TRADE-IN POLICY FRAMEWORK AND THE MANAGEMENT OF USED MOBILE PHONES IN ELDORET TOWN, KENYA

BY

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A Thesis Submitted to the School of Postgraduate Studies in Partial Fulfilment of the Requirements for the Award of the Degree of Master of Science in Information Systems of the Faculty of Information Science and Technology of Kisii University

November, 2016
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DECLARATION BY THE CANDIDATE

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LILLIAN NASIMIYU MAYENDE
DEDICATION

This work is dedicated to my parents who taught me that the best kind of knowledge
to have is that which is learned for its own sake. I am as ever indebted to them for the
love and support throughout my life. I owe my deepest gratitude to my family for the
enormous support; both emotionally and financially.
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ABSTRACT

In the past 10 years, the world has witnessed an increasing demand for newer, efficient and effective digital gadgets. Despite this increasing demand, there is still no well defined trade-in policy and collection methods for used mobile devices leading to an increased pile of electronic waste that often leads to both economic and public health problems. The purpose of this study was to assess trade-in policy framework in management of used mobile phone devices in Eldoret town. Specific objectives were: determine the levels of used mobile phone devices identify the inventory management methods used by the mobile phone dealers for used mobile phones, identify the challenges encountered by mobile device manufacturer agents in handling used models of mobile phone devices and to suggest effective trade-in policy framework for used mobile phones. The study was a cross-sectional survey design, where the target population was 390 and the sample size was 198. The study utilised stratified random sampling technique in selecting respondents who participated in the research. A questionnaire and an interview schedule were the instruments for data collection. Frequencies, means and standard deviation were employed in data analysis. Data coding and entry was aided by use of statistical package for social sciences (SPSS V.21.0). The findings indicated that only (28%) of the respondents reported to the presence of used phones of which (63.6%) reported Nokia while (63.6%) reported Samsung phone models. They also agreed that they buy their inventory from suppliers who have products that easily upgraded. However they disagreed that they have a lot of the phone’s stock remaining and inventory from suppliers that have products that easily take back obsolete. More than half of the respondents (64.1%) desired that used/slow moving stock is returned to their suppliers so that they make sales of the still useful parts of a used mobile phone handset (73.7%), that they have a collection point/place where the used mobile phone handsets are taken (76.3%) and that they usually collect used mobile phone handsets from our customers (88.7%). Challenges included, malicious customers who carelessly mishandle their phones and bring it for a trade in policy with the fact that it is available, handsets are sold in different places, so if someone breaks theirs in Mombasa and come to Eldoret they bring it to offices which interferes with their regional records. Also, there are handsets that are much similar so someone just gets rid of the cover and hand the different handsets to them. In conclusion, there is presence of used phones and that most mobile phone dealers have a great challenge of dealing with used handsets. The Trade-in policy framework generated in this study will be an important foundational document that will be used in formulating trade-in policies for the mobile device industry, vendors, agents and consumers. It will also add value to the body of knowledge.
# TABLE OF CONTENTS

DECLARATION BY THE CANDIDATE .......... Error! Bookmark not defined.

PLAGIARISM DECLARATION................................. ii

DECLARATION OF NUMBER OF WORDS....................... iv

COPYRIGHT....................................................................... v

DEDICATION...................................................................... vi

ACKNOWLEDGEMENT.................................................... vii

ABSTRACT...................................................................... viii

TABLE OF CONTENTS ..................................................... ix

LIST OF TABLES ............................................................ xiii

LIST OF FIGURES ........................................................... xiv

LIST OF ABBREVIATIONS AND ACRONYMS ..................... xv

CHAPTER ONE

INTRODUCTION................................................................. 1

1.1 Overview.............................................................................. 1

1.2 Background to the Study.................................................. 1

1.3 Statement of the Problem................................................ 4

1.4 Objectives of the Study.................................................... 5

1.5 Research Questions........................................................ 6

1.6 Significance of the Study................................................ 6

1.7 Scope of the Study.......................................................... 7

1.8 Assumptions of the Study................................................. 8

1.9 Limitations of the Study.................................................. 8

1.10 Conceptual Framework............................................... 8

1.11 Operational Definition of Terms.................................... 11

ix
CHAPTER TWO

LITERATURE REVIEW ........................................................................................................12

2.1 Introduction ..................................................................................................................12

2.2 Theoretical Review ......................................................................................................12

2.2.1 Value-Belief-Norm Theory ....................................................................................12

2.2.2 Waste Management Theory ..................................................................................13

2.2.3 Theory of Planned Behaviour ...............................................................................14

2.3 Concentration of Used Mobile Phones Across the World ........................................16

2.4 Inventory Methods for Managing Used Phones ........................................................19

2.5 Challenges Faced in Managing Used Phones ............................................................23

2.6 Trade-in Policy for Managing Used Phones ...............................................................29

2.7 Summary and Research Gaps ....................................................................................37

CHAPTER THREE

RESEARCH METHODOLOGY ...........................................................................................39

3.1 Introduction ..................................................................................................................39

3.2 Research Design .........................................................................................................39

3.2 Study Area ..................................................................................................................39

3.3 Target Population .......................................................................................................40

3.4 Sample Size and Sampling Procedures ......................................................................41

3.4.1 Sample size ............................................................................................................41

3.4.2 Sampling Procedure .............................................................................................42

3.5 Data Collection Instruments ......................................................................................42

3.5.1 Questionnaire .......................................................................................................42

3.5.2 Interview Guide ....................................................................................................43

3.6 Reliability and Validity of Research Instruments .......................................................43
3.6.1 Validity of the Instruments .................................................................43
3.6.2 Reliability of the Instruments ............................................................44
3.7 Data Collection Procedures .................................................................44
3.8 Data Management and Analysis ..........................................................45
3.9 Ethical Considerations .........................................................................45

CHAPTER FOUR

RESULTS AND DISCUSSION .................................................................47
4.1 Introduction .........................................................................................47
4.2 Demographic Profile of the Respondents ..........................................47
4.3 Concentration of used mobile phone Handsets in Eldoret Town ..........50
4.4 Inventory Methods Used by Mobile Phone Manufacturers Agents in
  Implementation of Trade-in policy Framework ........................................52
4.5 Challenges in handling Used Mobile Phones by Agents in Eldoret ......57
4.6 Trade-in Policy Framework on used Mobile Phones Management in Eldoret....60
4.5.1 Key Informants Responses on Trade-in Policy Framework ..............62

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS ......................65
5.1 Introduction .........................................................................................65
5.2 Summary of Findings ..........................................................................65
5.2.1 Level of Used Mobile Handsets in Eldoret Town ..............................65
5.2.2 Inventory Management Methods Applied for Used Mobile Phones ....66
5.2.3 Challenges encountered by mobile agents in handling used mobile phones...66
5.2.4 Trade-in Policy Framework on Management of Used Mobile Phones ....66
5.3 Conclusion ..........................................................................................67
5.4 Recommendations ..............................................................................67
5.5 Suggestions for Future Research .................................................................68

REFERENCES ........................................................................................................69

APPENDICES .........................................................................................................77

APPENDIX I: INTRODUCTORY LETTER ...............................................................77

APPENDIX II: QUESTIONNAIRE FOR EMPLOYEES ........................................78

APPENDIX III: INTERVIEW SCHEDULE FOR MANAGEMENT ............................81

APPENDIX IV: RESEARCH AUTHORISATION LETTER ..................................82

APPENDIX V: RESEARCH PERMIT .................................................................83

APPENDIX VI: MAP OF STUDY AREA ..........................................................84
<table>
<thead>
<tr>
<th>Table</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1</td>
<td>Target population</td>
<td>40</td>
</tr>
<tr>
<td>4.1</td>
<td>Response rate</td>
<td>47</td>
</tr>
<tr>
<td>4.2</td>
<td>Respondents age</td>
<td>48</td>
</tr>
<tr>
<td>4.3</td>
<td>Working Experience of Employees</td>
<td>50</td>
</tr>
<tr>
<td>4.4</td>
<td>Inventory management used by mobile manufacturer dealers</td>
<td>52</td>
</tr>
<tr>
<td>4.5</td>
<td>Options for disposing used mobile handsets</td>
<td>56</td>
</tr>
<tr>
<td>4.6</td>
<td>Challenges faced in handling used mobile phones by manufacturing dealers in Eldoret</td>
<td>58</td>
</tr>
<tr>
<td>4.7</td>
<td>Suggestions on Development of Policy Framework for Used Mobile Phones</td>
<td>60</td>
</tr>
</tbody>
</table>
LIST OF FIGURES

Figure 1.1 Conceptual Framework on Formulation of a trade-in policy framework on obsolete mobile phones management.........................................................................................9

Figure 2.1 Variables in the VBN theory of environmentalism........................................12

Figure 2.2 A schematic representation of TPB..............................................................15

Figure 4.1 Respondents Gender...................................................................................48

Figure 4.2 Respondents education qualification level.................................................49

Figure 4.3 Models of used phones present...................................................................51

Figure 4.4: Presence of old/used mobile phones ...........................................................52
# LIST OF ABBREVIATIONS AND ACRONYMS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AU</td>
<td>African Union</td>
</tr>
<tr>
<td>CAK</td>
<td>Communications Authority of Kenya</td>
</tr>
<tr>
<td>CBD</td>
<td>Central Business District</td>
</tr>
<tr>
<td>CCK</td>
<td>Communications Commission of Kenya (defunct)</td>
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<tr>
<td>CCN</td>
<td>County Council of Nairobi (defunct)</td>
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<tr>
<td>CRT</td>
<td>Cathode Ray Tube</td>
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<tr>
<td>CSR</td>
<td>Corporate Social Responsibility</td>
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<tr>
<td>ECOWAS</td>
<td>Economic Community of West African States</td>
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<tr>
<td>EEE</td>
<td>Electronic and Electric Equipment</td>
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<tr>
<td>EoL</td>
<td>End of Life</td>
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<tr>
<td>EPR</td>
<td>Extended Producer Responsibility</td>
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<td>GDP</td>
<td>Gross Domestic Product</td>
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<td>ICT</td>
<td>Information and Communication Technology</td>
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<tr>
<td>ITU</td>
<td>International Telecommunications Union</td>
</tr>
<tr>
<td>KEBS</td>
<td>Kenya Bureau of Standards</td>
</tr>
<tr>
<td>MNO</td>
<td>Mobile Network Operator</td>
</tr>
<tr>
<td>NACOSTI</td>
<td>National Commission for Science, Technology &amp; Innovation</td>
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<tr>
<td>NEMA</td>
<td>National Environmental Management Authority</td>
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<tr>
<td>NGOs</td>
<td>Non Governmental Organisations</td>
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<tr>
<td>OECD</td>
<td>Organization for Economic Cooperation and Development</td>
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<td>OEM</td>
<td>Original Equipment Manufacturers</td>
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<td>SPSS</td>
<td>Statistical Package for Social Sciences</td>
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<tr>
<td>TPB</td>
<td>Theory of Planned Behaviour</td>
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<tr>
<td>UK</td>
<td>United Kingdom</td>
</tr>
<tr>
<td>UNDP</td>
<td>United Nations Development Programme</td>
</tr>
<tr>
<td>US</td>
<td>United States of America</td>
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<tr>
<td>USD</td>
<td>United States Dollar</td>
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<tr>
<td>VBN</td>
<td>Value Belief Norm Theory</td>
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<td>WWF</td>
<td>Worldwide Fund for Wildlife</td>
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<tr>
<td>WEEE</td>
<td>Waste, Electronic and Electric Equipment</td>
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<td>WMT</td>
<td>Waste Management Theory</td>
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<td>YTF</td>
<td>Youth for Technology Foundation</td>
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CHAPTER ONE

INTRODUCTION

1.1 Overview
This chapter entails the background to the study, the statement of the problem, objectives of the study, significance of the study, justification of the study, the scope of the study, limitations of the study, assumptions of the study and the conceptual framework.

1.2 Background to the Study
The technology industry has witnessed a fast paced development of consumer oriented electrical and electronic technologies since the 1980s (Huang, 2009). This fast-paced development of electronic products has also resulted in a decrease in the useful life of the said products due to rapid changes in equipment features and capabilities (Basiye, 2008). Yla-Mella (2015) citing Moore predicted that electronic hardware would change to become faster, smaller and more efficient every two years. Hence the increased need for the consumers to procure better and more efficient devices for their use even in Kenya. The decrease of the life span of electronic products such as mobile phones has resulted to an increased amount of obsolete electronic equipment being dumped in various cities across Sub Saharan Africa (Jepchumba, 2014; Okoye & Odoh, 2014).

When a mobile phone becomes obsolete, which is a condition of no longer being used or useful, it is referred to as E-waste. E-waste is a generic term encompassing various forms of electrical and electronic equipment that are used end-of-life electronic appliances or have ceased to be of any value to their owners (UNEP). E-waste
includes electronics which are destined for reuse, resale, salvage, recycling, or disposal (NEMA, 2015).

Access to and use of mobile telephones in Sub-Saharan Africa countries has increased dramatically over the past decade (from early 1990’s). According to International Communication Union (ITU), there are ten times as many mobile phones as landlines in sub-Saharan Africa (ITU, 2009), and 60% of the population has mobile phone coverage. Mobile phone subscriptions increased by 49 percent annually between 2002 and 2007, as compared with 17 percent per year in Europe (ITU, 2008).

