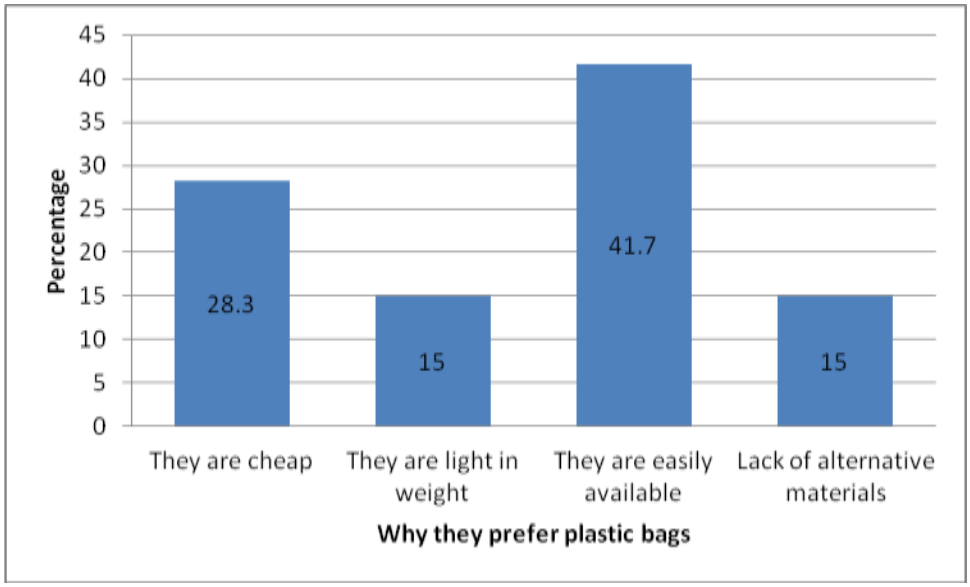


Figure 4.4 presents the findings on the Plastic products used excessively. The findings show that majority of the respondents 61.7% used plastic bags excessively; this was followed by those who use plastic liquid containers (bottles 25% while 13.3% used plastic buckets, bins and barrels excessively. The data indicates that the most widely used paper bag product is plastic paper bag which has contributed significantly in the plastic paper bag littering.

4.2.7 Reason why people prefer to use the plastic bag

The respondents were asked to indicate why they prefer to use the plastic product(s).

Figure 4.5: Reasons of Plastic Paper Bag Use

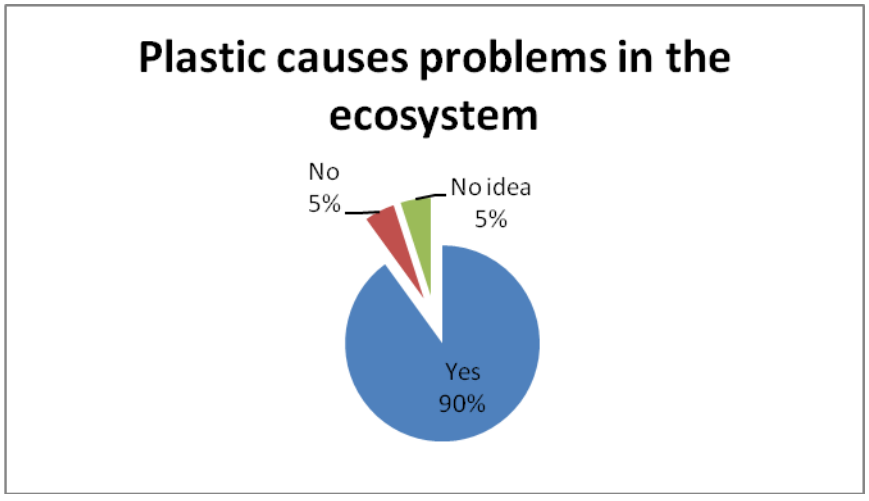


The above figure indicates that plastic paper bag is used excessively because they are readily available and given freely at the shopping outlets which has led to the excessive littering problem in Ongata Rongai

4.2.8: Social-economic problems of Plastic Paper Bag in the ecosystem

The respondents were asked to indicate whether they were aware that plastic paper bag wastes causes problems. Figure 4.6 below shows the study findings:

Figure 4.6: Awareness levels of social-economic problems of Plastic Paper Bag in the ecosystem

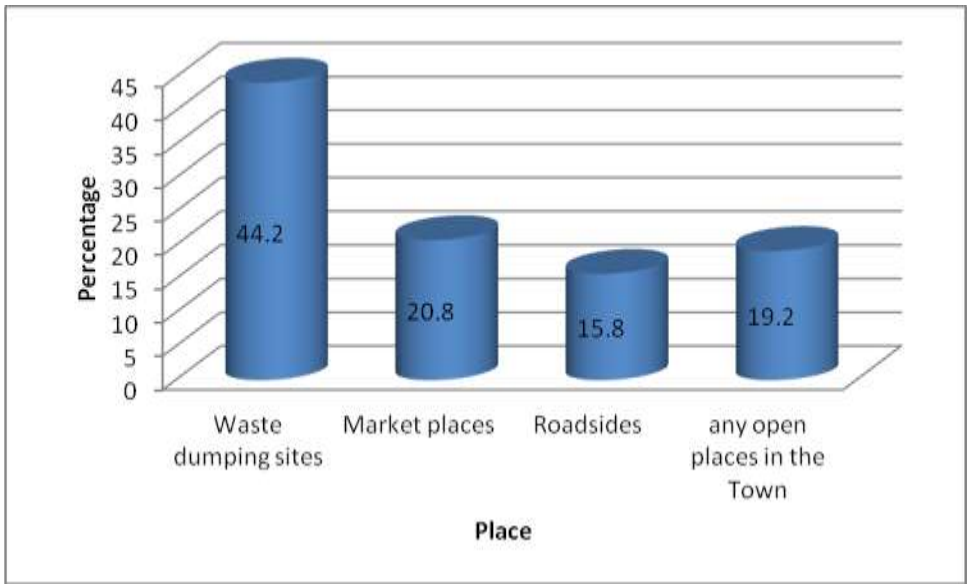


The results show that 90% of the respondents were aware that plastics bag litter causes social-economic problems in the ecosystem, 5% did not know that plastic bag litter causes problems to the ecosystem while another 5% also had no idea whether plastic bag litter cause problems in the ecosystem. It can be concluded from the above figure that majority of the population contributes to plastic paper bag littering despite knowing that plastic paper bag contributes to environmental hazards.

4.2.9 Places where plastic carrier bag litter commonly found at Ongata Rongai

The respondents were asked to indicate the places where plastic carrier bag litter is commonly found at Ongata Rongai. The figure below shows the study findings.

Figure 4.7: Places where plastic litter is commonly found



The results in figure above show that plastic bag waste that contributes to littering is commonly found in the waste dumping sites. Plastic paper bag litter is also common in market places and roadsides.

4.2.10: The effects of charging for plastic bags

The respondents were asked to indicate how they would respond if charges were introduced on the plastic bags. The figure below shows the study findings.

Table 4.3: Effects of charging for plastic bags

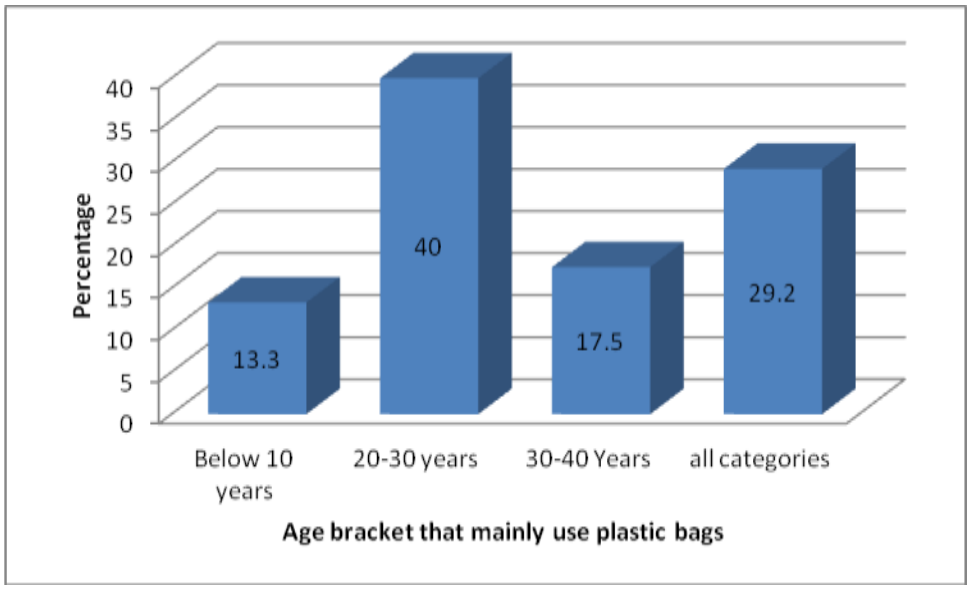
Description	No. of respondents	Percentage
Pay the small charge for each bag I use	22	18.3
Buy reusable bags and stop using plastic bags	38	31.7
Stop using bags	22	18.3
Bring my own bags from home	38	31.7
Total	**120**	**100**

The table above depicts that the problems of plastic paper bag littering can be minimized if the people are encouraged to re-use the plastic paper bags.

