FORMULATING AN ONLINE STRATEGY FOR IMPROVING SECURITY THROUGH COMMUNITY POLICING IN DANDORA, NAIROBI COUNTY

BY

NDEDE JOSEPH MBOYA

A THESIS SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF MASTER OF SCIENCE IN INFORMATION TECHNOLOGY, DEPARTMENT OF INFORMATION TECHNOLOGY, SCHOOL OF INFORMATION SCIENCES

MOI UNIVERSITY
ELDORET

2019

DECLARATION

Declaration by the Candidate:

This thesis is my original work and has not been presented for a degree in any other University. All rights reserved and no part of the this document may be produced, stored in retrieval system or transmitted in any means, electronic, mechanical, photocopying, recording and or otherwise, without prior written permission from the owner and/or Moi University.

Ndede Joseph Mboya……………………… ………………………………..

IS/MPHIL/038/11   **SIGN**   **DATE**

Declaration by Supervisors:

This thesis has been submitted for examination with our approval as University Supervisors.

Dr. Harrison Bii.........………………………………   **……………….………….**

                                                SIGN   **DATE**

Dean

School of Information Sciences & Knowledge Management

University of Kabianga

Ms. Edna Milgo   **………………………………**   **……………….………….**

                                                SIGN   **DATE**

Lecturer

Department of Information Technology

School of Information Sciences

Moi University, Eldoret, Kenya

DEDICATION

This piece of work is dedicated to my entire family, for their encouragement and

support

ABSTRACT

Traditional policing alone, is not effective in tackling recent and diverse methods of crime. Crime rates have increased among the youth, compounded with extreme poverty, drug and substance abuse among others. There is ill-preparedness of the police in terms of logistics and equipment, which is yet to be fully addressed and thus the need for improved strategies. This can be attained if a good strategy such as community policing is effectively adopted. The aim of this study was to investigate community policing in Dandora area, Nairobi County and formulate an online strategy for improving security intelligence between the community and the police service. The objectives of the study were to: investigate the types of crimes reported in Dandora; establish how the residents of Dandora use ICT based technologies in crime prevention; assess the modes of passing information between the community and the security agencies; examine the challenges faced by both the community and the police in community policing; and design and develop an ICT based solution that will support in community policing in Dandora, Nairobi County. Two theories guided the researcher in support of online strategy in improving security namely: Social disorganisation theory on crime and theoretical perspectives on ICT based technologies in community policing. Questionnaires and document analysis were used as tools in data collection. A sample size of 384 respondents participated in the study. Data collected was analysed using Statistical Package for the Social Sciences (SPSS) and the design modelled using UML. A waterfall software development model was adopted for the system. The main findings of the study showed a majority of the residents have been victims of crime and those who reported the cases to the administration did so physically. In conclusion, the residents of Dandora are acquainted with crime cases not being reported because of fear when reporting; a large number of both residents and the police have access to ICT tools that are useful in crime detection and prevention. The study recommends an online strategy for boosting community policing thus improving security. A web based system was designed based on the findings to aid community policing.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

4GLS	**:**	Fourth Generation Languages
AP	:	Administration Police
CACP/ACCP:		Canadian Association of Chiefs of Police / Association Canadienne des Chefs de Police
CAD	**:**	Computer-Aided Dispatch
CBD	**:**	Central Business District
CBP	:	Community Based Policing
CPC	:	Community Policing Committees
CPFs	:	Community Police Forums
CSC	**:**	Civil Security Committee
DO	:	District Officer
DOD	:	Department of Defence
FGD	:	Focus Group Discussions
GHZ	:	Gigahertz
GPS	**:**	Global Positioning System
GUI	:	Graphical User Interface
ICT	**:**	Information and Communication Technology
IIS	**:**	Internet Information Server
IP	:	Internet Protocol
IPOA	:	Independent Policing Oversight Authority
IT	:	Information Technology
KNCHR	:	Kenya National Commission on Human Rights
MPS	:	Metropolitan Police Services
MS	:	Microsoft

NCPE	:	National Committee for the Protection of Equality
NPSC	:	National Police Service Commission
OB	:	Occurrences Book
PITO	:	Police Information Technology Organisation
RAM	**:**	Random Access Memory
RCMP	:	Royal Canadian Mounted Police
RP	:	Regular Police
SAPS	:	South African Police Service
SLPS	:	Sri Lanka Police Service
SMS	**:**	Short Message Services
SOCA	:	Serious and Organised Crime Agency
SPSS	:	Statistical Package for the Social Sciences
SQL	:	Standard Query Languages
SRIC	:	Security Research and Information Centre
SSR	:	Security Sector Reform
UI	:	User Interface
UK	:	United Kingdom
UML	:	Unified Modelling Language
UN	:	United Nations
UNDP	:	United Nations Development Program
USA	:	United States of America
VHF	:	Very High Frequency
VPD	:	Vancouver Police Department
VSP	**:**	Victim Support Programmes

ACKNOWLEDGMENTS

CHAPTER ONE

INTRODUCTION

1.1. Background to the Study

Historically, the primary objective of an efficient police service is the prevention of crime, detection and reprimanding of offenders if crimes are committed. The protection of life and property, the preservation of public tranquillity, and the absence of crime, will alone prove whether these efforts have been achieved. Technology has revolutionized many practices, in various sectors of the economy as well as positive changes in enhancing better security, information and response to emergencies. There is, therefore, every reason to expect that the latest round of technological change i.e. the information technology revolution will have an equally dramatic impact on community policing. According to Robert Peel, who founded the Met in 1829: "The police are the public and the public are the police". The citizens of Britain, said Lord Blair, must decide what they want their police to do. A laudable concept indeed – yet the general public are routinely excluded from a debate that is conducted exclusively among police chiefs, politicians and others in the criminal justice elite (Johnston, 2011).

According to (National Crime Research Centre, 2012), among the initial attempts to address the problem of organized crime in Kenya was the enactment of the Prevention of Organized Crimes Act in August, 2010. The then Minister for Provincial Administration and Internal Security, issued a Gazette Notice on 18th October, 2010 banning 33 organized criminal groups. A study commissioned by the Panel of Eminent Persons in 2010 and conducted in Nairobi, Central and Nyanza regions identified 32 illegal groups, of which 27 were not listed in the 33 banned criminal

groups. At least there were 46 organized criminal gangs in the country in general. These statistics are a pointer to the increasing magnitude of the problem in Kenya and unless correct efforts are put in place by the relevant players in the administration of criminal justice, Kenya may become a land controlled by criminal gangs.

Uniformed police patrol the streets to prevent crime, to interrupt crimes in progress, and to apprehend criminals in situations where crimes are committed. In the 1990s, the police adopted proactive policing strategies in which police initiated action instead of waiting for calls. According to The National Committee on Criminal Justice report in 1998, governments and organizations face the reality that the staff and resources are stretched beyond the ability to cope with the community's growing demands. This therefore meant that the government had to seek alternative methods of policing to counter financial and personnel constraints faced by the agency. Police department had to make decisions regarding the reduction or elimination of crime as well as addressing disorder and nuisance violations using target-oriented policing in order to improve the quality of life, for residents and to increase the community's trust in police response among others (Independence Missouri Police Department, 2011). There are five core operational strategies adopted by most police departments, each with unique features: preventive patrol, routine incident response, emergency response, criminal investigation and problem solving.

E-community policing refers to the use of the Internet to deliver police services to the public. Web sites, e-mail and fax are contact methods that the public can use in addition to the telephone and face-to-face channels. Detection and control of crimes, provision of security to lives and properties and many more necessitate information sharing, coordination and collaboration with members of the public, police service,

business owners, community, vigilantes within the country among others. This becomes significant towards any successful community policing (Chan, David , Margot, & Sally , 2001). Community policing has been hailed by many police organisations around the world as a major paradigm shift from the 'professional' model of policing. Traditional crime-fighting and enforcement-oriented policing with its accompanying centralised, bureaucratic command structure has apparently given way to an inclusive philosophy based on encouraging partnerships between the police and communities in a collaborative effort to solve crime and disorder (Williamson, 2008).

Every time and again, both the print and electronic media in carries horrid episodes of wide-ranging criminal incidences. Typically, these incidences range from plain terrorism, murders, carjacking-related shootings, robbery with violence, property break-ins, abductions, rape and defilement, muggings, and intimate partner violence – otherwise commonly referred to as domestic violence among other crimes. Incidences of police officers being (literally) put on the firing line by hardened criminals have become all too common occurrences in the country. In fact, cases of armed violence indicate an increase in illegal arms in the country. For example, in the first ten months of 2010, the police were able to recover 128 rifles, 60 pistols, 10 toy pistols and 36,458 rounds of ammunitions in normal police operations. These excluded 1,064 firearms and 3,078 ammunitions recovered from disarmament operation in the same period (Kenya Police, 2010).

The Internet is increasingly central for the public access to information. Secure reporting of non-urgent incidents is one Internet application that is proving useful. Online crime reporting allows the public to file police reports for some incidents and

crimes via the Internet, at any convenient time. Police departments can retrieve these reports when police resources are available. This frees up patrol officers who would otherwise spend time tracking down these incidents (Canadian Police College, 2007).

The United Kingdom case study suggested that technology such as Internet portals can connect the police with segments of the community in a two-way communication process. We observed that the police had developed a new approach whereby the police authority was sending messages directly to the community or to some part of it for example, a request for information and reply from the community. E-policing expands our channels of communication through the Internet but it does not replace telephone or face-to-face contact, which remain important. High crime rates in some parts of the city may pose challenges to effective control and monitoring through policing in cities, with reports emanating on daily basis. There is also no one set of circumstances or conditions that can be shown to lead to a person committing a crime. However, several factors have been found to be related to the cause of criminal behaviour such as poverty, drug and alcohol abuse, violence in the home, mental disturbance, emotional stress, lack of education (Royal Canadian Mounted Police, 2007).

According to (Kenya_Police, Annual Crime Report for the year, 2010), it asserts that the security situation in the country improved with national crime trends decreasing by **5%** or **3293** cases as compared to the same period in 2009. Amongst all the Provinces in Kenya, Nyanza Province recorded the greatest improvement in security with 14 % reduction in reported crime followed by Eastern 10%, Central 9%, Western 7%, Coast 6% and Rift Valley 6%. Increases were noted in Nairobi province and North Eastern province, which recorded an increase of 28% and 15% respectively.

Nairobi recorded the highest number of crime rates and this was heavily on the Eastern side of the town popularly known as Eastlands.

Community-Based Policing (CBP) is an approach to policing that brings together the police, civil society and local communities to develop local solutions to safety and security concerns. The outcomes of lessons learned from two CBP pilot programmes in Kenya showed improved public trust in the police, cooperation between police, the community and stakeholders' capacity for Security Sector Reform (SSR). While Kenya has made remarkable development progress, poverty, crime, inadequate police capacity and distrust of police are still widespread. Public pressure for police reform in 2002 led the Government of Kenya to join with civil society and Saferworld to establish nation-wide community-based policing (SaferWorld, 2008).Community policing in Kenya has been interpreted and practiced differently and this has caused a lot of confusion, as well as the proliferation of militia groups that have instituted night patrols and other security measures that are outside the law and unorthodox to human rights. It has further relegated the public's rightful role of providing information and advanced the wrong notion that ordinary people can as well perform police duties. Against this background, community policing in the context of this policy document defined as a partnership between law enforcement agencies and the public that advances sharing of appropriate information for the enhancement of safety and security for people and property. It is a philosophy and value[1]-based policing system against which security objectives and services are provided and measured in regards

---

[1] Values a) as described in the Kenyan Constitution 2010 (articles 10: 1-2), which are summarized as patriotism, national unity, devolution of power, rule of law, democracy and participation of all people; b) human dignity, equity, social justice, inclusiveness, equality, human rights, non-discrimination and protection of the marginalized; c) good governance, integrity, transparency ,accountability and sustainable development.

to quality police services, timely delivery of such services and communities' contribution to the effectiveness of such facilities (Kenya_Police, 2012).

1.2.   E-community Policing in Kenya

In Kenya, e-community policing is a component where police and the community use ICT to share information among police service units and the police officers. This development, however, has not been expanded to improve the delivery of real time information given a wide Internet infrastructure available.. Expanding into e-community policing requires some or all of local upgrading of ICT infrastructure as well as hardware and software so as to develop portal technology and directory services through an operational database.

Based on the above facts other methods must be adopted to assist the police service in the reduction of crime in Kenya and particularly Nairobi, which has recorded increased cases of crime.

1.3.   Statement of the Problem

Although efforts are being put in place to address the problem of crime, factors contributing to increase in crime such as proliferation of small arms and light weapons, presence of criminal gangs, inequitable distribution of resources, poor urban planning, unemployment and idleness among the youth, extreme poverty, drug and substance abuse, and ill preparedness of the police in terms of logistics and equipment, among other causes, are still far from being addressed. Currently, high crime rates in several parts of Dandora, located on the East of Nairobi is attributed to inappropriate and inadequate reporting channels accompanied by fear of being victimized when one reports a crime on a face to face basis. People on the other hand

cannot give information on hot spot areas of crime far from the police stations or make inquiries all the time, unless announcements are made through media outlets (Marcel, 2008).

Traditional methods such as the use of paperwork on reporting crimes can limit the officers from "working smarter" while on the streets or in the office to execute record searches on crimes and criminal statistics since the records are immobile and information sharing is impossible. The police sources in Nairobi introduced crime reporting boxes along strategic streets and people did not use them at all. According to (Kenya Police Service Strategic Plan 2003-2007, 2007), it shows that the police service is still understaffed, with a police to population ratio of 1:1150. This has challenged adequate patrol in not only the larger estates but also in the areas considered strategic crime spots. Residents also feel insecure because of inadequate privacy for persons giving reports to the police as they fear being victimized or revealed to the criminals later. Poor filing methods also lead to reports and files disappearing at the hands of police or delay in retrievals. Organized crime undercuts development and creates distress which may lead to uncertainty towards attaining economic development targets. Therefore, the provision of timely information to the actors in the administration of criminal justice, law enforcement agencies and the public, is necessary in minimising crime rates.

In order to improve security, there is need to investigate how the community and the security agents relate and exchange information that assist in improving security and thereafter explore how an online strategy can be used to improve the communication and sharing of information among them.

1.4. Aim of the Study

The aim of the study was to investigate community policing in Dandora, Nairobi County and formulate an online strategy for improving security intelligence between the community and the police service.

1.5. Objectives

The objectives of the study were:

(1).   To investigate the types of crime reported in Dandora, Nairobi County.

(2).   To establish how the residents of Dandora use ICT based technologies in crime prevention.

(3).   To assess the modes of passing information between the community and the security agencies.

(4).   To examine the challenges faced by both the community and the police in community policing.

(5).   To design and develop an ICT-based solution that will support in community policing in Dandora, Nairobi County.

1.6. Research Questions

The following were the research questions that guided the researcher in achieving the above objectives:

(1).   What types of crime are reported in Dandora, Nairobi County?

(2).   What ICT based technologies are used in crime prevention in Dandora?

(3).   Which modes of passing information are in use between the community and security agencies?

(4).   What challenges faces the community and the police in community policing?

(5).   How best can an ICT based solution be designed to support in community

policing in Dandora, Nairobi County?

1.7.   Assumptions

Three assumptions were made in the study namely:

(1).   Crime rates in Dandora-Nairobi County were high because of many crimes

which go unreported by the victims in the community, for fear of being

victimized by the police.

(2).   The police do not react to crime incidents reported due to the ineffective

channels used by the police service in reporting crime.

(3).   ICT based solutions for reporting crime have not been adopted by the police in

Dandora.

1.8.   Significance of the Study

Through this research study, an interactive flow of information between the police

and the community in Dandora could be created.   Community policing in effect

allows community members to bring problems of great concern to the attention of the

police. Once informed of community concerns, the police must work with residents to

address their issues by provision of *e-mail newsletters, crime trends and other*

important information while at the same time encouraging residents to assist in

solving the problems of concern to the police. E-community policing fosters two-way

communication and provides better access to information for both the public and the

police.

While information technology may have enabled police to do common office tasks

better, it has not yet changed how the police in Kenya deal with crime. The study

shades light on the scope for, and barriers to using information technology as a means of enhancing community policing. Effective implementation of intelligence-driven patrolling does not only provide information systems that can provide data on hot spots and hot times, but also aids analysts interpreting this information and, most importantly, work-allocation systems that deploy patrols accordingly.

This study has contributed immensely to bring new knowledge which is useful to researchers. This has triggered further the research areas whose findings will assist the policy makers in formulating necessary policies in support of ICT use in crime prevention.

1.9. Scope and Limitation of the Study

This includes the extent of the project planning that involves determining and documenting a list of specific project goals, deliverables, tasks and deadlines or subject matter that something deals with or to which it is relevant and possibly what may make the objectives to be realised.

1.9.1 Scope of the Study

The research was conducted in Dandora (Phase I to V), in Embakasi Division, Nairobi County between January and February 2015 and the data collected from 384 members selected from a target population of around 300,000 people. Data collection was carried out using questionnaires and document analysis.