Many developing countries such as Kenya have seen a quick surge in the uptake of mobile phones for the last 15 years (Jepchumba, 2014). In 1999, for example, the Kenyan-based service provider Safaricom projected that the mobile phone market in Kenya would reach thirty million subscribers by 2020. Safaricom, alone, currently has over 17 million subscribers according Communications Authority of Kenya (CAK, 2015). At the onset, the mobile phones were only considered to be communication devices. However, mobile phone functionalities have evolved to include money transfer, access to the internet, word processing amongst other features such as tracking of healthcare (Ongondo & Williams, 2011a).

The introduction mobile phone services and a surge in mobile phone brands have put so much pressure on the consumers to always go for newer brands by the day (Murakami, Oguchi, Tasaki, Daigo & Hashimoto, 2010). Globally, seven hundred million obsolete phones which were discarded in 2005 contained an estimated 560,000 kg of lead in the form of solder (Lincoln et al., 2005). This implies that more than 10 years later one million tonnes of obsolete phones have already been discarded across the world (Yla-Mella, 2015).
The problem of obsolesce is increasing as newer and better phone devices are produced by major companies across the world (Okoye, & Odoh, 2014). Most manufacturers are more concerned with increased sales of new devices as demand rises against a back drop of surging mobile phone waste that is becoming a major social and environmental concern to most governments (Saphores & Nixon, 2014). There are currently no definitive trade-in policies for mobile phones and other mobile devices in Kenya as formulated by manufacturers, the government or the importers (Jepchumba, 2014).

Mobile phones and other mobile devices have relatively short life-spans and rapidly become obsolete in a short while as newer devices are rolled out. The average functional life of a mobile phone is 7 years but worldwide, the average consumer changes their mobile device every 11 months (Sharpe, 2005). However, the reusability of these devices as well as their material composition means that in terms of mass and volume, mobile phones represent the most valuable electronic products that are currently found in large numbers in waste streams.

End-of-life mobile phones are a high value (from a reuse and resource perspective), high volume (quantity), low cost (residual monetary value) and transient (short lifecycle) electronic product (Ogondi & Williams, 2011). Many countries in the world for example in Japan, Apple computers have a well defined trade-in policy for mobile devices including i-phones, i-pods and i-pads (Apple Computer, 2002). The Japanese government supports this initiative by manufacturers to encourage trade-in of mobile devices for newer versions at a marginal cost. Additionally, since October 2002, Apple has encouraged residents of the city of Cupertino - home of Apple’s worldwide headquarters - to recycle their used or unwanted computers and home electronics free
at Apple’s Cupertino recycling collection facility (Apple computers, 2002). However, it is not known how the government of Kenya has engaged with mobile phone manufacturers and dealers and trade-in of mobile devices, a focus of this research.

The lack of a policy framework on trade-in policies has hampered the management of the pile up generated by obsolete mobile phone devices in Kenya. This study will focus on Uasin Gishu County which is a county in Kenya’s Rift Valley which according to Kenya Bureau of Statistics in their 2009 census, has a combined rural and urban population of 894,179 (Open data, 2012). Additionally there is a national mobile phone penetration of 71% (CAK, 2009). Due to the high mobile penetration, issues of dumping of used phones have been on the rise because it creates an environmental risk. Therefore, the study conducted and assessment on the trade-in policy framework in managing used phones in Eldoret town, Kenya.

1.3 Statement of the Problem

Kenya just like other developing countries is a lucrative market for newer and superior mobile phone devices. According to CAK, Kenya had a mobile penetration of 72.7% by July 2013. The report also notes that due to the increase in the use of phones for voice call, short messaging and data, the projection of uptake by the year 2018 will be more that 100% since people may have more than one device each.

The same report indicates that a higher volume of mobile money transactions recorded in the first quarter of 2013 indicating the increased popularity of mobile money transfer services will contribute to an even higher uptake of the mobile phone handsets. It was noted that Ksh.205 billion deposits made, up from Ksh 192 billion in the previous quarter. The increase represents 6.7% growth between the two consecutive quarters (CAK, 2015). In that regard this study will help in ensuring that
there is a way of managing all those devices meaning that there will be an increased need for a trade-in policy to manage the cost of newer devices as customers purchase newer devices and dispose of the used ones. There exists little or no information to the consumers about how they can trade back their used but still functional mobile devices as they acquire new ones. The importance of the trade-in policy framework is to give guidelines to the formation of a sustainable trade-in policy. This study explored the best-in-class policies formulated in other jurisdictions and also collect and analyze the views of stakeholders to arrive at an appropriate and functional framework that will be a basis of generating policies that will optimize trade-in practices in Kenya.

1.4 Objectives of the Study

The main objective of the study was to assess the implementation of a trade-in policy framework for management of used mobile phones in Eldoret, Kenya. The specific objectives were:

(i) To determine the concentration of used mobile phone devices in Eldoret town mobile phone dealers

(ii) To find out the inventory management methods for used mobile handsets in Eldoret town.

(iii) To determine the challenges encountered by mobile phone agents in handling used mobile phone devices in Eldoret town.

(iv) To establish a workable trade-in policy framework for managing used mobile phones in Eldoret town.
1.5 Research Questions

The study was guided by the following research questions;

(i) What is the concentration of used mobile phones devices in Eldoret Town phone dealers?

(ii) What are the inventory methods for used mobile handsets are being adopted by the mobile phone dealers?

(iii) What challenges are being encountered by mobile phone devices agents in Eldoret town in handling used phones?

(iv) What is the best workable trade-in policy framework for managing used mobile phones in Eldoret town?

1.6 Significance of the Study

The findings of this study may assist the mobile phone manufacturer agents to handle used models and improve sales on newer models. They will also be able to know the models that their customers like and those that are not very popular, therefore producing the more popular brands while improving on the not so popular ones. It will also benefit the consumers who will be able to save money on their newer devices.

This study may also help the users of the mobile phone devices to learn how to properly dispose or manage their used but still functional mobile phones. They will be able to acquire the newer versions of their used mobile phones at a lower cost hence making them have more money in their pockets. The county government of Uasin Gishu will also benefit from this study by knowing the uptake of mobile phone devices within Eldoret, hence enabling them to plan better on the communication needs of their citizens.
The results of the study may enable the mobile phone agents to understand the need for a trade-in policy and the ministry of environment will be reminded of the reality of e-waste and its effect on the environment. It will also act as a resource material for other researchers. Moore’s Law predicted the increased rate of obsolescence when electronic manufacturers developed smaller and smaller transistors in computer hardware. This has resulted in the rate of obsolescence increase from two years to less than a year.

Therefore more and more mobile devices are bought and used ones disposed every two years in developing countries and much less in developed countries. A mobile trade in policy could be one of the ways of discouraging improper disposal and storage of used and end-of-life electronic products such as mobile devices. There is therefore need for a well defined trade-in policy framework to guide the private sector as well as the government in the management of used but still functional mobile devices.

1.7 Scope of the Study

This study sought to determine the implementation of trade-in policy framework in the management of used mobile phones by mobile phone manufacturing agents in Eldoret town. The study looked at the concentration of used mobile phones in Eldoret town; inventory management methods used by agents, challenges faced in handling used mobile phones and workable trade-in policy framework for used mobile handset. The study targeted mobile phone manufacturing agents in Eldoret town dealing with various phone brands and are certified by the parent company to handle, sell and even service their products. Data collection instruments were limited to questionnaires and scheduled interviews with key informants.
1.8 Assumptions of the Study

The following were the assumptions of the study:

(i) All Mobile devices and phones are brand new and not refurbished or used anywhere else.

(ii) That the respondents cooperated by answering the research questions honestly.

(iii) There are strategies initiated by mobile phone manufacturer agents to handle used phones brought by their clients.

1.9 Limitations of the Study

Several limitations were experienced during the process of data collection but the researcher overcame them. For instance, some respondents failed to answer the research questions in the questionnaire; this forced the researcher to obtain information from the selected members in the population that were not included in the final sample. Secondly, the interview with key informants was being postponed several times and the researcher had to persist in seeking time with them until all of them were interviewed. Another limitation concerned the concept under study (used mobile handset), some respondents (dealers’ staff) could not differentiate it with defective phones and it took a lot of time for the researcher to explain the concept to them so as to understand. This explains why the data collection period took long than expected.

1.10 Conceptual Framework

Conceptual framework is an analytical tool with several variations and contexts. It is used to make conceptual distinctions and organize ideas. The conceptual framework consists of independent variable (mobile phone-trade-in policy framework),
dependent variable (mobile phones management) and intervening variables (government policies, reduced cost of new models).

**Independent Variable**

**Trade in policy**

**Concentration of used phones**
- Year of purchase
- Brand

**Inventory methods**
- Collection of used phones
- Systems available

**Challenges**
- Lack of knowledge
- Attachment to value of used phones

**Workable trade-in policy**
- Manufacturer Trade discounts
- Discounts on the upgraded mobile phones

**Dependent Variable**

**Management of used mobile phones**
- Reduction of e-waste
- CSR
- More precious materials recovered from returned phones
- Good environmental conservation practices

**Intervening Variables**

- Government Policies,
- Reduced cost of new models,
- ICT infrastructure,
- Policy awareness

**Figure 1.1 Conceptual Framework on Formulation of a trade-in policy framework on obsolete mobile phones management**

**Source:** Self conceptualization (2015)

The model shows that there are four independent variables being studied in this work. At first, the study looked at the concentration of used mobile phone based on different brands. Secondly, the study looks at the inventory methods that mobile phone agents are using to manage used phones. Thirdly, the study looks at challenges that mobile
agents face in implementation of trade in policy framework and the last variables looks at workable trade-in policy framework for used phones. The main dependent variable is illustrated through the ways through which used mobile phones are managed. They have the following indicators; reduction of e-waste, corporate social responsibility activities, more precious metals recovered and good environmental practices. However, the model depicts the intervening variables that may affect usability of trade-in policy framework for used phones.
1.11 Operational Definition of Terms

**Attachment of value to obsolete mobile phones by** the consumer refers to the reluctance by the consumers to dispose obsolete mobile phones and thus leading to accumulation of obsolete waste on to their obsolete electronics due to perceived usefulness and their symbolic value.

**Inventory methods:** include the procedures that mobile phone manufacturing agents use to manage used phones.

**Management** – The process of collecting used phones from users for various purposes like recycling processes and even extraction of specific usable items in end of life mobile phones.

**Mobile Phone** – they are cell handsets used for communication, voice and data services

**Trade-in policy framework** – refer to legal policies and frameworks and the institutional mechanisms that have been put in place to regulate the management of used phones.

**Used phones** – They are phones that have already been used or refurbished.
CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction
This chapter presents and discusses the economics of mobile devices trade-in arrangements and recycling, the impact of wrongly disposed or stored mobile devices, trade-in policies and other interventions in Africa, the future of trade-in programs for mobile device manufacturers and vendors in Kenya, the theoretical framework and finally the empirical framework.

2.2 Theoretical Review

2.2.1 Value-Belief-Norm Theory
The research considered the use of value-belief-norm (VBN) theory developed by Stern (2000). The value belief theory has been linked to norm-activation theory. According to VBN theory, personal norms are activated when individuals believe that adverse consequences violate something they value and they would share the responsibility for those consequences by taking certain action (Stern 2000) Figure 2.1 illustrates the causal chain of VBN.

![Figure 2.1 Variables in the VBN theory of environmentalism](image)

Source: Stern (2000)

The VBN theory recognises that moral motivations, including personal values, beliefs, and norms, have a strong causal influence to the environmentally significant behaviour. These causal factors vary across behaviour and individuals, and may also interact with each other. Attitudinal causes are typically the most predictive for
behaviours not strongly limited by context or individuals’ capability, whereas contextual factors and personal capability induce more variance for expensive and/or difficult behaviours (Stern, 2000). In sum, VBN argues that individual choice about pro-environmental actions is driven by personal norms, an internalized sense of obligation to act in a certain way. Therefore consumers and dealers’ behaviour on environmental consciousness is critical to ensure used phones are managed well with minimal or no effect to the environment.

In relation to this study, consumers’ behaviour to return used phones to the mobile agents is determined by their belief and attachment to that device. For instance, some mobile phones may be having personal information and data that the consumer feels that he/she still needs not to dispose or give it away. It is better for the consumer to purchase another phone brand rather than replacing or giving it back to the manufacturer. This behaviour is explicitly linked to value belief norm theory.

2.2.2 Waste Management Theory

The second theory that the study considered was the waste management theory (WMT). Waste Management Theory was introduced to channel environmental sciences into engineering design. WMT is a unified body of knowledge about waste and waste management. It is an effort to organise the diverse variables of the waste management system as it stands today. WMT is considered within the paradigm of Industrial Ecology, and built side-by-side with other relevant theories, most notably Design Theory. Design Theory is a relatively new discipline, still under development. Following its development offers valuable insights about evolving technical theories.

Love (2002) argues that it is significant to theory development to integrate theories from other bodies of knowledge, as well as the clarification of the definitions of core
concepts, and mapping out key issues, such as domains, epistemologies and ontologies. At the present stage of WMT development, scientific definitions of key concepts have been offered, and evolving of WMT under the paradigm of Industrial Ecology is in progress. The function of science is to build up systems of explanatory techniques; a variety of representative devices, including models, diagrams and theories (Toulmin 1953). Theories can be considered milestones of scientific development. Theories are usually introduced when previous study of a class of phenomena has revealed a system of uniformities. The purpose of theory is then to explain systems of regularities that cannot be explained with scientific laws (Hempel 1966). Formally, a scientific theory may be considered as a set of sentences expressed in terms of a specific vocabulary. Theory will always be thought of as formulated within a linguistic framework of a clear specified logical structure, which determines, in particular, the rules of deductive inference.

