A SURVEY ON THE EXTENT OF THE AWARENESS OF MOBILE PHONE USERS ON MOBILE PHONE DISPOSAL IN KENYA.

BY

GITHINJI, NICHOLAS WANYOIKE

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DECLARATION

This research is my original work and has not been presented in any other University or College for the award of degree, diploma or certificate.

Signed.....**Date**.....18/11/2008.....
Githinji, Nicholas W.

SUPERVISORS

This research has been submitted with our approval as University supervisors.

Signed.....**Date**.....19.11.2008.....
Mr. Michael K. Chirchir

Department of Management Science

Signed.....**Date**.....20.11.2008.....

Mr. Lazarus Mulwa

Department of Management Science

DEDICATION

In loving memory of my father the Late Mr. Simon Githinji Muitithia on the 11th anniversary of his death. His education dream for me was realized albeit posthumously.

To the pupils of Three-Way Academy, may your dream in education be realized.

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ABSTRACT

The growth in telephone access in Africa has been largely fuelled by mobile cellular communications. The mobile telecommunication sector qualifies as one of Africa's success stories that will go down the annals of history. Africa's mobile market has been the fastest growing compared to any region over the last five years. The wireless boom has been caused by the combination of sector liberalization—which has seen the licensing of multiple cellular operators in most African markets—and service innovation in the form of a variety of products.

The research was conducted through a survey on mobile phone users. The research sought to find out the extent to which mobile phone users were aware about safe disposal of mobile phones. In addition the research went ahead to establish the avenues available to mobile phone manufacturers and users in order to enhance safe mobile disposal. The sample consisted of 80 respondents with a response rate of 69%.

From the research it was found out that 49% of the respondents left faulty phone accessories in the locker, 33% threw the accessories in the waste basket and the remaining 18% returned them to the dealers. The research also revealed that there were no enough incentives to encourage the customers to return mobile phones to the dealers. It was also noted that the legislation in Kenya that governs the disposal of electrical and electronic equipment was not widely known by the users.

The research revealed that there was the need for the mobile manufacturers to manufacture handsets from recyclable materials. The manufacturers should also avail information on handset disposal at the point of sale and do a follow-up using the available media. The mobile services providers can also play an important role on mobile disposal by availing the information on the face of the scratch cards. In addition they can notify the subscribers on the available disposal channels through text messages. The government through the designated agencies such as the Communications Commission of Kenya and National Environmental Management Authority (NEMA) needs to be more assertive in mobile phone disposal measures.

The researcher also encountered problems in the course of the research. First the researcher could not attain a complete response rate. There was the tendency of halo effect where the some respondents answered some

questions in a particular pattern. Finally it was also difficult for some respondents to spare their time to fill in the questionnaire.

LIST OF TABLES

Page

LIST OF FIGURES

Page

LIST OF ABBREVIATIONS

AMPS -Advanced Mobile Phone Service

CCK- Communications Commission of Kenya

DFE-Design For the Environment.

DFM-Design for Manufacture

DTI -Department of Trade and Industry

EMS- Environmental Management System

EPR-Extended Producer Responsibility

FCC-Federal Communications Commission

FDI-Foreign Direct Investment

ICT- Information and Communication Technology

ITU-International Telecommunication Union

KEBS-Bureau of Standards

NEMA-National Environmental Management Authority

PPP-Polluter Pays Principle

ULCH-Ultra Low Cost Handset

WEEE-Waste on Electrical and Electronic Equipment.

TABLE OF CONTENTS

CHAPTER ONE

INTRODUCTION

1.1.0 BACKGROUND

The global boom in mobile cellular communications has been truly astounding. It has revolutionized the concept of telephony in a number of ways. Mobile users no longer call a place but a person. Small, portable handsets have liberated users from the cord that tied telephones to a geographic location, enabling users to be reached anytime and anywhere. Compared with fixed telephones, mobile cellular typically offers a greater variety of options in terms of features and tariffs (International Telecommunication Union, 1999).

Beard and Hartmann (1999) argue that information has long been considered to be the fourth production factor after land, labour and capital. Since the invention of the telegraph in 1833, the intervening one hundred and fifty years of conventional telephone technologies in the 1980s have seen dramatic change. Kelly (1998) points out that the dual roles of telecommunications are to facilitate trade in other sectors and to facilitate directly traded products and services.

The number of mobile subscribers has increased dramatically over the last few years. In 2007, the African continent added over sixty million new subscribers representing about ninety percent of the Information Communication Users (ICT). Mobile penetration in the region is close to thirty percent of the population (African Telecommunication/ICT Indicators 2008).

1.1.1 GROWTH OF THE MOBILE PHONE INDUSTRY

According to Beard and Hartmann (1999), telecommunications are very large enterprises, and are often the largest corporate bodies in their country. The telecommunication sector has a history originating from the Post Office and evolving into large state bureaucracies with few if any competitors or predators. They further point out that telecommunications are also said to be one of the most important and most competitive industrial sectors of the future. The telecommunications sector, according to them, is currently experiencing phenomenal global change, with the liberalization and privatization of the sector, and this appears to be benefiting the environment in a number of unexpected ways.

The growth of mobile phones is the most significant change in the telecommunication industry in the developing countries. Mutula (2002) points out that cellular phone technology was invented in the 1940's and became commercially available in the 1970's. According to the Massachusetts Institute of Technology (2008), there were more than 2.4 billion cell phone users in the year 2006 worldwide, with more than 1,000 new customers being added every minute. The report further states that fifty nine per cent of these 2.4 billion people live in the developing countries, making cell phone the first telecommunications technology in history to have more users than in the developed world. The number of mobile phone users worldwide reached over 3.3 billion by the end of 2007, the International Telecommunications Union (2008) asserts. According to the Communication Commission of Kenya (CCK) there are 14 million mobile phone subscribers and three million internet users, local loop, and postal services in Kenya.

1.1.2 BENEFITS OF MOBILE PHONES

The value of mobile phones to the individual is greater because other forms of communication such as postal systems, roads and fixed-line phones are often poor. This has been reported in the Vodaphone policy paper (2005). The policy paper states that mobile phones provide a point of contact and enable users to participate in the economic system. Many people who cannot afford to own a mobile phone can access mobile services through informal sharing with family and friends or through community phone shops. In addition use of text messaging in rural communities is much lower due to illiteracy and the many indigenous languages. This has implications for other technologies that use written word, such as the internet. According to the African Telecommunication/ICT Indicators (2008) the success of mobile phones is driven largely by competition and a reduction in prices, single rate inter-regional roaming and the uptake of m-commerce applications.

1.1.3 ENVIRONMENTAL IMPACT OF MOBILE PHONES

Cannings (2006) argues that a mobile phone includes the handset, adapter and battery as well as accessories such as car chargers, headsets, carrying cases and extra faceplates. She further states that over one billion mobile phone handsets are currently in use around the world. According to her, each year, 130 million mobile phones are thrown away in the US, and 105 million in Europe with UK users alone disposing of 15 million mobile phones annually.

Cardinali (2001) says that as a result of technological change, and as a consequence of the search for efficiency, a consumer culture has been created which expects products to have a short life cycle, to be thrown away as (or even before) performance declines. This is made worse by the relentless marketing/advertising that insists that today's products are superior to yesterday's. Cannings (2006) is of the view that those involved in the mobile telecommunications industry must continue to pursue ways in which the environmental impact of products can be reduced. Cannings (2006) observes that product design is an obvious route and has resulted in the development of some biodegradable components such as handset casings.

Hissik (2007) reports that a group of mobile manufacturers, network operators, suppliers, recyclers, consumer and environmental organizations, led by Nokia have committed themselves to improve environmental performance of mobile phones and to raise awareness and participation in take-back and recycling. The group was created as part of a European Commission pilot project looking at how different industries could work with stakeholder groups to reduce the environmental impact of their products throughout their lifecycle.

Pana (2008) argues that electronic waste dumping has been classified by the United Nations Environmental Programme (UNEP) as the fastest growing source of urban waste and is associated with growing health complications, such as cancer, respiratory disorders and skin diseases.

1.1.4 NEED FOR LEGISLATION

International organizations such as the World Bank have successfully pressurised many African governments to deregulate their telecommunications sectors in recent years. Studies have found out that the use of mobile phones within any given African country has been rapid even when incomes are low (Pedersen, 2002).

Cardinali (2001) argues that by legislating industry to take greater responsibility for the product and its packaging waste, environmentalists hoped to stimulate the demand for recyclables and relieve municipalities of the tons of collected but unprocessed materials crowding storage facilities. The model for this paradigm of ``the responsible entity" is Germany's ``green dot" law. Adopted in 1991, Germany's ``Ordinance on the Avoidance of Packaging Waste" requires manufacturers and distributors

to take full responsibility for their packaging. In Kenya the law governing the use of mobile phones is contained in the Kenya Communications Act of 1998. Section 39 of the Communications Act of 1998 deals with the regulations for the radiation of electromagnetic energy. It spells out the requirements of the maximum intensity of electromagnetic energy of any specified frequencies which may be emitted in any direction from the apparatus while it is in use. The Environmental Management and Co-ordination Act of 1999 spells out in chapter 141 the offences relating to hazardous wastes, materials, chemicals and radioactive substances (Citator 2006).

1.2 STATEMENT OF THE PROBLEM

In the UK alone there are approximately 45 million phones, and over seventy seven per cent of the population has at least one mobile phone. Consumers in the UK are replacing up to fifteen million phones approximately every eighteen months although they are designed to last for seven to ten years. (www.vodaphone).