4.2.11: The Use of Plastic Paper Bag by Age

The respondents were asked to indicate the age bracket which they think mainly use the plastic bags. The figure below shows the study findings.

Figure 4.8: The Use of Plastic Paper Bag by Age



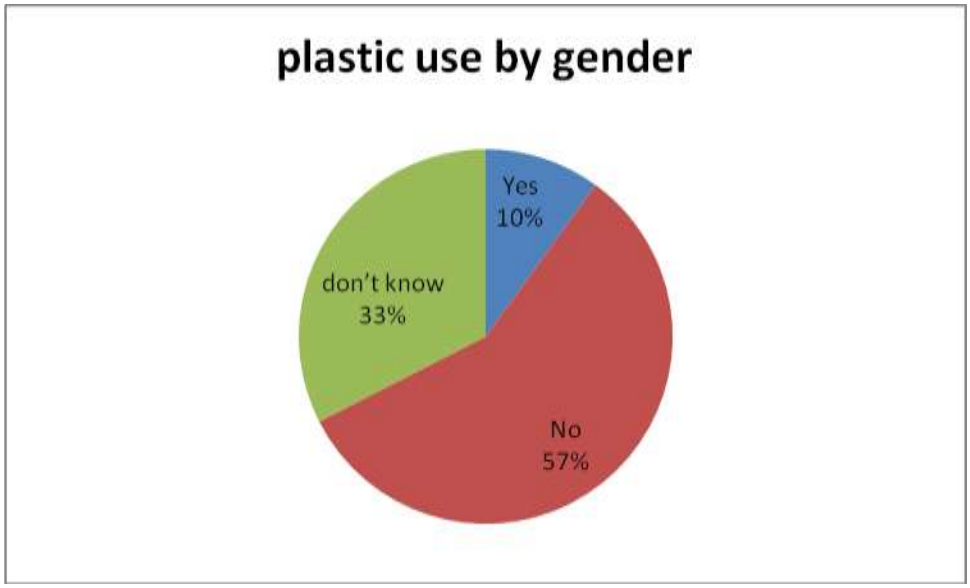
The results show that 40% of the respondents indicated that those aged 20-30 years used the plastic bags more often, 29.2% indicated that it was all age brackets, 17.5% indicated those who

were 30-40 years used plastics more often, while 13.3% indicated those below 10 years. The table indicates that the best age bracket to target while addressing the problems of plastic paper bag litter is 20-30 years in age.

4.2.12 Association of Plastic Paper Bag littering with gender

The respondents were asked to indicate whether plastic littering associated with any type of gender. The figure below shows the study findings.

Figure 4.9: Association of Plastic Paper Bag littering with gender

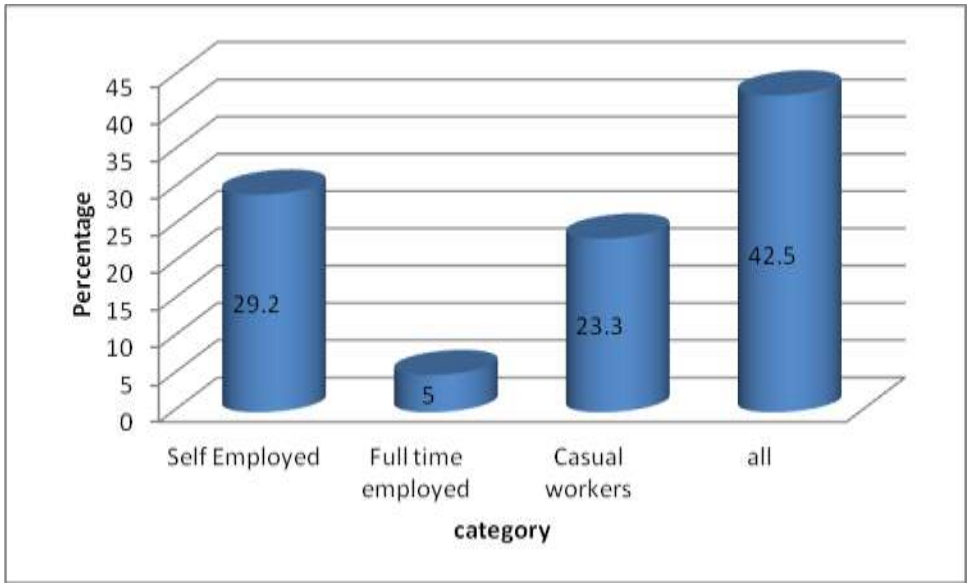


The results show that majority 57% of the respondents indicated that plastic littering was not associated with any gender, 33% indicated that they did not know while 10% indicated that plastic littering was associated with the gender characteristics. The results from the above figure indicate that plastic paper littering is not associated with any gender.

4.2.13 Social class associated with plastic bag littering

The respondents were asked to indicate the social status class associated with plastic bag littering. The figure below shows the study findings:

Figure 4.10: Social class and plastic Paper bag Use



The results in the figure above shows that majority42.5% of the respondents indicated all categories of classes use plastic bags. 29.2% indicated that plastic littering was associated with self employed people, 23.3% indicated that plastic littering was associated with casual workers and 5% indicated plastic littering was associated with full time employed people. The result concludes that the social status of individuals in the society does not contribute significally to littering behavior.

4.3 Causes of plastic Paper Bag littering

The respondents were asked to show their level of agreement with the following statements on plastic littering. The results are shown in the table below.

Table 4.4: Rating of Causes of plastic Paper Bag littering By Criteria

Description Of Criteria	SD	D	M	A	SA	Mean
Plastic bags have become overly cheap fuelling present-day use and throw away consumerism.	5	7	8	70	30	4.3511
The spread of plastic bag littering is associated with urbanization	7	8	5	60	40	4.1342
The amount of plastic wastes keeps on increasing due to the increase of population and life style of the people	8	10	2	35	65	4.4583
Absence of life cycle considerations amongst manufacturers	10	15	35	40	20	3.8534
There is no well organized way of disposal of solid wastes. People dispose the wastes in their own ways, wherever they find it necessary to dispose them	7	8	10	55	40	4.4235
plastic bags are manufactured from non-renewable and non-biodegradable materials also adds to the overall environmental burden	10	15	20	45	30	4.2917
Low public awareness on the responsible disposal of waste	5	12	4	60	39	4.1333

From the descriptive statistics presented in table above show that majority agreed with all the statements in the following order. The amount of plastic wastes keeps on increasing due to the

increase of population and life style of the people (m=4.4583). There is no well organized way of disposal of solid wastes and therefore people dispose the wastes in their own ways, wherever they find it necessary to dispose them (m=4.4235). Plastic bags have become overly cheap fuelling present-day use and throw away consumerism (m=4.3511). Plastic bags are manufactured from non-renewable and non-biodegradable materials also adds to the overall environmental burden (m= 4.2917). The spread of plastic bag littering is associated with urbanization (m= 4.1342). Low public awareness on the responsible disposal of waste (m= 4.1333) and Absence of life cycle considerations amongst manufacturers m= 3.8534).