The waste management theory was significant to this study in that it assisted the study to understand the different trade-in policy procedures that were available in the study. If manufacturers have a procedure of managing the waste associated with used phones, there have to be collaborations with other agencies to ensure that the products emitted are not harmful or destructive to the environment. Therefore, it was important to determine whether principles of waste management theory were applied in this research.

2.2.3 Theory of Planned Behaviour

The third theory that guided the study is the theory of planned behaviour (TPB) developed by Ajzen (2002). The TPB theory rests on the assumption that people, in essence, are rational by nature and they apply available information systematically.
The basis of TPB is that people try to reach a consistency between personal knowledge, attitudes and behaviour. Therefore, the central factor of TPB is the individual’s intention to perform certain behaviour. A simplified representation of TPB is illustrated in the Figure 2.2.

![Figure 2.2 A schematic representation of TPB](image)

**Source**: Ajzen (2002)

According to TPB, behaviour is driven by three independent determinants of intention; attitudes toward the behaviour, perceived social pressure or subjective norms and perceived behavioural control over the action, which is assumed to reflect the person’s past experiences. The stronger these factors are, the more likely they are to form a behavioural intention to do the action and, ultimately, act. All of these determinants are driven by the individual’s salient beliefs; therefore, changes in beliefs are required in order to influence individuals’ behaviour.

According to TPB theory, that external variables, such as personality characteristics or demographic variables, can affect the person’s behaviour only indirectly to either decided to dispose or manage a used phone. Therefore, they are regarded as less stable and are ordinarily excluded from TPB (Ajzen, 2002). This theory is related to this research in that a person’s intention to return used phones in exchange of a new one at an affordable fee is dependent on his/her attitude, subjective norm and behaviour control. Some consumers may develop a tendency of not giving back their
valuable phones due to their norms and attitude. The behaviour of a consumer might propel or inhibit the degree to which they may comply with trade-in policy framework.

2.3 Concentration of Used Mobile Phones Across the World

A mobile phone (also known as a cellular phone, cell phone, hand phone, or simply a phone) is a phone that can make and receive telephone calls over a radio link while moving around a wide geographic area (Huang, 2009). It does so by connecting to a cellular network provided by a mobile phone operator, allowing access to the public telephone network (GSMA, 2012). By contrast, a cordless telephone is used only within the short range of a single, private base station. In addition to telephony, modern mobile phones also support a wide variety of other services such as text messaging, MMS, email, Internet access, short-range wireless communications (infrared, Bluetooth), business applications, gaming, and photography (ITU, 2007).

Mobile phones that offer these and more general computing capabilities are referred to as smart phones (Donner & Steenson, 2008). A mobile device is a small computing device, typically small enough to be handheld having a display screen with touch input and/or a miniature keyboard and weighing less than 2 pounds or 0.91 kg (Weisser, 1991). In 2014, there were more than seven billion mobile phone subscribers worldwide, a number that is expected to keep growing. The United Nations reported that mobile phones have spread faster than any other technology and can improve the livelihood of the poorest people in developing countries by providing access to information in places where landlines or the Internet are not available, especially in the least developed countries. Use of mobile phones also spawns a
wealth of micro-enterprises, by providing work, such as selling airtime on the streets and repairing or refurbishing handsets (UNDP, 2007).

Ylä-Mella (2015) argues that the production and use of electrical and electronic equipment (EEE) have significantly increased during the last three decades due to technological innovations and new applications of EEE. Fast technological progress, EEE becoming a part of everyday life and rising incomes have led to the situation where EEE are more replaceable than ever causing the rapid growth of waste electrical and electronic equipment (WEEE). In order to reduce negative environmental and health impacts and to improve the recovery of valuable substances from WEEE, the European Union has implemented Directives related to EEE.

The amount of retired handsets has grown even more rapidly than other WEEE. The global number of cell phone subscribers has grown exponentially in the last 15 years: 16 million in 1991, 60 million in 1995, 470 million in 1999, 1.33 billion in 2003, and 2.5 billion in 2007 (Nokia, 2005; ITU, 2010). The number of end-of-use handsets increased even faster than this since cell phone lifetimes have been decreasing, from 3 years in 1991 to 18 months by 2002 and probably even less today. According to Yuan (2007), 60% of all 2007 sales in emerging markets were already replacement sales. Second, cell phones have a thriving second hand market, and more handsets are currently reused than recycled. Some environmental agencies are thus interested in understanding the drivers behind this in order to apply it to other WEEE (Defra, 2003).

The average mobile phone user replaces their mobile phone every 11 to 18 months (Informinc, 2009). Mobile phone manufacturers within Europe are subject to the WEEE directive. In Australia only, it is estimated that there were 3.5 million new
mobile phone sold in the last 12 months. Now with the introduction of 3G technology and coloured screens, more mobile phones are expected to be sold. The Australian bureau of statistics figures show in the year 2000, 61% of Australian households had mobile phones and this number has steadily risen to 12.8 million mobile phone connections at the end of 2003. The average Australian typically upgrades their phones every 18-24 months. Australia introduced a mobile phone recycling scheme in 2010 (Australian Bureau of Statistics, 2010).

Jepchumba (2014) noted that the mobile phone demand across Africa is rapidly expanding: it is estimated that over 50 million people have mobile phones in Africa, accounting for 7% of the population (Scott et al., 2004). Over the past five years there has been a 65% increase in mobile phone subscribers in Africa (Eagle, 2005). The number of mobile phone users in many African countries has over taken the number of fixed landline users (Banks & Burge, 2004).

Kenya has not been left behind in the rapid growth in the mobile phone subscription. From June 1999 there were only 15000 mobile phone subscribers and by the end of 2004 the number had risen to over 5.6 million (Eagle, 2005). As of 2008, it is estimated that there are approximately 10 million subscribers in Kenya (CCK, 2008). Currently, the mobile subscription base has risen to over 28 million (CCK, 2011). This rapid growth can be attributed to the fast and reliable means of communication and the opportunity it presents regarding the deficiency of pro-poor service in the remote and rural areas (Scott et al., 2004). The growth of mobile phones in the rural areas can be attributed to the ease of carrying them around thus making them suitable for use in these areas that lack infrastructure. The prepaid system with low cost denomination recharge cards and per second billing has increased the accessibility of
the services to the rural population, as it is commensurate with the economic situation (Scott *et al*., 2004). This rapid growth can also be attributed to the huge consumer demand and the willingness of the network operators to expand into the new markets that are not in the urban areas. The fact that the mobile phone networks need no cables to run over vast distances and the availability of solar energy as a power source in rural areas has also played a fundamental role in the proliferation and use of the mobile phones.

2.4 Inventory Methods for Managing Used Phones

Mobile phones and devices have value well after their intended use (Mmereki, Li & Li’ao, 2015). Yet the value of these gadgets to recyclers is marginal and relies on high volume to become profitable (Muruakami *et al*., 2010). The economic value of recycled cell phones is split into two categories; refurbished units that are resold to end users and phones that have no value to retail consumers that are recycled for their precious metals. The University of California Santa Barbara published a study in 2010 on the subject called, “Economics of Cell Phone Reuse and Recycling” that states the value of reused and recycled cell phones. In 2006, according to the study the average cost for U.S. Cell phone refurbishers ReCellular, PaceButler and RMS was USD 2.10 while the average revenue from said phones was USD17. Of the two recycling methods, refurbishment of cell phones is significantly more profitable than recycling the internal parts (US Environmental Protection Agency, 2015).

The lifespan of mobile phones depends on various reasons, e.g. economic conditions, cultural behaviour, and even market strategy for sales; however, the typical lifespan for mobile phones in service is from one to five years (Huisman *et al*., 2007; Jang & Kim 2010; Milovantseva & Saphores 2013; Murakami *et al*., 2009; Polak
The user’s age is significant in terms of lifespan; younger people tend to replace their mobile phones more regularly (Ongondo & Williams 2011a) while elder keep the phones longer (Jang & Kim 2010; Murakami et al., 2009). The common consensus of surveys is that most users replace their mobile phone within 2 years (Murakami et al., 2010; Ongondo & Williams 2011a).

The background of this short lifespan is the fact that in many countries mobile phone contracts are signed for 2 years. On the other hand, the short usage time of mobile phones creates also a re-use potential of functional devices. If people would deliver their functional EOU mobile phones to the recovery system without unnecessary delays, there is a reasonable chance to find a second user who could still use them. Unfortunately, this is not always the case. Currently, there seems to be an immense resource potential stored at homes, waiting for the storage phase to end (Bouvier & Wagner, 2011; Polak & Drapalova, 2012; Saphores et al., 2009, Toppila, 2011).

The insatiable desire for the cell phones in Kenya has made the country a profitable market for this high tech equipment, which is mostly second hand or refurbished products with a short life span (Jepchumba, 2014). This situation in return results in increasing number of obsolete products (Kang & Schoenung, 2004). This poses a major challenge in the end of life (EoL) management of this equipment alongside other ICT equipment. There has been an exponential increase in e-waste volumes due to the high influx of imported second hand electronics. The equipment and their accessories contain toxic heavy metals such as cadmium, lead, mercury, manganese, lithium, zinc, arsenic, antimony, and beryllium and copper (Oiva, 2000).

The mass flow study carried out in 2007 by Kenya ICT Action Network showed that 1,513 tonnes of electronics entered the market. The consumer in addition to receiving
1,489.4 tonnes also received 151.3 tonnes from the second hand market. Kenya has reached a mobile penetration rate of more than 71%, and an internet penetration of more that 18.6% (Communication Commission of Kenya, 2013). The number of internet users was estimated at 10.2 million while the number of ICT companies along the sector increased to more than 4000 companies.

Moreover, many shops and kiosks also resell ICT related services; especially services and products relating to the mobile phone ICT is being extensively used in the Education, Health, industrial, Trade and communication sectors (Munyao, Nyamwange, & Wayoike, 2006). Private sector has been installing heavy computing equipment and data centres, mainly mobile operators, banks, and Manufacturing sector companies. A research conducted by Nokia in late 2011 indicated that only 14 percent of Kenyans were aware that mobile phones could be recycled, and only 2 percent were actively recycling these devices (Nokia, 2011).

In Finland, Yla-Mella (2015) indicated that the implementation of the WEEE Directive has succeeded. The legislative basis and functional WEEE recovery system with high collection and recovery rates have been enacted within a few years. The study revealed that consumers’ awareness of the importance and existence of WEEE recovery system is high among the residents in Oulu; however, the high storing rates of mobile phones indicate that the proximity and the convenience of the WEEE recovery system are inadequate to motivate the return of small WEEE. Analysing the lifespan of electronics indicates that stockpiling deprives the re-use potential of mobile phones and thus hinders waste prevention. Storage also delays the return of valuable substances for recycling and risks the realisation of the waste management hierarchy. It is concluded that education and awareness raising will continue to be a
crucial element in the progress towards a more environmentally conscious WEEE recovery in Finland.

During 2011, Nokia initiated the first campaign in Egypt to highlight the importance of recycling mobile phones in collaboration with the Resala Foundation – an organization with over 100,000 volunteers involved in education and support for local communities across the countries – to link Nokia’s solution for recycling mobile devices to Resala’s education project. Nokia (2011) started the Eco-school program in cooperation with WWF in South Africa, raises awareness for teachers and educators about the importance of e-waste recycling.

In Nigeria, Nokia works in partnership with Youth for Technology Foundation (YTF). The purpose of the project, called “TakeItBack” is to increase education and awareness for take-back and recycling mobile phones in Nigeria, and to increase the amount of collected mobile phones by YTF and Nokia in Nigeria (Nokia, 2015). An in-depth survey was conducted in Nigeria, Kenya and South Africa to gauge consumers’ awareness of and concern for environmental issues, as well as attitudes towards recycling. The results show that, while Africans show high concern for the environment, awareness of recycling is still quite low. Responses also showed Nokia showing strong brand equity in the environmental space (Scott, Batchelor, Ridley, & Jorgensen, 2004).

In Nigeria, Okoye and Odoh (2014) study was carried out to ascertain the peoples’ level of awareness of the regulation, their mode of disposal of the e-wastes and their awareness of the dangers inherent in improper handling and disposal of wastes. Data for this study were collected through the distribution of 247 well-structured questionnaires. Likert Scale was adopted for the analysis of the respondents. The
results revealed that awareness is critically low. Though the respondents have concern for their environment in various degrees, majority dispose their e-waste alongside municipal wastes without knowing the implications. Awareness strategy was designed for sensitization campaign.

Igweta (2013) did a study on strategic evaluation of e-waste management in procurement and disposal of mobile phones, a case of mobile phone dealers in Nairobi county and found out that most of the companies and shops dealing with electronics have no policies and measures put in place to ensure that there is proper disposal of the e-waste tying the findings only to cost and technology as the determinants of the influx of the electronic waste. Mwendwa (2006) on the other hand, conducted a study on municipal solid waste management strategy selection model.

Thuo (1998) did an appraisal of solid waste management in small towns in Kenya: a case study of Othaya town, Nyeri District. From the above citations, it is evident that previous studies did not effectively address the relationship between strategic evaluation of electronic waste management and disposal of cell phones especially in Kisumu County. With these studies, no study has ever addressed the utilization of a trade-in system to redeem and control obsolete and used mobile phones hence the importance of this study.