There are key issues facing mobile phone recycling in the developing countries, such as Kenya. The rate of handset replacement is increasing because reconditioned phones that are being resold due to rapidly changing technology. In addition, there is the lack of a proper legislation on electronic waste. In this regard, governments in developing countries are becoming increasingly concerned over the threat to human and environmental safety posed by end-of-life phones and other electronic products exported there for disposal. Finally telecommunication is generally regarded as "service" industry, and therefore it is thought to have minor environmental impact.

1.3 JUSTIFICATION

Over the past few years there has been a proliferation of mobile phone handsets in the developing countries. For a long time the developing countries have been marked by scanty communication networks owing to the terrain of land and high set up costs. Consequently, there is a high demand for mobile phones, notwithstanding the individuals' income levels. As mobile hand sets are being shipped to the developing countries in their numbers, the dealers should be required to provide alternative disposal channels. When these mobile handsets reach their end of life, they find their way to the landfills and hence contribute to environmental degradation.

Africa, and indeed other developing countries, lacks both the manpower and the resources to safely dispose off mobile handsets. Moreover, many consumers are reluctant to hand in their old phones. The high rate at which mobile phones are being shipped in the developing countries is a pointer of future disposal problem.

1.4 OBJECTIVES

The research intends to fulfill the following specific objectives.

- To test the mobile phone users' awareness on mobile phone disposal.
- To explore the ways in which mobile phone manufacturers and service providers can use to improve the awareness on mobile phone disposal.

1.5 IMPORTANCE OF THE STUDY

The research is directed to a number of users. Mobile cell-phone users will find this research invaluable. The users will be in a position to appreciate the use as well as the harmful effects of mobile phones. They play a significant role of ensuring that unused or faulty phones are properly disposed off.

Mobile phone service providers will also have great interest in the research findings. Part of their social responsibility should be to educate the mobile subscribers on safe mobile phone disposal. Mobile phone manufacturers will also find this piece of research work worthwhile. They need to ensure that they manufacture handsets that are friendly to the environment.

The government agencies on mobile phone regulation notably the Communications Commission of Kenya (CCK), the body charged with the responsibility of regulating the communications industry in Kenya will also find this research of great importance. They have a role of minimizing or eliminating taxes on mobile equipment and services and keeping license fees to a minimum and encouraging infrastructure sharing.

The international community has its role to play in the telecommunication industry. Donors can help by enhancing universal service solutions for mobile phones by providing resources to empower regulators to act more effectively in areas such as licensing and interconnection. Another area where

the international community could help lower mobile access costs is through an initiative that would recycle used handsets from developed nations to Africa.

CHAPTER TWO

LITERATURE REVIEW

2.0 HISTORICAL PERSPECTIVE OF MOBILE PHONES

A mobile phone is a small, portable communication device that enables people to make phone calls wherever they are. It receives and gives out signals via the service providers' transmitting towers and even via satellite. The convenience of a mobile phone is allowing people to communicate with one another without the limitation of region and time. Signal transmission is the very basic concept for mobile phone. It uses the radio wave theory which is similar to the ordinary radio. The frequencies of mobile phones are stronger and higher than ordinary radios to enable clearer conversation among users. The transmission of the mobile phones allows these radio waves (signals) to interact (to receive and send) from the device to the transmission centers (towers), then to another user (whether land line or another mobile phone). The signals of mobile phone are split into small cells (this is also why mobile phones are also known as cell phones) geographically. These cells allow radio transmission between two or more authorized mobile phones, according to Oblivion (1996).

Farley, T (2000) observes that the technology influencing the mobile phone started back in the mid twentieth century. Furthermore, he points out that the very first mobile telephony service was in Sweden. It was a form of radio telephony tested by the Swedish police for use in police cruisers. This form of radio telephone was a two-way radio which is still widely used in taxis and police cruisers. With all the functions of an ordinary telephone, the telephone was powered by the car battery. According to Farley, T (2000) the equipment used so much power that one was only able to make two calls - the second one to ask the garage to send a breakdown truck to tow them away, their car and flat battery. These first car phones were just too heavy and cumbersome - and too expensive to use - for more than a handful of subscribers. It was not until the mid 1960's that new equipment using transistors were brought into the market.

According to Farley, T (2000) the year 1946 in Saint Louis, Missouri, America's two companies AT and T and Southwestern Bell brought out the first commercial mobile telephone service. This service was used on communication devices which were permanently installed on vehicles. It used a weaker signal (compared to what mobile phones receive now), but had a similar theory of receiving and giving out signals although, the bandwidth was very low. Anything to do with broadcasting and sending a radio or television message out over the airwaves came under the Federal Communications Commission (FCC)

regulation. The FCC can partially be blamed for the gap between the concept of cellular phone service and it's availability to the public. This is due to FCC's decision to limit the cellular phone frequencies in 1947-only twenty three cellular phone conversations could occur simultaneously in the same service area. The FCC reconsidered its position in 1968, freeing the airwaves for more mobile phones. AT and T proposed a cellular phone system to the FCC of many small, low-powered broadcast towers, each covering a 'cell' a few miles in radius, collectively covering a larger area. Each tower would use only a few of the total frequencies allocated to the cellular phone system, and as cars moved across the area their cellular phone calls would be passed from tower to tower.

More observations from Farley T (2000) indicate that the mobile phone was patented individually by Motorola (by Martin Cooper) in 1975. By 1977, AT and T constructed and operated a prototype cellular phone system. A year later, public trials of the new cellular phone system were started in Chicago with over two thousand trial cellular phone customers. In 1979, the first commercial cellular phone system began operation in Tokyo. In 1981, Motorola and American Radio phone started a second U.S. cellular radio-phone system test in the Washington/Baltimore area. By 1982, the slow moving FCC finally authorized commercial cellular phone service for the USA. In 1983, the first American commercial for analog cellular phone service or Advanced Mobile Phone Service (AMPS) was offered in Chicago, by Ameritech. Despite the incredible demand, it took cellular phone service thirty seven years to become commercially available in the United States. Consumer demand quickly outstripped the cellular phone system's 1982 standards. By 1987, cellular phone subscribers exceeded one million, and the airways were crowded.

2.1 THE MOBILE PHONE EXPLOSION

Beard and Hartmann (1999) are of the view that the telecommunication sector has a history originating from the Post Office and evolving into large state bureaucracies with few if any competitors or predators. They argue that a reversal is taking place at a considerable pace, and telecoms are attracting investor attention around the globe as affiliations abound and takeovers loom. The situation of bureaucracy is not only strange in Africa. Farley T (2000) observes that the FCC not only regulated landline interstate telephone business but also managed the radio spectrum. He further suggests that the FCC decided who would get what frequencies. It gave priority to emergency services, government agencies, utility companies, and services it thought helped the most people.

According to the International Telecommunications Union (2004) Indicators, Telecel was Africa's first mobile strategic investor. Its roots date back to 1987 when Miko Rwaitare, a Congolese of Rwandan descent, and Joseph Gatt of the United States launched the continent's first mobile network in DR Congo. They formed Telecel International in 1993 with a focus on launching mobile networks in other African countries.

Mbarika V. and Mbarika I. (2006) argue that the sparks that ignited the African cell phone explosion occurred in South Africa in 1993, when the government granted national cell phone licenses to MTN South Africa Limited, Johannesburg, and Vodacom Group Limited, Sandton. These companies, each partially owned by the South African government, quickly built large customer bases in South Africa, and eventually other African nations, by offering prepaid cell phone cards. Dodourava (2003) points out that popularity of the use of wireless communications increased significantly in the late 1990's, driven by improved mobile networks, better technology for hand-held devices, the emergence of internet based standards and personalized services.

It has been reported by Pedersen (2002) that international organizations such as the World Bank have successfully pressurised many African governments to deregulate their telecommunications sectors in recent years. The effect of deregulation is still under study with conflicting views about the impact it has had in the rural communities in Africa. On the one hand, Pederson (2002) argues, that this deregulation has only benefited the urban centres with their rural counterparts being neglected. On the other hand, studies have found out that the use of mobile phones within African countries has been rapid even when incomes are low.

2.2 CREATIVITY IN MOBILE PHONE USAGE

The importance of the mobile phones cannot be overemphasized. According to Emmot (1995) information is a technical term which refers to bits of data representing the combination of multimedia content such as video, graphics, text and sound. Dodourava (2003) says that telecommunications is changing from an industry that was all about voice to one that is mostly about data. Data traffic, at present being driven by the simple text messaging service called the Short Message Service (SMS), is already contributing well to the revenues of some wireless operators and, according to forecasts, will soon overtake voice traffic as the main source of revenue for mobile subscribers.

According to http://www.cellular.co.za/news the availability of pre-paid subscriptions has been a major growth stimulus across Africa, as in other regions of the world where the bulk of the population live in low per-capita income groups. In Africa, approximately 95 percent of all mobile subscribers are on pre-paid subscriptions. This should indicate a strong future for person to person SMS and SMS-based services, as has proved popular with pre-paid subscribers the world over.

The value of mobile phones to the individual is greater because other forms of communication (such as postal systems, roads and fixed-line phones) are often poor. Mobiles provide a point of contact and enable users to participate in the economic system. Many people who cannot afford to own a mobile themselves can access mobile services through informal sharing with family and friends or through community phone shops (commonly known as Simu ya Jamii and Simu Yetu in Kenya). Use of text messaging in rural communities is much lower due to illiteracy and the many indigenous languages. This has implications for other technologies that use the written word, such as the internet (www.vodaphone).