4.3.1 Own opinion

The respondents were asked o give their own opinion on what causes plastic bag littering in Rongai. The report indicates that Plastics bags have been used extensively in both food and water packaging because of their inherent properties such as low bulk densities and inertness that make them convenient carrier materials and low risk contaminants. Plastic bottles and sachets used to package water to people in transit points and in moving vehicles have become widespread in the Rongai. The adoption of a more hygienic mode of food, beverages, and other products brought plastic packaging to replace the existing other cultural packaging methods (leaf wrappers, brown paper and metal cup uses) in cities and towns. As a result of their unique properties, plastics have become the most favoured packaging materials in commerce with firms making windfall profits and transferring the environmental cost associated with cleaning plastic waste on the general public.

4.3.2 Causes of plastic bag litter in Ongata Rongai

Supermarkets, kiosks and outdoor markets are the sources of plastic paper bags that litter Ongata Rongai environment. The situation is even worse in informal settlements and slums in Ongata Rongai where plastic consumption is higher. Since the level of re-use and recycling of post-consumer flexible in Ongata Rongai is very low, tones of year of plastic paper bag waste are released into the waste stream.

Tuskeys, Uchumi and Cleanshelf and are the three biggest supermarket chains operating in Ongata Rongai. They provide customers with free, branded- and plain plastic shopping bags. A discussion with the staff from chain stores revealed that, these chain store do not encourages

customers to bring back used plastic shopping bags and they do not have facilities or bins for disposing plastic.

4.3.3 FGD on causes of plastic waste

The results from Focus group discussions shows that some of the reasons that has made Ongata Rongai a place of litter includes Limited focus on plastic paper bag pollution control mechanisms and inadequate waste collection services. This has caused adverse effect on the environment and public health. There is also fragmented approach with single media focus and a lot of conflict of interests, the residents has insufficient information and the authorized bodies have inadequate environmental planning, and also inadequate research and development programmes, there exists fragmented regulatory approach and regulations are inadequately enforced.

4.4 Extent of Plastic Paper Bag pollution

The respondents were asked to show their level of agreement with the following statements on extent of pollution. The results are shown in the table below.

Table 4.5: Rating of Extent of Plastic Paper Bag pollution

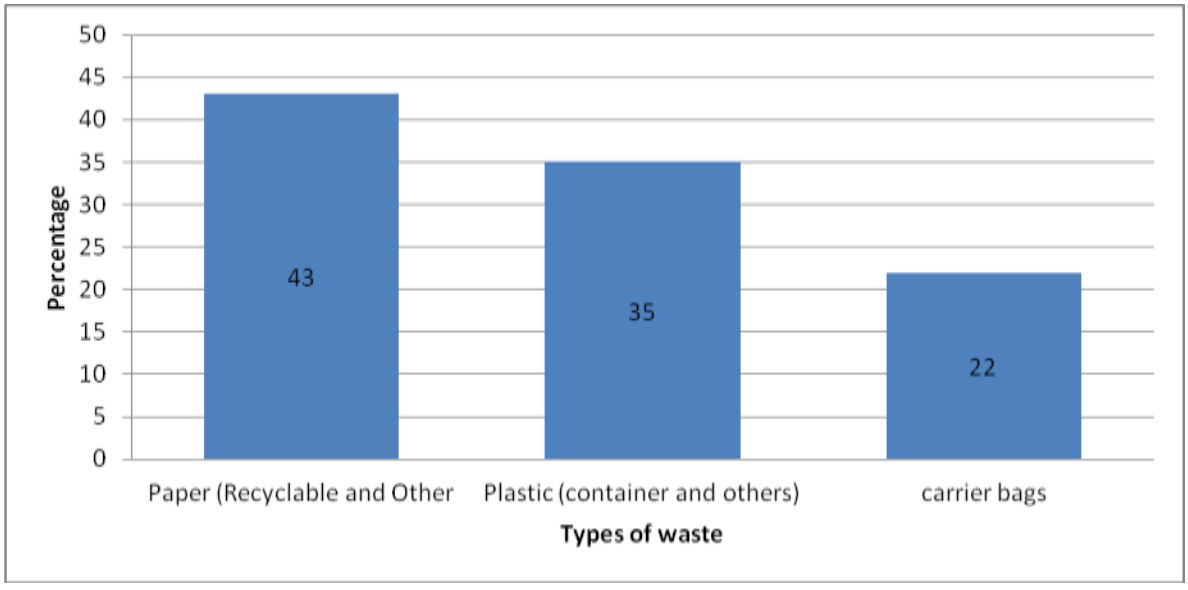
Description of Criteria	SD	D	M	A	SA	Mean
While more techniques and improvements to the recycling process arise, so do more people and more waste	10	8	8	62	32	4.1167
Hazards caused by plastic and plastic bag pollution create everlasting, detrimental effects upon the environment	10	10	5	50	45	4.4917
The extent of harm created by the disposed bags is not widely recognized by recipients	8	5	2	40	65	4.0583
Effects are currently causing global warming and "climate change" is often used to describe human-specific impacts	5	10	20	50	35	4.0833
Ordinary municipal landfills are the source of many chemical substances entering the soil environment	10	15	10	50	35	4.3167
Dioxins have been considered highly toxic and able to cause reproductive and developmental problems, damage the immune system, interfere with hormones and also cause cancer	10	15	20	45	30	4.1833

The descriptive statistics show that the respondents agreed with the statements on the extent of pollution in the following order. Hazards caused by plastic and plastic bag pollution create everlasting, detrimental effects upon the environment (m= 4.4917). Ordinary municipal landfills are the source of many chemical substances entering the soil environment (m=4.3167). Dioxins have been considered highly toxic and able to cause reproductive and developmental problems, damage the immune system, interfere with hormones and also cause cancer (m=4.1833). While more techniques and improvements to the recycling process arise, so do more people and more waste (m= 4.1167). Effects are currently causing global warming and "climate change" is often

used to describe human-specific impacts (m =4.0833). The extent of harm created by the disposed bags is not widely recognized by recipients (m=4.0583).

The report from Key informants in Ongata Rongai drawn from chain stores operating at Ongata Rongai that includes Tuskeys Supermarket, Uchumi and Cleanshelf indicates that history view plastics bag as one of the most important technical developments of the 20th century. Use of plastics have opened the way for new inventions and have replaced other materials in existing products. Plastic materials are light, durable and versatile, as well as resistant to moisture, chemicals and decay. Yet these of plastic properties can also bring challenges to plastic waste management. Worldwide, policies are being introduced that demand recycling that diverts plastic waste from landfills that increases greater levels of resource conservation. It is clear that the use of plastics reduces the mass of materials needed in many applications and many sectors. However, the more numerous, specialized, engineered and differentiated become plastics materials, the more difficult will be their recovery especially by material recycling which must be a first choice after reuse and prevention.

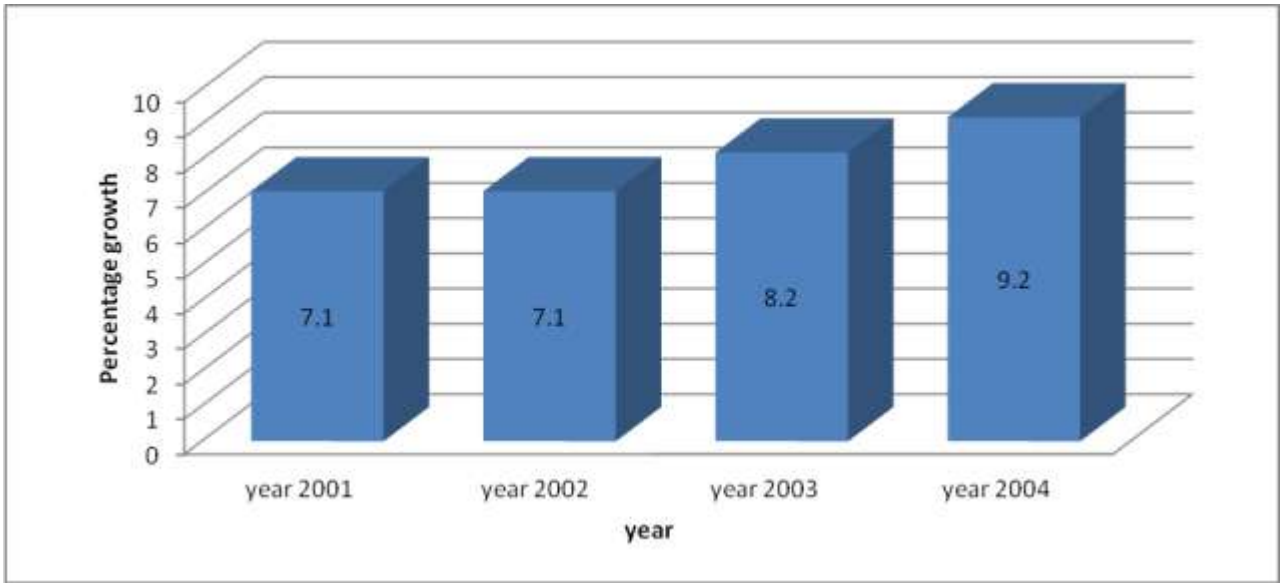
Figure 4.11: Plastic Paper bag Waste Levels



The amount of plastic bag waste generated in Ongata Rongai is getting worse by the day as a result of large scale urbanization and lack of adequate capacity by Kajiado County council to manage MSW.