2.5 Challenges Faced in Managing Used Phones

Jepchumba (2014) indicates that there are various challenges in e-waste management in Kenya. She asserted that the consumers perceive their waste is a resource that can generate income, thus the unwillingness of consumers to give out their EoL goods for free. This perception is further enhanced by the value attached to products by the
consumers; there is a tendency to store EoL EEE especially mobile phones at home even if these products are obsolete as opposed to disposing them. The consumers’ reluctance to pay for recycling and disposal services reinforces the notion that nothing goes to waste and that garbage is money. The above perceptions make consumers reluctant to freely participate in EoL management of EEE.

According to Nokia’s (2015) experience in Kenya, there are some challenges and opportunities for producers to establish effective take-back scheme. The challenges are: (1) inconvenience (due to very few collection points around the country); (2) lack of incentives to end users; (3) competition for material resources (between the repair shops and the take-back scheme); and (4) lack of awareness among the end users. On the other hand, the opportunities for future improvements include: (1) increasing quantities of mobile phone (so reasonable amount of obsolete mobile phones coming into the collection system); (2) no backyard dumpling (addressing the problem before it gets out of hand); (3) existing infrastructure (well established care centers by the network providers all around the country); and (4) Nokia’s competitive edge over other manufacturers due to early start (Nokia, 2011).

Lack of knowledge is also commonly mentioned as a reason for keeping phones at home; up to 46% of respondents did not know where to return those (Yin et al., 2014). Alternatively, Wagner (2009) proposed that stockpiling occurs due to the inconvenience of the WEEE recovery systems, households’ sufficient storage capacities and perceived value of stored phones. Meinhardt (2001) discusses the lack of awareness of users, industry and government regarding end-of-life computer issues: Users also lack awareness of the range of reuse and recycling options available to them. Another type of information failure is the lack of data on e-waste
Moreover, Consumers in Kenya magazine (2012) noted that like in many countries across the globe, are unaware of the economic benefits of recycling or taking back their broken or unwanted mobile phones, “said Bruce Howe, former General Manager for Nokia East Africa. “The reality is that mobile phones contain many valuable and useful materials that can be recycled, including precious metals and plastics. In fact, for every one million phones recycled, it is possible to recover nearly 35kg of gold and 350kg of silver, which can be re-used in the production of future electronic goods “(CIO Magazine 2012:13-14).

The entire e-waste management is coupled with the lack of necessary regulations, comprehensive policies, standards and guidelines that specifically address the e-waste issue and the laxity in implementation of the existing regulations. This is compounded with the absence of take-back schemes for EoL EEE and ineffective or failed take-back schemes. In most cases there are no take-back schemes in place and where there is one the end users are not even aware of its existence so such schemes do not succeed. There is generally lack of interest in EoL management of ICT products, but most of the multi-national companies that do not have offices in Kenya, but operate under distributors with the introduction of necessary regulations the producers/distributors should be more responsible for their products (Jepchumba, 2014).

Huang (2010) argues that according to current policies and empirical experience in China, there are both challenges and opportunities for involving producers in end-of-life mobile phone management. The challenges include unclear definition regarding producers in the policies, lack of awareness among end users for recycling of used mobile phones, the small amount of returned end-of-life products, the grey
refurbished product market and the informal recycling sector, and the cost of collecting used mobile phones. The opportunities are the new WEEE management policy, the potentially large amount of used mobile phones, a well established infrastructure, and the existing take-back schemes (Huang, 2009).

In Japan, a study by Murakami et al. (2009) found out that the main reasons for stockpiling phones are related to personal information security, content that is difficult to transfer (apps, music, etc.) and captured memories, such as photos or messages. The monetary investment in the device has a secondary role; however, as pointed out in Paper III, even a small monetary compensation could motivate consumers to hand over their EOL devices.

Competition for material resources from the end of life phones between the repair shops and the take-back scheme. The repair shops value the EoL phones as material resources for spare parts and thus buy back the phones as opposed to the take-back schemes intention of collecting the phones without any monetary exchange. This has been attributed to competition for resources by the repair shops in down town Nairobi as the major reason why the take-back scheme has not received any EoL phones (Maina 2008). The collection of mobile phones for recycling by Nokia is an onerous task as compared to the repair shops, as the repair shops refurbish the phones and resell them or reuse the parts, and buy the old phones from the end users thus breaking even for collection schemes is difficult, due to the fact that Nokia is not buying back these phones from the end users.

The repaired phones and refurbished phones on sale without manufacturer standards are mostly substandard and have a shorter lifespan. These phones, when sold under the guise of new phones, as done by many unscrupulous retailers, can have a negative
impact on the brand image. Most of the obsolete phones, sold to repairers can be refurbished for sale, or reused for parts, while the unusable parts are thrown out as waste. The waste generated by the repair shops is dumped along side other MSW. In many cases the waste mostly contains the mobile faces some still bare the manufacturer’s brand. The repair shops generate from approximately 1 kg of waste per month to 20 kg of waste per month. The pollution levels and environmental effects of small-scale enterprises like the repair shops could be insignificant at individual firm level but when the firms are put together they could have significant impacts on the environment (CCN, 2007).

In Botswana, Mmereki, Li and Li’ao (2015) investigated strategies to manage this waste stream in an environmentally sound way. Obsolete electrical and electronic equipment (EEE) are a complex waste category containing both hazardous and valuable substances. They argued that in developing countries such as Botswana, effective strategies that cover all stages throughout the lifecycle of products, particularly at the end-of-life, still lag behind. Infrastructure, pre-processing, and end-processing facilities and innovative technologies for end-of-life management of e-waste are noticeably absent due to lack of investment and high costs of its management. The authors found out that there was unavailability of national e-waste policy, absence of formal take-back system, absence of financing and subsidies, inadequate source separation programmes, absence of technical and logistical integration of pre-processing and end-processing facilities, and limited infrastructure and access to technologies and investment.

In Nigeria, based on the first consumer survey on consumer recycling behaviour and attitudes at 2007 it was found out that despite the fact that households on average
have each owned around five phones, very few of these have been recycled once they are no longer used (Osibanjo & Nnorom, 2007). The role of accumulating of obsolete electronic items and reluctance to dispose of these materials has led to accumulation of a large number of electronic materials, that appears to be of useless or of little value and have difficulties to dispose such items without clear conscious motivation or control (Sookman, Abramowitz, Calamari Wilhelm & McKay, 2005). According to Carisma (2010), in terms of behavioural aspect, Kenyans have strong penchant to keep prized items such as electronics due to the sentimental value attached to the product. It is common in many Kenyan houses to keep old and non-functional television, radio and refrigerator as household display or just for storage. As a general observation, ordinary Kenyans who cannot easily afford to buy expensive items such as electronics may find it hard to dispose valued possession right away.

Jepchumba (2014) investigated the factors that influence e-waste management in Kenya. The research design that was utilized was a cross sectional survey. The study was carried out in Nairobi County and the target population was the consumers of Telecommunication, manufacturer’s service centers, Regulatory body’s like NEMA KEBS and CCK, and the County Council of Nairobi (CCN). There was a clear indication that a sizeable portion of the respondents were ignorant on the potential dangers of toxic substances from the e-waste from the obsolete phones. Majority of the respondents would not sell obsolete mobile phone to the waste collectors or give it for free while only a few would give them out to waste collectors for safe disposal. On the action that would facilitate e-waste management on mobile phones, majority of the respondents looked forward to an increase in the scope of the municipal councils to collect the e-waste. They also cited the absence of recycling solutions, as the main obstacles in e-waste management on mobile phones.
2.6 Trade-in Policy for Managing Used Phones

According to Longman’s Dictionary of Contemporary English(2003), a policy is defined as a way of doing something that has been officially agreed and chosen by an organization. Similarly a framework is described as a set of rules, beliefs or ideas from which something is developed, or on which decisions are based. Many countries and organizations have crafted policies that help keep electronic waste generated by obsolesce of mobile and other electronic devices at manageable levels.

The purpose of preparing for re-use is to lengthen the product’s lifespan beyond the first usage phase by enhancing the product’s quality. Repair involves restoring the product to ‘working order’, which can be achieved like by rectifying activities through partial disassembly (King et al. 2006). Therefore, repair can be placed between direct re-use and remanufacture (Sihvonen & Ritola 2015). In addition to repair, a product can also be refurbished in order to be re-used. King et al. (2006) states that refurbishment of a product requires more work than repair, but less than remanufacture. Quality of the product is also expected to become higher in refurbishment than in repairing.

Economic incentives on a large scale have not been seriously considered yet for fostering WEEE recycling (Milovantseva & Saphores 2013; Saphores et al. 2012). Notwithstanding, various incentives have been offered for mobile phones (Ongondo & Williams 2011b; Tanskanen 2013). Original equipment manufacturers (OEMs) may offer various incentives in order to attract consumers to participate in recycling programmes initiated by OEM. For instance, Nokia, the well-known former Finnish mobile phone manufacturer, has organised various recycling programmes with telecom operators, retail companies, environmental NGO’s and educational institutes
or direct consumer campaigns over the years. In these programmes, incentives provided by Nokia, have ranged from prepaid phone cards to eco-friendly shopping bags or tree planting (Tanskanen, 2013).

In addition to OEMs, also mobile phone operators and recyclers may provide incentives for their customers. Ongondo and Williams have studied mobile phone collection and recycling in the UK, especially among university students (2011a, 2011b). According to their study (2011b), numerous mobile phone take back schemes operate in the UK. Many of these schemes are voluntary and most of them provide various incentives; in addition to direct monetary payment, they include discounts or free services for mobile phone usage and certain free returning options for EOL phones. Based on the survey of Ongondo and Williams (2011a) conducted among the university students, the most popular incentives for consideration were cash payments, ease of use and convenience of service, and a contribution to charity or environment, while free airtime, texts, MP3s and ringtones were ranked the least attractive incentives.

Sprint a Mobile Network Operator (MNO) in the USA had a buyback program where subscriber receive up to USD 200 trade-in guarantee to deposit their used mobile devices for newer generation ones. They have Sprint Mobile retail stores scattered all over the United States where subscribers can submit their working and functional smart phones for new ones for as much as USD 200 (Sprint, 2005). It is called the Sprint Buy-back program and is very popular and is part of the company’s CSR program dealing with environmental degradation associated with mobile devices.

T-Mobile similarly has a trade-in policy where when a subscriber purchases a new mobile device they trade-in their used device for credit and internet bundles. It has
been christened “Credit-for-Mobile (T-Mobile 2015). Other MNOs in Europe and the US that have similar Trade-in arrangements include Verizon wireless, Singtel and AT&T (AT&T 2012). Verizon Wireless have a zero landfill policy that has so far helped to recycle 2.1 Million mobile devices since 2012 (Verizon Wireless, 2015).

Electronic scrap components, such as CRTs, may contain contaminants such as lead, cadmium, beryllium, or brominated flame retardants. Even in developed countries recycling and disposal of obsolete electronics may involve significant risk to workers and communities and great care must be taken to avoid unsafe exposure in recycling operations and leaking of materials such as heavy metals from landfills and incinerator ashes. Life span of a computer changed from 4-6 years in 1997 to 2 years in 2005 and further decreasing (Hai Yong & Schoenung, 2006).

Product take-back whether voluntary or mandatory, has been listed by the OECD (2001) as the most active use of EPR in managing EoL electronics. Lindhqvist (2000) points out that EPR take-back policy can be distinguished from other take-back schemes due to the feedback to the product system development. In a study conducted by van Rossem et al (2006), it points out that companies that take-back their own brand products are more capable of designing cleaner and more resource efficient products. But the main challenge facing take-back programmes is to make end users play their role and return the EoL products for recycling as opposed to indiscriminate disposal of these products.

Huang (2009) explored China’s policies on and practice of e-waste management, especially in the case of used mobile phones, by applying the concept of Extended Producer Responsibility (EPR). It aims to paint the picture of current policies and implementation pertaining to e-waste management in China, focusing particularly on
producer responsibility and on a selected product group (mobile phones). Currently in China, there is a voluntary take-back project (the “Green Box Program”), initiated by some mobile phone producers and a telecommunications operator. This case may be the only one available to date in which the producers play an active role in dealing with e-wastes in the country. At present, there are eight mobile phone producers and one telecommunications operator taking part in the project, and they have applied various strategies to take back used mobile phones. For example, they set up dropping points for end users at their service centers, and also offer certain rewards as incentives for end users to drop the used products at the collection points. Generally, the program has increased the public’s awareness on recycling used mobile phones. However, one issue of the program is that not many mobile phones were taken back, and most of the collected scraps were obsolete batteries (Huang, 2009).

In the voluntary collection scheme, the manufacturers and network provider involved undertake all of the three types of responsibility. However, there are not many used mobile phones taken back through the scheme. Furthermore, the scheme competes with the grey refurbished mobile phone market and the informal recycling sector for the used mobile phones. In addition, some factors affect the outcome of the scheme, which include the driving force, the convenience of the take-back scheme for end users, awareness among end users, the incentives for end users, and the gray market for refurbished mobile-phones and the informal recycling sector (Huang, 2009).

One of the major ways of decreasing electronic pile up of mobile phones is by the introduction of a mobile phone trade-in policy. This is a framework that should guide mobile device vendors on how to valuate pre-owned mobile devices from the potential buyers and hence reducing the cost of the new mobile phone a client wishes
to purchase. The concept of trade-in has been witnessed in the automobile industry and on other consumer electronic products such as refrigerators; where clients with a similar refrigerator brand get a discount when they purchase a new product. Unfortunately, there are no existing mobile device trade-in policies in Africa.