1.9.2 Limitation of the Study

Many respondents such as the police, the administrators and some residents of Dandora were quite busy in their work areas but the researcher minimised this

by booking appointments. The researcher also faced the challenge of non-honoured appointments due to emergency calls particularly the police and the chiefs, however persistency paid in the long run when all required data was collected. Nevertheless, where respondents doubted confidentiality the researcher assured them of privacy and confidentiality anchored in the study.

1.10. Definition of Operational Terms

The following is list of definition of operational terms and concepts that have significant meaning for the study:

Baraza: A place where public meetings are held

Community Policing: A strategy that centres on the involvement of residents in the design, implementation and evaluation of law-enforcement programs.

Crime: An unlawful act punishable by a state.

E-community policing: An extension of traditional interactions using the developments in communication technologies such as the Internet to deliver police services to the public who are the residents.

Gang: Any notable group of adolescents and young adults who are generally perceived as a distinct aggression by others in their neighbourhood involved in a sufficient number of illegal incidents or claiming control over territory in a community, and engaging either individually or collectively in violent or illegal behaviour.

Information and Communication Technology: Use of any computers and electronic devices to capture, store, process, secure and exchange data via networks.

Insecurity: Is the degree of inability or lack of protection from, harm making the residents or their property vulnerable target and may lead to loss.

Intelligence: A very general mental capability that, involves the ability to reason, plan, solve problems, think, comprehend complex ideas, learn quickly and learn from experience for example, in fighting crime in Dandora.

Kotkot: Is a local terminology referring to using master keys to get access into houses especially during the day when people are at work.

Mungiki: militia group operating within the Nairobi slums and its environs.

P3: Kenya Police Medical Report Form, used by the Police. Simply put, the P3 form acts as evidence that a violent act occurred and is therefore referred to as an "Exhibit" in court

Watiaji: A local terminology referring to key informants to the police and local administration considered to be a sell-out of the criminals.

CHAPTER TWO

LITERATURE REVIEW

2.1. Introduction

This chapter discusses the literature that has been reviewed for this study. The main aspects of the critical review include criminal activities, community policing in America, Europe, Asia, Africa and Kenya. It also explores on the modes of passing information to agencies. The literature also identifies the benefits of e-community policing to the community and to the police. An illustration on the theoretical framework to implementing intelligence-led policing and a summary on the diversity of types, models and objectives of community policing with some of the key challenges and benefits that shape the nature of community policing around the globe are also discussed.

2.2. Criminal Activities

The over-abundance of criminal activities that are reported on daily basis by both the print and electronic media channels in the country is simply mind-boggling: they are ferocious and weird. The most unsettling reality is that criminal activities have now permeated practically all aspects of our society in Kenya. The Government of Kenya, through the National Steering Committee on Peace building and Conflict Management, Ministry of State for Provincial Administration and Internal Security and with support from UNDP Kenya, tried implementing a three year peace programme that was seeking to consolidate peace during the period 2010 – 2013 (National Steering Committee on Peace building and Conflict Management, 2011).

Security is always the key for a country to survive and focus on its economy. Insecurity in Kenya was witnessed during the time of bomb blast in the year 1998, *Mungiki* killings, post-election violence in 2007-2008, cattle rustling and the recent killings by *Al Shaabab* terrorists in Garissa. Insecurity is a big challenge to the government and every society. Women and children in the informal settlements are usually affected by rape incidents. To human beings, security is the most precious thing because it gives peace of mind and where there are insecurity cases, people live uncomfortable life and in fear (Wayua, 2014). Robbers also interfere with the security of families and businesses. Robbers do anything when they get a chance; taking people's valuables and also messing them up through raping and hurting them physically. The issue of Al- Shabaab seems to be more based on the group's belief but it does not have any political attachment. Murdering people is their game and Kenyans should just be careful while in various gathering (KNHRC, 2008). Many people have lost loved ones through grenade attacks and fatal shootings in churches, entertainment halls, shopping malls, while travelling and recently in institutions of higher learning in Garissa University College, on 2nd April 2015, in which over 148 students died. Kenyans should put up security measures even in their places of stay. Unemployment should not be a reason for committing crime, residents should take it as a challenge to think harder and start their own projects (Mutambo & Hajir, 2015).

However, despite the foregoing, we are alarmed at the recent levels of runaway insecurity experienced in the country between *April 2013 and April 2014* (KNHCR, 2014). From the wanton killings of innocent Kenyans by an assortment of marauding gangsters, the loss of lives in internecine, inter-ethnic and intra-ethnic conflicts—sponsored by politicians and ethnic warlords—spreading from Moyale to Isiolo,

Mandera, Pokot, Turkana, Baragoi, Nairobi, Mombasa, Lamu and Bungoma to name just but a few places; to the numerous occurrences of car-jacking and robberies in Kenya's urban centres; to the continued commercialization of cattle-rustling with its dire consequences amongst the pastoralist communities and their neighbours (Akiwumi, 2011)

The Internet is increasingly central for the public to access information (Garson, 2008). Secure reporting of non-urgent incidents is one area where Internet application can prove useful. Online crime reporting allows the public to file police reports for some incidents and crimes via the Internet, 24 hours a day, and seven days a week. Police departments can retrieve these reports when police resources are available. This frees up patrol officers who would otherwise spend time tracking down these incidents. E-policing expands our channels of communication through the Internet but it does not replace telephone or face-to-face contact, which remain important. Developing an e-community policing initiative requires development of a strategic vision and direction, evaluating impacts of related legislation, evaluation of technology options, a projection of all costs, including planning, implementation and operation and identifying such barriers to success as deficiency of strategy, resistance and delays in requirements (LeBeuf, 2006)

2.3. Community Policing

The Community Policing Consortium defines community policing as "*a collaborative effort between the police and the community that identifies problems of crime and disorder and involves all elements of the community in the search for solutions to these problems*." (Community Policing Consortium, 1994) Community policing is based on the premise that police alone cannot control crime, disorder and promote

residents' quality of life in community policing-in contrast to traditional policing-the public's involvement is viewed as a "co-producer" of community safety and wellness (Whitaker, 1980).

Community policing also expands the role of police beyond crime fighting to maintaining order and promoting improved living conditions for residents. While traditional policing has been characterized by reactive responses to crime, community policing emphasizes proactive problem solving to prevent and otherwise control crime (Sparrow, 1988). The goals of community policing are to reduce crime and disorder, promote citizens' quality of life in communities, reduce fear of crime, and improve police-citizen relations (Community Policing Consortium, 1994). These goals are achieved through three essential efforts: community engagement, problem solving, and organizational transformation. The following discussion focuses on how each of these elements is understood in the community policing context and raises key questions about their effective implementation.

2.3.1 Community Policing in America and Europe

According to (Maximino, The impact of community policing: Meta-analysis of its effects in U.S. cities., 2014), he asserts that Police services across the United States have tried a range of new approaches to ensure public safety, from "hot-spots policing" to "order maintenance" strategies. Yet many U.S. citizens remain unsatisfied with law-enforcement authorities' ability to reduce crime, treat minorities fairly and hold officers accountable for their actions. Community policing is a strategy that centers on the involvement of citizens in the design, implementation and evaluation of law-enforcement programs. Such strategies are supported by the Office

of Community Oriented Policing Services, established in 1994 as part of the U.S. Department of Justice. The key components — community partnerships, organizational transformation of the police and problem-solving activities — offer an alternative to traditional and reactive policing strategies. However, just what constitutes "community policing" varies greatly across police departments; and the programs' outcomes have varied, as research and case studies have suggested. From foot patrols to education programs in school and door-to-door surveys, the degree of implementation and impact of community-oriented policing is uneven across America (Maximino, The impact of community policing: Meta-analysis of its effects in U.S. cities., 2014).

A (Charlotte, Weisburd, Telep, Vitter, & Bennett, 2014) report on the effectiveness of community policing in the United States through a quantitative analysis of prior academic studies. The researchers sought to better understand the effects of community-oriented policing on crime, disorder, fear, and citizen satisfaction with and trust in the police. The authors analysed 25 different studies containing 65 independent assessments before and after the introduction of a range of community-oriented policing strategies (Maximino, The impact of community policing: Meta-analysis of its effects in U.S. cities., 2014). The findings include:

- Overall, community-policing strategies have a positive effect on citizen satisfaction and trust in the police, as well as in the reduction of individuals' perception of disorderly conduct, including drug dealing. However, no statistically significant effect was found on reported crime or fear of crime.

- In 27 of the 65 comparisons where official crime outcomes were analysed, community-oriented policing was associated with 5% to 10% greater odds of reduced crime. This finding was not statistically significant, however.

- In 16 of the 65 comparisons, community-oriented policing was associated with a 24% increase in the odds of citizens perceiving improvements in disorderly conduct. While this effect was not statistically significant, the odds increased to 35% and became statistically significant when one study with a small number of observations was removed from the analysis.

- Citizen satisfaction with the police was evaluated in 23 comparisons, and community-oriented programs were found to be effective in almost 80% of the cases, and citizens were almost 40% more likely to be satisfied with the work of the police. "Citizens reported increased trust and confidence following community-oriented policing interventions and felt that they treated people more fairly," the authors state. These measures were not statistically significant, however (Gill, Weisburd, Telep, Vitter, & Bennet, 2014).

Community policing is said to be at the heart of all police activity in New Zealand and is a policing style which means we believe the people who live in a community are best able to deal with concerns about crime and order (Oireachtas Library & Research Service, 2012). The New Zealand Police Strategic Plan 2011 - 2015 sets out a vision of "Safer Communities Together" and has a mission of working in partnerships with communities to prevent crime and traffic accidents, as well as enhancing public safety and maintaining public order. Community policing staffs are located around the country and usually focus on either a geographical area or a crime problem. In 2012 a Strategy "Prevention First" was initiated which aims to have the right people in the

right place at the right time to stop crime happening in the first place. New mobile technology was introduced to enable police to spend more time on the streets and to deal with crimes away from police stations (Spotlight, 2012).

According to (Putt, 2010), Community Policing in Australia has been hailed by many police organisations around the world as a major paradigm shift from the 'professional' model of policing. Traditional crime-fighting and enforcement-oriented policing with its accompanying centralised, bureaucratic command structure has apparently given way to an inclusive philosophy based on encouraging partnerships between the police and communities in a collaborative effort to solve crime and disorder. It is clear from the above that community policing has been born from a growing need for crime prevention and judging from its popularity, it is at least to some extent,

2.3.2   Community Policing in Asia

According to (Denney & Jenkins, 2013), the Chinese style of community policing, termed "mass line policing", is rooted in the Communist ideology of "for the masses, relying on the masses, from the masses and to the masses". It depends heavily upon the mobilisation and empowerment of the people to solve their own problems, rather than relying on the police to fight crime (Wong, 2009). The mass line model is embedded in historical forms of social control, where such powers were decentralised and based around communal groups such as family and clan. It is infused with Maoist ideals in which people are the masters of their own destiny. Thus, the Chinese model delegates broad-policing powers to the family and the community as a whole. This is operationalized through:

- Neighbourhood committees elected by residents and responsible for educating residents on safety, resolving disputes before they escalate into criminal cases and reporting criminals to the police.

- Work units based in employment settings that serve to discipline individuals, offering rewards, penalties and providing quasi-justice and para-security functions.

- Social order joint protection teams collaborate across districts to prevent crime and maintain order (Zhong, 2009).

- Combating crime and managing social order is thus seen as 'everyone's business.

The family unit provides education and discipline, neighbours provide supervision and sanction, and the community sets the moral tone and customary norms.

2.3.3   Community Policing in Africa

Community policing in Africa varies from one country to another based on the adaptation of the individuals, some of which include:

- Plural policing in Nigeria.
- Local adaptations Community Policing in Mozambique.
- Community policing in South Africa.
- Sungusungu in Tanzania.

The literature about community policing in the above areas are discussed as follows:

2.3.3.1 Plural Policing in Nigeria

In the context of rising crime rates in Nigeria, poor police-citizen relations and inability or unwillingness of the state to provide protection, local communities have formed policing structures for self-protection (Alemika C. , 2004). These groups include religious groups such as the Hisbah groups enforcing Sharia laws, and have been granted the authority to arrest citizens; ethnic groups such as the Olode (hunters) in Jigawa state, which have historically fulfilled security and securing communities: the what and how of community policing protection roles; state sponsored groups such as the Bakassi Boys (Denney & Jenkins, 2013), which originated as a self-help group to confront crime in market towns. The Nigerian government welcomes the establishment of informal policing groups as long as they:

- Register with the police.

- Submit to police screening.

- Do not carry weapons.

- Do not detain suspects, but rather hand them over to the police.

Some of these groups were later legalised and commandeered by the state and then later criminalised because of severe abuses; and community/neighbourhood watch groups which are organised by street or village associations to man the entrances and gates and carry out foot patrols (Alemika & Chukwuma, 2004).

2.3.3.2 Local Adaptations Community Policing in Mozambique

According to (Davis, Henderson, & Merrick, 2003), local adaptations community policing in Mozambique started following the end of the 16 year civil war in 1992. Mozambique struggled to democratise and demilitarise the national police and make it more democratically accountable and sensitive to human rights issues. In 2000, the

Ministry of Interior, with the strong support of international donors, launched a community policing initiative-PolCom-to reform the police and to address rising crime rates. PolCom adopted a model which emphasised community forums in other words, Conselhos de Policiamento Communitário–(CPCs) where voluntary members, selected by local populations gathered to discuss local security problems. CPC members were able to facilitate patrols and mediate minor conflicts, such as family or neighbourhood disputes, but were prohibited from carrying weapons and expected to hand over anyone arrested to the police (Denney & Jenkins, 2013).

2.2.3.3 Community policing in South Africa

According to (Pelser, 1999), the South African Police Service Act, 1995 provides for and regulates the establishment of Community Police Forums and Boards. The South African Police Service (SAPS) community policing policy was articulated in a document of the Department of Safety and Security entitled "Community Policing Policy Framework and Guidelines", published in 1997. In addition, the SAPS has committed itself officially to the implementation of community policing as a national strategy and adopted it as its "operational philosophy". Despite these efforts, the successful implementation of community policing is still being hampered by a number of obstacles (Juta, 1995) . These challenges include the following:

i) Community policing is viewed as limited to the functions of Community Police Forums (CPFs). CPFs exist today at most police stations in South Africa, although some may be existing in name only.

ii) Absence of an Identifiable Community: The fragmented nature of South African society makes it very difficult to clearly define "community".

iii) Communal Complicity in Crime: Another major concern is that many communities may in fact display a "communal complicity in crime" as a result of extreme poverty.

iv) Institutional Capacity: The institutional capacity of SAPS is another factor which may be detrimental to implementation of the policy.

2.2.2.4 Sungusungu in Tanzania

In Tanzania , the demobilisation of soldiers in the aftermath of the Tanzania/Uganda conflict led to increasing insecurity and violence associated with cattle - rustling and banditry in Tanzania. The state was largely ineffective in managing the violence and as a result, in the early 1980s, villages responded autonomously by forming defence groups called Sungusungu in order to confront these gangs of thieves. Groups of men patrolled their villages on a rotational system, protecting property, apprehending and arresting thieves, and recovering stolen cattle (Heald, 2009). The Sungusungu committees are well rooted in traditional governance mechanisms and are elected by democratic village assemblies. The Sungusungu movement was encouraged by the ruling party and has been partially institutionalised and incorporated within administrative structures (Suzette, 2009)

In conclusion, community policing should be used to bridge the gap between those supporters who see community policing as the cure for everything and those "over-zealous" detractors who do not even want to give it a chance. Community policing should not be regarded as a substitute for all other needed forms of policing, but rather as a complementary strategy.

2.3.4 Community Policing in Kenya

In Kenya, police reform is a critical issue not only for community safety and economic development, but because there is intense popular demand for reduced crime and better police performance. Community policing is the perceived effort to enhance security thus recognizing the interdependence and shared responsibility of the police and the community in ensuring a safe and secure environment. Community policing works by creating an understanding between the police and the community about their roles in crime prevention. Supplementing police patrols through private guards, use of neighbourhood watch groups and provision of educational capacity building also enhances constructive participation in addressing the problems of crime. Forming community policing victim support centres, training response teams (units), improving street lighting (security lights) to reduce crime (the use of adopt-a-light programme for the slum population) among other do assist in community policing (Masese & Mwenzwa, 2013).

There were some 12 well-organized militia groups operating within the Nairobi slums by 2001. Some of these included the Bagdad, Mungiki, Kamjesh, Jeshi la Mzee, Chinkororo, 42 Brothers, the Amachuma, and Taliban among others. With increasing threats of the militias to national security, the government banned all militia and vigilante groups in 2001. However, some militias were useful to the community because they ensured minimum standards of order in the slums where they dominated (Olang & Okoth, 2012). There has been progress in each area, with perhaps the most notable achievement based on the fundamental principles of CBP such as practise policing by consent not coercion, be part of the community not apart from it, find out (together with the community) what the community's needs are, work in partnership

with other agencies and the public, tailor the 'business' of policing to meet the community's needs. (Saferworld, 2008).

Similarly, (Dinnen & McLeod, 2009) assert that traditional forms of security and justice provision in Melanesia are based upon 'underlying imbalances of power ... not least in respect of gender'; and (Ruteere & Pommerolle, 2003) illustrate how neighbourhood watch groups in Kangemi settlement in Nairobi are dominated by landlords, and how tenants are under-represented in consultative committees despite constituting 80 per cent of the population.