A discussion with retailers of plastic bags , indicated that the bags most responsible for littering at Ongata Rongai environment are carrier bags of between 6 and 7 microns (known locally as *juala)* for which there is a very high demand due to their affordability. The County MSW disposal site at Ngong Township is overfull with plastic bags waste at the dump site being scattered with the help of wind due to their light weight, which again makes them difficult to collect. As a result, the thin plastic bag litter is now scattered in Ongata Rongai environment, polluting and contaminating the ecosystem. In the Ongata Rongai, plastic bag litter is major causes of drainage blockage and water stagnation. In open dumpsites at Ngong, the accumulation of plastic bag waste has greatly increased due to their poor degradability. The plastic waste problem is exacerbated by lack of effective collection and recycling infrastructure in Ongata in the County.

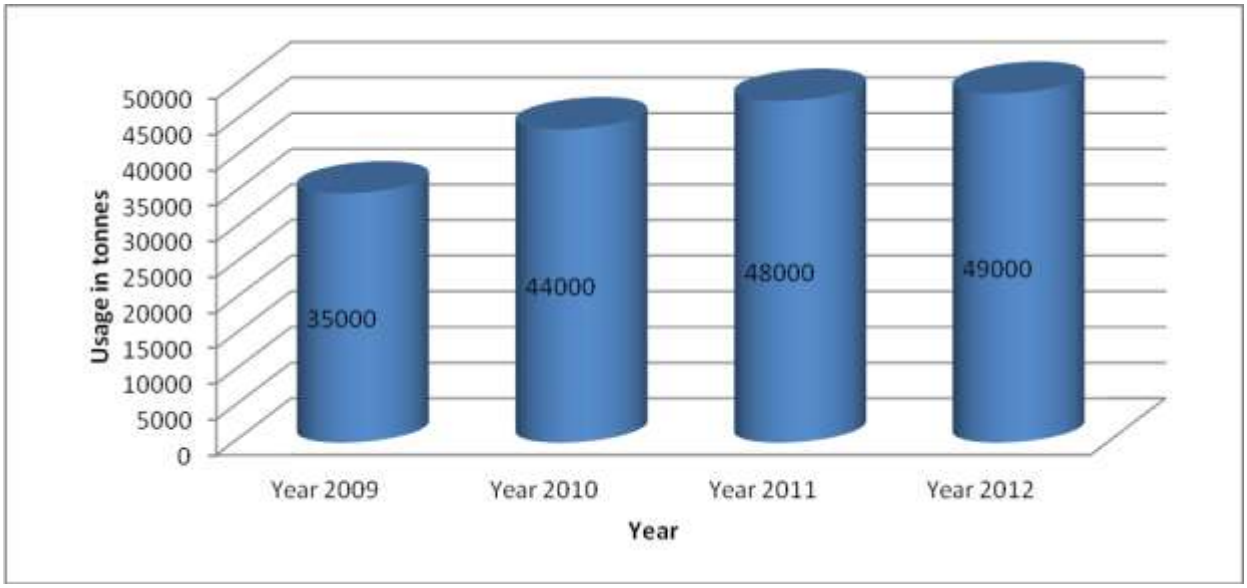
Figure 4.12: Plastics Production in Kenya



Kenya does not have petrochemical industries and hence the virgin raw materials for plastics and polythene industries are imported from overseas. Plastics are imported and exported either as raw materials or as finished plastic products. Most of the plastics manufactured in Kenya are consumed locally while the remaining portion is exported to Uganda, Tanzania, Burundi, Democratic Republic of Congo (DRC), Zimbabwe, Sudan, Ethiopia, Ghana, Rwanda, Zambia, Burkina Faso, Egypt, Cameroon and Mauritius, Norway, Taiwan and Cyprus.

The first plastics factory in Kenya was inaugurated on November 16th 1968. At the time, the then minister for Commerce and Industry (Retired Former the President of the country), Mr. Mwai Kibaki, is reported as having hailed the use of plastics as "a new boon to young Developing Nations". Since then, the plastic manufacturing industry has grown rapidly due to the increasing demand of plastics products. The plastic manufacturing sub-sector grew by 7.1% in 2001, 7.1% in 2002, 8.2% in 2003 and 2.9% in the year 2004. There are about 50 plastic manufacturing industries located in Nairobi.

Figure 4.13: Plastic Bag Use in Kenya



Manufacture of plastic bags in Kenya boomed around the early 1990s strongly driven by consumer demand. Major growing Kenyan supermarkets in Kenya resorted to using plastic paper bags as other paper bags were proving scarce and expensive. Another reason why plastic paper bag is often used in Kenya is that was that plastic bags turned out to possess better features in many respects. Of the 193,000 tons/year of plastics output, a sizeable 49,000 tonnes/year is plastic bags. About half of this (an equivalent of approximately 24,500 tonnes) are less than 15 microns thickness and primarily are used for carrying consumer products. This category comprises plastic bread bags whose average thickness is only 6-7 microns; these are the major causes of inadvertent littering observed in Nairobi and many other urban and rural environments in Kenya.

4.5 Effects of plastic paper Litter at Ongata Rongai

The respondents were asked to show their level of agreement with the following factors on effects of plastic littering. The results are shown in the table below.

Table 4.6: Effects of plastic paper bags

The scale is illustrated in the table as 1=strongly disagree (**SD**), 2= disagree (D), 3=moderately (M), 4= agree (A) and 5= strongly agree (SA).

Description	**SD**	**D**	**M**	**A**	**SA**	**Mean**
The plastic wastes do not affect only the people but also animals such as sheep, goats, cows, fowls.	10	20	8	42	40	4.5025
Plastic wastes find their way into the water bodies thus polluting the water	15	5	7	45	48	4.5225
Marine animals are killed by plastic waste that finds their way in water bodies as they mistakenly eat plastics as food.	5	8	2	40	65	4.3583
Every bag that ends up in the woodlands of the country threatens the natural progression of wildlife	20	10	5	50	35	4.1333
Without the balance of the ecosystem food sources dry up and starvation occurs	15	20	10	40	35	4.1245
There is no way to strictly limit the effects of plastic bags on the environment because there is no disposal method that will really help eliminate the problem	10	15	20	30	45	2.2125
Throughout the world plastic bags are responsible for suffocation deaths of woodland animals as well as inhibiting soil nutrients	5	12	4	50	49	4.6083

The results show that respondents strongly agreed with the following statements: Throughout the world plastic bags are responsible for suffocation deaths of woodland animals as well as inhibiting soil nutrients (m=4.6083). Plastic wastes find their way into the water bodies thus polluting the water (m=4.5225). The plastic wastes do not affect only the people but also animals such as sheep, goats, cows, fowls (m= 4.5025). the respondents agreed with the following statements ; Water animals are killed by plastic waste that finds their way in water bodies as they mistakenly eat plastics as food (m=4.3583). Every bag that ends up in the woodlands of the country threatens the natural progression of wildlife (m=4.1333). Without the balance of the ecosystem food sources dry up and starvation occurs (m= 4.1245). The respondents disagreed with the following statements: There is no way to strictly limit the effects of plastic bags on the environment because there is no disposal method that will really help eliminate the problem (m=2.2125).