Sinha (2005) notes that the function of a mobile phone in many developing countries extends past its functionality as a personal communication device, into a source of economic growth potential, social networking, and heightened political awareness. In January 2001, he says, thousands of Filipinos took part in demonstrations to remove President Estrada from office. During this week of demonstrations, the two main text message operators in the Philippines transmitted an average of 115 million text messages per day-in contrast to the regular daily average of 24.7 million. Philippines is reportedly the highest texting nation in the world with an average user sending over 2000 messages a year.

Another innovative way of using a mobile phone according to Sinha (2005) is "beeping" or "flashing". This occurs when a caller dials but hangs up before the call is connected. This method is popular not only because it avoids a call charge, but also because it can be used discretely, almost as a code language.

According to Wikipedia (2004) in Japan, mobile phone companies provide immediate notification of earthquakes and other natural disasters to their customers free of charge. In the event of an emergency,

disaster response crews can locate trapped or injured people using the signals from their mobile phones; an interactive menu accessible through the phone's Internet browser notifies the company if the user is safe or in distress.

Sources by the ITU indicate that access to information and communication technologies continue to grow at high speed and the digital divide – in terms of mobile subscribers, fixed telephone lines and Internet users - keeps getting smaller. Statistics show that by the end of 2004, the telecommunication industry had experienced continuous growth, as well as rapid progress in policy and technology development, resulting in an increasingly competitive and networked world. There are more ICT users worldwide and more people communicating than at any other time in history (http://www.itu..int/ITU).

2.3 THE CHALLENGES OF MOBILE PHONE USE

Sinha (2005) says that the ability to connect with others is a double-edged sword. There are freedoms gained by being able to connect to others for economic or social reasons, but there is an increased level of duty to answer incoming calls and to inform kin and friends of one's whereabouts and business. Increased access to individuals can also lead to the exacerbation of traditional asymmetries in social power and control. He, for instance, gives an example of the authority that parents exercise over their children or the vulnerability of women to the dominance of males.

According to http://www.live-care.net/index.html symptoms caused by the radiation of mobile phones are one of the most argued problems. Many scientists believe that the radiation from the mobile phones may cause the users to have different symptoms such as headache, earaches, blurring of vision and even causing cancer. Schüz (2006) argues that during operation, the antenna of a cellular telephone emits radio frequency electromagnetic fields that can penetrate four to six centimeters into the human brain. According to Schüz (2006), the overall epidemiologic evidence suggests no increased risk for any tumor among cellular telephone users with less than approximately ten years of use.Mobile phone users, though, are adviced to reduce the usage on mobile phones if it is possible.

Gonzalez, a psychiatrist quoted in http://www.wirelessmoment.com/banning says mobile phone addiction is an obsessive-compulsive disorder which looks set to become one of the biggest non-drug addictions in the 21st century. Along with the age drop of the mobile phone users and the ease of prepaid method provided by the system operators, most teenagers now own their own mobile phones

and network service. Teenagers are engaged on their mobile phones all the time on phone calls, using SMS text messages, personalizing the mobile phones with ring tones and pictures. Besides this, it is further noted in the website, many people are running after the latest mobile phones. New models of mobile phones are released almost everyday. In order to get up-to-date, people tend to change their mobile phones once in a while. These become habits among the mobile phone users, causing them to spend unnecessarily high costs. It has further been noted in http://www.wirelessmoment.com/banning that mobile phone addiction can totally isolate its victims, ruin them economically and even turn them into criminals.

Robinson, R (2004) believes that Cyber bullying is also another disadvantage of mobile phones. Cyber bullying is the act of using offensive words and behaviour via online chatting, emails or SMS. The psychological effects of cyber bullying are much severe than face-to-face bullying.

Reiter's Camera Phone Report (2003) notes that there are still many problems caused by the mobile phone technology. Mobile phones with camera functions are causing privacy problems. Saudi Arabia banned camera phones through out the country while many countries are concerned about this problem. This is because many people have misused camera phones such as using it as a hidden camera to take photos which are private. The spreading on computer viruses is also a problem for this new technology. Just like computer viruses, these viruses will affect the normal usage of mobile phones, making them to malfunction.

Banks are concerned that cellular phone voice conversations could be used to carry out robberies. Hats and sunglasses could be used as disguises. According to www.textually.org/picturephoning thieves in South Africa take photos of people withdrawing money from a bank and send the photos to accomplices who rob the victims sometime afterwards. The article further says that the person is not actually followed out of the bank, and there is very little suspicion aroused.

2.4 ENVIRONMENTAL IMPACT OF ELECTRONIC DISPOSAL

Cardinali (2001) says that as a result of technological change, and as a consequence of the search for efficiency, a consumer culture has been created which expects products to have a short life cycle, to be thrown away as (or even before) performance declines. This is made worse by the relentless marketing/advertising that insists that today's products are superior to yesterday's. Over two billion

mobile phone handsets are currently in use around the world. Each year, 130 million of these are thrown away in the US, and 105 million in Europe with UK users alone disposing of 15 million mobile phones annually.

Beard and Hartmann (1999) say that what has been most surprising is that both the positive and negative impact of the telecommunications industry on the natural environment has been largely unknown and unquestioned. They further argue that environmentalists have been campaigning against extractive industries, particularly focusing on chemical and oil companies. The sheer size of telecommunication companies accounts for a significant quantity of both global consumption and global waste. What telecommunications companies choose to do about reducing their consumption and waste, they say, is thus of great significance in terms of global "sustainable development".

Canning (2006) argues that the ubiquitous nature of mobile telecommunication, the rate of new model introduction and low unit value of old handsets presents the telecommunications industry and governments with a major challenge. The challenge for organizations involved in the industry lies in dealing with what is a fragmented market and in persuading customers to return phones for which they no longer have any use. This resulted in the legislation of the Waste Electrical and Electronic Equipment (WEEE Directive) which became law in the UK in January 2007. This law means that mobile phone manufacturers, operators and retailers need to collect and recycle unwanted handsets and accessories. How far this will be successful especially in the developing countries is yet to be realized, argues Canning (2006).

Mobile phones contain numerous substances which need to be disposed of in safe and efficient manner. According to http://www.recyclingappeal.com the cadmium in the battery from a single old phone could seriously contaminate six hundred thousand litres of water, enough to fill a third of an Olympic-sized swimming pool. Cadmium is being phased out of new batteries. Lead -which affects the immune, endocrine and central nervous systems, and causes serious damage to children's brains - is used to solder components to the printed wiring boards of mobile phones. Brominated flame retardants, used in wiring boards and plastic cases of mobile phones, have been associated with cancer, liver damage and problems with the neurological, immune and endocrine systems. Beryllium, which can cause serious lung damage,

is used in contacts and springs and highly toxic dioxins can be emitted if the phones are incinerated in waste plants

It has been noted in http://kenvironews.wordpress.com/2007/09/20/kenya-faces-an-e-waste-time-bomb that the situation in Kenya is reaching crisis proportions. An example is the Dandora dumpsite in Nairobi's Eastlands area which is chocking with electronic waste, ranging from obsolete television sets, computers, fridges and mobile phones and batteries-all containing highly toxic substances. Residents surrounding the area risk contracting cancer, respiratory and skin diseases due to poisonous by-products namely lead, cadmium and mercury from electronic waste.

According to http://www.cellularfunds.com/, in the next three years, individuals and organizations worldwide will replace more than 400 million cell phones. Statistics show that mobile phone users in the UK are replacing their handsets on average every 18 months. It is estimated that there are in the region over 90 million mobile phones and Personal Digital Assistants lying unused in the UK alone and this figure is set to increase as people upgrade their handsets for new and better features. Mobiles and Personal Digital Assistants have become fashion accessories, and this is accelerating the demise of perfectly good equipment. The components in these kinds of equipment can take centuries to break down if put in landfill, and can produce dangerous toxins into the ground. Recycling stops this problem. (http://www.mobileamnesty.co.uk).

2.5 PRODUCER END OF PRODUCT LIFE RESPONSIBILITY

According to www.vodaphone the perception in the developed world is that since most of the phones being discarded are in good working order they could significantly benefit those in the developing nations where the costs of phones are still high. The irony of it all is that there is the belief that the developing world lacks the skills and infrastructure to recycle mobile phones yet they are being shipped in there continent unabated.

Tong (1994) has observed that environmental issues in manufacturing must become an integral part of the product development process. According to him this was the sentiment shared by those participating in the Management Roundtable's Second Annual Congress on Environmentally-conscious Design and Manufacturing: From Best Practices to Profit, a conference held in Dearborn, Michigan, USA. All the

companies which supported this conference, including Apple Computer, AT and T, General Motors, 3M Corporation and Xerox Corporation share the common goal of integrating environmental factors into the design and manufacturing of products, not just for the good of the Earth, but for the good of the bottom line as well.

Stevels and Boks (2000) observe that in the early 1990s, leading electronic companies started with ecodesign (also referred to as design for the environment). Initially the activities were primarily defensive for instance compliance with upcoming legislation and regulation, making mandatory design rules and setting up an internal organization to ensure that such items were followed up. They also point out that for electronics companies in Europe, in particular, the issue of take-back and recycling of Waste of Electrical and Electronic Equipment (WEEE) got an increasing amount of attention, providing the necessity for such actions. In many respects, the first initiatives that led to the German 1991 draft ordinance for recycling of WEEE can be seen as the starting point for the societal, technical, juridical and scientific debates about these issues

Schvaneveldt, (2003) notes that to improve the recyclability of a product, several issues can be addressed, including reducing disassembly time, labeling material types and using materials for which recycling is feasible. On the other hand, notes Schvaneveldt, to assess the energy efficiency of most electronic products, it is necessary to consider the amount of power consumed while in standby mode as well as during active use.