In 2003 Ghana formulated its policy on Information and Communications Technology (ICT) for accelerated development, with the understanding for instance, that Ghana’s accelerated development would not be possible without an ICT-driven development agenda. The demand for EEE in Ghana grows by the day with a corresponding high rate of WEEE generation. Almost all EEE in Ghana is imported mainly from Europe, North America and Asia (Yaw Amayaw-Osei et al., 2011). There is certain awareness on environmental impacts of wrong disposal of WEEE among the consumers, especially within Accra, but due to the lack of environmentally sound disposal options, most obsolete equipment is either given to the informal collectors or stored. Yet, a high proportion of devices becoming obsolete are brought to repair shops instead of immediate disposal (Yaw Amayaw-Osei et al., 2011).

The various trade-in strategies adopted by different countries in Africa include the collaboration of Airtel and Ericsson in Ghana. Airtel, a leading mobile operator in Ghana, is working with Ericsson under their global Ecology Management Product Take-Back program to minimize the potential environmental impact associated with the disposal of decommissioned electrical equipment. As a pioneer and leader in the Ghanaian telecommunications industry, Airtel takes seriously the responsibility to limit its environmental impact. The Ecology Management Product Take-Back program is a part of Ericsson’s Sustainability and Corporate Responsibility effort.
geared towards taking accountability for environmental impacts of all products and services during their lifecycle.

The program ensures that end-of-life material is waste-treated in an environmentally responsible manner. Ericsson’s program targets exceed the minimum requirements set out under the European Union’s Waste Electrical and Electronic Equipment (WEEE) directive, where product take back is required by law. Ericsson provides free product retrieval and safe disposal services for equipment that has reached its shelf life, as part the company’s extended producer responsibility. Ericsson offers the program to all customers globally, not only in Europe where it is required by law. This guarantees that this e-waste does not end up in trade-restricted areas, landfill, or in places where unethical business practices are taking place (Ericsson Press, 2013). The equipment is then loaded at Airtel Ghana’s warehouse facilities and then transported by sea to the Ericsson approved recycling partner in Durban, South Africa. There, the sorting and dismantling process is initiated before being shipped to the partner’s main recycling facility in Netherlands. Here the final recycling will be completed.

The consumers/ end users play a crucial role in the take-back schemes. The main challenge the producers face in the implementation of take-back programmes is how to make the end users return the used product for recycling as opposed to taking it to the repair shops or storing the phones at home. The main issue with sending the EoL EEE to repair shops relies on the final disposal of this obsolete equipment by the repair shops. EEE is stored by the owner, as it is perceived to be of value ranging from sentimental, emotional or physical before being disposed of as MSW (Osibanjo & Nnorom, 2007). The level of consumer awareness on the on-going take-back scheme initiated by Nokia is very low. Consumer awareness is a crucial area for an
effective take-back scheme. The willingness to participate in a take-back scheme by consumers will determine the success of the scheme.

In Kenya, there is also an ICT policy instituted by Ministry of Information and Communication 2006 (CCK, 2012). But a lack of commitment and enough resource allocation has hampered the enforcement of these laws. The private sector has contributed immensely in the control, storage and reuse of mobile devices. For example, Nokia averted a potential environmental crisis in Kenya after the company put their hand up to handle the collection and recycling of more than two million counterfeit phones that were rendered useless when they were disconnected from the country’s mobile networks on 30th September 2012 (CCK, 2012).

The Communication Commission of Kenya (CCK) announced plans in 2011 to block all non-genuine mobile devices from connecting to the networks, in an attempt to stop the illegal trade of knock-off devices, yet in the lead-up to the deadline admitted there were no systems in place to collect and recycle any unwanted phones. In December 2013, Nokia started a promotion in Kenya where mobile phone users would trade-in their used phones for newer Nokia branded phones and this was similarly replicated by Samsung in 2014 (Techweez, 2013). This was probably the first initiative by a mobile device manufacturer to establish a trade-in arrangement for mobile devices. However its success is questionable.

The banning of fake and used mobile devices by the then regulatory agency, CCK in October 2012 resulted in two million subscribers losing their mobile accounts, the anticipated lose of livelihood and social belonging was predicted to be in hundreds of millions. However most of the phone owners who lost their phone bought new, genuine phones resulting in increased obsolete mobile phones in the hands of
consumers (Communication Authority, 2012). Apart from temporal loss of mobile accounts there was no major impact to the economy due to this action.

However, there have been glaring gaps in regard to disposal of used mobile devices both by the government and organizations. Hence the need for a firm and official policy in regard to disposal of mobile devices. An important step was the establishment of NEMA regulations on disposal of electronic waste and by extend of mobile devices. A Trade-in policy enshrined in the National Environmental Management Act 2012 will ensure there are more strategies used in the disposal of mobile devices with little or no waste.

Various empirical studies have been conducted to determine the effectiveness of management of used phones around the world. For instance, Mmereki et al., (2015) suggested effective strategies such as an “integrated approach” (mixed options), access to technologies, establishment of pre-processing and end-processing facilities and optimization of logistics, optimizing diversion of e-waste from disposal sites, and investment in e-waste are suggested to manage this complex waste stream in an environmentally sound way.

In Kenya, Jepchumba (2014) suggested that the government should be at the forefront in public education on the hazardous effects of retaining e-wastes. The mandated organizations should be disposing the e-waste safely and also facilitate by providing the incentives of proper disposal of obsolete mobile phones. Also the manufacturers, retailers and distributors should be at the forefront in collection of the obsolete phones. There should be convenient collection points countrywide as this would enhance effective and efficient collection of obsolete mobile phones.
2.7 Summary and Research Gaps

The study reviewed theoretical and empirical literature on the effect of trade-in policy framework on management of used mobile phones. The studies have been conducted across the world in determining the level of use of mobile phones, inventory methods, challenges and trade-in policy frameworks. This enabled the researcher to develop research variables. However, despite studies being conducted, there are several gaps that have been observed. For instance, it has been found out that some companies e.g. Nokia have trade-in policies although the extent to which their dealers comply with the directive has not yet been done. This research study sought to determine if there existed those policies in Kenya.

Yla-Mella (2015) research in Finland focused on electrical and electronic equipments recovery systems from consumers’ perspective which appeared to be too wide and therefore the research decided to concentrate on used mobile phone management methods. Jang and Kim (2010) researched on management of used and end of life mobile phones in Korea, the findings showed that South Korea is already implementing policies. The gap was that it is not yet clear whether the country (Kenya) has developed trade-in policy to manage used phones, a focus that the study looked at.

An attempt has already been made by Jepchumba (2014) to determine factors influencing disposal of mobile phones in Nairobi County without looking whether there existed e-waste management policies in the area. This study therefore sought to fill this gap by determining the practices and policies that were used to dispose used phones by consumers and mobile agents in Eldoret town. From the above gaps among others, the research sought to investigate the effect of trade-in policy framework on
the management of used mobile handsets in Eldoret, Town, Uasin Gishu County, Kenya.
CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents the research design and methodological procedures followed during the process of identifying, selecting respondents who participated in the study. The chapter covers the study design, description of the study setting, sampling techniques and sample size and data collection instruments. The chapter also presents validity and reliability of the research instruments, data collection procedure, data analysis and the ethical considerations. The study used a mixed study approach where qualitative and quantitative methods shall be used.

3.2 Research Design

There are several research designs that are applicable in a research study, so this study utilised a descriptive survey research approach. This design allowed the use of mixed method research approach. This enabled the researcher, to generalize from the data collected and make plan for prediction regarding the private secondary schools in the entire population. The design was adopted because the population studied was too large to be observed directly and thus economically viable in both time and money of taking a sample of population to generalize results for the whole population, resulting to in-depth, rich and meaningful research findings.

3.2 Study Area

The study was conducted in Eldoret Town which is the head quarter of Uasin Gishu County. Eldoret town is a cosmopolitan town in Kenya with inhabitants of diverse ethnic backgrounds. Uasin Gishu County is one of the fourty seven counties in Kenya
located in the North Rift region. It is bordered by both Baringo and Elgeyo Marakwet, Trans Nzoia and Kakamega counties. The map is provided in the appendix section.

3.3 Target Population

The study targeted both sales and management members who are agents of different mobile phone brands in Eldoret town. The manufacturers mobile device agents in Eldoret town include; Phone Express, Safaricom, Airtel, Orange, Tuskys, Eldomatt Mega and Transmatt Supermarkets and subsidiary distributors for mobile phone manufacturers such as Nokia, Samsung, Apple, LG, Huawei and Tecno. The mobile phone manufacturer agents were chosen because they had direct contact with the buyers (customers) and were better placed to explain how they handled used mobile phones on behalf of the manufacturers.

The management teams were targeted because they were better placed to provide information on the trade-in policies and management methods they used for handling used phones. Based on the above discussion Table 3.1 shows the actual mobile phone manufacturing agents’ employees and their managers.

Table 3.1 Target population

<table>
<thead>
<tr>
<th>Respondents</th>
<th>Sales representatives</th>
<th>Management</th>
<th>Sample size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phone Express</td>
<td>33</td>
<td>1</td>
<td>17</td>
</tr>
<tr>
<td>Safaricom</td>
<td>76</td>
<td>1</td>
<td>38</td>
</tr>
<tr>
<td>Airtel</td>
<td>61</td>
<td>1</td>
<td>31</td>
</tr>
<tr>
<td>Orange</td>
<td>55</td>
<td>1</td>
<td>28</td>
</tr>
<tr>
<td>Eldomatt</td>
<td>43</td>
<td>1</td>
<td>22</td>
</tr>
<tr>
<td>Tuskys</td>
<td>55</td>
<td>1</td>
<td>28</td>
</tr>
<tr>
<td>Transmatt</td>
<td>38</td>
<td>1</td>
<td>19</td>
</tr>
<tr>
<td>Naivas</td>
<td>32</td>
<td>1</td>
<td>16</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>393</strong></td>
<td><strong>8</strong></td>
<td><strong>198</strong></td>
</tr>
</tbody>
</table>

**Source:** Data compiled from different mobile dealers in Eldoret (2015)
The table (3.1) shows that a total of 401 respondents formed the target population for the study. This included 393 employees and eight management representatives from mobile phone dealers in Eldoret town.

### 3.4 Sample Size and Sampling Procedures

Sampling is the process of selecting a sub-set of cases in order to draw conclusions about the entire set (Mugenda & Mugenda, 2003). A sample is a small part of a large population, which is thought to be representative of a larger population.

#### 3.4.1 Sample size

The study selected all (8) management representatives to participate in the study using census method. However, considering the population of employees was high, the researcher decided to select the sample size to represent the whole target population. There are several methods of determining the sample size for research. The study calculated the sample size based on formula conceptualised by Reid and Boore (1991) method of sample determination when the target population (N) is known. The sample size is given below

\[
\frac{393}{1 + N (e)^2} = \frac{1}{1 + 393 (0.05)^2} = 198
\]

Where \(N\) is the known population (target population=393) and 

\(e\) is the standard of error which was 0.05 (5%).

Therefore the final sample size for the study involved 198 employees and 8 management representatives totalling to 206. All the key informants participated in the study because their size was small and manageable.
3.4.2 Sampling Procedure

The researcher adopted purposive sampling method in selecting key informants (managements representatives) while the employees were selected through stratified random sampling methods. The key informants were selected purposively because they held important information concerning the trade-in policies their manufacturers had developed to manage used phones. Stratified random sampling was employed to sample the participants from each mobile phone dealers in Eldoret town based on their company i.e Naivas, Nakumatt, Tuskys and the rest. According to Orodho (2003), allocation of sample size among strata is commonly used, since each stratum contributes to the sample a number that is proportional to its size population. This was based on unique identifiers assigned to the respondents. The main advantage of stratified random sampling is that it ensures inclusion in the sample or the subgroup which otherwise would be omitted entirely by other sampling methods because of their small numbers in the population (Mugenda & Mugenda, 2003).

3.5 Data Collection Instruments

This study employed two tools for data collection; questionnaire and interview schedule.

3.5.1 Questionnaire

According to Oso and Onen (2009) a questionnaire is a collection of items to which a respondent is expected to react, usually in written form. The instrument was used to gather responses from mobile phone manufacturing agents’ employees (Appendix II). The questionnaire consisted of open and close-ended question which were developed by the researcher. The questionnaire was structured according to the objectives of the study. Section A consisted of questions on demographic information of respondents,
Section B contained questions on the level of use of mobile phones, Section C contained questions on the challenges involved during handling of mobile phones while the last section contained questions on the trade-in policy framework being used to handle used phones by mobile agents in Eldoret town.

3.5.2 Interview Guide

The interview guide was prepared to solicit information from mobile phone manufacturing agent management members. The interview guide was semi-structured and contained the questions that related to the study objectives. Moreover, the information obtained from interviews was used to triangulate information obtained from questionnaires.

3.6 Reliability and Validity of Research Instruments

3.6.1 Validity of the Instruments

As described by Amin (2005), validity is the degree to which a test measures what it is supposed to measure. It is the extent to which the instruments capture what they purport to measure (Oso & Onen, 2009). Validity of the instruments is critical in all forms of researches and acceptable level is largely dependent on logical reasoning, experience and professionalism of the researcher (Cooper & Schindler, 2008). The method applied must actually measure what you think it measures (Greener, 2008).