4.6 Possible solutions

The respondents were asked to show their level of agreement with the following factors possible solution of plastic littering. The results are shown in the table below.

Table 4.7: Possible solutions

Description	SD	D	M	A	SA	Mean
Effective collection of plastic waste can be done by identifying the sources of plastics wastes, the contributors of the plastic wastes	5	10	15	40	50	4.4655
The plastic wastes can be collected for recycling from people in residential areas by putting recycling plastic waste bins in vantage places for easy collection later and also collecting from the roadside	10	15	5	55	35	3.9667
Plastic waste management is basically a welfare and development matter and it is commonly accepted that public participation is essential for its success	10	20	5	45	40	4.5125
Awareness can be created through formal and non-formal education with the assistance of both the print and electronic media	5	10	20	40	45	3.9833
Extensive and intensive sensitization is essential in enabling people to bring sound environmental practices into focus	8	15	4	44	49	4.0667

From the descriptive statistics presented in table above shows that the mean are above 3.5 for all the factors on possible solutions to the plastic litter. The respondents strongly agreed that Plastic waste management is basically a welfare and development matter and it is commonly accepted that public participation is essential for its success (m=4.5125). They agreed that Effective collection of plastic waste can be done by identifying the sources of plastics wastes, the contributors of the plastic wastes (m=4.4655). Extensive and intensive sensitization is essential in enabling people to bring sound environmental practices into focus (m= 4.0667). The plastic wastes can be collected for recycling from people in residential areas by putting recycling plastic

waste bins in vantage places for easy collection later and also collecting from the roadside (m=3.9667). Awareness can be created through formal and non-formal education with the assistance of both the print and electronic media (m=3.9833).

4.6.1 Opinion on possible solutions

The respondents indicated that the possible solution would include: Shops should only stock plastic bags thicker than 60 microns (a micron is 1 thousandth of a millimeter). Stronger, thicker plastic bags are re-useable and easier to recycle than thin bags. Shoppers should pay for the stronger bags, so that they would be more likely to re-use them than throw them away. Manufacturers should make sure that plastic bags are made of materials that can be recycled more easily. Manufacturers, distributors, and retailers of plastic carrier bags should apply environmental policies for the management and disposal of plastic bags .The use of recycled paper bags and cloth bags should be promoted.

4.6.2 Plastic Waste Management Initiatives

Since its inception in 2003, the National Environmental Management Authority (NEMA) has received numerous complaints from members of the public about the significant adverse environmental impacts of plastic materials. There have been reports of sewer blockages and livestock deaths attributed to plastics waste. The additives contained in plastics such as colorants, stabilizers, and plasticizers often contain toxic constituents such as lead and cadmium posing varying level of health hazards. According to NEMA, discarded plastic products and packaging materials make up a growing portion of municipal solid waste. In response to the expanding scope of the problem and the growing concern expressed by the public, NEMA initiated stakeholders discussions taking into consideration the provisions of the Environmental Management and Coordination Act issued in 1999. The consultation which has been carried out with the active participation of the plastic sector under the Kenyan Association Manufacturers (KAM) identified a 10-point action plan covering such areas as plastic recycling, introduction of a standard thickness, development of economic measures, legal measures on littering and selection of disposal methods as reflected in the table below:

Table 4.8: Ten-point Action Plan: Mid-2005 Status as Reported by KAM

Activity	Immediate Action to kick start and timing	Expected Completion date	Targets
1. Recycling	Directive from NEMA immediately to all stakeholders	By July 2006	* 15% recycling by manufacturers by 200 *75% Recovered by ret restaurant outlets by
2. Introduction of standard thickness	Finalize the standard on thickness immediately	By July 2005	All manufacturing concerns
3. Phasing out currently flimsy plastics	Phase out purchase and production immediately	By July 2005	All users and manufacturers
4. Economic measures	Drafting to start immediately	By July 2006	Finance Bill of 2005
5. Reduced Tariff on electricity	KAM to draft them immediately	By July 2005	Finance Bill of 2005
6. Recover by retailers	Cooperative awareness and directives	By July 2005	Adopt recovery and re-use strategy
7, Enforcement of thickness standards	Publication of draft standards	July 2004	Full-scale enforcement within year
8. Collection of plastics already in the environment	Instructions to local authorities, retail chains, etc.	Immediately and continuous	No plastics in Kenya major cities by July 2005
9. Legal measures on littering	Local and corporate regulations formulated	By July 2005	Each City and Municipal Council have a bye-law on plastics
10. Selection of disposal methods	Development of disposal guidelines	By July 2004	Disposal guidelines for plastic 2005

4.6.3 Challenges faced when implementing the action plan

The NCC was to implement the strategic initiatives developed by NEEMA .However , the City Council of Nairobi faces several challenges in (plastic) waste management, namely, very high consumption levels of different types of plastics, particularly of the flimsy type; absence of an overall solid waste management policy, weak institutional capacity to handle plastic waste and other types of wastes, inadequate enforcement of anti-littering by-laws, and inadequate awareness and recycling technologies. Given the magnitude of environmental impacts of plastics waste in Nairobi, this comprehensive strategy was developed with the expectation that it was to lead to overall Reduction of plastics use, increased Reuse of plastic products as well as Recycling levels of plastic wastes.

4.6.4 The key elements of the comprehensive strategy

The strategy involves creating awareness and education on litter avoidance, reusing and recycling of plastic products. Streamlining and strengthening of the waste management services through the active involvement of the private sector arid the community-based organizations Development of the waste management infrastructure of the city by establishing liner collection systems, solid waste collection and transfer points, and landfills development. Promotion of plastic recycling by providing support to community-based recycling groups. Due to lack of commitment to reduce the plastic paper bag litter by the Government, the present state of plastic bag littering remains in the peri-urban areas of Kenya.

4.6.5 Recommendation

The focus group discussions came up with the following recommendations; the government and the people in the community should focus on integrated and comprehensive approach (prevention, minimization and recycling). There should be adequate waste collection services for all and come up with a sustainable protection of the environment and public health. The media should use consolidated approach and there should be transparency in conflict resolution. There should be integrated waste information system, Holistic integrated environmental planning and capabilities, Focused investigations that take cognizance of cross-cutting implications, Integrated regulatory approach and they should make sure there is an enforcement body which ensures all the plans are effected. The polluter should pay principle amount and total cost accounting

CHAPTER FIVE
SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents summary of findings as discussed in chapter four and interpretations of the data analysis, conclusions and recommendations based on the findings of the research.

5.2 Summary of Findings

The study found out that the percentage of women respondents were 55% and men respondents were 45 % . terms of. Based on the findings, it can be generalized that women are more in urban communities than men. The researcher also observed that in Ongata Rongai shopping centre, the gender ratio patronizing the streets and shopping outlets were in the same proportion. The researcher concluded that there co-exists a relationship between gender population and littering at Ongata Rongai in the in similar percentage. The researcher proposes that while looking for possible solutions of littering in the peri-urban settings of Ongata Rongai, women being the majority patronizing the streets and shopping presents a better target audience.

In terms of age group, the study found out that of 46.7% the respondents were aged between the ages of 21 to 30 years; this was followed by a significant percentage 33.3% that were aged between 31-40 years. 8.3% were aged 41-50 years, 5% were aged 18-20 years 4.2% were aged 61-70 while 2.5% were aged between 51-60 years. In targeting the ideal population for control of plastic bag littering in Ongata Rongai, the largest populations in Ongata Rongai peri- urban area are aged between the ages of 21-30 which is 46.7%, followed by the age bracket of 31-40 which is 33.3%. The study found out that there has been a tendency of over urbanization at Ongata Rongai in the last 20 years. The rapid urbanization in Ongata Rongai was brought about by introduction of commuter services to ongata Rongai from Nairobi City in the last 20 years, affordable settlement areas and cosmopolitan societies willing to venture in various types of business opportunities in the Township. From the study, this is depicted by length of stay by the residents that shows that 63.3% of immigrants at Ongata Rongai has stayed in Ongata Rongai for the last 6-10 years who have contributed to the recent behavior of littering.