According to Stevels and Boks (2000) saving on resources turned out to be directly related to price reduction; good environmental performance was realized to be a good vehicle to enhance brand image and sales. They further talk of five focal areas as of the utmost importance in managing ecodesign activities: energy, materials application, packaging and transport, potentially harmful substances and durability/recyclability. Their argument goes on to say that idea behind bringing together market research and environmental benchmark data arises because not everyone views "green" issues the same way. Customers and legislative bodies see things differently and this can create a dilemma for, for example, producers and product managers. A compromise can be made by weighing improvements which have an effect on the various green focal areas.

In Kenya, studies have found out that there is an extensive informal phone repair market-there are 10 authorized mobile repair centres in the capital, Nairobi, and between 2,000 and 4,000 informal repair businesses across the country. These informal repair centres, not consumers, are the main source of phone waste. In developing countries, people will generally repair and reuse their mobiles, rather than throwing away. The repair businesses are a major source of electronic waste as some components cannot be reused. To be effective, any recycling programme must be designed to obtain this waste from small recycling businesses rather than directly from consumers as is typical in developed countries. Vodafone (2008).

Nokia Company announced free recycling program for its cell phones and batteries in East Africa. In Kenya, Nokia Company is appealing to their customers who may not know how to dispose off their mobile phones and accessories to take them to their care centres for safe disposal or recycling. From the collection centres, the discarded phones and accessories will be shipped to Europe for recycling. Kisambira (2008) says that Nokia Company wants to ensure that the environment in which they do business is protected.

2.6 DESIGN FOR THE ENVIRONMENT (DFE).

DFE is described as a technique which addresses all environmental impacts of a product throughout the complete life cycle of the product, while aiming to enhance other criteria like function, quality, and appearance (Goggin, 1996). Rao, H.A and Peihua, Gu (1997) say that manufacturing system design can essentially be viewed as the process of evolving a design consisting of the physical and process descriptions of a manufacturing system to satisfy the functional requirements which ultimately satisfy the external conditions imposed on it. The design methodology should provide a framework for the design of the physical aspects of a product and processes for meeting design objectives. Tong (1994) says that not only are customers demanding companies to manufacture "greener" products, but to also have greener manufacturing processes DFE is not an add-on feature to quality, but a quality enhancer.

Studies by Stevels and Boks (2000) led to the concept of environmental benchmarking which was seen as the ideal link between creating awareness and design itself because a proper benchmark tells where current products stand, thus creating a platform for discussions and brainstorms in where to go. The researchers argue that environmental benchmark procedure consists of four elements: choice of products, system definition, comparing and validation of products and review of results, using fact

sheets on which measurements derived in the preceding step are compiled. Other considerations to be taken into account in product design, apart from environmental ones, include an assessment of whether the improvement option does reduce the impact on the environment and consumer feasibility of whether the consumers will accept the option as beneficial to them. In addition, an assessment must be made on the extent to which society will benefit from the proposed improvement. Finally, consideration of the technical and financial feasibility should also be made.

Schvaneveldt (2003) says that theoretically, the highest benchmark for a product's environmental performance would be for the product to have zero impact on the natural environment. This absolute goal is seen to be infeasible, however, when one realizes that products and services are created, consumed, and reach their end-of-life within the natural environment and all conceivable products and services require materials or energy at various points in that life-cycle. As a consequence, some degree of impact on the environment is inevitable.

Fabricius (1994) observes that a rising number of manufacturing companies are starting to address Design for Manufacture (DFM), in order to improve the manufacturing situation by changing the product design. Such companies see DFM as a way to raise the productivity, virtually without any additional investments. In a DFM project the aim is to avoid (not solve) known problems by redesigning the product. Schvaneveldt (2003) argues that environmental goals are critical to improving the environmental performance of products and should be integrated into the product development process. According to him if the goals are specific and measurable, then it is possible to make comparisons and measure progress.

2.7 MOBILE PHONE RECYCLING AND REUSE

It has been observed in http://en.wikipedia.org/wiki/Mobile that recycling is the reprocessing of materials into new products. It prevents useful material resources from being wasted, reduces the consumption of raw materials and reduces energy usage, and hence greenhouse gas emissions.

Vodafone is participating in the Mobile Phone Partnership Initiative (MPPI), part of the Basel Convention on waste. Draft guidelines have been developed on minimizing waste from mobile phones and refurbishing and recycling old phones safely and in an environmentally sound way. These cover:

design, refurbishment and reuse, collection and transport, and recycling. Many consumers are reluctant to hand in their old phones. Vodafone is focusing on promoting recycling and making it easy for consumers to return their phones. Their research in Australia and the UK found that offering charity donations or financial incentives encourages people to recycle. Vodafone has programmes in Australia, Ireland, Italy, Japan, the Netherlands, Spain and the UK to help their corporate customers increase handset recycling. They support campaigns to raise awareness among their employees and provide return bins and freepost envelopes. In the UK, for example, funds generated from recycling are donated either to Vodafone's selected charity or to the customer's chosen charity. In 2005/06 year, they collected over 200,000 phones from corporate customers in these seven countries.

In addition in 2005/06, Vodafone ran a campaign to encourage employees to hand in their phones for recycling or reuse. The company published an article in the employee magazine and produced videos, posters and other promotional material. The campaign highlighted the environmental and social benefits of reusing and recycling phones. The campaign was particularly successful in New Zealand, where more than 2,300 phones were handed in by the 1,300 employees within two weeks.

According to Fonebak, consumers in the UK are replacing their phones every eighteen months but they are designed by the manufacturer to last for seven to ten years. This means that over fifteen million people are replacing their phones each year in the UK alone. Customers can simply return old phones or can include unwanted items as part of an upgrade. Some of the operators and retailers provide financial incentives such as cash vouchers for functionally operational phones, whilst others accept returned equipment, promising that all funds generated will go to nominated charitable organizations. The means for returning items also varies with customers being able to return equipment to retail outlets or to post it to specified product recovery addresses.

2.8 THE RECYCLING PROCESS

According to Fonebak, handsets are recycled using waste-to-energy incineration. The energy created during this process is used to heat the local village with almost zero emissions. The metals are extracted during this process and include gold, platinum, silver, palladium and copper. These are put back into productive use. Batteries are sent to a specialist in France where materials like Nickel, Cadmium and Lithium are extracted and used in items like power tools, saucepans and pharmaceuticals. They could

also be used to make new batteries. The metal from the charger is extracted and the plastics are used to make items like traffic cones and buckets. Paper packaging is recycled and other plastics are recycled into sheeting used in furniture making

On the other hand reuse of the mobile involves repairing and refurbishing where handsets are thoroughly tested and refurbished, making the phone look like a new one. The phones are then packaged in Fonebak's distinctive brand and are sent to emerging markets in Eastern Europe, Asia and Africa where the cost of a new phone is often prohibitively high, and landlines are few and far between. Fonebak has developed the "World Recycling Support Programme" to help emerging markets to set up recycling and reuse initiatives. Recovery of products and the reconditioning and reselling of these is one way of extending the life of equipment.

According to Cannings (2006) it is at the point of upgrading or switching handset, that a customer's contribution to recovery and reuse/recycling systems is significant. Customers have to be willing, able and know how to hand back mobile phone products that they no longer use, and in doing so accept the incentives made available to them from retailers, network providers and producers. Furthermore consumer participation in phone retrieval requires that firms both offer incentives to persuade the end customer to return phones which no longer have a useful purpose and also inform or educate consumers of the significance of electronic waste.

2.9 ENVIRONMENTAL STANDARDS

It has been noted by Stevels and Boks (2000) that the demand for more stringent environmental regulation on product end-of-life and production processes is enhanced by customer concerns for environmental protection. This has increased the need for industry to address environmental issues in the product design process. The emergence of international standards for environmental management, such as the ISO 14000 series, has also created a strong incentive for manufacturers to promote environmentally conscious products and processes. Considerable progress has been made in design for the environment (DFE). However, there is still the need for a structured approach to DFE that addresses environmental concerns in a coherent way. This approach should also support an environmental management system (EMS).

Faced with rapidly filling waste disposal sites and mounting concerns about toxic substances in products, many countries, as observed by Schvaneveldt, (2003) have enacted stricter laws governing product take-back, recycling, and usage of substances with high environmental impacts. Besides this push from the regulatory side, many corporations are making their own positive efforts to be more socially responsible and to meet customer expectations for more environmentally conscious products.

Cannings (2006) points out that when deciding to use mobile telecommunications services, in the UK, a consumer typically makes three choices, namely the nature of the mobile telecoms connection (line rental and handset purchase/rental), which mobile operator and handset to use as well as how to obtain the telecommunications service (via a retailer or directly from mobile operator and handset companies). Consumers will periodically review the experience and cost of using a particular service provider or handset and switch to better alternatives that are available. She further argues that in the UK, it is apparent that few phone manufacturers have any form of direct retail facility through which consumers can obtain handsets. Therefore the mobile operators and retail companies represent the industry's main point of contact with end-customers.