To test the validity of the research instruments used, content validation method was used. Here, the supervisors and research experts were consulted to provide feedback on the validity of the research instruments. The supervisors and experts provided feedback on the questions to amend while in some cases, some questions were deleted from the research instruments. The researcher made corrections to the research instrument before reliability test.
3.6.2 Reliability of the Instruments

The reliability of a research instrument concerns the extent to which the instrument yields the same results on repeated trials (Kothari, 2004). Although unreliability is always present to a certain extent, there is generally a good deal of consistency in the results of a quality instrument gathered at different times. The tendency toward consistency found in repeated measurements is referred to as reliability (Carmines & Zeller, 1979). The reliability of the research instrument was determined split half method. This involved conducting a pilot study by involving respondents who did not participate in the final research.

Twenty two respondents were picked to participate in the pilot study. They were given the questionnaire to answer and the researcher took them back. To calculate the reliability of the research instrument, split half technique was used. The number of questions in the questionnaire were divided into two halves (odd numbered questions against even number questions) and then entered in electronic spreadsheet software (SPSS Version 21). Thereafter Cronbach alpha correlation coefficient was computed to check on the reliability index of the split data. A reliability index of $\geq 0.5$ was considered reliable. Based on the result, a reliability index of 0.6832 was obtained for the research instrument. This value was more than 0.5 making the researcher to conclude that the instruments were reliable.

3.7 Data Collection Procedures

The researcher sought permit from National Commission for Science, Technology and Innovation (NACOSTI) to conduct research. The study thereafter approached the mobile manufacturer agents to seek approval to conduct research in their establishments. After getting approval from agents, the questionnaires were given to
the employees to fill after providing them with consent form (Appendix I). Instructions on how to fill the questionnaire were given. Confidential treatment of information was assured. Interview with management members were scheduled two weeks in advance. The interview sessions was conducted at managers’ offices. The interview session lasted for between 20-30 minutes.

3.8 Data Management and Analysis

The completed data collection tools were checked for completeness and also to remove unanswered items. Quantitative data was coded and entered into electronic spreadsheets with the help of statistical package for social sciences (SPSS Version 21.0). Data entered was analysed using descriptive statistics. Descriptive statistics (Frequencies, means and standard deviation) were used to summarize the data. Qualitative data obtained from interview schedule and open ended questions were analysed using two methods. At first, qualitative data from questionnaire was converted into numerical values and presented into quantitative methods. Thereafter qualitative data from interviews was analysed inductively thematically using content analysis and presented in narration. The results of data analysis are presented as per the objectives of the study through use of tables and graphical illustrations.

3.9 Ethical Considerations

In order to protect the rights and welfare of respondents and to ensure that the study does not psychologically, socially and financially harm them as emphasized by Waller (2011), the study sought informed consent from respondents before they participated. Authority from various mobile phone agents was also sought. The respondents were aware of the purpose of the research and the expected benefits of the research. The researcher assured the respondents of confidentiality by not
including any form of identification on the data collection tools. In addition, completed data collection tools were kept in a place accessible only to the researcher and computerized was password protected. The researcher considered the fact that participation in research was voluntary.

In addition, the researcher strived to respect the rights of the participants in the event that the participant(s) refused to take part in the study at any stage. However participants consent for access and acceptance was sort before commencement of interviews either on the day of interviews or in advance put in writing through a formal letter. Ultimately, the researcher took time to explain to the respondents the importance of the study and therefore requested the respondents to participate in the study by giving information relevant for the study. To establish good working relationship with the participants, the researcher endeavoured by developing a rapport with them.
CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents the findings on the management of used mobile phones in Kenya with specific reference to mobile phone manufacturing agents in Eldoret town. The study also sought to determine the trade-in practices that were being practiced by the agents in Eldoret town. The sources of information of this study were both employees and management teams of mobile phone manufacturing agents. The findings are presented according to the specific objectives. The data are presented by using tables and graphs.

Table 4.1 Response rate

<table>
<thead>
<tr>
<th>Respondent</th>
<th>Sample</th>
<th>Response</th>
<th>Response rate %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employees</td>
<td>198</td>
<td>173</td>
<td>87.37</td>
</tr>
<tr>
<td>Management</td>
<td>8</td>
<td>6</td>
<td>75.00</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>206</strong></td>
<td><strong>178</strong></td>
<td><strong>81.19</strong></td>
</tr>
</tbody>
</table>

Table 4.1 shows that 173 out of 198 employees returned the questionnaires successfully resulting to a 87.37% response rate. Moreover, a total of 6 out of 8 managers of mobile agents also agreed to participate in the interview. The response rate for the study was 81.2% which is acceptable as suggested by Mugenda and Mugenda (2003). This shows that the results obtained by the study reflect the actual situation in Eldoret town and the data was reliable.

4.2 Demographic Profile of the Respondents

This section describes the bio-data information of respondents based on their gender, age, education level and work experience in the mobile phone industry. At first, the
respondents were asked to indicate their gender. The results are presented in Figure 4.1.

![Gender of employees](image)

**Figure 4.1 Respondents Gender**

It is seen that most 117 (65.7%) of sales employees in the mobile manufacturing agents were female while 61 (34.3%) were male. This shows that the agents consider employing more female to sales people than men. The result coincides with Jepchumba (2014) who found out majority of employees working in the mobile industry were female. Secondly, the respondents were asked to indicate their age bracket. The results are presented in Table 4.2.

**Table 4.2 Respondents age**

<table>
<thead>
<tr>
<th>Range</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 25yrs</td>
<td>35</td>
<td>20.2</td>
</tr>
<tr>
<td>26-35yrs</td>
<td>101</td>
<td>58.4</td>
</tr>
<tr>
<td>36-45yrs</td>
<td>24</td>
<td>13.9</td>
</tr>
<tr>
<td>46yrs and above</td>
<td>13</td>
<td>7.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>173</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>
Result form Table 4.2 shows that more than half 101 (58.4%) of respondents reported that they were aged between 26-35 years, 35 (20.2%) said that they were aged less than 25 years, 24 (13.9%) were aged between 36-45 years and only 13 (7.5%) were found to be aged more than 46 years and above. Considering mobile industry require people who can work and adapt easily to changes in technology, employees who are below 40 years are seen to be preferred as compared to those who are of older generation (40 years and above) (Sije & Awuor, 2013). The respondents were further asked to indicate their education qualification level. The results of the analysis are presented in Figure 4.2.

![Figure 4.2 Respondents education qualification level](image)

Results show that 76 (43.9%) of employees working in mobile handset agency shops had certificate level of education, 47 (27.2%) had secondary level of education (O-level), 39 (22.5%) had diploma and only 11 (6.4%) had degree. This shows that majority of employees working in the mobile manufacturing agency shops were literate and therefore understand the dynamics of managing used phones.
After that, the respondents were also asked to indicate their work experience. Their responses are given in Table 4.3

**Table 4.3 Working Experience of Employees**

<table>
<thead>
<tr>
<th>Range</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 1 year</td>
<td>13</td>
<td>7.5</td>
</tr>
<tr>
<td>1-3yrs</td>
<td>37</td>
<td>21.4</td>
</tr>
<tr>
<td>4-6yrs</td>
<td>79</td>
<td>45.7</td>
</tr>
<tr>
<td>7-9yrs</td>
<td>21</td>
<td>12.1</td>
</tr>
<tr>
<td>10yrs and above</td>
<td>23</td>
<td>13.3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>173</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

Result show that majority 79 (45.7%) of employees had worked for a period of 4-6 years, 37 (21.4%) had worked for 1-3 years, 23 (13.3%) had worked in the industry for more than 10 years, 21 (12.1%) had worked for 7-9 years and only 13 (7.5%) said that they had worked for less than 1 year. The result therefore shows that majority of respondents had been operating in the mobile industry for long and therefore had the capacity to respond to research items on the methods used by their organisation to manage used phones.

### 4.3 Concentration of used mobile phone Handsets in Eldoret Town

The first objective sought to determine the magnitude of used mobile phones handsets in Eldoret town. At first the study wanted to establish the common phone brands that mobile agents stocked in their shops. The respondents were asked to state the brand of used phone model that was common in their area of operations. The results are given in Figure 4.3.
Figure 4.3 Models of used phones present

Results shows that the major used phone brand was Nokia at 29.8% followed by Samsung at 25.3% then Techno at 16.9% and lastly Sony at 9.0% while other phone models accounted for 19.1%. the result shows that the three mobile phones are the strongest brands preferred by customers when purchasing phones in Eldoret and this explains why their used number is high because they produced new brands or models on regular basis. Moreover, the phone brands are the ones with major retail and manufacturer agents across the country. To answer the first research question, the respondents were asked to give their rating on the presence of used mobile handsets in Eldoret town. The results of the analysis are presented in Figure 4.4.
Figure 4.4: Presence of old/used mobile phones

Figure 4.4 shows that 76 (43.9%) of respondents reported that there is high proportion of used mobile phones in Eldoret, 63 (36.4%) said that the rate is on average while 34 (19.7%) said that the used phone rate in Eldoret town was low. From the findings above, it is clear that used phones devices are available and this calls for effective measures to be formulated to address end of life and also disposal policies. The result compares with Basiye (2008) who found out that the level of used phones was high in Kenya. In Finland, Yla-Mella (2015) also found out that most of the respondents (85%) had unused mobile phones at home. In total, 30% stated to have one extra phone at home and, in addition, almost half of respondents admitted to having 2–5 phones not in use. When asking the reasons for failing to return mobile phones for recycling, 70% of all, or 82% of those respondents who had mobile phones at homes, told that they just keep at least some of the phones at home. Every fourth respondent stated to give at least one old phone to children, relatives or friends and 28% of them have taken old mobile phones to the recycling centre. Only a few of them have sold an unused mobile phone onward while 13% of respondents have left it at the store when buying a new one.

4.4 Inventory Methods Used by Mobile Phone Manufacturers Agents in Implementation of Trade-in policy Framework

The second objective sought to determine the various inventory management methods used by the mobile phone dealers. The respondents were asked to respond to items of inventory management they used in their organisations through statements constructed on a Likert scale of five. The results are summarized in Table 4.4.

Table 4.4: Inventory management used by mobile manufacturer dealers

<table>
<thead>
<tr>
<th>Indicator</th>
<th>SD</th>
<th>D</th>
<th>N</th>
<th>A</th>
<th>SA</th>
</tr>
</thead>
</table>

52
Customers find phone they desire and when they want | 2 (1.2%) | 13 (7.4%) | 19 (11.1%) | 98 (56.8%) | 41 (23.5%)  
At any given month more than half of our inventory is sold to the customers | 4 (2.5%) | 35 (20%) | 26 (15%) | 80 (46.2%) | 28 (16.2%)  
We have a lot of the phone’s stock remaining | 11 (6.4%) | 64 (37.2%) | 58 (33.3%) | 38 (21.8%) | 2 (1.3%)  
We buy our inventory from suppliers that have reusable products | 39 (22.7%) | 81 (46.7%) | 23 (13.3%) | 25 (14.7%) | 5 (2.7%)  
We buy our inventory from suppliers who have products that easily take back obsolete, used but still functional | 22 (12.8%) | 78 (44.9%) | 22 (12.8%) | 38 (21.8%) | 13 (7.7%)  
We buy our inventory from suppliers who have products that easily upgraded | 7 (3.8%) | 39 (22.5%) | 13 (7.5%) | 54 (31.2%) | 54 (31.2%)  
We have a strategy for disposing obsolete/used inventory | 26 (15.2%) | 88 (50.6%) | 20 (11.4%) | 37 (21.5%) | 2 (1.3%)  

**Key:** SD=strongly disagree, D=Disagree, N=Neutral, A=Agree, SA= strongly agree

Results from Table 4.4 shows that most 98 (56.8%) agreed that customers find the phones they desire and when they want, 41 (23.55) strongly agreed, 19 (11.1%) were neutral, 13 (7.4%) disagreed while 2 (1.2%) strongly disagreed. The findings implies that customers find the phones they desire and when they want as they seem to totally agree with the statement (M=4.0 and SD=1.0). In addition, 80 (46.2%) of respondents agreed and 28 (16.2%) strongly agreed that at any given month, more than half of their inventory is sold to customers. However, 26 (15.0%) were undecided, 35 (20.0%) disagreed and 4 (2.5%) strongly disagreed. This therefore shows that most of phones stocks in mobile phone manufacturer dealers is sold and few of them supplies remain in their inventory as confirmed by mean results (M=3.6 and SD=1.1) which showed that they agreed with the statement.

On whether they had a lot of phone stock remaining, 58 (33.3%) were neutral, 64 (37.2%) disagreed, 38 (21.8%) agreed, 11 (6.4%) strongly disagreed while 2 (1.35)
strongly agreed with the statement. The descriptive results shows that the mean was 2.6 with standard deviation scores of 0.1 which suggests that the respondents had mixed opinion on the statement. However, close to half 81 (46.7%) of respondents disagreed and 39 (22.7%) strongly disagreed with the statement that they buy their inventory from suppliers that have reusable products. Only 25 (14.7%) agreed and 5 (2.7%) strongly agreed and 23 (13.3%) were undecided on the statement. This shows that majority of mobile phone dealers in Eldoret purchase new inventories from their suppliers with no re-usable products suggesting that they only sell brand new products. This also shows that majority of mobile phone dealers do not have product take-off or recycling practices for end of life gadgets.