The researcher found out that 29.2% of the respondents use an average of 6-10 plastic bags in a week, 20.8% use 21-25 plastic bags per week, 15.8% use 16-20 plastic bags in a week, 13.3% use 0-5 plastic bags in a week, 10.8% use 25 and more plastic bags in a week while 10% use 10-15 plastic bags in a week..From the result, 49.2% of the respondents indicated that they dispose their litter by discarding it, 21.7% indicated they burn their plastic litter, 20% burry their plastic litter while 19.2% re use they plastics.

The research findings indicate that Plastic paper bag is used excessively in Ongata Rongai with a percentage of 61.7 % with 38.3 of other types of shopping bags being used by respondents at Ongata Rongai. The findings indicates the use of plastic bag being favoured by the consumers because of being readily available had 41.7% , while 28.3% of those interviewed indicated that they were cheap while 15% prefer using the plastic product because they are light in weight while another 15% prefer using the plastic product because of lack of an alternative material to use.

The results show that 90% of the respondents were aware that plastics bag litter causes social-economic problems in the ecosystem. The results show that majority of the respondents with a percentage 44.2% indicated that plastic waste is commonly found in the waste dumping sites. 20.8% of the respondents indicated that plastic waste is commonly found in the market places. 19.2% indicated that waste was commonly found in any open places in town while 15.8% indicated that waste was commonly found in the roadsides.

The researcher found out that 90% of the respondents indicated that they were aware that plastic paper bag litter cases adverse effect to the ecosystem , 5% did not know that plastic bag litter causes problems to the ecosystem while another 5% also had no idea whether plastic bag litter cause problems in the ecosystem. Some of the hazards of plastic bag litter in Ongata Rongai are ideal sites of mosquito breeding grounds when filled with rain water .When plastic bag carrier litters are burned they smolder for long periods of time emitting hundreds of chemical and compounds that pollute the air causing respiratory illnesses. Additionally the residue left behind harms the soil and leach into groundwater. It was noted that 90% of the residents of Ongata Rongai uses borehole water for drinking and hospitals in the area are reported to be dealing with cases of water borne diseases. Cases reported in many clinics in Ongata Rongai include amoebasis, typhoid fever, intestinal worm infestation and other forms of ailment related to food

poisoning. In addition, plastic bag litter at Ongata Rongai is aesthetically displeasing; it causes visual, thermal and noise pollution and a contributing factor to urban neighborhood strained interrelationship when plastic bag litter spills over to neighborhood.

The study found out that 31.7 % of the respondents indicated that they would bring their own plastic bags at home if encouraged to do so by the super markets and retailers on condition that the supermarkets and retailers compensate the shoppers a recognized manner like earning points for every re-usable paper bag brought by the shoppers.Onother 31.7 % of the respondents indicated that would buy re-usable bags and stop using plastic bags. Other respondents18.3% indicated that they would buy reusable bags and stop using plastic bags while other 18.3% indicated that they would stop using plastic bag.

The data obtained from the respondents indicates that the amount of plastic bag litter keeps on increasing in Ongata Rongai due to urbanization and poor infrastructure development by the County Government that handles MW, affluenza life style of the Ongata Rongai residents, lack of organized of disposal of solid wastes in the peri-urban set up of Ongata Rongai that culminates in residents disposing the wastes in their own ways, lack of any awareness of hazards of plastic bag litter in the environment, lack of facilities by the residents to dispose off waste by the roadside or public places and the County Government lack of any serious measures to curb litter-louting behavior in the peri-urban set up. Similarly Plastic bags have become overly cheap fuelling present-day use and throw away consumerism. Plastic bags are also manufactured from non-renewable and a non-biodegradable material also adds to the overall environmental burden. The low public awareness on the responsible disposal of plastic by the residents also contribute to the sky rocketing behavior of plastic bag littering at Ongata Rongai peri-urban Centre.

5.3 Conclusion

The process of urbanization in Kenya has provided impetus for social disorganization or anomie. The result is that the collective purposes of society are less fully realized than they could be under a different, better organized system. When there is no provision of a shared set of priorities among these competing obligations, the individual's behavior has become unpredictable in the urban set up.

The anomy existing in the urban set up has been exploited by capitalist to sell their merchandize uncontrollably. Capitalism is open- ended, internally contradictory process and it produces manifest and latent functions that are difficult to predict and control. Capitalism has dynamics that are driving social changes that are full of new risks called "*manufactured risks*" that are incalculable in origin and indeterminate in their consequences. These risks are created by the impact of human knowledge and technology to the natural world. They are the outcome of human interventions into the nature. Manufactured risks manifest themselves in form of environmental and health risks that include urbanization, pollution, contamination, global warming, flooding, and consumption of genetically modified organisms, use of non-bio gradable materials. The collective outcome of capitalism has been creation of widespread environmental destruction whose precise cause is indeterminate and whose consequences are similarly difficult to calculate phenomena called "*technological disaster"* .The dichotomy of plastic paper bag characteristics is that at micro-level, it has latent functions but at macro-level, it has manifest functions.

The behavior of litter-louting is acquired through classical conditioning, operant conditioning or through social learning. The purpose human's behavior is to fulfill certain kinds of needs. , behavior can also be un-learned through positive reinforcement, negative reinforcement or by extinction. Behavior occurs in response to an identifiable event or stimuli, behavior is weakened or strengthened by the consequences that follow the behavior, behavior is a form of communication and behaviors serve a function and have a purpose. If benefits do not result from displaying certain behavior, n individuals would stop doing them.

5.4 Recommendation

Because there is no roadmap to these new dangers and risks for capitalism, modernity or urbanization that has resulted in plastic paper bag littering impacting on biotic species and abiotic components adversely, individuals, counties, organizations and the government of Kenya including the international community of states also known as "*global risk society*" must negotiate risks as they make choices how live is to be lived. The risks of plastic paper bag litter are not restricted spatially, temporally or socially but they affect the global community and the environment and all social classes. They have global consequences. Manufactured risks caused by plastic paper bag litter are controllable when individuals act responsibly. To contain the

"viral" spread of plastic paper bag use and disposal, the following is recommended as stop gap measures to contain the hazards:

- To enact into law the policy instruments proposed by NEMA and presented to the government.
- The County Governments to adopt these policy guidelines and implement them.

5.5 Suggestion for Further Studies

Further studies should concentrate on establishing the effect of plastic paper bag to the consumer goods in the urban settings.

.

REFERENCES

Aadland, D. & Caplan, A. (2006), Curbside recycling: waste resource or waste of resources? *Journal of Policy Analysis and Management* 25(4) 855-874.

Adams,G.and Schvaneveldt.1985.Understanding Research Methods, Longman Inc.New York.

Akullian, A., Karp, K., & Austin, D. (2006). Durbin, Plastic bag externalities and policy in Rhode Island. *Brown Policy Review*.

Allen Francis R.Social- Cultural Dynamics: An Introduction to Social Change.New York : Macmillan,1971.

Allen, F.B (1990), Social-Cultural Dynamics: An introduction to Social Change MA polity press

Amani Mehdi, *The Urban Explosion,* UNESCO Currier, 1992

Bahri,D. & Girum, S. (2005). Sustainable Management of Plastic Bag Waste: The Case of Nairobi, Kenya. IIIEE Reports: 03, Sweden. Banks, Sam, 2008. Plastic Bags: Reducing Their Use Through Regulation and Other Initiatives. *Report for Parliament of Canada: Industry, Infrastructure and Resources Division.*

Beychok, Milton R. (January 1987). "A data base for dioxin and furan emissions from refuses incinerators". *Atmospheric Environment* 21 (1): 29–36.

Bhari Girum : *Thesis on Sustainable Management of Waste* :Case Study of Nairobi, Sept 2005.

Bjerkli, C. L. (2005). *The cycle of plastic waste: an analysis on the informal plastic recovery system*: Addis Ababa, Ethiopia.

Bogdom.R and S.Biken 1992. Qualitative Research for Education. Allyn and Bacon, Boston, USA

Bohm,Roberts M. Introduction to Criminal Justice. Department of Criminal Justice and Legal Studies University of Central Florida, Orlando,1996

Borg and Gall.1993.Education Research .An Introduction. Longman, New York.