2.10 LEGISLATION ON MOBILE PHONE DISPOSAL

The Department of Trade and Industry's (DTI's) Statutory Instrument (SI), the Waste Electrical and Electronic Equipment Regulations (2006) (the WEEE Regulations) transposed the European Waste Electrical and Electronic Equipment Directive (the 'WEEE Directive') into UK law starting January 2007. Given the trans-boundary nature of these impacts, the SI is also intended to contribute to environmental protection at the European, and global level. The Waste Electrical and Electronic Equipment Directive is an environmental directive based on the principle of extended producer responsibility (EPR). EPR attempts to expand the 'polluter pays principle' (PPP), under the premise that as producers design and manufacture products, they are best placed to facilitate effective re-use, recycling, recovery and disposal at 'end of life'.

In Kenya chapter 141 of the Environmental Management and Co-ordination Act of 1999 prescribes a penalty of one million shillings, or an imprisonment for a term of not less than two years, or to both for an offence relating to hazardous wastes, materials, chemicals and radioactive substances. In addition the Kenya Bureau of Standards (KEBS) in Cap 496 can cancel a permit, or suspend the operation of a

permit holder, for such period, not exceeding one year where it is satisfied that the holder of a permit has not manufactured any commodity to which the permit relates to the relevant Kenya Standard or approved specification, Citator (2006).

2.11 THE KNOWLEDGE GAP

It can be established from the foregoing literature that the developing world has seen an increase in mobile phones at a rate higher than their counterparts in the developed world. The reason given is that Africa has for a long time grappled with a dilapidated infrastructure on telecommunication that left masses with little access to fixed lines. The bureaucracy in most of these state owned telecommunication corportations delayed the introduction of mobile phones. Despite the massive shipment of mobile phones to Africa, little has been done to educate the masses about the adverse effects of mobile phone disposal. Worse still, the legislation on waste of electrical equipment in Africa is in its formative stages.

The increase in the number of mobile phone users in Kenya and the growing concern of manufacturing products that are not harmful to the environment is what has given rise to this research. It is hoped that the mobile phone users will become more enlightened on the subject of mobile handset disposal. The research also points out the role of mobile service providers and manufacturers in ensuring that they avail the channels for mobile phone disposal. At the moment there has been little activity on the subject of mobile phone disposal.

CHAPTER THREE
RESEARCH METHODOLOGY

3.1 RESEARCH DESIGN

To achieve the two objectives a sample of mobile phone users was selected and a standardized questionnaire was administered to them. The research used a survey design, which, according to Kathuri and Pals (1993) aims at describing and exploring a phenomenon. Copper and Shindler (1999) argue that a survey does not require that there be a visual or objective perception of information sought by the researcher. The research sought to find out the disposal awareness of mobile phone users and how it can be improved by the service providers and manufacturers.

3.2 POPULATION AND SAMPLE DESIGN

(i) Population

The target population for the research was mobile phone users. The respondents were drawn randomly from the streets in the City of Nairobi. Purposive sample is one of the best techniques used to gather qualitative data especially where population is homogeneous, Cooper and Schindler (1999).

(ii) Sampling Design and Sample Size

The researcher used a sample of 80 questionnaires to a random sample of users cutting across different age groups. With the increase in the number of mobile phone users in the recent past, a random sample sufficed. The variation in the population parameters under study and the estimating precision determines how large a sample should be, argues Cooper and Schindler (1999).

3.3 DATA COLLECTION METHODS

Primary data collection method with both closed and open-ended questions was used. There was the use of dichotomous questions, multiple choice questions, categorical, likert-scale and numerical questions. There were two sections: section one capturing the personal information and section two seeking to find mobile phone information.

3.4 DATA ANALYSIS

There was the use of quantitative approaches to describe the outcome. Data collected was edited for accuracy, uniformity, consistency and completeness. The descriptive measures included frequencies on various questions, measures of central tendencies such as the mean, medium and the mode and measures of dispersion such as the standard deviation and variance. Data was presented in the form of tables, graphs and charts.

CHAPTER FOUR

DATA ANALYSIS, FINDINGS AND DISCUSSIONS

4.0 INTRODUCTION

This chapter covers data analysis, discussion and the findings of the research. The data was summarized by means of statistical averages (including rankings) and presented in the form of tables. Out of the 80 questionnaires distributed. 55 were completed and returned representing a response rate of 68.75%.Table 4.1 below shows the percentage of male and female respondents.

Table 4.0: Gender

Gender	Frequency	Percentage (%)
Male	24	44
Female	31	56
Total	**55**	**100**

Source: Primary Data

4.1 AGE OF THE PARTICIPANTS

The research sought to know the age bracket of mobile phone users. From the finding. 63.6% of the respondents were from the age bracket of 21-30 years. In addition. it was established that about 80% of potential mobile phone users were in the age group of 21-40 years. Information on how to dispose off mobile phones should be designed to appeal to this age group. The age of the participants is summarized in table 4.1 below:

Table 4.1: Age of participants

Age	Frequency	Percentage(%)
Under 20 yrs	5	9
21-30 yrs	35	64
31-40 yrs	9	16
above 40 yrs	6	11
Total	**55**	**100**

Source (Primary data)

4.2 OCCUPATION OF PARTICIPANTS

The respondents were asked to indicate their occupation in the questionnaire. About 75% of the respondents had some gainful employment. Manufacturers of mobile phones can collaborate with the employers to avail disposal channels for mobile phones at the work-place. A sizeable number representing 20% of the respondents were unemployed and had mobile phones implying that the penetration rate of mobile phones was high, income levels notwithstanding. Consequently, low cost handsets that are recyclable could come in handy.

Table 4.2: Occupation of participants

Occupation	Frequency	Percentage
Student	3	6
Employed	41	74
Unemployed	11	20
Total	**55**	**100**

Source (Primary data)

4.3 HIGHEST LEVEL OF EDUCATION

The researcher wanted to know the level of education of the respondents. From the finding it was established that 72.7% of the respondents were college/university graduates. This implied that majority of the mobile phone users would be fairly easy to educate on the harmful impact of unsafe phone disposal.

Table 4.3 Highest level of education

Education level	Frequency	Percentage
Postgraduate	4	7.3
College/university	40	72.7
Secondary	8	14.5
Primary	3	5.5
Total	**55**	**100**

Source (Primary data)

highest level of education

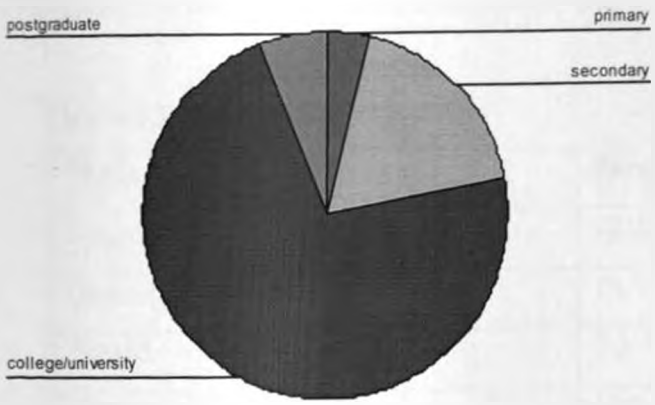

Figure 4.1 Highest level of education

Learning institutions could encourage more research on mobile phone disposal and contribute to the pool of knowledge. In addition they can also carry out more research to come up with better phone disposal methods.

4.4 PREFERRED MODE OF COMMUNICATION

The research wanted to know the most preferred mode of communication from selected modes. From the finding, it was established that 83.6% of the respondents preferred mobile phone as compared to 10.9% and 5.5% respectively who preferred land line and e-mail. This was because of the conveniency associated with the use of mobile phones. By liaising with the mobile phone service providers, the mobile manufactures can send out text messages to the subscribers informing them on the phone disposal points.

Table 4.4: Preferred mode of communication

Mode of communication	Frequency	Percent
Mobile	46	83.6
Landline	6	10.9
Email	3	5.5
Total	**55**	**100**

Source (Primary data)

4.5 OWNERSHIP OF HANDSET

Most mobile users had their own handsets, this represented 78.2%. Community owned mobiles represented 14.5% while 7.3% of the respondents shared with family and friends.

Figure 4.5: Ownership of handset

Mode	Frequency	Percentage
Owned	43	78.2
Community	8	14.5
Shared	4	7.3
Total	**55**	**100**

Source (Primary data)

Mobile phone manufacturers can design brochures informing the users on the available disposal methods at the point of purchase.

4.6 TYPE OF TARIFF

It was found out that 81.8% of the respondents were on pre-paid tariff as compared to 12.7% who were on postpaid. Still 5.5% of the respondents were on both tariffs. Handset manufacturers can display the recycling information at the scratch card outlets. In order to reach the postpaid customers they can have the handset disposal information printed on the monthly bills.