As to whether their shops bought their inventory from suppliers who have products that easily take back obsolete, used but still functional or slow moving stock, most 78 (44.9%) disagreed, 38 (21.8%) agreed, 22 (12.8%) strongly disagreed, 22 (12.8%) were undecided while 13 (7.7%) strongly agreed with the statement. this implies that the respondents had divided opinion on the statement but more than half 57.7% disagreed that they buy inventory from their suppliers who have products that have take-back policies. This shows that majority of phone dealers in Eldoret town do not take-back old but functional mobile phones.

Lastly, result of the study showed that at least 88 (50.6%) of respondents denied that they had a model for disposing obsolete or used inventory in their business. This shows that there are not measures for mobile phone manufacturing agents in Eldoret town to take back used phones or ones that are obsolete and could be the reason for majority of customers owning more than one phone in their phones in Eldoret as previously reported. From the above findings it is evident that very few
manufacturing phone dealers in Eldoret have buy-back, take-back or disposal policies for used but functional phones.

After determining the inventory management methods used for used phones, the researcher further sought respondent opinion on the options they had in their organisation for disposing used mobile handset from their customers. They were asked to rate their level of agreement on several statements presented to them. The results of the analysis are presented in Table 4.5.
### Table 4.5: Options for disposing used mobile handsets

<table>
<thead>
<tr>
<th>Option</th>
<th>SD</th>
<th>D</th>
<th>N</th>
<th>A</th>
<th>SA</th>
</tr>
</thead>
<tbody>
<tr>
<td>The used/slow moving stock is returned back to our suppliers</td>
<td>18</td>
<td>93</td>
<td>11</td>
<td>27</td>
<td>24</td>
</tr>
<tr>
<td>We make sales of the disabled parts of used mobile phone handsets</td>
<td>39</td>
<td>89</td>
<td>7 (3.8%)</td>
<td>37</td>
<td>13</td>
</tr>
<tr>
<td>We make sales of upgraded used mobile phone handsets</td>
<td>31</td>
<td>85</td>
<td>7 (3.8%)</td>
<td>37</td>
<td>13</td>
</tr>
<tr>
<td>Slow/moving used stock is sold to other less competitive region/country</td>
<td>26</td>
<td>67</td>
<td>22</td>
<td>50</td>
<td>8</td>
</tr>
<tr>
<td>We have a collection point/place where the used mobile phone handsets are taken</td>
<td>30</td>
<td>102</td>
<td>11</td>
<td>22</td>
<td>8</td>
</tr>
<tr>
<td>We usually collect used mobile phone handsets from our customers</td>
<td>37</td>
<td>117</td>
<td>2 (1.2%)</td>
<td>17</td>
<td>0</td>
</tr>
</tbody>
</table>

**Key:** SD=strongly disagree, D=Disagree, N=Neutral, A=Agree, SA=Strongly agree

Regarding options for disposing used mobile handset, more than half 93 (53.8%) of respondents disagreed that that used/slow moving stock is returned back to suppliers. Only 27 (15.4%) agreed and 24 (14.1%) strongly agreed that they returned used phones back to their suppliers. This shows that majority 64.1% of mobile phone dealers to do not take or return used phones back to their suppliers.

When asked as to whether they made sales of disabled parts of used mobile phone handsets, 39 (22.5%) strongly disagreed, 89 (51.2%) disagreed, 7 (3.8%) were neutral, 37 (21.5%) agreed and 13 (7.6%) strongly agreed with the statement. This therefore shows that majority of phone dealers neither take in used or obsolete phones to extract parts which acts as spares for damage handsets. This also shows that majority of manufacturer phone dealers in the area deal with new phone handsets as opposed to used, repaired, refurnished or brand new handsets. Moreover, it was also clear from 85 (49.4%) of respondents disagreed that they made sales of upgraded used mobile handsets.
handsets, 31 (17.7%) strongly disagreed, 37 (21.5%) agreed, 13 (7.6%) strongly agreed and only 7 (3.8%) were neutral on the statement. This shows that 67.1% of mobile phone dealers in Eldoret do not sell upgraded used mobile phone handsets may be due to their slow moving trend or even customer preference. It also shows that fewer customers are willing to take back their used phones in exchange for new ones at an extra charge.

Results further revealed that 67 (38.8%) of respondents disagreed and 26 (15.0%) strongly disagreed that slow moving mobile handset stock is sold to other less competitive areas of the country. Only, 50 (28.8%) agreed and 8 (5.0%) strongly agreed with the statement. This shows that more than half 53.8% of phone dealers do not sell slow moving mobile handset stock to other areas. When asked as to whether they had a collection point where mobile phone handsets were taken, 102 (58.8%) disagreed, 30 (17.5%) strongly disagreed, 11 (6.2%) were undecided, 22 (12.5%) agreed and 8 (5.0%) strongly agreed. This implies that there are no collection mechanisms for used phones in Eldoret town and this suggests that concentration of e-wastes among households is high in the study area which is hazardously risk to the human and environment at large. Lastly, it was revealed that only 17 (10.0%) of mobile phone dealers in Eldoret town collected used mobile phone handsets from their customers while the others did not. This shows that this is not a common practice of disposing used or end of life phones among mobile manufacturers’ agents in Eldoret town.

4.5 Challenges in handling Used Mobile Phones by Agents in Eldoret

The third objective sought to determine the challenges encountered by mobile device manufacturer agents in handling used models of mobile phone devices. Jepchumba
(2014) indicated that there are various challenges in e-waste management in Kenya. The study sought the opinion of employees and management who were key informants. Through open-ended question, the respondents (employees) were asked to indicate the challenges they faced in handling used mobile phones. Their responses are given in Table 4.6.

Table 4.6 Challenges faced in handling used mobile phones by manufacturing dealers in Eldoret

<table>
<thead>
<tr>
<th>Challenge</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of trade-in policy by the communication authority of Kenya</td>
<td>134</td>
<td>77.5</td>
</tr>
<tr>
<td>Customer ignorance and lack of awareness</td>
<td>105</td>
<td>60.7</td>
</tr>
<tr>
<td>Attachment of value to obsolete mobile phones</td>
<td>99</td>
<td>57.2</td>
</tr>
<tr>
<td>Impact of second hand phones from China</td>
<td>86</td>
<td>49.7</td>
</tr>
<tr>
<td>Unwillingness by consumers to give EoL gadgets for free</td>
<td>66</td>
<td>38.2</td>
</tr>
<tr>
<td>Cost of collecting used mobile phone</td>
<td>53</td>
<td>30.6</td>
</tr>
<tr>
<td>Consumer willingness to participate in take-back initiatives</td>
<td>45</td>
<td>26.0</td>
</tr>
<tr>
<td>Competition for resources</td>
<td>41</td>
<td>23.7</td>
</tr>
<tr>
<td>Impact on brand image</td>
<td>39</td>
<td>22.5</td>
</tr>
<tr>
<td>Lack of mandatory collection schemes</td>
<td>32</td>
<td>18.5</td>
</tr>
</tbody>
</table>

According to most employees, the lack of trade – in policy by the communication authority of Kenya is the main challenge 134 (77.5%) that mobile phone manufacturing agents in Eldoret town faced. Secondly, 105 (60.7%) of respondents said that customers lack of awareness on the methods of recycling, disposing and also managing used or end of life phones in Eldoret was another challenge that the mobile manufacturing agents faced. To a large extent, awareness affects whether end users will return their used mobile phones. Without end users’ participation, producer’s take-back scheme is not possible to work well.
The respondents 99 (57.2%) also said that the trade-in policy cannot succeed well because majority of customers have an attachment value to obsolete mobile phones. They says that most of the unused phones are still at home, making the trade-in or take-back policy implementation process difficult. For instance, some customers would not return back their used phone when purchasing new one because they have stored enough information on their handset and therefore taking them back will deny them their pictures, documents and contacts. The lack of awareness that take-back policy is even possible and knowledge on existing programs and locations could be the main obstacles for consumers.

Close to half 86 (49.7%) said that another challenge they faced in handling used phones at their enterprise was the entry of second hand phones from ‘china’. One operator said that the phones from ‘china’ are not up to the standard and very few customers will go to buy original ones because similar ones are found at lower prices. Another proportion 66 (38.2%) of respondents said that some customers could be unwilling to give their EoL phones for free despite the manufacturing agents supporting the initiative. Most of the people would like to receive incentive similar to the price of their gadgets at the market price rather than disposing it for free leading to increased stockpile in their homes.

Cost of collecting used mobile phone was also found to be a challenge facing mobile phone manufacturing agents in Eldoret (30.6%). This implies that the manufacturers are implementing the collection schemes on a voluntary basis and thus the schemes efficiency and effectiveness depends on the manufacturers’ good will and determination and they cannot be held accountable for the dumped e-waste. The result coincide with Huang (2009) research that showed that with the competition
from gray refurbished product market and the informal recycling sector, the cost of the current voluntary take-back scheme was higher than the former two in terms of getting back used mobile phones.

Moreover, 45 (26.0%) of respondents also cited that some consumers were not willing to participate in take-back initiative and this was another challenge that they faced. Other challenges identified were like lack of mandatory collection schemes, impact on brand image and competition for resources.

From the key informants, among the challenges reported included;

“We’ve had the malicious customers who carelessly mishandle their phones and bring it for a trade in policy with the fact that it is available. Secondly that the handsets are sold in different places, so if someone breaks theirs in Mombasa and come to Eldoret they bring it to our offices and this interferes with our regional records. Also, there are handsets that are much similar to ours so someone just gets rid of the cover and hand the different handsets to us”

4.6 Trade-in Policy Framework on used Mobile Phones Management in Eldoret

The fourth objective sought to formulate trade-in policy framework on used mobile phones. The study sought the responses from employees through questionnaires and key informants through interview sessions. At first, Table 4.7 shows the results from employees on suggestions towards developing a trade-in policy framework.

Table 4.7 Suggestions on Development of Policy Framework for Used Mobile Phones

<table>
<thead>
<tr>
<th>Suggestion</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase education and awareness for take-back and</td>
<td>146</td>
<td>84.4</td>
</tr>
</tbody>
</table>
The government can adopt measures to increase public awareness on recycling used e-products

Manufacturing firms to offer certain rewards as incentives for end users to drop the used products at the collection points

Manufacturing firms to set up dropping points for end users at their service centers,

Since refurbished mobile phones have a market, it is better to legalize refurbishment in Kenya, in order to place the activities under control

There should be convenient collection points countrywide as this would enhance effective and efficient collection of obsolete mobile phones.

Manufacturers also need to provide discounts on the upgraded phones

Manufacturers to provide trade discounts for used customers who return used phones for new ones

Manufacturers, retailers and distributors should be at the forefront in collection of the obsolete phones

Result show that majority 146 (84.4%) of respondents said that there is need for all stakeholders in the mobile phone industry (manufacturers, suppliers, retailers, agents and government agencies) to increase education and awareness for take-back and recycling mobile phones. On the policy front, 130 (75.1%) suggested that government can adopt measures to increase public awareness on recycling used phones countrywide. To the phone manufacturers, 121 (69.9%) suggested that they need to offer certain rewards through their agents as incentives for end users to drop used products at the collection points. This will be facilitated by setting up dropping points for end users at their service centres located in different parts of the country. More than half 91 (52.6%) recommended that there should be convenient collection points
countrywide and this would enhance effective and efficient collection of used and end of life mobile phones.

Others 99 (57.2%) said that since refurbished mobile phones have a market, it is better to legalise refurbishment in Kenya, in order to place the activities under control. On trade discounts for used phones, 72 (41.6%) opined that manufacturers need to provide discounts on the upgraded phones, 69 (39.9%) said that they also need to provide trade discounts for used phones to customers who return them and 56 (32.4%) saw the need for manufacturers, retailers and distributors to be at the forefront in collection of used, end of life and obsolete forms. This will facilitate effective trade-in policy implementation in Eldoret and other parts of the country.

4.5.1 Key Informants Responses on Trade-in Policy Framework

The responses were obtained from key informants using an interview schedule. They were asked on what they think about the trade-in policy, and whether they think it can work for an organization?

Trade-in policy was defined as

“Where people trade in their old mobile devices for either getting a new one or requiring upgrade services”

All the key informants reported not to have a trade-in policy at the time of the study. One of them said

“We do not have a trade in policy except for recently we introduced a new phone, Airtel Red, which has the provision of a trade in policy. The reason why we do not have a trade in policy for the other mobile devices is that we get supplied for and it is not really a merchandise of Airtel, but with the Airtel Red, we do provide for the trade in policy”
There was no consensus on whether a trade-in policy is practical or not

One said

“Yes, especially in the recycling sector. If we are able to take in the old phones from the customers, we will be able to reduce the so many old phones out there”

Another one said

“Personally I don’t think it is practical. You see, mobile devices are not like motor vehicles, for the later it is much easier because the amount of loss is not greatly felt unlike for mobile phones. Alternatively the customers can be signing a contract and adhere to the terms that the contract provides. This is mainly to keep off con artists”

The third one said;

“You see there is no way you’ll give me your old phone for me to exchange it with a new one. The problem is that the customer might not want to buy your old phone, thus causing me losses”

On policy formulation, the manufacturer was the one they felt should formulate for the reason that he would incur the lowest percentage loss. However, they all agreed to be consulted in the formulation process. For instance one said

“Yes, I would like to be consulted because I believe my input will help in providing the best provisions of the policy”

They suggested the following to be included in the trade in-policy

A provision of security should be there to counteract cases where the customers bring stolen phones or have intentions of hacking into the system”. Documentation of the old phones that are being brought in by the customers as evidence that they indeed belong to them
Also provision in the policy that when the old phones are brought they be brought with money on top, that is, to equal out the price of the new phone. The policy should include that we get some amount of money once we give the manufacturers the old phones.