2.4 Modes of Passing Information to Agencies

The police department strives to actively involve citizens in its operations, through a variety of means. According to (Lincoln Police Department, 2015), in USA, Volunteers are widely used, whether college interns or retired seniors. Citizen patrols and crime prevention initiatives are welcomed and encouraged. Area *commanders meet often with members* of the public to solicit input and feedback. Many internal committees include public participation. The department seeks to educate the general public about police work in various ways, including publications, *web sites, public-access television, and town hall meetings*. The department accepts and even encourages citizen review of its performance. According to (Bureau of Justice Assistance, 1994), strategic analysis requires that information be collected by a number of unconventional methods for example, modern Computer-Aided Dispatch (CAD) systems, which assist in prioritizing police response to service requests. Cellular telephones, pagers, fax machines, and voice mail can also relieve the overburdened 911 systems and provide vital communication links between

communities and the police. In addition, geocoding and mapping technology can prove priceless to the problem-solving process.

In Sri Lanka, a number of community policing activities were noted as being particularly important in contributing to improved interaction between police and communities: police patrols at the village level and ***anonymous complaint boxes*** provided at Civil Security Committee (CSC) meetings (Chambers, Denney, & Pieris, 2014). Bicycle policing has specifically helped the Sri Lanka Police Service(SLPS) to improve police– community relations in many ways such as the use the 'common man's' mode of transport. This has reduced the social distance between the police and the members of the communities they serve.

In 2012, two armed men in Johannesburg, South Africa, commandeered an automobile, forced its driver into the rear luggage compartment, and drove away. Kidnapping in the course of a carjacking often ends tragically for the victim. In this case, the carjacking victim avoided such an outcome with an astute use of technology. Using his mobile phone, the victim sent a text message to a companion telling her of his predicament. She then used Twitter to send a tweet to her followers who, in turn, retweeted her message to their respective followers. With each retweet the network of those aware of the situation grew exponentially. The retweet soon made its way to "Pigspotter," a popular though controversial Twitter hashtag devoted to circulating warnings about police speed traps. With 110,000 followers, including a private security company and a local volunteer fire and rescue service, the posting on Pigspotter immediately elevated awareness of the incident. Using the mobile phone signal, the car's location was soon identified. Two hours after the start of the drama, a

tweet read, "Just received a call, the police have found him in Ventersburg! (Livingston & Steven, 2013).

In Nigeria, higher levels of transparency and accountability can be achieved by mobile phones linked together in common cause by FrontlineSMS or RapidSMS, with much the same effect as a vast array of closed-circuit television cameras. In short, ICT can empower citizens to organize for community protection quickly and at low cost. Nigerians wanted a clean and fair election in 2011. Through the convergence of mobile phones, Ushahidi, and a strong show of support from civil society organizations, ReclaimNaija contributed to the realization of that community intention as well as to a significant improvement in electoral credibility in Nigeria (Livingston. & Steven, 2013).

2.4.1   Benefits of E-Community Policing: for the Community

There are several advantages in extending the police-public relationship to include Internet communications. People can access the system when convenient; they can opt out easily if they wish to; and they may find comfort in the ability to communicate without face-to-face contact. However, Internet reporting is not usually anonymous and police can normally trace back reporters using computer IP addresses (Davies, 2004). E-community policing offers more choice and convenience for the public. The forms ensure that every inquiry is documented with identical screening questions. The public can ask questions and get answers at any time and without having to see a police officer. Those living in rural or dispersed geographical areas can access the police more easily (Marcel, 2008).

2.4.2 Benefits of E-Community Policing: for the Police

E-community policing helps police manage paperwork without having to assign a patrol officer to the report (Smith, 2004). Internet access helps officers to "work smarter" while on the streets. It is also a powerful tool for expanding intelligence networks – both with partner organizations and difficult-to-access target groups such as the youth. The Internet offers opportunities to deliver services and increase communication in a convenient and cost-effective way. Online strategies should be designed to deliver cost-effective 24/7 virtual police service in crime spots and remote areas (Marcel, 2008)increase visibility of the police services within the local community, link with local organizations and partners to build relationships and create a stronger community bond. In 2004, the Metropolitan Police Service (MPS) of United Kingdom held two e-community policing consultations: one with the public and partner/community organizations, and one with MPS managers. Participants were asked their views on electronic services and the results were used in the strategic planning process (Metropolitan Police Authority, 2004). Their reports show how e-community policing is promoted and how it relates to their objectives

2.4.3 Evaluating E-Community Policing

Information Technology (IT) now permeates many aspect of policing. The police services use IT for records management, mobile information access and data processing in police vehicles and, email. Information technology eases communication and promotes information sharing within organizations and with partners. Increasing reliance on IT brings risks and challenges. At the Montreal CACP/ACCP conference in 2003, speakers noted difficulties related to information sharing and interoperability. The increasing need for police to collect and process

information more effectively and to share it with law enforcement partners and the community was paramount (CACP/ACCP, 2003).

Despite the growing dependence of policing on IT, there is relatively little research on how IT affects management of police practices, policing activities, information sharing within the police and with law enforcement partners, or how well police are managing system integration and interoperability. For the most part, it is assumed that IT will reduce bureaucracy and daily paperwork (Futronics, 2005).

One study examined whether IT improved management (of human resources, for example) and the execution and recording of such daily activities as automated fingerprinting and photographing those arrested. The benefits realised included saving officers time; reducing overtime costs; reducing the need for clerical staff; helping to solve cases through relational databases and increasing crime clearance rates (Colloquia, 2003)

Another study assessed patrol officers' and detectives' attitudes and their perception of information sharing, online training and usage of automated information systems such as laptops in police vehicles (Colloquia, 2003).

2.5. ICT based Technology in Crime Prevention

In USA, it is no longer relegated to "nice-to-have" status or the province of the most prosperous, law enforcement. Technology has changed the way police conduct business. Emerging technologies and new uses for existing technologies are changing the landscape of police work every day. Technology plays a key role in community policing as the facilitator of partnerships, enhancer of problem-solving, and enabler of organizational change. Technology can facilitate police-community dialogue,

increasing transparency and enabling accurate and timely information sharing that can inform police response strategies and save lives. Such technologies include 311 systems, reverse-911, e-mail notifications, agency websites, and social networking tools. (United States Dept of Justice, 2013).

According to (Reynolds, 2013), Royal Canadian Police department, the Internet is increasingly central to public access and information. Secure reporting of non-urgent incidents is one Internet application that is proving useful. Online crime reporting allows the public to file police reports for some incidents and crimes via the Internet, 24 hours a day, and seven days a week. Police departments can retrieve these reports when police resources are available. This frees up patrol officers who would otherwise spend time tracking down these incidents.

In Canada, police would retrieve the online reports when they had resources available but could access files 24/7. This would allow police to organize some work according to the Internet activities. Online reporting would allow the police to compile information better, map problems and see patterns of crime by zones, areas, etc. Web links could be developed with the business community and with other agencies for emergency for example. Using automated translation on the web, it would be easy to report and to read police information in one's own language (Reynolds, 2013).

In Jamaica, Ministry of National Security, is taking full advantage of the offerings of Information Communication Technology (ICT) in combating crime across the island. It was noted that a number of crime control and prevention initiatives have been implemented with the use of modern technology. Among these, is the recent upgrading of the Jamaica Constabulary Force's (JCF) Automated Palm and

Fingerprint Identification System (APFIS) at a cost of $260 million. In addition, the Blackberry (smart phone) law enforcement database has been installed on some 550 handsets of traffic and operational personnel across the island and the smart phone application has been used to check the authenticity of drivers' licences and motor vehicle documents (Reynolds, 2013).

According to a recent review of crime prevention technology by Brandon Welsh and David Farrington (2007: 81), "Technological advances over the years have had a profound influence on the way we think about crime and the efforts that are taken to prevent it. For example, several large U.S. cities have recently begun deploying CCTV cameras, including Boston, New York, Los Angeles, Chicago, and Newark New Jersey, and it was estimated that there were approximately 1 million CCTV cameras being deployed across the United States by the end of 2006- (Nestel, 2006), but more current estimates are not available. A Close Circuit Television (CCTV) is a situational crime prevention system with some crime prevention capacity. When installed at some strategic places, it can trigger a perceptual mechanism in a potential offender that if he commits a crime, he will be caught. In other words, CCTV can be used to increase the perceived risk of capture. Other nations all over the world have embraced the use of CCTV as a surveillance tool to monitor events, people and government installations for example, Charlie Hebdo attack in Paris, France on 15th January 2015, where around eleven people died, CCTV footages were used to track down the perpetrators. Similarly, this ICT tool was used to track down perpetrators of Boston's Marathon Bomb attack which occurred on Boylston Street, USA on 15th April 2013. It is our strong belief that if this

technology is properly harnessed here in Nigeria, it will stem the rate of crime and also aid the police in their investigation(with video footage of incidences).

The ubiquity of the mobile phone in Africa allows communities to establish methods for transmitting information about crime in real time so that community members can avoid crime hotspots or inform local leaders about percolating disputes to prevent further escalation. The Nigerian police have piloted several programs to enhance surveillance and response using ICTs in major urban areas. In 2011, solar powered cameras were set up in crime hotspots in four major cities, including Lagos, to provide constant surveillance. With mobile phones, Africans can more quickly and easily report incidents to the police and provide intelligence on criminal activities. Police force, meanwhile, can maintain active links with under-policed areas despite their common personnel shortages (Livingston. & Steven, 2013).

2.6. Challenges Facing the Community Policing

There are inadequate personnel to fight the increasing crime as cited in 2015 where the number of police officers in Kenya stood at 1: 800, against the 1:400 recommended by the United Nations for efficient and effective policing. Little has been done to realize the professionalization of the police service. Most of the police service members have basic education and this has proved to be quite a challenge. In addition the police service has been so much unresponsive to emergent crime such as cyber-crime albeit the police service is really striving taking into account the meagre resources available to them to fight terrorism, (Brenda, 2011). The police service lacks modern technology to cope with sophisticated crimes of today like the use of Internet. Police agencies, like other large bureaucracies, are still very paper-intensive organisations in which substantial amounts of time are spent on completing reports,

and considerable organisational resources are expended on administering paper flows, storing and maintaining records. 'Too much paperwork' has been a common source of complaint by police and is often cited by them as an explanation for why they are unable to spend more time on policing tasks such as conducting patrols and investigating crimes (Dufka, 2010).

In Nigeria for example, challenges facing community policing include wide spread corruption in the police force thus fuelling abuses against ordinary citizens and severely undermining the rule of law, extrajudicial killings (Dufka, 2010) and allegations levelled against the institution and its personnel, some of which have proven to be true, include arbitrariness in exercising its power, corruption, perversion of justice, and delays in the administration of justice. Inadequate manpower (both in strength and expertise), insufficient education and training, inadequate equipment, and poor conditions of service of the average policeman. "**God fatherism**" is also an endemic problem which funds and abets vices by shielding "connected" criminals from justice by government agents and highly placed officials entrusted with the power and authority to investigate and prosecute such vices (Onyeozili, 2005).

2.7. Development of Community Policing Systems

Robust information systems do supply timely and accurate data. In the U.S. Department of Justice, the Office of Community Oriented Policing Services (COPS Office) indicates that the power switch technology can be leveraged in specific ways to enhance the implementation of the community policing philosophy. E-community policing systems have been used in several countries around the world (Scheider, Community Policing Dispatch, 2008).

Technology can increase the effectiveness of problem-solving and corporation initiatives and assist in the implementation of organizational changes designed to institutionalize processes in the following areas:

(a) Problem Solving: Robust information systems that supply timely and accurate data to analysts and officers can contribute significantly to enhanced problem-solving efforts. Problem solving can be information-intensive and often requires access to both traditional data (offender information, incident reports, and calls for service) and non-traditional data (physical characteristics of locations, property owners/managers, and increased victim information) that can allow for the improved identification and analysis of problems. Agencies have also had success developing databases for problem-solving initiatives. These databases allow for the sharing of knowledge regarding problems and innovative responses through agencies and maintain an on-going record that can be referenced when confronting similar problems in the future. In addition, crime mapping technology can contribute significantly to broader problem-solving efforts and can provide officers (often through in-car computers) with up-to-date information regarding recent trends and locations of incidents and problems in their beats (Scheider, 2008)

(b) Partnerships: Technology can also facilitate partnerships through increased police communication with the public. Community policing encourages agencies to develop two-way communication systems that can be enhanced through such means as online reporting systems and interactive applications (surveys, maps), reverse 911, e-mail alerts, and discussion forums, thereby facilitating on-going dialog and increased transparency. Databases of potential partners can also be

developed that include information on the historical relationships with specific partners and the potential human and financial resources they can bring to address various problems. These databases can then be searched for specific public safety problems that the police are addressing.

(c) Organizational Transformation: Technology can enhance organizational support for community policing by improving internal communication systems through electronic memos, reports, newsletters and e-mails. It can also improve incident reporting through electronic reports, resulting in greater accuracy and increased efficiency that can feed problem-solving and crime analysis efforts. Technology can also improve dispatch and reduce response times, resulting in greater time to engage in proactive efforts. Technology allows for greater coordination and communications interoperability with other entities for more efficient operations and coordinated responses. Community policing also encourages the use of technology to develop accountability and performance measurement systems that are timely and contain accurate metrics and a broader array of measures linked to community policing principles through COMPuter STATistics(*CompStat*), like and early intervention systems. Technology, particularly effective Internet sites, can also greatly enhance recruitment efforts and can be used to provide online training around community policing topics (Scheider, 2008)

In the United Kingdom, the initiative came from a government white paper requiring local councils to have their services available electronically by 2005. Police Information Technology Organisation (PITO), a non-departmental organization under the responsibility of the Home Office was created for procurement of IT systems and

hardware to the police services. A data management system – the Portal – was developed as a single point of entry for information. The Portal has three major modules: Message broadcasting (e-mails, telephone, and text messages), Notification of minor crimes and Intelligence reports (Royal Canadian Mounted Police, 2016).

According to (Royal Canadian Mounted Police, 2016), in British Columbia, Vancouver Police Department (VPD) implemented its online crime reporting in 2001. In 1999 VPD reviewed service delivery and concluded that Internet reporting would be ideal for public reporting of *minor property offences and non-emergency incidents*. The online crime reporting system did not prove to be demanding or time-consuming for the staff dealing with the submitted forms. Dealing with service calls from the public only required a simple reorganization of schedule, no additional staffing. The VPD web page explains the six-step process required to fill and submit the form, the time required and a list of reportable crimes. Senders are promised a response within five working days; a majority (62%) are notified the same day. Police review takes three to six minutes and 80% to 85% of reports require little or no modification. Once the review is complete, the sender is e-mailed an incident number. Data from valid reports are automatically transferred into the Records Management System (RMS).

In Nigeria, e-neighbourhood Management Architecture for Crime Detection and Control system works in the following ways: Whenever vigilant people or neighbours watch or suspect anyone with criminal intent, a call or text message is initiated at the location. The location could also be a scene point of the incidence. The call or the message, as the case may be, is communicated to the Control Centre (CC), at the headquarter computer. This computer represents the VoiceXML "Machine" which is

able to process caller's Text/Voice. The computer is able to process the caller's voice or text messages by converting Voice to Text and vice versa. Once the centre accepts an alarm message that a crime is going on in a place, then, the system automatically triggers alert which is sent to the regional Server (C1, C2, C3) around the areas of the crime or likely crime spot. Once in the server another alert is triggered and a crime-alert is sent to all neighbours in the vicinity. Also, a page is sent to the police mobile phone or a pager to all the police personnel in the vicinity. The Architecture also allows voice communication to be strictly sent from the main server to the control sub-system. The message is always rooted to the police patrol vehicle for urgent action to be taken after the crime is reported. (Adeola, Falaki, & Olabode, 2014).

Features of such systems do incorporate modules on wanted persons, suspected criminals, criminal history, wanted cars and stolen cars, cases, news and events, contact details, weather, recommendations, airline information and audit trail. There are several successes which have been mentioned in countries using computerised community processing systems. Online crime reporting offers benefits for both communities and the police. Technology has become more sophisticated and enables police to be ahead of criminals in many aspects and as described, notable e-policing systems are reputed to provide:

1. Timely capture and sharing of criminal intelligence which enhances police collaboration across various police functions and integrate with other law enforcement agencies;

2. Effective law enforcement platform that combines and streamlines many resources into one single, secure and easily-accessible system;

3. Prioritization of competing responsibilities and easy identification of bottleneck policing areas;

4. Ensuring of continuity in policing, while maintaining flexibility through centralization of crime information, providing instant availability through databases accessible within the country;

5. High-security mechanism while maximizing real-time information sharing;

6. Elimination of unnecessary delays caused by manual mistakes; and

7. Development of technical capability on IT and e-governance within police department.

Majority of services will continue to be delivered by front-line police officers face-to-face with the public. However, many services and initial public contact can be handled electronically through the Internet or facilitated by hand-held electronic devices.