Carroll,AB., Business and Society :Ethics and Stakeholder Management ,South-Western:Cincinnati,Ohio,1992.

Chambers English Dictionary 2000

Chandran, (2004). *Research Methodology.* World Scientific Ltd. London

Changshe Norbu Consultancy, (2009). *Study on Poly Bags and Strategies to Reduce Their Use*. Prepared for the Royal Society for Protection of Nature. Bhutan.

Cherrier, H. (2006). Consumer identity and moral obligations in non-plastic bag consumption: a dialectical perspective, *International Journal of Consumer Studies* Vol 30 No. 5 pg 515–523.

Clapp J, Swanston L, Williams J (2008). Single-use plastic shopping bags: Issues for the region of Waterloo to consider. *University of Waterloo, Faculty of Environmental Studies, Waterloo, USA.* Vol.1, pp. 2-13.

Clapp, A. Jennifer, R. & Linda, S. (2009). Doing away with Plastic Shopping Bags: International Patterns of norm emergence and Policy Implementation. *Environmental Politics*, Vol.18 No.3, Pg. 315-332.

Clover, C. (2007). Plastic bag tax 'would increase waste'. *Telegraph*. URL

Collins Thesaurus of the English Language – Complete and Unabridged 2nd Edition. 2002 © HarperCollins Publishers 1995, 2002

Gay, L. R. 1981. Education Research: Competencies for Analysis and Application. Charcles E. Mairill Publishing Company A.Bell & Howell Company, Columbus, Toronto, London.

Germani, Gino. The Sociology of Modernization. New Brunswick, NJ: Transaction Books:1981

Gertth, Hans, and C. Wright Mills. Character and Social Structure. New York: Harcourt, Brace Jovanovich, 1953.

Giddens Anthony and et al 1996: Essentials *of Sociology.* W. W. Norton & Company Ltd, Inc, 500 fifth Avenue, New York, N.Y 10110.

Goodman, J. (2008). Who does the grocery shopping, and when do they do it? The Time Use Institute. Available at http://timeuseinstitute.org/GroceryWhitePaper. Accessed October 19, 2011.

Graves, Philip E., and Robert Louise Sexton; Over urbanization and its Relation to Economic Growth for Less Developed Countries, CT Greenwood Press, 1984

Hasson, R., Leiman, A. & Visser, M. (2007). The economics of plastic bag legislation in South Africa. *South African Journal of Economics* Vol: 75 Pg 62-63

Hauser, Philip M. "The Chaotic Society: Product of the Social Morphological Revolution, 2nd ed, New York,1973.

http.//www.answerbag.com/q_view 1905324, accessed on 17 April 2012

http.//www.answerbag.com/q_view 195324, accessed on 13 june 2010

Ikiara, M.M., Karanja, A. M. & Davies, T. C. (2004) "Collection, Transportation and Disposal of Urban Solid Waste in Nairobi", In Baud,I.,Post, J. and Furedy, C.(eds.), Solid Waste Management and Recycling: Actors ,Partnerships and Policies in Hyderabad, India and Nairobi, Kenya, Chapter 4, Kluwer Academic Publishers, Dordrecht, The Netherlands.

Janis, I. L. (1972). *Victims of Groupthink: a Psychological Study of Foreign-Policy Decisions and Fiascoes*. Boston: Houghton Mifflin. ISBN 0-395-14002

Kikang, J. & Visser, M.(2010). Behavioral response to plastic bag legislation in Botswana. *Environment of Development*. Vol:1 Pg10-13.

KIPPRA, July 2006.Policy Instruments for the Management of Plastic Bags in Nairobi. KIPPRA, Bishops Garden Towers, Bishop Road ,Nairobi Kenya.

Kombo and Tromp (2006*). Research Methodology*.2nd ed. Wiley Eastern Ltd. New Delhi

Macafee C. (2001) "Lowland Sources of Ulster Scots" in J.M. Kirk & D.P. Ó Baoill, *Languages Links: The Languages of Scotland and Ireland*, Cló Ollscoil na Banríona, Belfast,

Maddox, G. B., Balota, D. A., Coane, J. H., & Duchek, J. M. (2011). *The role of forgetting rate in producing a benefit of expanded* over *equal spaced retrieval in young and older adults.*

Maranga, S. (2005). A comprehensive plastic waste management strategy for the city. NAIROBI Kenya National Cleaner Production Centre.

Mesthane, Emmanuel G. "*The Role of Technology in the Society*." In Albert H.Teich (ed), Technology and the Future, 4th ed. New York:st. Martin's Press 1986.

Miller, K. (2011) Student attitude and action regarding the single-use plastic shopping bag W.E. Oates, Green taxes: can we protect the environment and improve the tax system at the same time? *Southern Economic Journal* Vol 61 No.4 Pg 915-922.

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

Municipal Solid Waste Management and Handling Rules 2000, Ministry of Environment and Forests, Government of India. envfor.nic.in.

NEEMAnews Magazine December, *Plastic Debate*, (2005). National Environmental Management Authority, Nairobi.

NEEMAnews Magazine December, *Plastic Debate*, (2006). National Environmental Management Authority, Nairobi.

NEEMAnews Magazine December, *Plastic Debate*, (2007). National Environmental Management Authority, Nairobi.

Park, Robert E. "*Social Change and Disorganization*." In Stuart H.Traub and Craig B. Little (eds), Theories of Deviance.Itasca, IL: F.E Peacock, 1975.

Persons, Talcott.Social System: New York, Free Press 1951

Random House Unabridged Dictionary, Copyright © 1997, by Random House, Inc., on Infoplease.

Redfield, Roberts. The Folk Culture of Yucatan.Chikago :University of Chikago Press,1941.

Ritch, E., Brennan, C. & McLeod,M. (2009). Plastic bag politics: modifying consumer behavior 35 for sustainable development. *International Journal of Consumer Studies* ISSN 1470-6423.

Romer, J.R. (2008). The evolution of San Francisco's plastic-bag ban. *Golden Gate University Environmental Law Journal* Vol.1 Pg. 439-465.

Sibley, C.G., & Liu, J.H. (2003). Differentiating active and passive littering: A two-stage process model of littering behavior in public spaces.

Somanathan, R. & Gupta, K. (2009). *Understanding the consumer demand for plastic bags in India*. Evidence from an experiment in Delhi. Delhi School of Economics.

Strife, S. (2010). Reflecting on environmental education: where is our place in the green movement? *The Journal of Environmental Education* 41(3) 179–191.

Sweeney M.H., Mocarelli P., Human health effects after exposure to 2,3,7,8- TCDD, Food Addit. Contam. 17 (2000)

Timasheef, F. & Nicholas, B. (1961) *Sociological Theory: its Nature and Growth*. rev ed.New York:Random House.

United Nation Report (2005). *Selection, Design and Implementation of Economic Instruments in Solid Waste Management Sector in Kenya* : Case of Plastic Bags.

Vago, Steven. Social Change, 3rd edition. Upper Saddle River, New Jersey: Prentice Hall, 1996.

Vergara, S. E.; Tchobanoglous, G. (2012). "Municipal Solid Waste and the Environment: A Global Perspective". *Annual Review of Environment and Resources*

Waste Digest January-July 2007

Waste Digest July-December 2005

Waste Digest July-December 2006 What about these two references? Incomplete

Waste Digest, (2006). *Working with the Community to Rid the City of Plastic.*UNDP Kenya, 2006

Wirth ,Louise B. " Urbanism as a way of Life". American Journal of Sociology, 1938

Wirth, Louis B. "Urbanism as a way of life." American journal of sociology 1938

Yablonsky, Lewis.Robopaths.Indianapolis:Bobbs-Merril,1982

Yang, R. (2007). Innes, Economic incentives and residential waste management in Taiwan: an empirical investigation. *Environmental & Resource Economics* Vol. 37 Pg. 489–519. Narz, jr with Dick Backer, Stanford University Press, Stanford, California. Amani, Mehdi. "The Urban Explosion." UNESCO Currier, January 1992.