One of the major ways of decreasing electronic pile up of mobile phones is by the introduction of a mobile phone trade-in policy. This is the framework that should guide mobile device vendors on how to valuate pre-owned mobile devices from the potential buyers and hence reducing the cost of the new mobile phone a client wishes to purchase. The concept of trade-in has been witnessed in the automobile industry and on other consumer electronic products such as refrigerators; where clients with a similar refrigerator brand get a discount when they purchase a new product.
CHAPTER FIVE
SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction
The chapter presents the summary of research findings, conclusion and recommendations on trade-in policy framework in management of used phones by agents in Eldoret town.

5.2 Summary of Findings
This section presents the summary of the findings of the study on the trade-in policy framework implementation in management of used mobile phone in Eldoret town. The study involved participation of employees and selected management representatives who were manufacturing agents in Eldoret town. The study established that majority of employees were female compared to men. Moreover, majority of employees were found to have worked for more than 5 years in the industry thereby being in a position to understand the trade-in practices for used mobile handsets.

5.2.1 Level of Used Mobile Handsets in Eldoret Town
This study established that some of the mobile phone dealers in experienced the presence of used/old mobile phones in their businesses. This is evidenced by the presence of mobile phone handset outlets in most of the dealers’ shops in Eldoret town. The research found that 28% of the mobile phone dealers had used or slow moving mobile phones. Most of the dealer reported Nokia and Samsung models in particularly as slow moving stock. Mobile phones become obsolete due to technical, functional and style related purposes. This is because over the years, the mobile phone has had technological advancements, phased out models due to wear and tear
and more aesthetically appealing models respectively. This is because most phones have a market life cycle of 9 to 24 months, leading to high rates of used phones as the expansion of mobile industry continues. Due to the nature of the industry, traders are therefore incurring some costs in obsolete and/or slow moving stock as most of the mobile phones handsets, battery, and accessories are not produced or recycled in the Kenya. In addition, unlike many countries of the West, most developing countries do not have mechanisms of disposing electrical gadgets such as the mobile phone.

5.2.2 Inventory Management Methods Applied for Used Mobile Phones
The management of the entire lifecycle of a product from its conception, design and manufacture to service and disposal is critical for the firm’s survival. This is aimed at addressing such challenges as stock outs, high inventories due to overstocking, long lead times and other inefficiencies. The study found out that the mobile phone dealers have come up with various inventory management methods to deal with the challenge of handling used phones.

5.2.3 Challenges encountered by mobile agents in handling used mobile phones
The growth in the use of the mobile phone has resulted in many mobile phone innovations in the market both globally and in Kenya. The study identified malicious customers, interference of regional records and similarity of handsets and lack of mobile trade-in policy as the main challenges in the handling of old/used mobile phone.

5.2.4 Trade-in Policy Framework on Management of Used Mobile Phones
The current study established that no trade-in policy on mobile phones was in existence. This is consistent with the statement that there are no existing mobile device trade-in policies in Africa. The lack of a policy framework on trade-in policies
has hampered the management of the pile up generated by obsolete mobile phone devices. Rapid changes in technology, changes in media (tapes, software, MP3), falling prices, and planned obsolescence have resulted in a fast-growing surplus of electronic waste around the globe. Technical solutions are available, but in most cases a legal framework, a collection, logistics, and other services need to be implemented before a technical solution can be applied.

5.3 Conclusion

Based on the findings from the study, it is concluded that there is presence of used phones with Nokia and Samsung models reporting highest. The study established that most mobile phone dealers have a great challenge of dealing with used handsets. Most dealers stock phones that customers desire and when they want and buy their inventory from suppliers that have products that easily upgraded. The main challenges in handling old mobile phones were maliciousness of customers who carelessly mishandle their phones and bring it for a trade in policy, Also different handsets are sold in different places, so if someone breaks theirs in Mombasa and come to Eldoret they bring it to offices and this interferes with regional records. Also, due to similar of handsets, someone just gets rid of the cover and hand the different handsets to us. In addition, there was lack of a mobile trade- in policy for all the models

5.4 Recommendations

Based on the findings of the study, the following recommendations are made. There is need for more formation on a mobile trade- in policy by manufacturersin as a major way of decreasing electronic pile up of used mobile phones. As the used mobile phones market continues to mature, it is essential that government and industry work
together to provide comprehensive solutions on how to deal with old/used mobile phone through adopting strategies that ensure that orders are only made on the basis of customer requests. There is a need for mobile manufacturing companies to design a system that will sensitise users to bring back their used phones to the appropriate collection points.

5.5 Suggestions for Future Research

The study recommends further research to be done on the following areas. Future the study can be expanded to other end-of-life e-products’ management, such as air conditioners and TV sets. There is need for further studies to investigate easy and sustainable approaches that mobile phone dealers can employ to avoid and deal with used mobile phone handsets.
REFERENCES


INECE Strategic Implementation Plan 2006-2009


71


Dear research Participant,

I am Lillian Mayende, a Master of Information systems student at Kisii University and I am carrying out a study on “Trade-in policy framework for management of used mobile phones in Eldoret, Uasin Gishu county, Kenya”. I have identified you as one of the suited respondents to give your views on this study.

Be assured of confidentiality and anonymity. All information received will be for academic purposes only. I look forward to your cooperation.

Thank you in advance.

Lillian Mayende
Kisii University Eldoret Campus
MIS Student
APPENDIX II: QUESTIONNAIRE FOR EMPLOYEES

Introduction
You are kindly requested to give information by filling in the blank spaces. Do not write your name in the questionnaire. Your cooperation is highly appreciated. Tick the correct alternative and fill in the spaces where applicable.

Section A: Demographic Profile
1. What is your gender?
   Male [ ]   Female [ ]
2. What is your age category?
   Less than 25yrs [ ]   26-35yrs [ ]   36-45yrs [ ]   46 yrs and above [ ]
3. What is your highest level of education?
   No formal education [ ]   Primary [ ]   Secondary [ ]   Certificate [ ]
   Diploma [ ]   Degree [ ]   Masters [ ]   Other………………
4. How long have you worked in the mobile phone industry?
   Less than 1 year [ ]   1-3yrs [ ]   4-6yrs [ ]   7-9yrs [ ]
   10yrs and above [ ]

Section B: Concentration of used mobile phones in Eldoret
5. Which models of phones do you sell (you can tick more than once)
   Nokia [ ]   Samsung [ ]   Techno [ ]   Sony [ ]   Huawei [ ]
   Infinix [ ]   All [ ]   LG [ ]
   Others (specify) ______________________
6. What is the level of used phones that customers have in this area?
   High [ ]   Moderate [ ]   Low [ ]   Not available [ ]

Section C Inventory Management Methods of Used Phones
7. The following statements seeks your level of agreement on the inventory management methods that your business users to manage used phones as. Indicate the extent to which you agree or disagree with the statements on the following scale; SD-Strongly Disagree, D-Disagree, N-Neutral, A-Agree and SA-Strongly Agree
9. The following statement also seeks your response on the options or measures that you currently apply in disposing used mobile phone handsets received from your customers. Indicate the degree to which you agree or disagree with the following statements on the following scale: SD-Strongly Disagree, D-Disagree, N-Neutral, A-Agree and SA-Strongly Agree

<table>
<thead>
<tr>
<th>Inventory Management method used</th>
<th>Level of agreement</th>
</tr>
</thead>
<tbody>
<tr>
<td>i. Customers can find the phone they desire as and when they want</td>
<td>SD D N A SA</td>
</tr>
<tr>
<td>ii. At any given month more than half of our inventory is sold to the customers</td>
<td>SD D N A SA</td>
</tr>
<tr>
<td>iii. We have a lot of the phone’s stock remaining</td>
<td>SD D N A SA</td>
</tr>
<tr>
<td>iv. We buy our inventory from suppliers that have reusable products</td>
<td>SD D N A SA</td>
</tr>
<tr>
<td>v. We buy our inventory from suppliers that have products that easily take back obsolete, used but still functional or slow moving stock</td>
<td>SD D N A SA</td>
</tr>
<tr>
<td>vi. We buy our inventory from suppliers that have products that are easily upgraded</td>
<td>SD D N A SA</td>
</tr>
<tr>
<td>vii. We have a strategy for disposing obsolete/used inventory</td>
<td>SD D N A SA</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Options for disposing used mobile phone handsets</th>
<th>Level of agreement</th>
</tr>
</thead>
<tbody>
<tr>
<td>i. The used/ slow moving stock is returned back to our suppliers</td>
<td>SD D N A SA</td>
</tr>
<tr>
<td>ii. We make sales of the disassembled parts of used mobile phone handsets</td>
<td>SD D N A SA</td>
</tr>
<tr>
<td>iii. We make sales of upgraded used mobile phone handsets</td>
<td>SD D N A SA</td>
</tr>
<tr>
<td>iv. Slow moving/ used stock is sold to other less competitive region/ country</td>
<td>SD D N A SA</td>
</tr>
</tbody>
</table>
v. We have a collection point/place where the used mobile phone handsets are taken

vi. We usually collect used mobile phone handsets from our customers

10. Please indicate any other method/s you use for disposing slow moving and/or used mobile phone handsets in your shop:

_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________

13. What are the challenges encountered in handling used mobile phones?

_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________

14. What do you think needs to be done to improve the formulation and implementation of policy framework for used mobile phones in Kenya?

_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________
APPENDIX III: INTERVIEW SCHEDULE FOR MANAGEMENT

Instructions
This interview is purely meant for academic research. Please respond to the items in an honest way as possible.

Questions
1. What is your understanding of a trade in policy?
2. Do you think a trade-in program will be functional practically?
3. Do you think there is need for a mobile trade in policy   Yes ()   No ( )
   a. Explain
4. If yes in (3) above, who should be responsible for its formulation?
5. Would you want to be consulted on the formulation of the trade in policy and why?
6. Do you think its formulation will help in the management of obsolete/used phones?
7. What role should be played by stakeholders’ e.g. manufacturers, operators, distributors and users in the formulation of the policy?
8. What should the mobile phone trade in policy formulation consider?
9. In your opinion, what challenges may be encountered in its formulation?
APPENDIX IV: RESEARCH AUTHORISATION LETTER

NATIONAL COMMISSION FOR SCIENCE,
TECHNOLOGY AND INNOVATION

Telephone: +254-20-2213471,
2241349, 310571, 2219420
Fax: +254-20-318245, 318249
Email: secretary@nacosti.go.ke
Website: www.nacosti.go.ke
When replying please quote

Ref: No. NACOSTI/P/15/15779/7866

Date: 27th October, 2015

Lilian Nasimiyu Mayende
Kisii University
P.O. Box 402-40800
KISII.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on
“Formulation of a trade-in policy framework on used mobile phones
management: A case of mobile phone manufacturer agents in Eldorei Town,
Uasin Gishu County, Kenya,” I am pleased to inform you that you have been
authorized to undertake research in Uasin Gishu County for a period ending
27th October, 2016.

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

On completion of the research, you are expected to submit two hard copies
and one soft copy in pdf of the research report/thesis to our office.

Said Hussein
FOR: DIRECTOR GENERAL/CEO

Copy to:
The County Commissioner
Uasin Gishu County.

The County Director of Education
Uasin Gishu County.
APPENDIX V: RESEARCH PERMIT

THIS IS TO CERTIFY THAT:
MS. LILIAN NASIMUY MAYENDE
of KISH UNIVERSITY, 8387-30100
Eldoret, has been permitted to conduct research in Uasin-Gishu County

on the topic: FORMULATION OF A TRADE-IN POLICY FRAMEWORK ON USED MOBILE PHONES MANAGEMENT: A CASE OF MOBILE PHONE MANUFACTURER AGENTS IN ELDOROT TOWN, UASIN GISU COUNTY, KENYA

for the period ending:
27th October, 2016

Applicant's Signature

Director General
National Commission for Science, Technology & Innovation

CONDITIONS

1. You must report to the County Commissioner and the County Education Officer of the area before embarking on your research. Failure to do that may lead to the cancellation of your permit.
2. Government Officers will not be interviewed without prior appointment.
3. No questionnaires will be used unless it has been approved.
4. Excavation, filming and collection of biological specimens are subject to further permission from the relevant Government Ministries.
5. You are required to submit at least two hard copies and one soft copy of your final report.
6. The Government of Kenya reserves the right to modify the conditions of this permit including its cancellation without notice.

RESEARCH CLEARANCE PERMIT

Serial No. A 6957

CONDITIONS: see back page
APPENDIX VI: MAP OF STUDY AREA
TRADE IN POLICY FRAMEWORK AND MANAGEMENT OF USED MOBILE PHONES IN ELDORET

BY: Lillian Nasimiyu Mayende


DECLARATION AND RECOMMENDATIONS

Declaration I declare that this is my original work and it has not been presented for examination for any degree in any institution or University. Lillian Nasimiyu Mayende Min11/20299/14

Signature Date Recommendations This thesis has been submitted for examination with our approval as University supervisors.

DR. Moses Oginda Lecturer Signature Date Faculty of Information Science Kisii University

DR. Justin Nabushawe.

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