2.8. Theoretical Framework

Many theories of technological revolution have been offered and expanded for the past decades in modern-day information system research literature. In this context, most of the studies moving around these theories have been created on crimes in the community, challenges in fighting crime, how information is passed between community and police and information technology usage. They all attempt to explain the strategies for improving security through community policing. The relevant models in support of the online strategy for improved security are presented in a chronological argument using two theories namely:

2.8.1 Social Disorganisation Theory on Crime

Sociological approaches suggest that crime is shaped by factors external to the individual: their experiences within the neighbourhood, the peer group, and the family. Why do some neighbourhoods have higher crime rates than others? What is it

about certain communities that consistently generate high crime rates? These are the central questions of interest for social disorganization theory, a macro-level perspective concerned with explaining the spatial distribution of crime across areas.

 Social disorganization theory has emerged as the critical framework for understanding the relationship between community characteristics and crime in urban areas. According to the theory, certain neighbourhood characteristics –most notably poverty, unemployment, drug abuse, residential instability, and racial heterogeneity – can lead to social disorganization (Kubrin & Wo, 2016).

The origins of social disorganization theory date back to the early 1900s. In 1929, two researchers from the University of Chicago, Clifford Shaw and Henry McKay, began a series of studies using official records which showed that in the city of Chicago, rates of delinquency, criminality, and commitment to correctional institutions varied evidently by area. In particular, rates were highest in slums near the city centre and diminished as distance from the centre of the city increased, except in areas of industry and commerce just outside of the central district, which had some of the highest rates. Shaw and McKay also found that rates of crime and delinquency exhibited a remarkable consistent pattern over decades; in particular, the spatial pattern of rates revealed significant long-term stability even though the nationality structure of the population in the inner-city areas changed greatly over time. Shaw and McKay thus determined that crime and delinquency were not the result of personal characteristics of the residents who lived in the neighbourhoods but were tied to the neighbourhoods themselves. Since areas of high and low crime and delinquency maintained their relative positions over many years, a key theoretical task became to

explain the existence and stability of these area differentials over time (Kubrin & Wo, 2016).

According to (Kornhauser, 1978), a fundamental part of their explanation involved the concept of social disorganization. Social disorganization refers to the inability of a community to realize the common values of its members and maintain effective social controls. As Kornhauser describes, "Social disorganization exists in the first instance when the structure and culture of a community are incapable of implementing and expressing the values of its own residents." According to the theory, a common value among neighbourhood residents is the desire for a crime-free community. In essence, then, socially disorganized neighbourhoods are ineffective in combating crime.

The basic social disorganization causal model can be expressed as: neighbourhood characteristics → social ties → informal social control → crime.

2.8.2 Theoretical Perspectives on ICT Based Technologies

In the second theory, the most recent round of technological changes in policing is determined by three imperatives to improve the effectiveness and efficiency, to satisfy the demands of external agencies for information and to meet the demands of police management and accountability. The first imperative is technology and holds that not only does technology promise to improve police effectiveness and efficiency in controlling crime; it may also enhance their professional status and organizational legitimacy (Ericson & Haggerty, 1997). The second imperative is information motivated and views that police organizations regularly provide data for external bodies such as road traffic authorities and insurance companies for their own management and risk assessment needs. The third imperative is policy driven. Police organizations use of information technologies to improve performance is the result of

externally imposed demands for public accountability in terms of cost effectiveness, probity and procedural regularity (Chan 1999:249-68).

Dr. A.P.J. Abdul Kalam (former President of India) maintained that there is a need for Wi-max and Wi-Fi connectivity with state-of-the-art security for the police to detect crimes and for efficient surveillance, crime prevention, detection and control, the police needs to be equipped with the new technologies. From the available data, the following new technology modes are found to be available to the police in developed countries but can be adopted by other developing nations.

(a). **Mobile Data Computer:** Wireless mobile data or mobile computing terminals and laptop computers with wireless or radio communications are becoming essential public safety communication tools to increase officers' safety, productivity, improve agency effectiveness, control or reduce operating costs. Community-oriented policing becomes more efficient and more effective with the use of wireless mobile data and mobile computing. The use of mobile data computers in the roadside environment is the fastest emerging technology tool to assist law enforcement. The uses of this technology are only limited by the imagination and cost factors. Identification of suspect or missing/unidentified people can be readily accomplished in the roadside environment. This will assist law enforcement in ridding the streets of fugitives that may previously have gone undetected.

(b). **Mobile Printers:** Patrol vehicles are equipped with printers plugged into the mobile data computers. Violation notices can be given to the offender; depositions can be entered directly into the computer, printed, and signed. Photographs of wanted and missing persons can be printed. Mobile printers got their big start making life easier for people about 25 years ago. The devices have reached a point in their evolution

where they are probably about as small, durable and cost-effective as they are likely to get. Most mobile printers in use today are ruggedized for use in the field.

(c). **Mobile phone camera:** A camera phone that is a mobile phone, which is able to capture either still photographs or video. Since early in the 21st century the majority of cameras and mobile phones in use are camera phones. There are dozens of relevant patents dating back as far as 1956. Compared to digital cameras of the 1990s, a consumer-viable camera in a mobile phone would require far less power and a higher level of camera electronics integration to permit the miniaturization. Camera phones can share pictures instantly and automatically via a sharing infrastructure integrated with the carrier network, thus negating the need for connecting cables or removable media to transfer pictures. As mobile phones are constantly carried, camera phones allow for capturing moments at any time.

(d). **Global Positioning System (GPS):** The GPS is a space-based global navigation satellite system that provides reliable location and time information in all weather and at all times and anywhere on or near the Earth where there is an unobstructed line of sight to four or more GPS satellites. It is maintained by the United States government and is freely accessible by anyone with a GPS receiver. This system was created and realized by the American Department of Defence (DOD) and was originally based on and run with 24 Satellites. It was established in 1973 to reduce the large number of navigation aids and to overcome the limitations of previous navigation systems. The GPS consists of three parts: the space segment, the control segment, and the user segment. GPS satellites broadcast signals from space, which each GPS receiver uses to calculate its three-dimensional location (latitude, longitude, and altitude) plus the current time. Equipped with these GPS receivers,

users can accurately locate where they are and easily navigate to where they want to go, whether walking, driving, flying, or boating. GPS has become a mainstay of transportation systems worldwide, providing navigation for aviation, ground, and maritime operations.

(e). **Computer:** A computer is a programmable machine that receives input (data), stores and manipulates data, and provides output (information) in a useful format. Although mechanical examples of computers have existed through much of recorded human history, the first electronic computers were developed in the mid-20th century. These were the size of a large room, consuming as much power as several hundred modern personal computers (PCs). Modern computers based on integrated circuits are millions to billions of times more capable than the early machines, and occupy a fraction of the space. Simple computers are small to fit into small pocket devices, and can be powered by a small battery

(f). **Internet**: The Internet is a global system of interconnected computer networks that use the standard Internet Protocol Suite (TCP/IP) to serve billions of users worldwide. It is a network of networks that consists of millions of private, public, academic, business, and government networks of local to global scope that are linked by a broad array of electronic and optical networking technologies. The Internet carries a vast array of information resources and services, most notably the inter-linked hypertext documents of the World Wide Web (WWW) and the infrastructure to support electronic mail. Internet enabled devices such as mobile phones and, data cards, handheld game consoles and cellular routers allow users to connect to the Internet from anywhere where there is a wireless network supporting that device's technology.

(g). **Mobile Telephones:** Billions of people in the world today realize how essential mobile phones are in their lives. Mobile phones have become a part of everyday life for many individuals and some could not even manage to last an hour without them. This is also the fashion trend nowadays. Without cellular phones we are incomplete. They turned out to be the personal dairies of a lot of people. This device calculates, wakes people up, and reminds them of all occasions and appointments, helps in accessing the Internet and has the messaging service and several other benefits. Mobiles are of use to the elderly and handicapped, as well. For example, the visually impaired have their "talking mobile phones" wherein they can read the text messages.

When implementing an online-community policing program, specific features of the environment and characteristics of the community are often not taken into account, which is a major threat to the success of the program. The social disorganisation theory provides the interrelationship between the environment (community) and the security agencies (system) variables which require dialogue and understanding in order to facilitate exchanges of relevant data for analysis and effectiveness of security lapse controls.

The theoretical perspectives on ICT based technology on the other hand, insists on the use of latest technological advancement modes in the area of policing and holds that modern management technology could be made use of for police augmentation and making the system more efficient by use of electronic gadgets such as computers, mobile phones, digital cameras, Internet, Global Positioning Systems, image and video transmission tools, over a large area thus giving the police a tool to rapidly alert neighbourhood, businesses and associations about criminal activities

and wanted suspects. The community can also respond through real time reporting in this engagement. Some of these tools are already in the neighbourhood where majority of adult population have phones among others. The online strategy for community policing and patrol parties can increase efficiency, precision and effectiveness despite the limited resources available.

2.9. A Conceptual Framework

A concept is an image or symbolic representation of an abstract idea. Chinn and Kramer (1999) define a concept as a "complex mental formulation of experience".

According to (Mugenda, 2008), a conceptual framework is a concise description of the phenomenon under study accompanied by a graphical or visual depiction of the major variables of the study. (Young, 2009), defines conceptual framework as a diagrammatical representation that shows the relationship between dependent variable and independent variables. The conceptual framework was developed by venturing on the relationships and interconnectivity between the objectives of the study. Independent variables are those variables which are systematically varied by the researcher. In this study the independent variables were the types of crime, residents ICT views, modes of passing information, challenges faced and ICT based solution. On the other hand, dependent variables are those variables whose values are presumed to depend on the effects of the independent variables (Mugenda, 2008). The dependent variable is the formulating of online strategy for community policing which relates with the independent variables as shown in **figure 1** below.

Independent Variables   **Dependent Variable**

```
┌─────────────────────┐
│ Crime types         │──────────┐
│                     │          │
└─────────────────────┘          │
                                 ▼
┌─────────────────────┐          │
│ Residents ICT       │──────────▶
│ views               │          │
└─────────────────────┘          │        ┌─────────────────────┐
                                 ├───────▶│ Formulating online   │
┌─────────────────────┐          │        │ strategy for         │
│ Modes of passing    │──────────▶        │ community policing   │
│ information          │          │        └─────────────────────┘
└─────────────────────┘          │
                                 │
┌─────────────────────┐          │
│ Challenges faced    │──────────▶
│                     │          │
└─────────────────────┘          │
                                 │
┌─────────────────────┐          │
│ ICT based solution  │──────────┘
│                     │
└─────────────────────┘
```
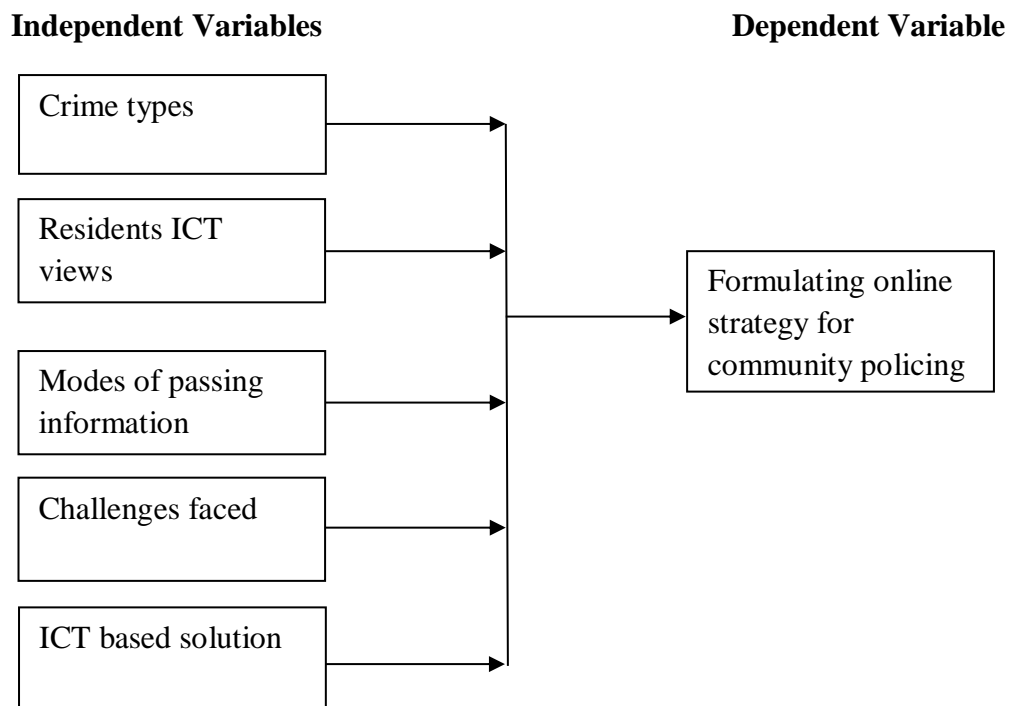
Figure 1: The Conceptual Framework Linking the Variables of Study

2.10. Conclusion

This section has broadly mapped the literature related to diversity of definitions, types, models and objectives of community policing with some of the key challenges and benefits that shape the nature of community policing in America, Europe, Asia, Africa and Kenya. There is a revelation in the literature that African countries lag behind in community policing with ICT application being positive in success to community policing. Based on this literature the methodology used in the study is examined below in chapter three.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1   Introduction

This section sets out several steps and segments to be followed in the implementation of the study. It comprises the description of the plan to be followed to attain the objectives, the research design, sampling technique, instruments of measurements and analysis of data during fact finding exercise and the plans to aid the researcher in answering the raised research questions. The study further pursued to consider the level of computer knowledge among the police service, the community, as well as the availability of infrastructure and also the types of crime reported through the available modes. The independent variables of concern in the study were age, gender, subject area and academic qualification.

3.2 Research Design

This study adopted a mixed method approach (both qualitative and quantitative strategies) so as to maximize the strengths and minimize the limitations of each approach. Qualitative research seeks to describe and analyse the culture and behaviour of humans and their groups from the point of view of those being studied (Kombo & Tromp, 2006).

Cluster random sampling technique was used to ensure that it was possible to select the members randomly where no single list of the population members existed; the selected   groups were used in the study. This was because the sampling frame was large and the exact population size could not be obtained, neither was it possible or practical to compile an exhaustive list of the elements that make up the target

population. This saved time and money thus enabling the researcher to generalise the findings to a larger population as is found in Dandora.

3.3 Study Area

The study was carried out in Dandora which is on the Eastern suburb of the capital city in Nairobi County, Kenya. Dandora is in Embakasi Division and it constitutes two locations namely Dandora A and Dandora B. It borders Kasarani Division to the North, a division which comprises poor neighbourhood such as Kariobangi, Baba Dogo, Gitare Marigo and Korogocho. Dandora is divided into five phases as was established in 1977, with partial financing by the World Bank in order to offer higher standard of housing in Dandora (Kombo & Tromp, 2006).

The area was selected because the estate is found in low economic level of the community status, coupled with unemployment, high-density slums with high crime records in dark areas at night because of absence of street lighting. Dandora is constantly being mentioned in the media and within the general public due to increasing and existing crime and insecurity concerns. Almost half of crime incidents in Nairobi city within the months of November and December, 2010 were reported in Eastern Nairobi (47%) as opposed to (13%) of crime incidents within the   CBD (Kenya Police, 2010).   Dandora is also adjacent to Nairobi's largest principal dumping site serving as the home location of street families who fend and scavenge from the site, with street boys known to terrorise people using nearby adjacent streets closer to the dumping site. Dandora, like most of the estates in the Eastlands area is prone to rampant crime. There are often gang related activities. Two infamous gangs in Kenya reside in Dandora: Kamjesh and Mungiki. Extortion,

murder, illegal taxation and rape are things that residents have become used to. The Mungiki extort money from privately owned minibus operators.

3.4 Study Population and Sampling

According to Kenya National Bureau of Statistics Census (2009), the population of Dandora was 142, 046 people and currently have a population of **approximately** 300,000 and a land area of 4 square kilometres.

Sampling size

According to (Cochran, 1977) in his formula, to calculate a representative sample for proportions where the population is large and the degree of variability is not known, the sample size can be derived by computing the minimum sample size required for accuracy in estimating proportions by considering the standard normal deviation set at 95% confidence level (1.96), percentage picking a choice or response (50% = 0.5) and the confidence interval (0.05 = ±5). The formula is:

$$Sample\ size(SS) = \frac{z^2 * p(1-p)}{e^2}$$

Where:
z = standard normal deviation set at 95% confidence level
p = percentage picking a choice or response
c = confidence interval

SS = (Z-score)² * p*(1-p) / (margin of error)²

SS = (1.96)² * 0.5*(1-0.5) / (0.05)²

SS = 3.8416 * 0.25 / 0.0025

SS = **384.16**

As shown in **Table 3.1** below, a sample of 384 people was drawn from the local community, police personnel and the administration department such as the chiefs and assistant chiefs, in Dandora's two locations. To select respondents from supervisory

officers, convenience sampling was used on time availability and both the two (2) chiefs and their two (2) assistants, four (4) elders from each of the two locations, six (6) residents/victims reporting crime cases, eight(8) administration police officers and eight(8) regular police officers and 70 respondents from each of the five phases in Dandora, as summarised below.