Table 4.6: Type of tariff

Type of tariff	Frequency	Percent
Prepaid	45	81.8
Postpaid	7	12.7
Both tariffs	3	5.5
Total	**55**	**100**

Source (Primary data)

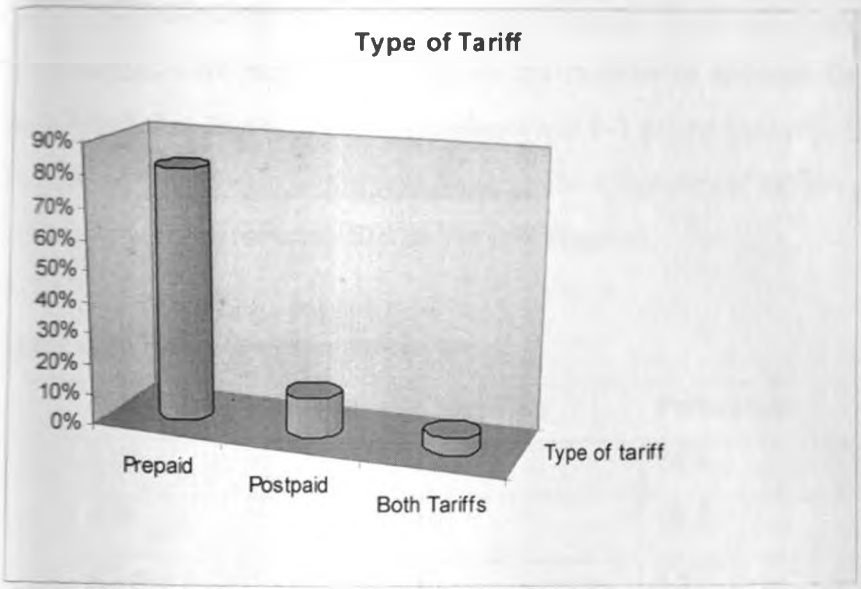

Figure 4.2 Type of Tariff

4.7 CHOICE OF MOBILE HANDSET

The respondents were asked to rate on a scale of 1-5 (where 1 represented most important and 5 least important) the factors that they considered in making their choices when they purchased their mobile handsets. Environmental consideration was ranked as the least factor that was considered while acquiring a handset. This implied that handset manufacturers had a huge responsibility of educating mobile phone users on the environmental impact of phone disposal.

Table 4.7: Choice of mobile handset

Factors	Mean	Standard deviation
Value	1.62	0.93
Size	1.64	0.82
Durability	1.95	1.28
Cost	2.15	1.13
Model	2.15	1.33
Environment	3.24	1.59

Source (Primary data)

4.8 NUMBER OF HANDSETS POSSESSED FOR THE LAST THREE YEARS

Respondents were required to indicate the number of handsets they had for the last 3 years. It was established that 76.4% of the respondents had 1-3 phone handsets. 18.2% had 4-6 handsets while 5.5 % had above 6 handsets for the last 3 years. The frequency of mobile phone replacement was high, hence the need to ensure recyclability and/or safe disposal.

Table 4.8: Number of handsets

Number of handsets	Frequency	Percentage
1-3	42	76.4
4-6	10	18.2
Above 6	3	5.5
Total	**55**	**100**

Source (Primary data)

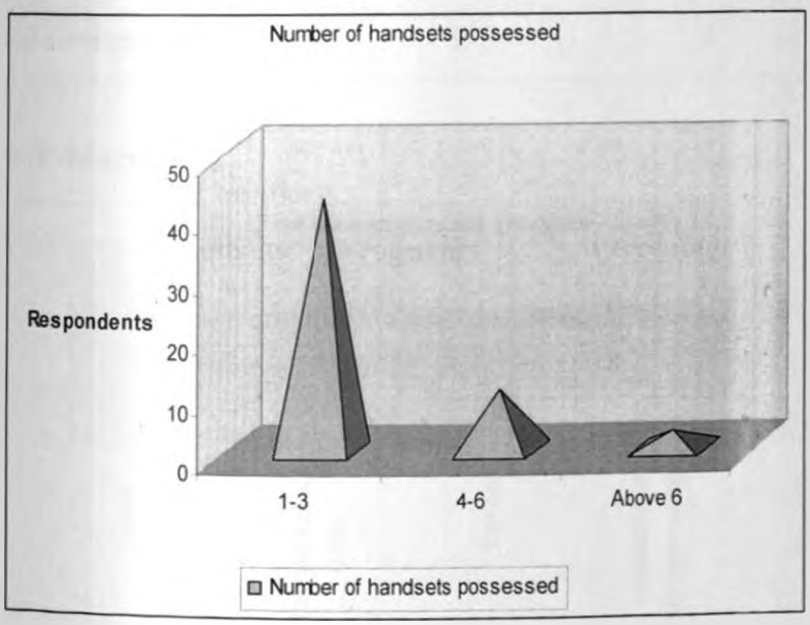

Figure 4.3 Number of handsets possessed.

4.9 USES OF MOBILE PHONE

The respondents were asked to indicate their use of mobile phones. It was found out that 81.8% of the respondents used their mobile phones for social networking. A relatively low number (10.9% of the respondents) keenly followed the political development by use of the phone. Information on mobile phone disposal can be availed at social places to raise the users' awareness.

Table 4.9: Uses of mobile phone

Uses of mobile phone	Yes (%)	No (%)	Rank
Social networking	81.8	18.2	1st
Business/official duties	76.4	23.6	2nd
Call back	34.5	65.5	3rd
Job notification	30.9	69.1	4th
Political awareness	10.9	89.1	5th

Source (Primary data)

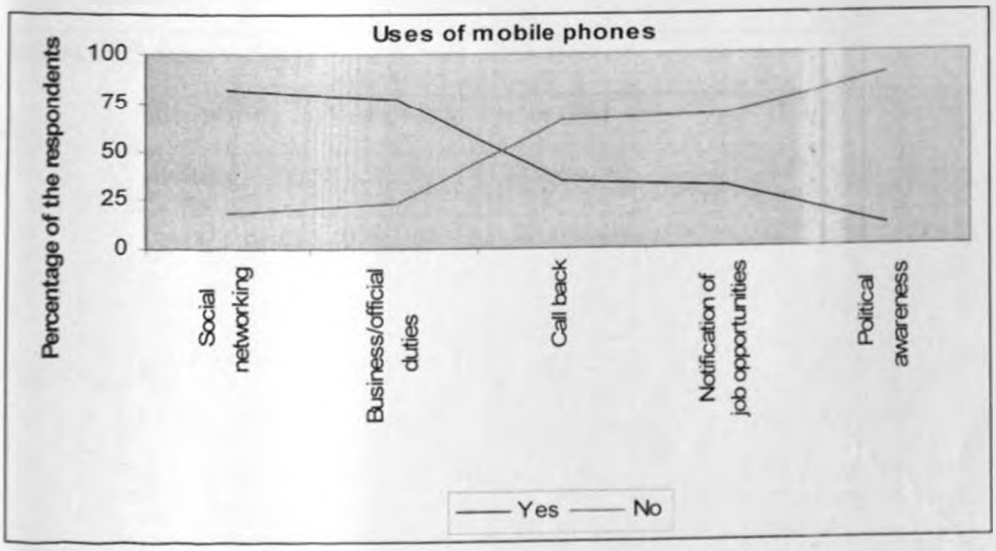

Figure 4.4 Uses of mobile phones

4.10 PROBLEMS ENCOUNTERED IN THE USE OF MOBILE PHONE

The research wanted to establish the problems encountered by mobile phone users. It was found out that 72.7% of the respondents were concerned about high calling costs. A paltry 10.9% of the respondents were concerned with the environmental impact as a result of mobile telephony. Health related problems were also associated with a relatively low number, represented by 14.5% of the respondents. It can be pointed out that although there was a low number of respondents claiming to have health related problems, mobile phones have not been in use long enough to give an authoritative figure.

Table 4.10: Problems encountered

Problems	Yes	No	Rank
High bills	72.7	27.3	1st
Incoming calls	43.6	56.4	2nd
Cyber bullying	30.9	69.1	3rd
Mobile viruses	16.4	83.6	4th
Health	14.5	85.5	5th
Privacy	12.7	87.3	6th
Environmental	10.9	89.1	7th

Source (Primary data)

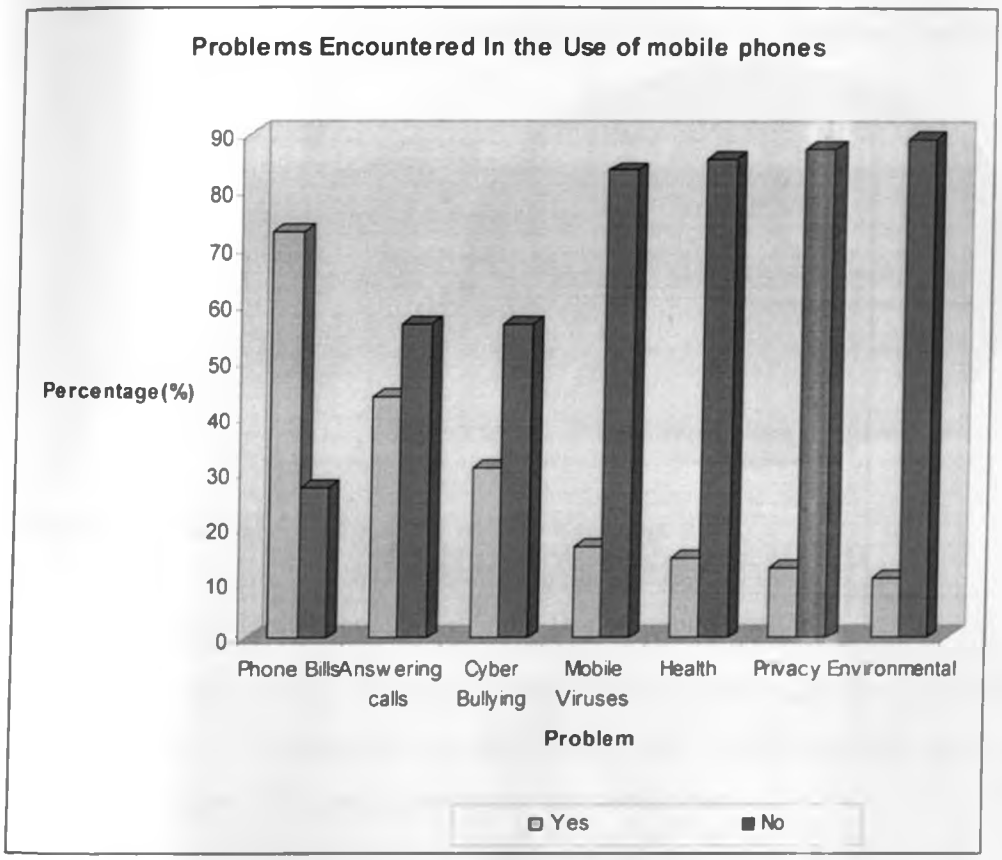

Figure 4.5 Problems encountered in the use of mobile phones.