Appendices

Appendix I: Questionnaire

This questionnaire is to collect data for purely academic purposes. All information will be treated with strict confidence. Do not put any name or identification on this questionnaire. *Answer all* ***questions as indicated by either filling in the blank or ticking the option that applies*****.**

SECTION A: PERSONAL INFORMATION

1. Gender

Male [ ]

Female [ ]

2. Age group of respondents

18-20[ ] 21-30[ ] 31-40 [ ] 41-50 [ ] 51-60 [ ] 61-70[ ] 70+ [ ]

3. For how long have you been a resindence of Ongata rongai?

Less than 3 years [ ] 3-6years [ ] 6-10years [ ] over 10 years

4. What do you do with the plastic bag after using it?

Reuse [ ] Discard as it as litter [ ] Burying [ ] Burning [ ] Any other (Please specify)……

…….

6. On average how many plastic bags do you take each week from the store to help you carry your purchases?

0-5 [ ] 6-10[ ] 11-15 [ ] 16-20 [ ] 21-25 [ ] 26+

7. Which plastic products do you use excessively?

Plastic bags [ ] plastic liquid containers (bottles) [ ] Plastic buckets, bins and barrels

Others (Please, specify) [ ]

8. Why do you prefer to use the plastic product(s) especially plastic bags?

They are cheap [ ] They are light in weight[ ] They are easily available[ ]

Lack of alternative materials others (Please, specify) _____

9. Do you think that plastic bag wastes cause problems?

Yes _____ No _____ No idea _____

10. Where is plastic carrier bag litter commonly found at Ongata Rongai ?

Waste dumping sites [ ] Market places [ ] Crowded residential areas [ ]

Roadsides [ ] any open places in the Town [ ] sewage (drain) lines [ ]

11. If stores started charging for plastic bags, what would you do?

Pay the small charge for each bag I use [ ]

Buy reusable bags and stop using plastic bags [ ]

Stop using bags [ ]

Bring my own bags from home [ ]

Any other (Please specify)……

12 Which age bracket does plastic littering?

Below 10 years [ ] between 10-20 years [ ] 20-30 years [ ] 30-40 Years [ ] Above 40 year

13 In your opinion, is plastic littering associated with any type of gender?

Yes [ ] No [ ] I don't know[ ]

14 If your answer to the above question is yes, which type of gender is mostly associated with littering?

Male [ ] Female [ ]

16. Which class of social status does plastic bag littering?

Self Employed [ ] Full time employed [ ] Non-employed [ ] Casual workers [ ]

SECTION B: THE HAZARDS C OF PLASTIC BAG LITTER

Part A: Causes of plastic bags littering

15. What is your level of agreement with the following statements that relate to the causes of plastic bags waste. Rate your response on a scale where 1=strongly disagree, 2= disagree, 3=moderately disagree, 4= agree and 5= strongly agree.

Statement	Strongly disagree	Disagree	Moderately disagree	Agree	Strongly agree
plastic bags have become overly cheap fuelling present-day use and throw away consumerism					
The spread of plastic bag littering is associated with urbanization					
The amount of plastic wastes keeps on increasing due to the increase of population and life style of the people					
Absence of life cycle considerations amongst manufacturers					
There are no well organized way of disposal of solid wastes. People dispose the wastes in their own ways, wherever they find it necessary to dispose them					
plastic bags are manufactured from non-renewable and non-biodegradable materials also adds to the overall environmental burden					
Low public awareness on the responsible disposal of waste					

16. In your own opinion what do you think is contributing to the increased plastic wastes?

    .....

    .....

Part B: Extent of pollution

17. **What is your level of agreement to the following statements regarding extent of pollution?** Rate your response on a scale where 1=strongly disagree, 2= disagree, 3=moderately disagree, 4= agree and 5= strongly agree.

Statement	**Strongly disagree**	**Disagree**	**Moderately disagree**	**Agree**	**Strongly agree**
While more techniques and improvements to the recycling process arise, so do more people and more waste					
Hazards caused by plastic and plastic bag pollution create everlasting, detrimental effects upon the environment					
The extent of harm created by the disposed bags is not widely recognized by recipients					
Effects are currently causing global warming and "climate change" is often used to describe human-specific impacts					
Ordinary municipal landfills are the source of many chemical substances entering the soil environment					
Dioxins have been considered highly toxic and able to cause reproductive and developmental problems, damage the immune system, interfere with hormones and also cause cancer					

Part C : Effects of plastic bags

18. **What is your level of agreement to the following statements regarding extent of pollution?** Rate your response on a scale where 1=strongly disagree, 2= disagree, 3=moderately disagree, 4= agree and 5= strongly agree.

Statement	Strongly disagree	Disagree	Moderately disagree	Agree	Strongly agree
The plastic wastes do not affect only the people but also animals such as sheep, goats, cows, fowls					
Plastic wastes find their way into the water bodies thus polluting the water					
Water animals are killed by plastic waste that finds their way in water bodies as they mistakenly eat plastics as food					
Every bag that ends up in the woodlands of the country threatens the natural progression of wildlife					
Without the balance of the ecosystem food sources dry up and starvation occurs					
There is no way to strictly limit the effects of plastic bags on the environment because there is no disposal method that will really help eliminate the problem					
Throughout the world plastic bags are responsible for suffocation deaths of woodland animals as well as inhibiting soil nutrients					

Part D : Possible solutions

19. **What is your level of agreement to the following statements on possible solutions?** Rate your response on a scale where 1=strongly disagree, 2= disagree, 3=moderately disagree, 4= agree and 5= strongly agree.

Statement	**Strongly disagree**	**Disagree**	**Moderately disagree**	**Agree**	**Strongly agree**
Effective collection of plastic waste can be done by identifying the sources of plastics wastes, the contributors of the plastic wastes					
The plastic wastes can be collected for recycling from people in residential areas by putting recycling plastic waste bins in vantage places for easy collection later and also collecting from the roadside					
Plastic waste management is basically a welfare and development matter and it is commonly accepted that public participation is essential for its success					
Awareness can be created through formal and non-formal education with the assistance of both the print and electronic media					
Extensive and intensive sensitisation is essential in enabling people to bring sound environmental practices into focus					

20. What do you think would be the possible solution to the plastic waste problem?

    .....

    .....

21. What would you recommend as an effective way of managing the plastic waste problem

    .....

    .....

22. Do you think there is need to completely do away with plastic bags?

    .....

    .....

23. Do you think that the 3r strategy that includes reduce, recycle and reuse can be an effective way of managing the plastic problem?

    .....

    .....

Appendix II: Key informant schedule guide

1. Tell us about your occupation
2. How is your line of work related to plastic wastes?
3. In your own opinion what do you think is contributing to the increased plastic wastes?
4. What are the behavioral methods of plastic littering employed by residents of Ongata Rongai Township?
5. What is the magnitude of plastic bags littering in Ongata Rongai Township?
6. How many plastics do you think circulate in this area on a weekly basis?
7. What are the hazards of plastic bags litter to the society in Ongata Rongai?
8. What are the health issues that commonly affect this area due to plastic litter?
9. How have you tried to address the problem in the areas?
10. Has the government been supportive in helping address this issues?
11. What other problems do you think affect the residents of Rongai?
12. What are the possible solutions to the plastic problem in Ongata Rongai?

Appendix III: Interview schedule for FGDs

1. What is the extent of Extent of plastic bag littering in Rongai area?
2. What are the hazards paused by plastic bags litter?
3. For how long has the problem affected the people of Rongai and what has been done to solve this problem
4. Has the government been supportive in helping address these issues?
5. What challenges have the people faced in trying to address this problem
6. How do you think this problem can be solved?

Appendix IV: Regulatory Bodies Governing control of plastic Litter In Kenya

1. Nairobi City Council (NCC)
2. The National Environment Management Authority (NEMA)
3. Kenya Revenue Authority (KRA)
4. Kenya Bureau of Standards (KEBS)
5. Kenya Institute for Public Policy Research and Analysis (KIPPRA)
6. Kenya National Cleaner Production Centre (KNCPC)
7. Local Government By-laws
8. The Public Health Act

Appendix V: Pictures for the Study

These picture were taken from the site by the researcher depicting the the state of plastic bag littering in the peri-urban set of ongata Rongai aloong the busy Magadi Road in the area of study.

Picture no. 1 Animals grazing in the peri-urban plastic bag littered ecosystem

The state of plastic bag litter along Magadi Road in the Town.





























CLEANSHELF




CLEANSHELF