Table 3.1: Sample/Participant Size

Population Sampled	Number available	Sampled
Focus group (2 Chief and 2 assistant chiefs)	4	4
Elders with empirical knowledge on community policing from the sub locations	10	8
Local community who utilize or report cases at Kinyago Police Station and at the Chief's camp	-	6
Administration police attached to the DO/chief's office	25	8
Regular police officers attached to Kinyago police Station	25	8
Respondents chosen from the community in Dandora based on age, gender and location (Phase I-V)	300,000 (Approx.)	350
	Total	384

Cluster random sampling method was used on the 350 respondents from the community. The population of the community was divided into relatively smaller clusters based on area of residence (Phases- I, II, III, IV and V) after which five groups of households were first selected randomly, then within each cluster, 70 households were selected randomly from each phase totalling 350 people. This was because the travel distance between most households would be much shorter. The technique used ensured that it was possible to select the members randomly where no

single list of the population members existed; the selected   groups were used in the study. This enabled saving time and money.

3.5 Data Collection Instruments

The researcher collected primary data from the community, the administration and the regular police service personnel using two research instruments which were largely quantitative, through questionnaires and examination of documentary sources as numbered below:

3.5.1   Questionnaire

Questionnaires were developed for the police personnel, administrators and the local community in Dandora, with the objective of extracting data with regard to some problems under investigation. They were used to get numerical data which aided in analysis. (**See Appendix A and B**).

3.5.2   Document Analysis

In this qualitative study, document analysis method was used. Self-administered document review was also conducted. This is because of the need to unearth the communities' feeling about policing and its capability in collecting an in depth data from the community. Content analysis is a systematic process to identify relationship in data, so it plays a communicative role (Merriam, 2013). Content analysis is a kind of interpretation, which is aimed to reveal common aspects of text, intended for classification and construction of common aspects through generalization quantification. This reveals concepts and relations, which help to interpret the primary source data collected especially the hidden truth, as documented by the police occurrence book.

At this point, all documents, analysed in this research and also other sources, were carefully read by the researcher who comprehended the contents. The documents were very useful for this research and most of them were available through the OCS' desk, but under strict control and confidentiality.

The researcher was granted permission to peruse through the Occurrence Book (OB) at Kinyago Police Post in the presence of the OCS, because of the nature of content which required privacy and was able to gain a better understanding about the existing reports. The Occurrence Book is an accurate and faithful record of all crimes and other matters of public interest requiring investigation and attention by the service, as well as the duties performed by the members of the station.

An entry in the Occurrence Book must be signed by the member making that entry (this in no way lessens from the provisions of any other official directive requiring more than one signature for a specific type of entry in the Occurrence Book). Entries are made without detracting from their clarity and are brief as possible. The date and time of entry are also recorded.

A look at the P3 forms obtained, on the other hand, also highlighted some information captured that were almost similar to those in the OB, with brief details of the alleged offences, the nature of report and extent of bodily injury sustained, location of crime, date and time of report to police, among others. This document captured mainly assault and sexual offences resulting in injuries.

As a technique for data collection and analysis, this technique was used to complement other means of collecting (questionnaires) and analysing data, with a view to making the study object easier to understand.

3.6 Data Collection Procedure

Data collection involved administering of questionnaires to 384 residents of Dandora as indicated in **Table 3.1** above, which included two(2) chiefs, two(2) assistant chiefs, eight(8) community elders, six(6) local community residents who reported cases, sixteen(16) police service personnel and 350 respondents chosen from the community.

3.7 Data Collection Schedules

The researcher carried out data collection using various test instruments such as record inspection and questionnaires. **Table 3.2** below gives a summary of the nature of data collected and the respondents.

Table 3.2: Nature of Data Collected

Type of data	Respondent
Crime • The level of security in the area • The type of crimes commonly reported • The category group reporting cases for example, Gender and age brackets **Community Policing** • Any existence of community policing • Challenges in community policing • Participation and cooperation between the administration and the community in curbing crime • The channels used in reporting **Existence of Internet infrastructure** • Awareness of Internet community policing • Presence of Internet in their offices	• Provincial Administrators in the location (Chiefs and assistant chiefs-Dandora A and B). • Regular Police service personnel and the Inspector in-charge of Kinyago Police Station. • Administration Police personnel and the Inspector in-charge of Dandora Area • Residents who utilize or report cases at Kinyago Police Station or at the Chief's camp

3.8 Pilot Testing

One of the goals of a pilot study is to identify unforeseen problems, such as ambiguous inclusion or exclusion criteria or misinterpretations of questionnaire items. The first pilot test run involved a group of two(2) Regular Police officers from the target sample at Kinyago police post for the purpose of test the reliability of the research instrument on **(Questionnaire for the police officers and administrators-Appendix A)**. The second pilot test was conducted in the neighbouring estate of Korogocho, in a single household flat involving 17 respondents as a means to small scale trial run of questionnaire components **(Questionnaire for the residents of Dandora-Appendix B)** in order to find out if the survey form will work in the "real world" by trying it out first on a few people.

A simple formula to calculate the sample size needed to be able to identify if a problem exists with 5% probability in a potential study participant, the problem will almost certainly be identified (with 95% confidence) in a pilot study including 19 participants as a representation to the 384 community residents and administrators who responded.

The pilots were carried out in order to make sure that everyone in the sample not only understood the questions but also to minimise ambiguities after which fine-tuning was done on the questionnaires by rephrasing to give greater clarity and some questions were discarded, as they proved irrelevant.

3.9 Validity and Reliability of the Research Instruments

Validity: To ensure validity the researcher mostly focused on content validity, which refers to the accuracy with which an instrument measures the factors under study.

Therefore content validity was concerned with how precisely the questions asked tended to produce the information sought. The research instrument was tested for content validity by giving the questionnaire to the researcher's supervisors and also to a research expert in Directorate of population and Social Statistics department at Kenya National Bureau of Statistics (KNBS), to standardise the tools of research. Their inputs were used to improve the clarity of items on the questionnaires used in the study.

Pilot testing an instrument allowed for the identification of error sources and therefore refinement of the instruments then focused on minimizing measurement errors.

Reliability: In this respect, the researcher carried out a pilot study as a pre-test data collected using the instruments and a group of individuals from the target sample of police officers in Kinyago Police Post, to test the reliability of the research instruments. Accurate and careful wording of each question to avoid ambiguity and leading respondents to a precise answer safeguarded reliability of the tool. The respondents were informed of the purpose of the research and of the necessity to respond frankly.

3.10 Data Analysis

Data collected from selected sample was analysed using SPSS software. Most of the questions in the questionnaire were closed questions. They were coded for easy analysis by computer. The open-ended questions were categorised manually by the researcher. Descriptive statistics such as frequencies, percentages and means were used for the purpose of comparison and description.

3.10.1 Data pre-Processing

Data obtained from the document review were recorded and pre-arranged based on the research objectives, after which interpretation of facts captured from respondents were tabulated on frequency tables, counted and converted into percentages which were used in comparison and descriptions. This was based on types of crime reported in the estates, how the community feels on safety and security, modes of reporting to the administration and the police and the level of understanding on proficiency of Internet access in relation to online reporting and policing.

(a)   Questionnaires

A total of eight (8) questionnaires administered to the regular police officers at Kinyago Police Post were collected from the police commanders' office after one week. Another batch of eight (8) questionnaires given to the administration police officers through the District Officer (DO) were all received back after one week. Four (4) questionnaires given to the two chiefs and their assistants were all received back. Out of ten(10) elders with empirical knowledge on community policing from the sub locations, eight(8) were given the questionnaires and were received back during the DO's *baraza* as two elders were recorded absent, having traveled out of the city.

Respondents chosen from the five estates of Dandora based on age, gender and location were 350 in total, with each cluster estate having 70 questionnaires. The researcher assistants administered the questionnaires and waited for the respondents to fill them, after which they were received back immediately, as soon as they were completed.

Six local community residents who reported cases at Kinyago Police Station and at the Chief's camp were also given the questionnaires as they waited to be served.

In case of any inquiries regarding clarifications, the researcher gave out the phone number on the questionnaires however this only featured with the police officers and the administrators. The researcher assistants were there to explain and clarify any issues to the community residents. In general the return rate of the questionnaires was 100 percent

(b)   Document Analysis

Document review was limited to the Occurrence Book (OB) at Kinyago Police Post and some P3 forms. The researcher did not gain access to all files, but relevant information was obtained based on standard operating procedures and departmental crime statistics, since some of the documents were not for the public. Data analysis addressed the question of how well the Police Department and the administration implement community policing.

3.10.2 Data Analysis and Results

Document analysis revealed concepts and relations, which helped to interpret the collected data. Data was conceptualized and organized in a logical way to lead us to the theme that is more understandable in conjunction with other methods used.

Once data was collected, it was keyed into the computer and errors detected were addressed. The researcher analysed the respondents' data and other relevant departmental reports, including crime statistics, and compared them. The researcher analysed the questionnaires and compared community policing terms the community used. Those given by the administrators and the police were also used (crime type,

reporting, effectiveness of community policing etc.). The researcher coded and tallied all relevant data using SPSS software as follows:

(a) The steps in analysing quantitative data were given as: -

- All the questionnaires were cross checked for clarity and accuracy. The researcher went through these questionnaires rapidly to get a feel of the replies.

- Coding was done for the closed ended questions. The data in the questionnaires were recorded in the SPSS research software.

- Frequency tables were generated from the entered data. Cross tabulation was done and split tables were also generated where necessary.

- The data were studied and inferences were drawn. Percentages were used to draw conclusions.

(b) In case of open ended questions the researcher carefully studied the replies of the respondents. Common elements were found from the qualitative data for drawing appropriate conclusions. The replies to the open ended questions and their analysis were compared with the results of quantitative data. The findings are discussed and presented in the form of frequency tables, pie charts and bar graphs in **chapter 4**.

3.11 Ethical Considerations

This study required the participation of human resource professionals and because of this, certain ethical issues was addressed. The consideration of these ethical issues was necessary for the purpose of ensuring the privacy as well as the safety of the participants. Among the significant ethical issues considered in the research process include consent and confidentiality. In order to secure the consent of the selected participants, the researcher relayed all important details of the study, including its aim

and purpose. By explaining these important details, the respondents were able to understand the importance of their role in the completion of the research. The respondents were also free to withdraw from the study even during the process. The confidentiality of the participants was also ensured by not disclosing the names or personal information in the research. Only relevant details that helped in answering the research questions were required or included.

3.12   Data Modelling and System Development

The Unified Modelling Language (UML) is a graphical language for visualizing, specifying, constructing, and documenting the artefacts of a software-intensive system was used. UML uses object oriented design concepts and it offers a standard way to write a system's blueprints, including conceptual things such as business processes and system functions as well as concrete things such as programming language statements, database schemas, and reusable software components used to support object oriented system analysis and to develop the object models. Use Case analysis has been used for requirements specification of the system and the behaviour specification.

The following tools were used to develop and implement the proposed system:

(a) Visual Basic.NET programming language – was used to create the interface and code for the model system.

(b) Microsoft SQL 2014 Server – for creating the database to store the systems data.

The structure of the Visual Basic programming language is very simple, particularly as to the executable code. Visual Basic.Net is not only primarily an integrated

Interactive Development Environment (IDE) language that is highly optimized but also supports Rapid Application Development (RAD), making it easy to develop graphical user interfaces and to connect them to handle functions provided by the application. The graphical user interface of the VB-IDE provides intuitively appealing views for the management of the program structure in the large and the various types of entities. VB.Net interfaces with SQL Server 2014 well and is very easy to install and set up making it relatively simple.

3.12.1 Waterfall model

The waterfall model is a sequential (non-iterative) approach, used in software development processes, in which progress is seen as flowing steadily downwards (like a waterfall) through the phases of conception, initiation, analysis, design, construction, testing, production/implementation and maintenance as shown in **Figure 2** below.
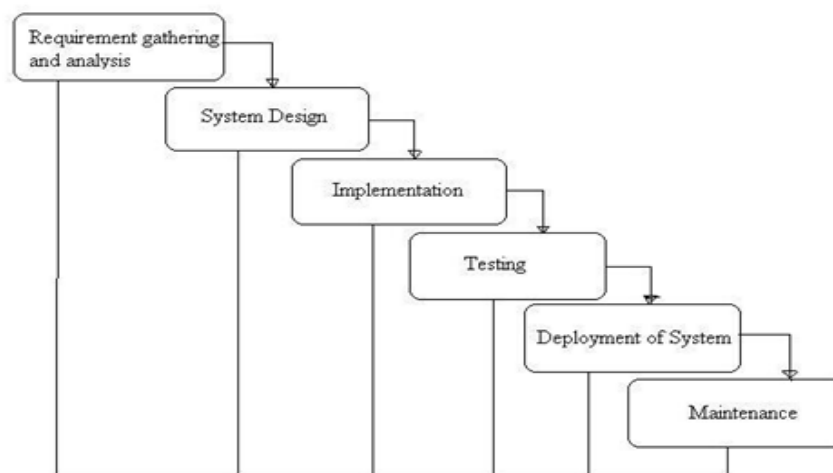
Figure 2: Waterfall Model (Jhanjeri & Mohali, 2015)

The waterfall model is used when the requirements are well understood and are unlikely to change radically during system development. The stages in the model include:

- **Requirement specification Phase (Definition):** All possible requirements of the system are captured in this phase. Requirements are set of functionalities and constraints that the end-users (who will be using the system) expect from the system namely the community and the police.

- **System Design:** Enables designers to understand what they are going to create and what it should look like. Design helps in specifying hardware and system requirements and also helps in defining overall system architecture.

- **Implementation/ Construction:** This is where the actual coding begins. On receiving system design documents, the work is divided in modules and actual coding is started. The system is first developed in small programs called modules or units, which are integrated in the next phase.

- **Integration & System Testing**: Each unit is developed and tested for its functionality; this is referred to as Unit Testing. Unit testing mainly verifies if the units meet their specifications.

- **Deployment of system/Operations:** Software development does not end with the handing of the software to the client. There may be some flaws which get detected during the actual implementation of the project. Problems with the system developed (which are not found during the development life cycle) come up after its practical use starts, so the issues related to the system are solved after deployment of the system.

- **Maintenance/New Requirement Phase:** Changing times may require that the product requirements be changed. The client company may be expanding into

other fields and it may want new features to be added over to the existing software. Hence, it is very important that the updated requirements be taken from the client. This requires the entire product life cycle to start all over again.

3.10.2 Reasons for using Waterfall Model

The *waterfall* is an approach to development that emphasizes completing a phase of the development before proceeding to the next phase and is adopted because of the following reasons:

(a) Prototyping process defines definite starting and ending points of a project.

(b) The process ensures early detection of errors and misunderstanding in each stage.

(c) Requirement specification document serve as the guideline for the development and testing phase.

(d) Since the following phases are dependent on previous phases, this approach ensures project deadline control.

(e) Each phase is discrete and team members involved in a stage ensures the perfection of the stage before delivering to next stage. Waterfall process ensures greater project output.

(f) This approach can be very efficient when team members are dispersed in different locations.

(g) The amount of resources required to implement waterfall model is lower than other methods.

The waterfall model illustrates the software development process in a linear sequential flow. The next phase was started only after the defined set of goals are

achieved for previous phase and it is signed off, so the name "Waterfall Model". In this model phases do not overlap.

3.13 Conclusion

This chapter encompassed study area, population, sample size and sampling procedure, data collection instruments, pilot testing, validity and reliability, data collection procedure, data analysis and ethical considerations. Questionnaires and document analysis were the main instruments for data collection while data analysis utilized both qualitative and quantitative data. Waterfall software model was used in design and development. The research design and methodology chosen helped the researcher to collect data. Analysis, presentation and interpretation of data collected are presented in chapter four.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND INTEPRETATION

4.1   Introduction

This chapter provides data presentation, analysis and interpretation of the data collected from the respondents who were the local residents, the administrators (chiefs and assistant chiefs) and the police officers in Dandora. The study findings have been discussed under the following sections: types of crime reported, use of ICT based technologies in crime prevention, the modes of passing information between the community and the security agencies, challenges facing the community and the police in community policing and how to design and develop an ICT-based solution that will support in community policing in Dandora, Nairobi County. The study findings are based on a sample of respondents from Dandora where 350 respondents from the community, 16 police officers, 2 chiefs and 2 assistant chiefs, 8 elders and 6 resident respondents who utilized or reported cases at Kinyago Police Station or at the Chief's camp .

4.2   Respondents Data

The presentation of background information was divided into two sections detailing the segment on the administrators and the police service in the area as well as the community response on basic information on ICT and profiles.

4.2.1 Data Source

The purpose of this section was to obtain information on the types of crime, community policing, and mode of reporting incidents to the police among others. The respondents were required to provide information on the following:

Police personnel and community administrators

The composition of the police personnel was made up of a police inspector and seven(7) service men/women from Kinyago Police post, one inspector of Administration Police and seven(7) service men/women from Dandora DO's office, two chiefs from Dandora A and Dandora B locations and their assistants all totalling to 20 people. The information was useful in finding the nature of the respondents with regard to computer literacy awareness and infrastructure available, existence of community policing, types of crime committed and how victims reported the incidents as well as any ideas on e-policing.

Community residents in Dandora area

From the total number of 384 respondents, the composition of the community was made up of 70 respondents from each of the five phases in Dandora where 350 people, eight (8) community elders and six (6) residents, who utilized or reported cases at Kinyago Police Station and at the chief's camp. The community residents totalled to 364 people. The information was useful in finding the nature of the respondents with regard to gender, age, level of education, estate of residence etc. The respondents' computer literacy awareness and infrastructure available, existence of community policing, types of crime committed and how the crime victims reported the incidents as well as any ideas on e-policing were also required.