4.11 REASONS FOR REPLACING MOBILE HANDSETS

Respondents were asked to indicate reasons that made them to replace their handsets. The research established that most respondents (50.9%) replaced their handsets due to theft/loss. 30.9% replaced their handsets because they were spoilt or faulty while 18.2% replaced their handsets because they wanted to keep up with technology. There was the need to ensure that mobile handsets were manufactured from recyclable materials in their design consideration.

Table 4.11: Reasons for replacing mobile handsets

Reason for Replacement	Frequency	Percentage
Theft/loss	28	50.9
Spoilt/faulty	17	30.9
Technology	10	18.2
Total	**55**	**100**

Source (Primary data)

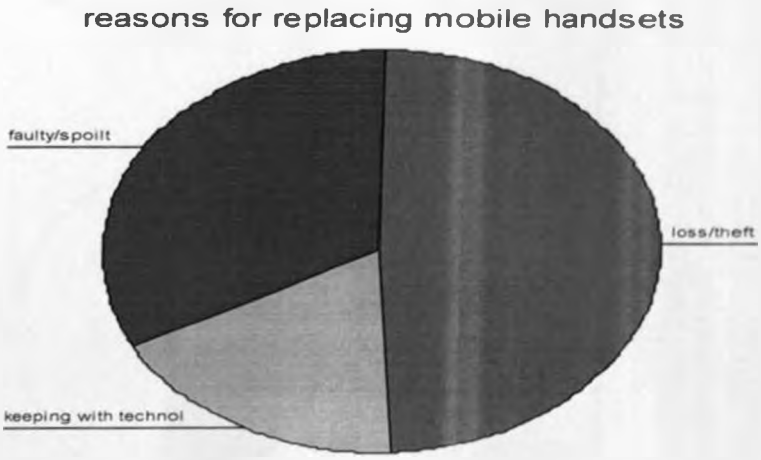

Figure 4.6 Reasons for replacing mobile handsets

4.12 MODE OF DISPOSING HANDSETS AND ACCESSORIES

Respondents were asked to indicate how they disposed spoilt handsets and accessories. 49.1% left them in their drawers, 32.7% threw in the waste basket while 18.2% returned them to dealers for replacement.

Table 4.12: Mode of disposing handsets and accessories

Mode	Frequency	Percentage
Throw away	18	32.7
Return	10	18.2
Leave in drawer	27	49.1
Total	55	100

Source (Primary data)

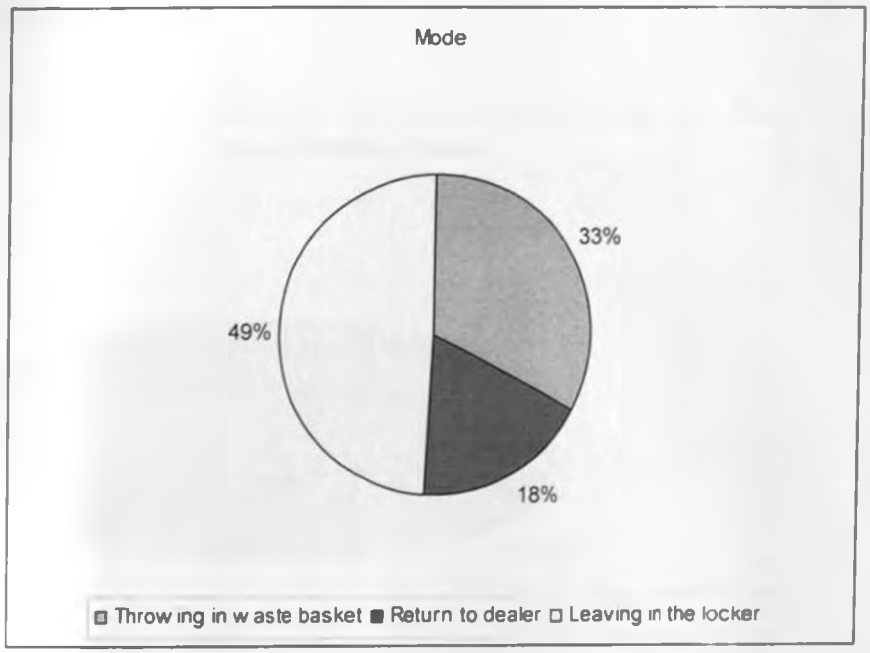

Figure 4.7 Mode of disposing handsets and accessories

Mobile phones contain harmful substances that can cause damage to the environment if not disposed in the right manner. The manufacturers of mobile phone handsets should come up with incentives to encourage the users to return faulty or malfunctioned handsets. Another way is to assure the users that the proceeds of those returned phones would be offered to charitable organizations. Similarly, studies have also shown that the energy generated in the process of recycling can be put to use such as provision of light.

4.13 RETURNING MOBILE PHONE OR ACCESSORIES TO A DEALER OR AGENT

The research wanted to establish whether the respondents had ever returned mobile phones or accessories to dealers or agents. It was established that 72.7% had never returned mobile phones or accessories to a dealer or agent whereas 27.3 % of the respondents had ever returned.

Table 4.13 Returning mobile phones or accessories

Return of mobile phones	Frequency	Percentage
Return	15	27.3
Not Returned	40	72.7
Total	**55**	**100**

Source (Primary data)

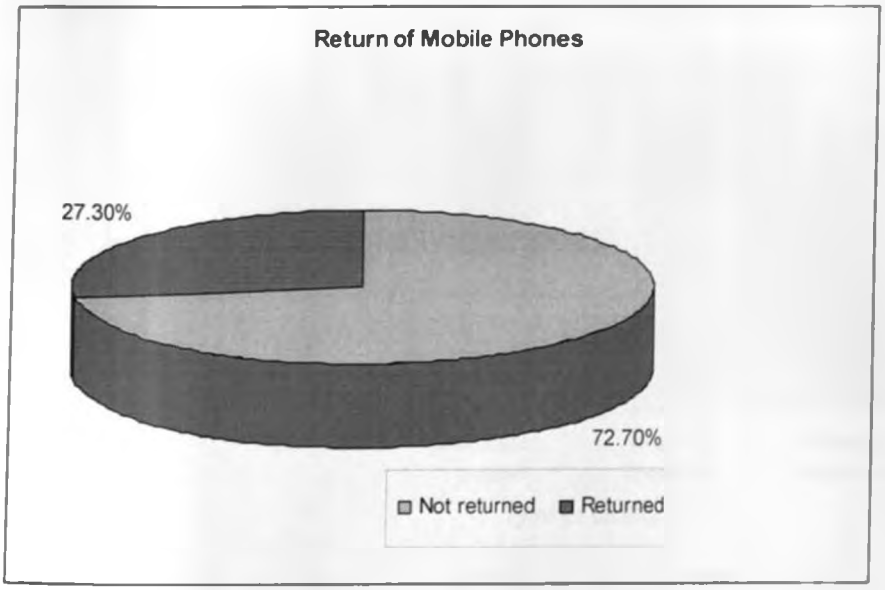

Figure 4.8 Returning mobile phones or accessories

This indicates that there were very low awareness levels on the availability of disposal mechanisms for mobile phones.

4.14 FACILITIES OFFERED AFTER RETURNING MOBILE PHONES OR ACCESSORIES

The respondents were asked to indicate whether they were offered certain facilities upon returning a mobile phone or accessories to the dealer. From the finding, it was established that there were no incentives to encourage return of malfunctioned mobile phone accessories.

Table 4.14 Facilities offered

Facilities offered	Yes	No	Rank
Provide return bins	12.7	87.3	1st
Information availed	9.1	90.9	2nd
Pre-paid envelopes	7.3	92.7	3rd
Incentives	5.5	94.5	4th

Source (Primary data)

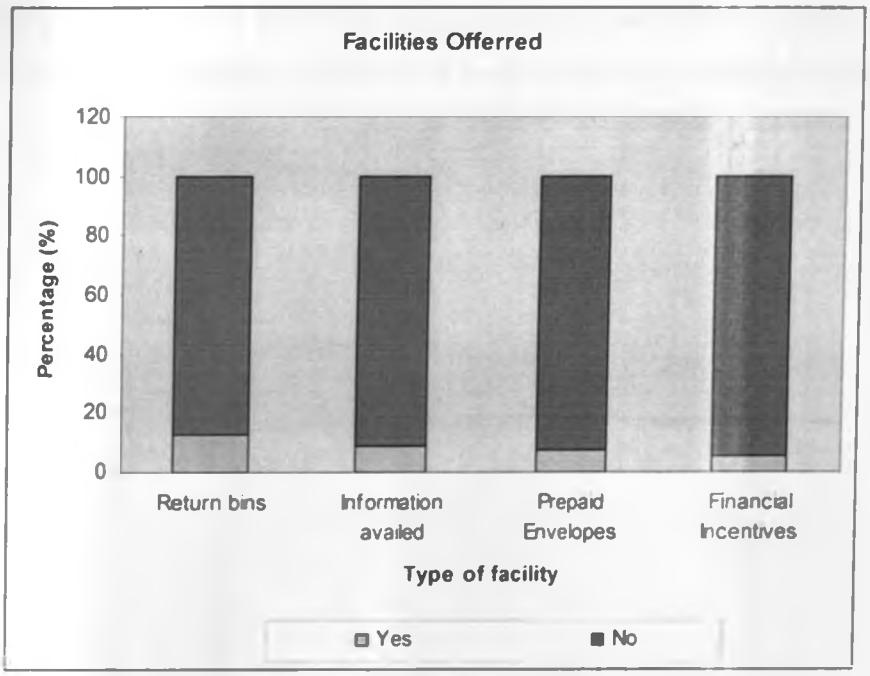

Figure: 4.9 Facilities offered

4.15 AWARENESS OF ANY LEGISLATION GOVERNING WASTE OF ELECTRICAL AND ELECTRONIC EQUIPMENT

The respondents were asked if they were aware of any legislation governing disposal of electrical and electronic waste. The research established that 83.6% of the respondents were not aware of any legislation regarding the Waste of Electrical and Electronic Equipment. This implied that mobile phone users were not in a position to hold the mobile phone manufacturers accountable for the use and subsequent disposal of handsets.