Table 4.3 below shows a summary of the respondents from the community surveyed based on gender. The gender of the respondents comprised 46.4% for male and 53.6% for female. A majority of the respondents were female. This may have been attributed to the circumstances as it appeared that most men were usually out for economic engagement than women during daytime, when the research was conducted.

Table 4.3: Gender category

Gender		
Response	**Frequency**	**Percent**
Female	195	53.6
Male	169	46.4
Total	**364**	**100**

Table 4.4 below shows a summary of the respondents from the community surveyed based on age group data set. Their ages showed that those under 16 years were 6.9%, 16-24 years were 26.4%, 25-44 years were 29.9%, 45-59 were 27.7% while 60 years and above were 9.1%. On academic level of education, those with basic primary level constitute 17.3%, high level 36.3%, College or University 44% while those with other (Non Educated or never completed primary level) stand at 2.5%.

Table 4.4: Age Group Category

Age group		
Response	**Frequency**	**Percent**
Under 16	25	6.9
16-24	96	26.4
25-44	109	29.9
45-59	101	27.7
60 and above	33	9.1
Total	**364**	**100**

It was also noted that the distribution of age group of residents are between 16 and 60 years in other words the majority are potential and productive age group.

4.3   Types of crime reported in Dandora

The first objective of this study was to investigate the types of crime reported in Dandora region. **Table 4.5** shows crime statistics cited by the community and considered common in the area with drug abuse taking the larger portion of (13.8%),

robberies(13.1%), house break-ins(12.6%), domestic violence(11.1%), mugging(9.8%) , rape (9.3%), on the higher side followed by illegal gangs, carjacking, assault, burglaries, forgeries in that order as indicated below.

Table 4.5: Types of Crime and Statistics in Dandora as Surveyed from the Community

CRIME STATISTICS AS SURVEYED FROM THE COMMUNITY IN DANDORA							
Crime Type	PHASE I	PHASE II	PHASE III	PHASE IV	PHASE V	COMMUNITY	Crime %age
Drug Abuse	52	58	56	34	36	236	13.8
Robberies	52	30	44	48	50	224	13.1
House break-ins	54	60	30	36	36	216	12.6
Domestic Violence	44	52	46	22	26	190	11.1
Mugging	42	52	38	16	20	168	9.8
Rape	32	58	38	10	22	160	9.3
Illegal Gangs	28	30	26	28	26	138	8.0
Car jacking	48	2	34	10	24	118	6.9
Assault	40	2	34	12	22	110	6.4
Burglaries	28	24	14	12	14	92	5.4
Forgeries	26	4	12	2	14	58	3.4
Other	0	0	0	0	6	6	0.3

From the table above there is a clear evidence of some crimes being associated with the estates, for example Dandora phase I and phase III have a lot of car-jacking mostly in areas adjacent to the Komarock road passing along the estates through to Kangundo Road where motorists drive slowly mainly because of the dilapidated-potholed roads and unavailability of street lighting. The dumping site in phase II on the other hand provides safe haven for criminals who operate from the site, using it as a hiding place and so high crime strategizing point for muggers, rapists, robbers and drug peddlers.

A closer observation of the Occurrence Book (OB) documents availed at Kinyago Police Post and other support documents at the area chiefs' offices; there were a complete resemblance on the types of crime reported to the administration and the statistics obtained during the survey.

When the residents were asked whether they had been victims of crime or not in the past 12 months, out of the 364 respondents, 206(56.6%) have been victims of crime in the last 12 months, suggesting that the majority have faced some form of crime in the last 1 year and therefore a clear evidence of crime prevalence in the area.

Out of the respondents who have been victims of crime 206(56.6%), the majority of these victims of crime 149(72.2%) did not report their cases to the administration or the police in the last 12 months, as indicated in in **Figure 3** below.

Whether the past crime victims in the last 12 months reported crime?
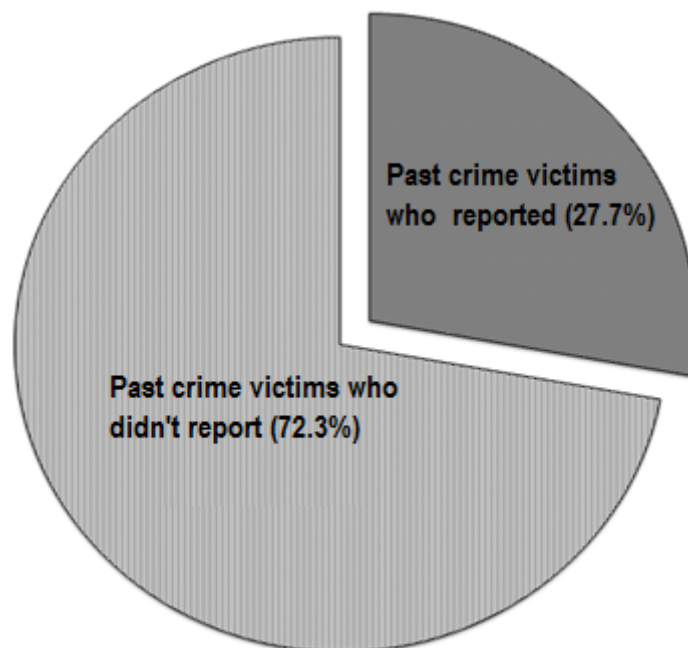
Figure 3: Crime Victims who reported or Never Reported to Administration

4.4   Use of ICT Based Technologies in Crime Prevention in Dandora.

On the use of ICT based technology to fight crime in Dandora, almost all adults surveyed had access to at least one cell phone that could serve as a portable ICT tool in fighting crime either through Short Message Services (SMS), calling the police or

the administration or accessing the Internet. The majority of residents in Dandora 234(64.3%) have access to Internet either at work place or at home mostly from their Internet enabled smart phones. Those who can access cybercafé as an alternative to phones constitute 121(33.2%). This means that there is a clear indication that the residents have the right tools at hand which could enable them access Internet services faster, from any crime spot and to speed up reporting using e-policing methods.

A majority of the residents 318(87.4%) are familiar with basic computer applications such as MS Office, E-mailing and browsing as well as common mobile applications. A good proportion 12(75%) of police officers also have access to Internet either through their phones, cybercafés or elsewhere because there is no infrastructure available for Internet facilities at Kinyago Police, the DO's office and the chiefs offices that is used for community policing.

The residents do not have a platform for sharing information with the police and would rather remain quiet because of fear of being known or being called 'watiaji'. This means that most residents and the security agents have enough technical knowhow to use and operate the devices if the infrastructure to share information is made available for e-community policing.

The residents of Dandora who called the police officers or the chiefs used mobile phones or wrote messages to them to inform them of incidences of crime. This collaboration is however essential for the collection of timely information and exchange of intelligence, the identification of threats and vulnerabilities, and the sharing of resources in the event of an attack. Furthermore, community partnership identifies the value of involving the community in the policing process and one of the

ways community policing might become a permanent part of law enforcement is through the development of effective partnerships with local community groups.

Police and community should work in partnership not only to solve problems but to reduce the fear of crime, physical and social disorder and neighbourhood decay. These relationships need to be based on trust by challenging people to accept their share of the responsibility, which will in turn enable parties to identify priorities and develop responses to solve their own problems. Equally, police and the administration representatives must cooperate inclusively with all local groups to develop the strategic framework needed for implementing a comprehensive community-oriented policing program will be better off (Coleman, 1996).

The survey in **Table 4.6** below also shows that residents of Dandora did not report crime incidents mainly because of the process being complicated 30(8.2%), police station and administration being far away 24(6.6%), fear of being victimised 45(12.4%), lack of confidence on police and administration 77(21.2%) while a majority 188(51.6%) of residents did not report crime and gave others reasons like victims feeling the cases are petty, mugging is normal, time consuming, the victims believed the crimes were not important enough or the police would not help them much among others. When crimes are not reported to the police, victims may not be able to obtain necessary services to cope with the victimization, offenders may go unpunished, and law enforcement and community resources may be misallocated due to a lack of accurate information about local crime problems.

Table 4.6: Reasons for not reporting Crime by Residents

Why Dandora residents don't report crime		
Response	Frequency	Percent
The process is complicated	30	8.2
The police and administration is far away	24	6.6
Fear of being victimised by police or administration	45	12.4
Lack of confidence on police and administration	77	21.2
Other reasons	188	51.6
Total	**364**	**100**

Since 72.8% of the residents feel insecure when they report to police because of lack of trust when they report cases in person, this means community policing cannot be carried out effectively. There is need therefore to explore other avenues of reporting or sharing information amongst the people of Dandora. A comparison on the frequency and the respective percentage of the total number of residents who have heard of online reporting being 52.2% even though 87.4% of residents are familiar with common computer applications such as the Internet yet it is less utilised. The residents would want to remain anonymous in most cases while reporting and 276(75.8%) believe online reporting can dispel fear of being victimised when they report or share remotely from cybercafés or by using Internet-enabled phones. This is likely to bridge the gap of sharing information based on the fact that majority 202(55.5%) think community policing has not been used to its maximum potential, 58(15.9%) believe community policing has been used fully and 104(28.6%) have no idea of what it has achieved. These entirely mean the residents may have clues on crime activities in the area and all the same resort to keep quiet making it impossible for the police to gather data or statistics in crime for prevention purposes. There is less commitment and blurry relationships between the two parties. The community and the

police/administration minimally cooperate in fighting crime and this may not provide a better avenue to crime solutions in the area. Physical reporting as a means of reporting to the police is slow and is only used by the victims of crime themselves mostly and this has driven the confidence level on the residents down making them shy to report other cases.

4.5   The Modes of Passing Information between the Community and the Security Agencies.

From **Figure 4** below, the mode of reporting cases to the authority is predominantly physical in person 261(71.7%), through other friends and relatives 49(13.5%), by calling 999 or Police Line number 52(14.3%) while the remainder 2(0.5%) call police/administrator friend number.

Common modes of reporting crime
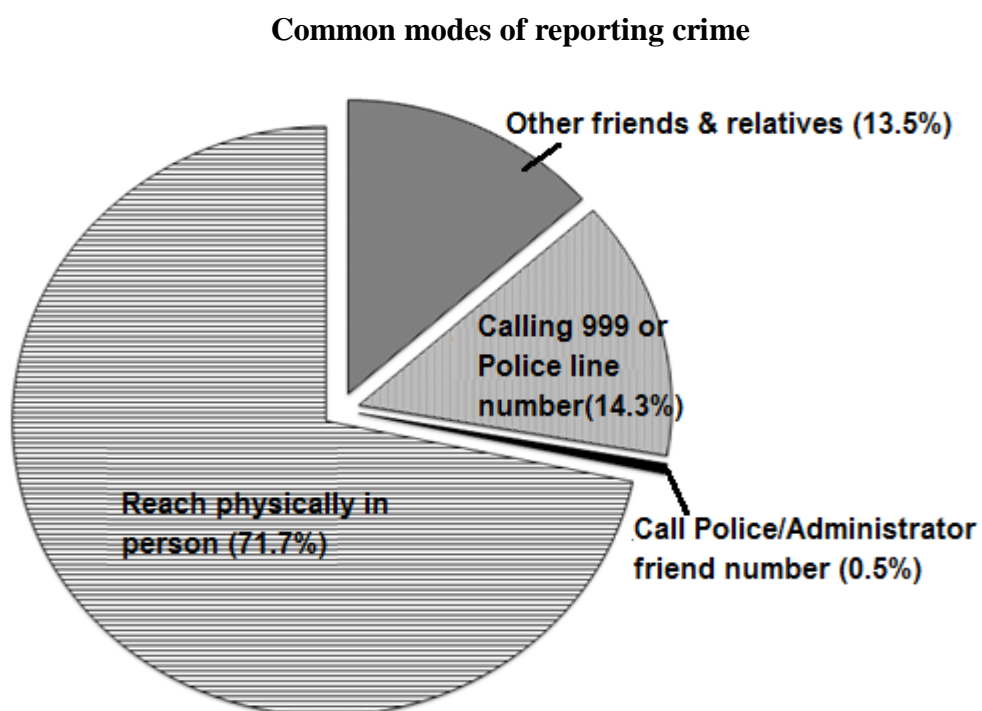
Figure 4: How Crime Victims Reach and Report to Police or Administration Officers to Report Crime Cases

The **Table 4.7** below in relation to **Figure 4** above was a survey conducted on the police and administrators in relation to how residents reported crime to them at the police stations and a majority 14(70.0%) of respondents acknowledged the same trend as reported by residents where reporting is physically in person, with victim's relatives and friends who report constituting 1(5.0%), 3(15.0%) admitted reporting was both in person and through friends while 2(10.0%) did not reply back the questionnaire due to transfer during the research and one taking leave.

Table 4.7: Mode of Reporting Crime as Surveyed on the Police and Administrators in Dandora

Questionnaire on how residents report crime?		
Response	**Frequency**	**Percent**
In person	14	70.0
Through friend/relatives	1	5.0
All the above	3	15.0
Missing/No reply	2	10.0
Total	**20**	**100**

It was also noted that the main reasons behind physical reporting as indicated in **Figure 4** and 5 were mainly because the police would issue the victims with an OB number which is an evidence of reporting as the investigations continue. Issuance of medical examination form, popularly known as P3, is also provided free of charge at the police stations for victims with body injury sustained by complainant(s) in assault cases and part one (I) of the form must be filled by the Police Officer requesting medical examination. This preferred mode of reporting however is slow and expensive especially where crime is done at night. Giving victims maximum choice in the mode of reporting will possibly increase the willingness to report for relatively less severe crimes.

It was also noted that a majority of those reporting cases to the police 265((72.8%), however felt insecure at reporting information compared to 99(27.2%) who felt secure, as indicated in **Figure 5**. This was because they felt some police officers might report them back to the criminals, who may retaliate causing fear and this explains why there is delay in reporting or why they do not report at all.

Do you feel confident, safe and secure when reporting crime to police or administration?
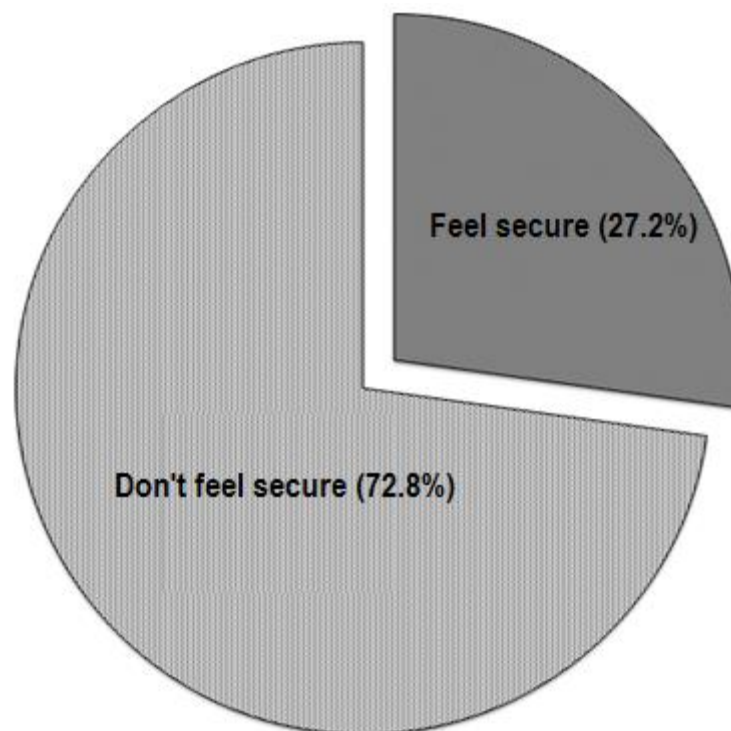
Figure 5: Whether the Community Feel Secure When Reporting Cases

On the modes of reporting, majority 266(73.1%) as indicated in **Figure 6** below, attested to the fact that the current methods of reporting, which is majorly in person is not good since those far away from the police and administration stations mostly reported their cases the following day in the event that a crime was committed at night and also because those who may seek the chiefs' offices could only do so during office working hours. This delay in reporting may see some of the criminals escape

completely or the community resorting to taking the law in their hands by killing the suspects or burning them alive before the police arrive. This traditional reporting technique is sometimes inconvenient, risky and time wasting for urgent cases.
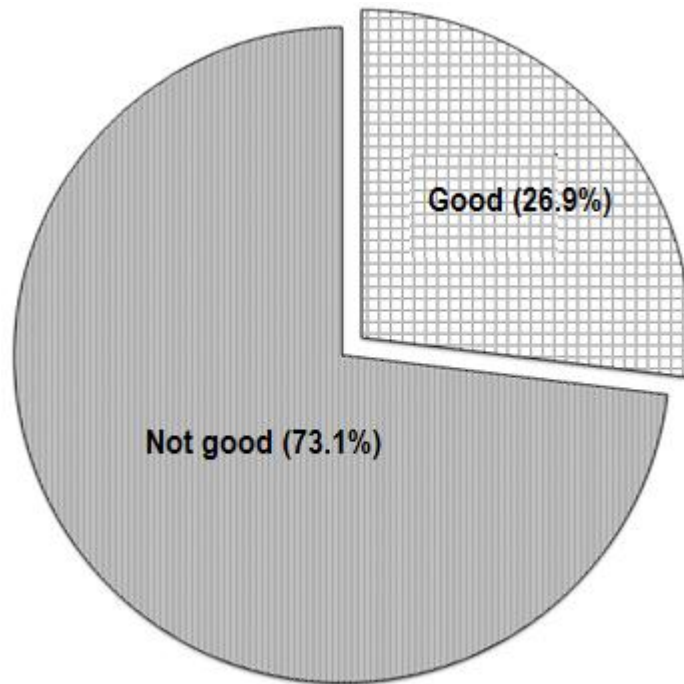
Figure 6: Are the Current Modes of Reporting to Administration Good for Victim.

4.6 Assessment of other Modes of Reporting Crime to Police

The other modes of reporting, other than those mentioned above is through a completely independent organization called Independent Policing Oversight Authority (IPOA), which allows individuals and organisations that have specific complaints regarding police for investigation. A complaint can be filed through a visit to IPOA offices, a telephone call, the website, a letter or email. You will be required to complete a form detailing the specifics of the complaint, any documentary evidence in your possession and your contact details.

**4.7	Challenges Facing Community Policing**

The fourth objective was to investigate challenges facing the community and the police service, administration and the Dandora community. The following were cited by respondents during the study:

- Inadequate patrol by police in the estate.

- Slow police response time during crime.

- Poor relationship between the community and the police in fighting crime.

Each of these will be discussed further in the subsequent sections below:

**4.7.1	Inadequate Patrol by Police in the Estate**

From the survey, the majority of the residents of Dandora 187(51.4%) are dissatisfied with the police patrol in the area and when asked to categorise police patrols in the estate, out of 364 respondents, a total of 153(42.0%) indicated below average, 120(33.0%) respondents noted it was average with a paltry 23(6.3%) admitting there was a very good patrol **Table 4.8**.

Table 4.8: Police Patrol as Viewed by Residents

How do you categorise police patrol in the estate?		
Response	**Frequency**	**Percent**
Very good	23	6.3
Good	44	12.1
Average	120	33.0
Below average	153	42.0
Don't know	24	6.6
Total	**364**	**100**

**4.7.2	Police Response Time during Crime**

A total of 268(73.6%) out of 364 respondents in Dandora are not happy with the length of time taken by the police to respond to crime in the area while **Table 4.9**

below, indicated that among the 364 respondents polled, 182(50.0%) cited the response time of the police during crime being below average, 68(18.7%) average, 15(4.1%) good, 26(7.1%) very good and 73(20.1%) did not know their response time during crime.

Table 4.9: Ranking Police on Response Time

How do you rank the period of response time by the police?		
Response	**Frequency**	**Percent**
Very good	26	7.1
Good	15	4.1
Average	68	18.7
Below average	182	50.0
Don't know	73	20.1
Total	**364**	**100**

The senior police officers also admitted that they were always blamed on delays especially in the estates far away from the police stations because of the foot patrol by officers in the expansive estates which make it impossible to cover every corner as there is no single moving vehicle allocated to the police in Dandora area. Vehicles were scarce as is fuel and this meant that the officers could at times resort to demanding for transport from the victims themselves, when they report cases. Many officers also used their personal vehicles and mobile phones to communicate with each other and with police headquarters as there was no reliable communication between the officers on the ground with central control command.

4.7.3 Poor Relationship between the Community and the Police in Fighting Crime

The challenge of poor relationship between the community and the police in combating crime is not unique to Kenya and is equally low in Dandora as indicated in **Table 4.10** below:

Table 4.10: Quality of Work Relationship

How do you rate the quality of relationship between you and the police in combating crime?		
Response	**Frequency**	**Percent**
Very good	13	3.6
Good	21	5.8
Average	112	30.6
Below average	196	53.8
Don't know	22	6.0
Total	**364**	**100**

From the survey, majority of residents in Dandora, 261(71.7%) admitted to have no work relationship with the police which could assist in the fight against crime. In terms of how the residents rate the relationship in the fight to combat crime, as shown in **Table 4.10** above**,** a paltry 13(3.6%) of the respondents citing- Very Good, 21(5.8%)-Good and the majority either posting 112(30.8%)-Average, 196(53.8%)-Below Average and 22(6.0%)-Do not Know. This strained relationship implies the fewer prospects from residents in providing vital information that can be helpful in combating crime in the area. There is no way the police can successfully combat crime without side by side collaboration and good relationship with residents as the criminals are members of the community and also live amongst them as residents.

4.8   Suggestion for Improvements of Community Policing

The following information gives several suggestions which could be adopted in order to improve community policing strategies:

Open talks: Communication involving talking to panicky and nervous residents using a clear, slow voice, defusing conflicts that might otherwise end in injury or death, and finding ways to reduce anxiety while avoiding the use of force during interrogation and extraction of facts from victims and criminals

Warnings: Known criminals can be invited or talked to where they're given straight talk by neighbours, police, street-outreach workers and clergy in order to keep doing what they are doing and to get hard tackle consequences such as prosecuting you in court if possible or put the guns down or desist from crimes and get help to improve in their daily activities.

Trust and transparency: Looking to build trust between communities through better communication, increased talk and police as a focus on community policing. The Police officers need to interact directly or indirectly on a daily basis in order to spearhead community policing in the locality.

Online collection and use of data: Collection and of use data is the first step to understanding what is really going on in our communities and in our country. Through online application that captures real time data on crime incidents reporting, it becomes an easier way to monitor and improve services at the police departments and thus it spearheads good relationships between the police and the residents**.**

4.9   ICT Use in E-Community Policing

On the awareness of online reporting, many residents of Dandora 190(52.2%) are informed or at least have heard about online reporting by use of Internet and computer based technologies, and 276(75.8%) also believe it can dispel fear of being victimised during reporting. This means an implementation of computer based reporting is not a new idea in the area, the residents' confidence on the platform is equally welcome because of minimum fear during reporting and they believe being unanimous during reporting of other cases can be done well at anytime and anywhere where there is connectivity.

The ICT sector in Kenyan continues to grow exponentially, with mobile penetration rate hitting 80.5 per cent. The July-September 2014 quarter report indicated that the number of mobile subscriptions increased to 32.8 million up from 32.2 million, during the last quarter, representing a 1.6 per cent growth. Data/Internet subscriptions maintained an impressive upward trend recording a 5.8 per cent growth to reach 14.8 million subscriptions up from the 14.0 million in the preceding quarter. Consequently, the number of estimated Internet users stood at 23.2 million up from 22.3 million users in the last quarter, representing a 4.1 per cent increase during the period (Communications Authority of Kenya, 2014).

Mobile phone use among the police and wider population of Dandora is very high and there is stable network coverage throughout the city. In Dandora, 273(75.0%) of the residents have access to the Internet through phones as indicated in **Figure 7** below and despite the low-income from in the residents in the neighbourhoods and among the lower-ranking officers in the National Police Service, this is likely to change over the coming few years.
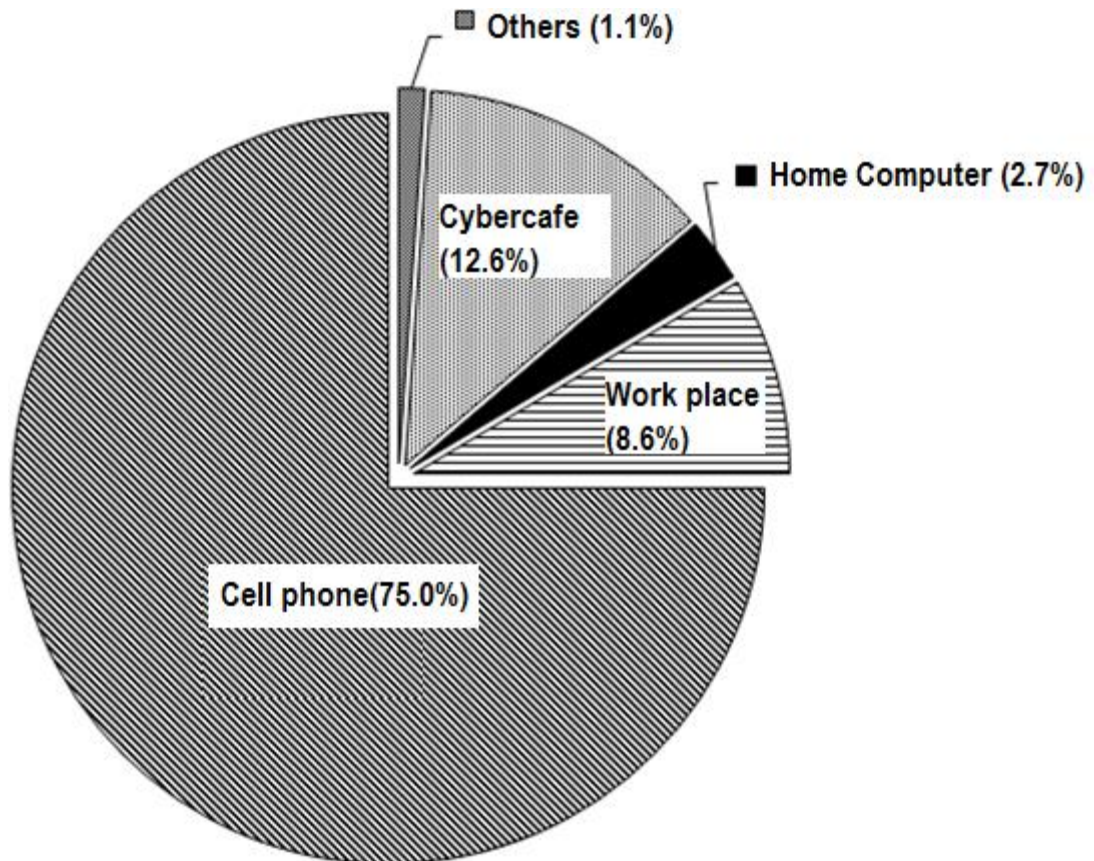
Figure 7: How Residents of Dandora Access the Internet

Mobile cell phones are increasingly Internet-enabled (more than half of the surveyed population reported having this function). While ICT adoption by Kenyan society has been quick and Nairobi is an emerging hub for technological innovation in Africa, the Kenya police have not systematically incorporated ICTs into their operations and tend to rely on face-to-face communication and, in some instances, radio. However, important steps have been taken with the introduction of call centres and online crime reporting options (Frilander, Lundine, Kutalek, & Likaka, 2014).
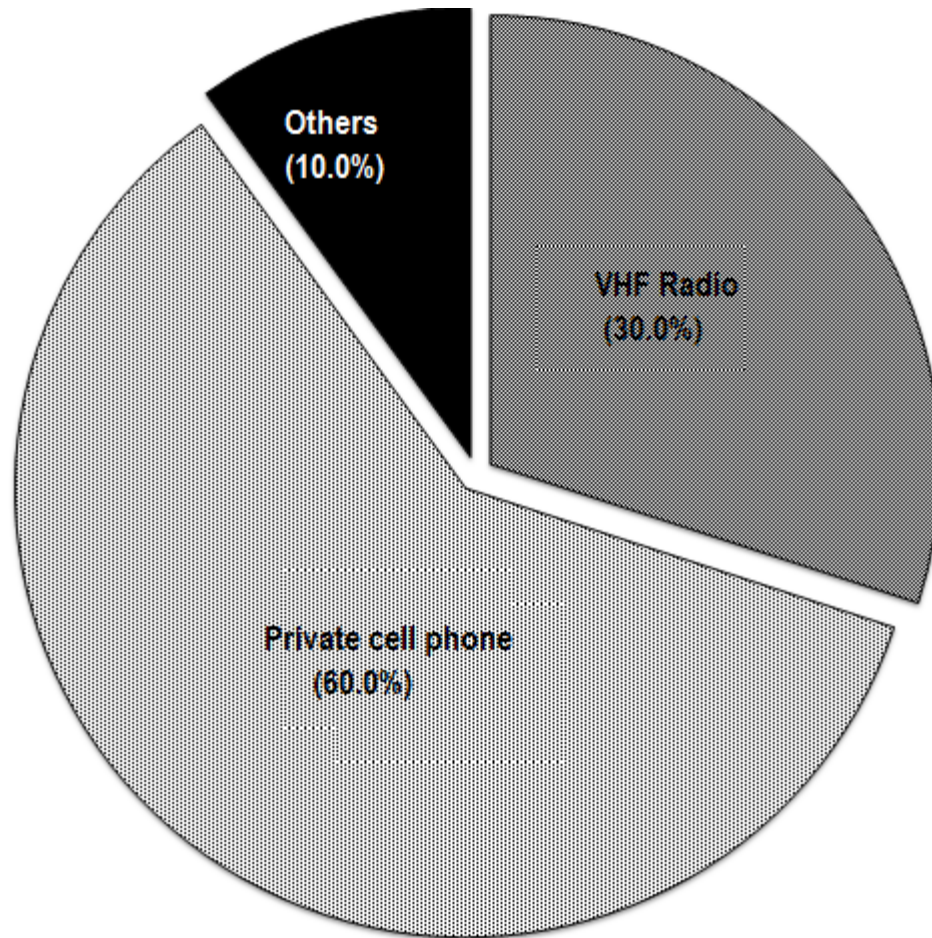
Figure 8: Tools used by Police Officers to Communicate with the Base Station When on Patrol

Figure 8 above shows that some officers are issued with a Very High Frequency (VHF) radio 6(30%) during patrol, although they are frequently in poor conditions and seldom used. Kenyan police officers at all levels have personal mobile phones however, most police respondents claimed they were for personal use and rarely used them for official purposes. When prompted, the majority of police officers 12(60.0%) said they use their private cell phones to communicate with colleagues and some said that they had shared their numbers with local business people. Furthermore, 2(0.5%) of the community members who had participated in an earlier survey on how the

residents in the community pass information to the police indicated that they communicate with police officers via mobile phone as in **Figure 4**.

A minority of younger police officers also appeared to have smartphones and use them for accessing Google maps, to identify locations and routes for work purposes but suggested if they could be given low cost or free Internet bundles from the government this could be useful for the police if adopted.

4.10   Conclusion

This chapter presented respondents data, data source, types of crime reported in Dandora, how the residents of Dandora use ICT based technologies in crime prevention, policing, the modes of passing information, challenges facing community and suggestions for ICT use in community policing. ICT can help the police to discharge their duties optimally by sending and receiving up-to-date vital information to creditably perform their activities and tame undesirable elements in the society by using mobile phones and web based systems. Such invaluable information could help the police to perform creditably hence the need for these ICT tools for the successful performance leading to requirement identification, analysis, design and development in the next chapter.

CHAPTER FIVE
REQUIREMENTS, ANALYSIS, DESIGN AND DEVELOPMENT

5.1   Introduction

This chapter covers requirement identification, analysis, design and development highlighting a comprehensive depiction of the intended prototype as a tool and techniques as well as the environment under which it is developed. It pronounces what the software prototype will do in which hardware and how it will be expected to perform. It addresses the 'what' of the system. The following are the requirements for the developed system which can assist the residents to improve in collection and reporting of   data about crime and the criminals and to inform the residents on crime areas.

5.2   Deriving User Requirements

To develop the database, details of user requirements for the project is meant to design a technology based design to help the community to have direct access to crime data and give suggestions on tackling crime in the area by using other means other than relying on word of mouth. This will address the problems by developing a suite of testing tools. The resulting software product will be the "e-community policing system", which will encompass a number of integrated "weblog-based tools" to engage the community to present their views through:

(a) Provision of information and communication between the users and the police.

(b) Accessing and disseminating crime information to provide access to relevant information arising from the e-community policing.

(c) Helping in coordinating the response to the many consultations received from the community, so that the responses take account of the views of a wider range of community members.

In all cases, conventional media and physical reporting of crime will continue to be used alongside the e-community policing program. The program will be designed to support community engagement with the Regular Police and Administration Police in Kinyago and DO's office, chiefs, elders and the community in the two locations in Dandora. Specifically the prototype program will provide the following functionality, in the form of a website for each participating parties.