The Kenya Communications Act of 1998 provides for the establishment of the Communications Commission of Kenya (CCK) whose objective is to license and to regulate telecommunications, radio-communication and postal services. Section 39 of the Kenya Communications Act deals with the regulations for radiation of electro-magnetic energy and prescribes the maximum intensity of electromagnetic energy of any specified frequencies which may be emitted in any direction from the apparatus while it is in use. Furthermore, the Environmental Management and Co-ordination Act of 1999 spells out in chapter 141 the offences relating to hazardous wastes, materials, chemicals and

radioactive substances. Chapter 141 of the Environmental Management and Co-ordination Act of 1999 prescribes a penalty of one million shillings, or an imprisonment for a term of not less than two years, or to both for an offence relating to hazardous wastes, materials, chemicals and radioactive substances.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

5.0 INTRODUCTION

The findings, conclusions and recommendations based on the objectives of the study: to test the mobile phone users' awareness on mobile phone disposal and to explore the ways in which mobile phone manufacturers and service providers can use to improve the awareness on mobile phone disposal have been discussed. In addition the limitations experienced by the researcher and areas that need to be explored have also been highlighted.

5.1 SUMMARY

The growth of mobile telephony in Kenya has been very rapid in the last five years. Mobile phones have changed the lifestyles of a vast majority of Kenyans. The telecommunication industry has revolutionalised trade, offered a wide range of services and created gainful employment directly and indirectly. On the other hand mobile phones have problems associated with their use. The research sought to find out whether mobile phone users were aware about safe handset disposal. The research also wanted to find out how the manufacturers of handsets and mobile service providers can use the available opportunities to promote safe disposal. It was realized that the greatest percentage of users have had an average of three phones in the last three years. Majority of the mobile phone users were not aware of the disposal alternatives available and hence left them in drawers.

It was established that mobile phones were useful across all age-groups, gender and professions. The research revealed that income level was not a determinant in owning a mobile phone. There were Ultra Low Cost Handset (ULCH) mobile phones that were sold at very affordable prices. Mobile phone service providers had introduced low denomination calling cards and a variety of tariffs to accommodate the different types of user needs. The research also revealed that the majority of users were unaware of phone disposal methods that were available in the market.

The most preferred mode of communication, according to the research, was through the mobile phone. This explains why there has been a rampant growth in this industry the Information and Communication Technology (ICT) sector. This growth in itself posed a very great challenge of disposal when the phones reached their end of life. There was therefore, the need to ensure that mobile phones are made from

materials that are recyclable, friendly to the environment when disposed and that the users are made aware of this.

Mobile phones had problems associated with their use. The problems ranged from high bills, increased duty of answering incoming calls and privacy issues especially in the use of phone cameras. It was also established that there were health related problems in the use of mobile phones.

5.2 RECOMMENDATIONS

Manufacturers of mobile phone handsets should take advantage of the fact that a fairly large proportion of mobile users are literate and therefore avail information on phone disposal. To cater for the less literate mobile phone users, the manufactures can convey the message in the languages that the users can understand through the available media.

With the rise in mobile phone handsets replacement mobile phone manufacturers should avail the information about recycling and/or safe disposal at the point of purchase. The recycling information can also be availed in social places and on the face of scratch cards. Furthermore prepaid envelopes can be provided to encourage return of faulty or handsets that are not in use. The manufacturers can also explore the option of liaising with the employers to collect the handsets at their workplace. It would also be worthwhile to provide incentives for each handset returned, financial or otherwise. The proceeds from the returned phones can be used in such a manner as to motivate the return of handsets for instance contribution to charity.

There is the need to enact stricter legislation to manufacturers of mobile phones to ensure that they are made from recyclable material. In addition the mobile phone manufacturers should be made accountable of the environmental impact of mobile phone disposal. The government should also ensure that the country does not become a dumping site for cheap phones in the name of subsidized handsets. Instead it should ensure that the handsets being shipped meet the conditions of cost, durability and safe disposal. To do this the government can offer tax incentives on Ultra Low Cost Handsets.

5.3 LIMITATIONS OF THE STUDY

The researcher experienced the problem of mistrust among the respondents in the streets. Some respondents were too busy and had no time for answering the questions. Still others failed to complete and return the questionnaires. The research also encountered biased answers from some respondents especially on the personal information of age and education levels. It was also noted that majority of mobile phone users were not aware of the existing legislation that governs the safe use and eventual disposal of mobile phones. The Environmental Management and Co-ordination Act of 1999, for instance, prescribes the penalties relating to hazardous wastes, materials, chemicals and radioactive substances.

5.4 SUGGESTIONS FOR FURTHER RESEARCH

The research provides an overview of the awareness of mobile phone users on phone disposal. An area that needs to be further explored is a study on what the service providers and manufacturers of mobile phones were doing to respond to this lack of awareness. On the other hand, it would be important to study what the government was doing in response to the growing number of mobile phone shipment that will soon reach their end-of –life. The harmful impact of mobile phones needs to be studied to establish the extent of its harmfulness and how the phone users can be made aware of this.

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APPENDIX : MOBILE PHONE USERS' QUESTIONNAIRE

SECTION A: PERSONAL BACKGROUND TO USERS

1. **What is your gender?**

   Male ☐ Female ☐

2. **What is your age?**

   Under 20 years ☐ 21 to 30 years ☐ 31 to 40 years ☐ Above 40 years ☐

3. **What is your occupation?**

   Student ☐ Employed ☐ Unemployed ☐

4. **What is your highest level of education?**

   Primary ☐ Secondary ☐ College/university ☐

   Postgraduate ☐

SECTION B: MOBILE PHONE INFORMATION

5. **Which is your preferred mode of communication?**

   Mobile ☐ Land line ☐ Email ☐ Others (please specify)----------
   ---
   ---

6. **If your preferred mode is mobile in 5 above, what is the ownership of the handset?**

   Owned ☐ Community payphone ☐ Shared with family/friends ☐

7. **Which tariff are you in?**

   Prepaid ☐ Postpaid ☐ Both ☐

8. **On a scale of 1 to 5 where 1 is most important and 5 least important how did you rate the following factors in your choice of mobile handset?**

	1	2	3	4	5
(a)Cost	☐	☐	☐	☐	☐
(b) Value Added Services eg internet, SMS	☐	☐	☐	☐	☐
(c) Model	☐	☐	☐	☐	☐
(d) Size	☐	☐	☐	☐	☐
(e) Durability	☐	☐	☐	☐	☐
(f) Environmental Consideration eg recyclability	☐	☐	☐	☐	☐

9. How many mobile phone handsets have you had in the last 3 years?

1 to 3 ☐ 4 to 6 ☐ above 6 ☐

10. What are some of the uses for your mobile phone? (*You can select more than one use)*

Call back (flashing or beeping) ☐

Business or official duties ☐

Social networking ☐

Political awareness ☐

Notification of job opportunities ☐

Others (***please specify***)----------

11. What are some of the problems you encounter in the use the mobile phone?

Health related problems ☐

Increased level of duty to answer incoming calls ☐

Disruptive ring tones and pictures (cyber bullying) ☐

Unnecessary cost on mobile bills ☐

Privacy problems caused by phone cameras ☐

Environmental degradation (unsafe disposal of mobile phone accessories) ☐

Mobile phone viruses ☐

Others (please specify)----------

12. What are your reason(s) for the replacement of mobile handsets?

Due to loss/theft ☐ **In keeping with technology** ☐

Faulty/spoilt ☐ **Others (please specify)**----------

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13. How do you dispose spoilt handsets and accessories such as chargers?

Throwing in the waste basket ☐

Returning to the dealer or any other agent ☐

Leaving in the locker or drawer ☐

Any other(please specify)----------

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14. Have you ever returned a mobile phone or accessories to a dealer or agent?

Yes ☐ No ☐

If your answer in Question 14 is No please go to Question 16.

15. If you have ever returned a mobile phone or accessories to a dealer, was any of the facilities listed below offered to you. (Please tick Yes or No).

	Yes	No
Pre-paid envelopes	☐	☐
Offered financial incentives	☐	☐
Provide return bins	☐	☐
Information availed at place of work	☐	☐

Any other (Please specify)----------

16. Are you aware of the any legislation governing the waste of electrical and electronic equipment phones in Kenya?

Yes ☐ No ☐

Thank you for your co-operation.