5.2.1   User Characteristics

Figure 9 below in this section identifies the potential users in terms of their responsibilities and likely levels of ICT experience. They include:
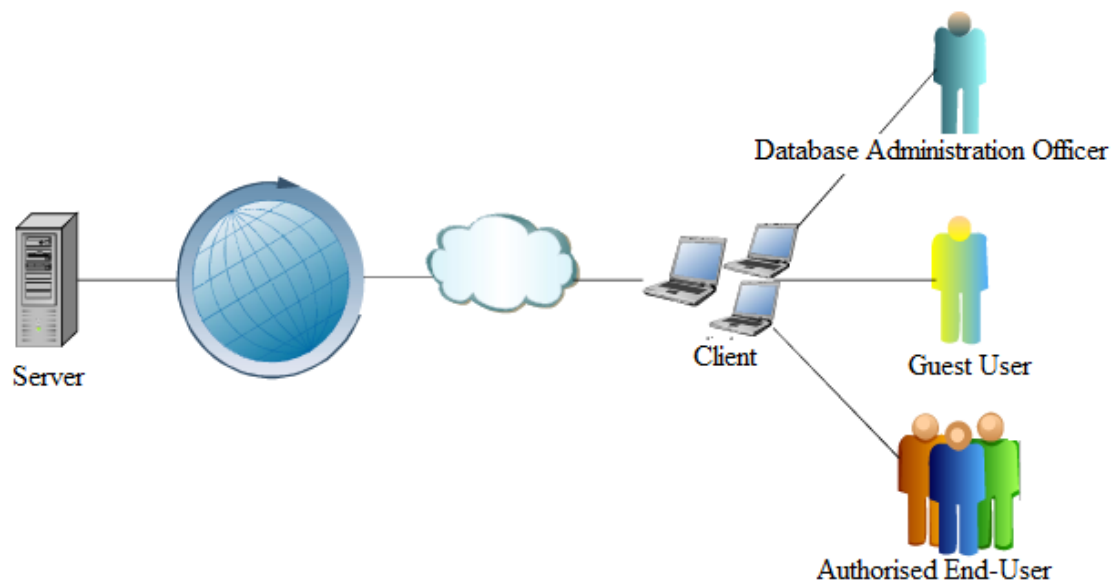
Figure 9: Interaction of end-Users with the System

(a)   Guest-Users or visitors

Guest-users may be assumed to be those not registered but have basic ICT skills and experience and may include:

- Police officers

- Residents of Dandora community

- Members of the general public.

(b)   Authorised End-User

This is an end-user who is a registered member who has successfully logged in. Such a user may however have different privileges based on whether he/she is a police officer, administration officer (such as the chiefs) or a resident from the community and may be able to easily:

- Upload new content, in text and other formats.

- Edit existing content, in text and other formats.

- Moderate comments provided by end-users.

(c)   Database Administration Officer

An authorised administration officer is responsible for performing a website administrator role which may include:

- Apply patches or upgrades to the database as needed

- Create new databases

- Establish the needs of users and monitoring user access and security

- Maintain database tables.

- Enhancing security, validation and backup procedures.

5.5.2 Functional Requirements

Functional requirements directly support the user requirements by describing the "processing" of the information or materials as inputs or outputs. The components are described as a set of inputs, the behaviour, and the outputs. Functional requirements are technical details, data manipulation and processing and other specific functionalities that show how a case can be handled using an e-community website. Some of the functions include:

- Register: Residents, the local administration, the police and other guest to register on the e-community system.

- Log in: To allow the authorised users and administrators to login.

- Submit data: allow users to submit crime report or news according to crime category.

- Read News: To allow all users to read news that appear on the e-community system.

- Watch video: To allow the user to watch videos recorded and submitted about crime.

- Upload video: To allow the user to upload videos.

- Post comments: To allow all users to give comments.

- Administrator tools: To allow the administrator to control the e-community such as: users, comments, files, menus etc.

5.5.3 Modelling the Requirements

These requirements define functions of a given system or its components describing an activity or process that the system must perform. Unified Modelling Language (UML) diagram provides guidance as to the order of a team's activities, specifies

what artefacts should be developed, directs the tasks of individual developers and the team as a whole, and offers criteria for monitoring and measuring a project's products and activities. A number of UML diagrams such as class diagram, activity diagrams, sequence diagram and Use Case diagrams were used to model how the police officers and community members and the system register individuals to use the system, as indicated below.

(a)   **Input Process Output(IPO) Diagram**

Input – Process – Output (IPO) – chart in **Figure 10** below shows the processing activities for the modules that are incorporated in the system listing the inputs, the processes, and the outputs as indicated.

INPUT	PROCESS	OUTPUT
• Enter new user details • User enter Login data • Enter information on crime • Registering crime hotspot areas	• Process new user details. • Process and informing residents on any crime news • Registering Crime Hot spot Areas • Process news list • Assigned cases report under investigation by police.	• Informing residents on current news report from the police • View crime hotspot areas • Print reports on assigned cases under investigation by police.

Figure 10: IPO Chart on Online Crime Reporting Modules

89

(b) **Class Diagram Showing E-Community Policing**

As indicated in **Figure 11** below, several tables have been used to interlink the

e-community policing system as a basis of interaction between the participants

and the database.
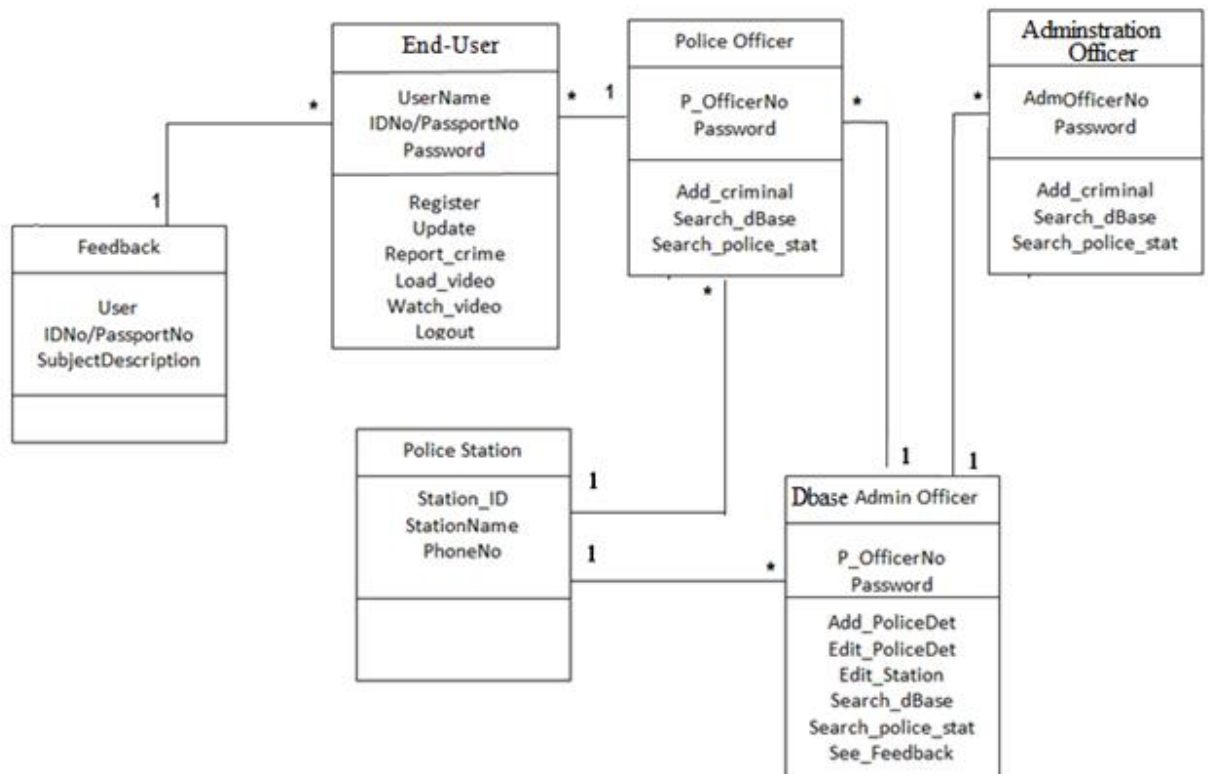
Figure 11: E-Community Policing **Class** *Diagram*

(c) **Activity Diagrams**

An Activity Diagram is essentially a flow chart showing flow of control from

activity to activity. They are used to model the dynamic aspects of a system.

They can also be used to model the flow of an object as it moves from state to

state at different points in the flow of control.

Members: In the diagram below, in **Figure 12**, a user or a member registers

with proper details in order to login in this system in order to register their

complaints or make reports. A user can see the criminal records. Here, a user can search the different criminals with their names and also search the police-station from the system. So, once user logout he/she cannot go back, he/she must have to login first.
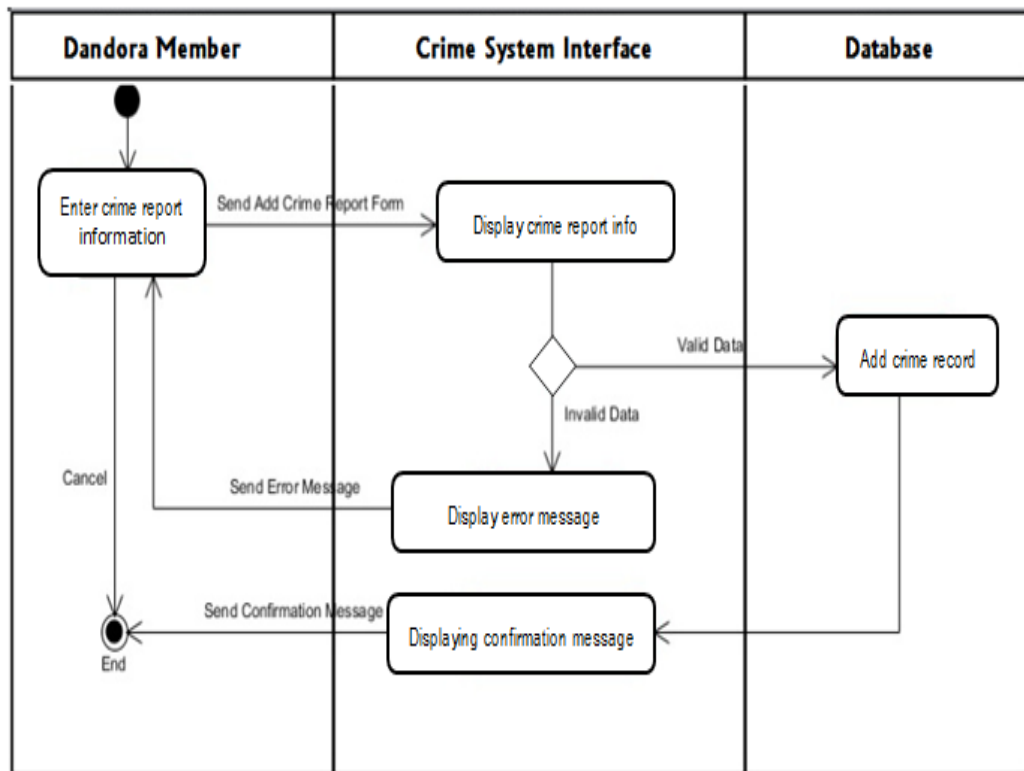
Figure 12: Adding Crime Record

The Database administrator: can search particular crime details using different parameters. Database administrator can add criminal information. Here administrator cannot update his/her personal information. Database administrator can also see the feedback/complaint which is given by users. Here Session is applied on this system.

So, once administrator logout he/she cannot go back, he/she must have to login first as indicated in **Figure 13** below.
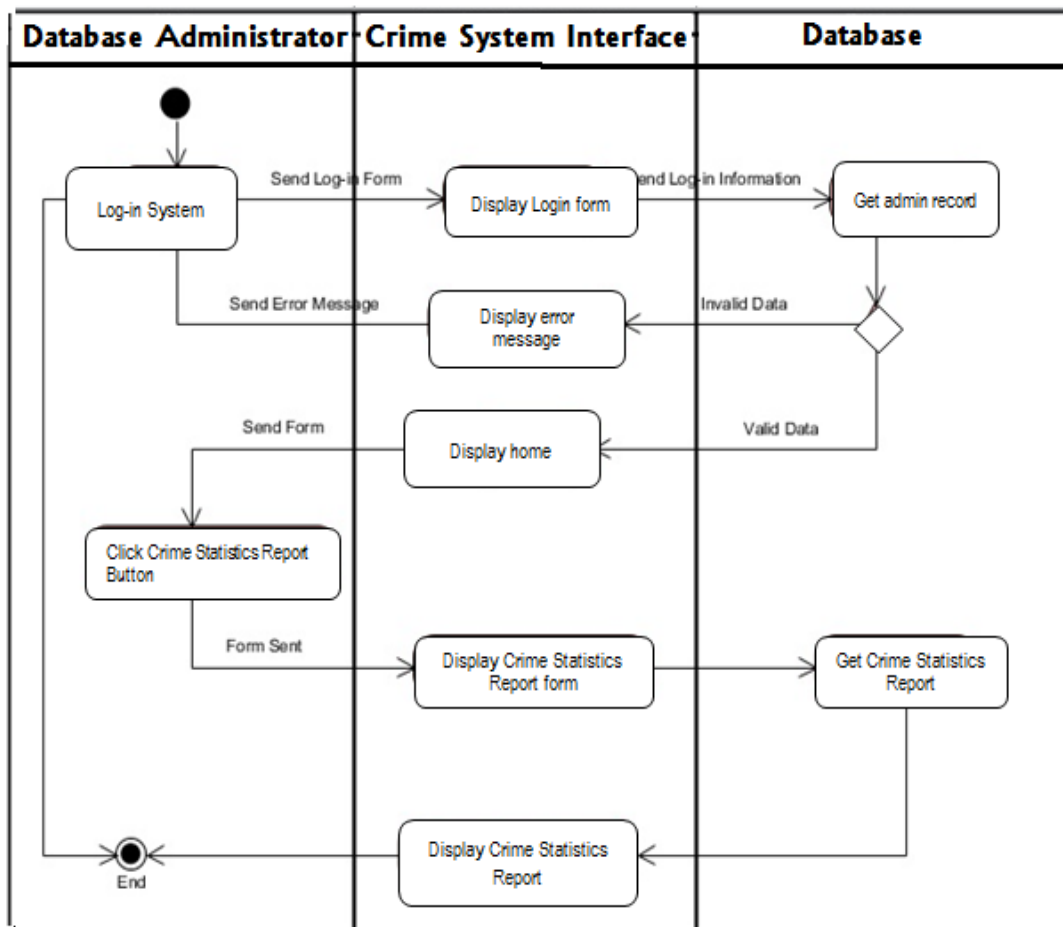
Figure 13: Viewing Crime Statistics

(d)   **Sequence Diagram**

Sequence diagrams in **Figure 14** below illustrates decomposition of the generic e-policing application in respect of each use case sequence of event and interfaces.
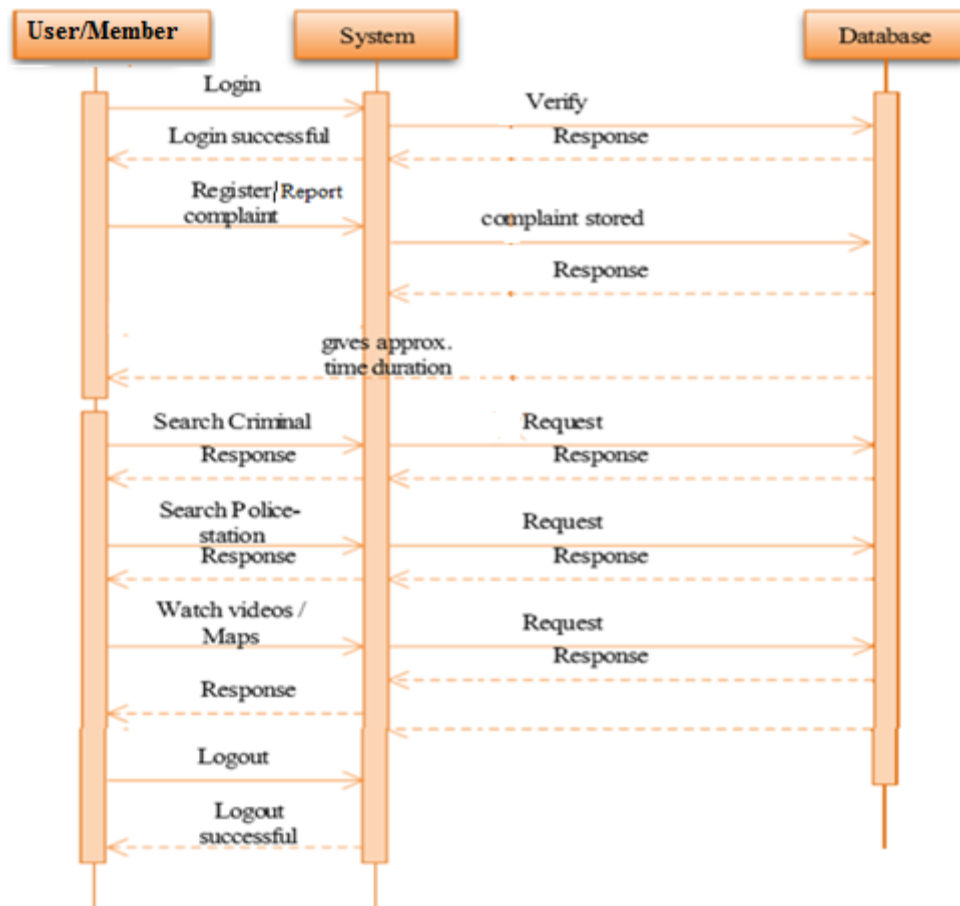
Figure 14: User and Police Officer Module

- The system feature allows a registered user to login by entering input details.

- The input details are verified on clicking the hyperlink database.

- The user can thereafter register complaints which are submitted into the database.

- The user can search criminal information from the system and response is given from the database.

- The user can search police station with response if any.

- The user can also watch uploaded pictures and videos about crime areas.

- Once the database events are over the user can log out.

(e) **Use Case Diagram**

The Use Case as a software modelling tool is used to give a description of a system's behaviour as it responds to requests that originate from outside, mainly from the visitors, residents/members of Dandora, the police and the database administrator. It however does not specify how to do it. **Figure 15and 16** below describe who can interact with the system and what they can do.
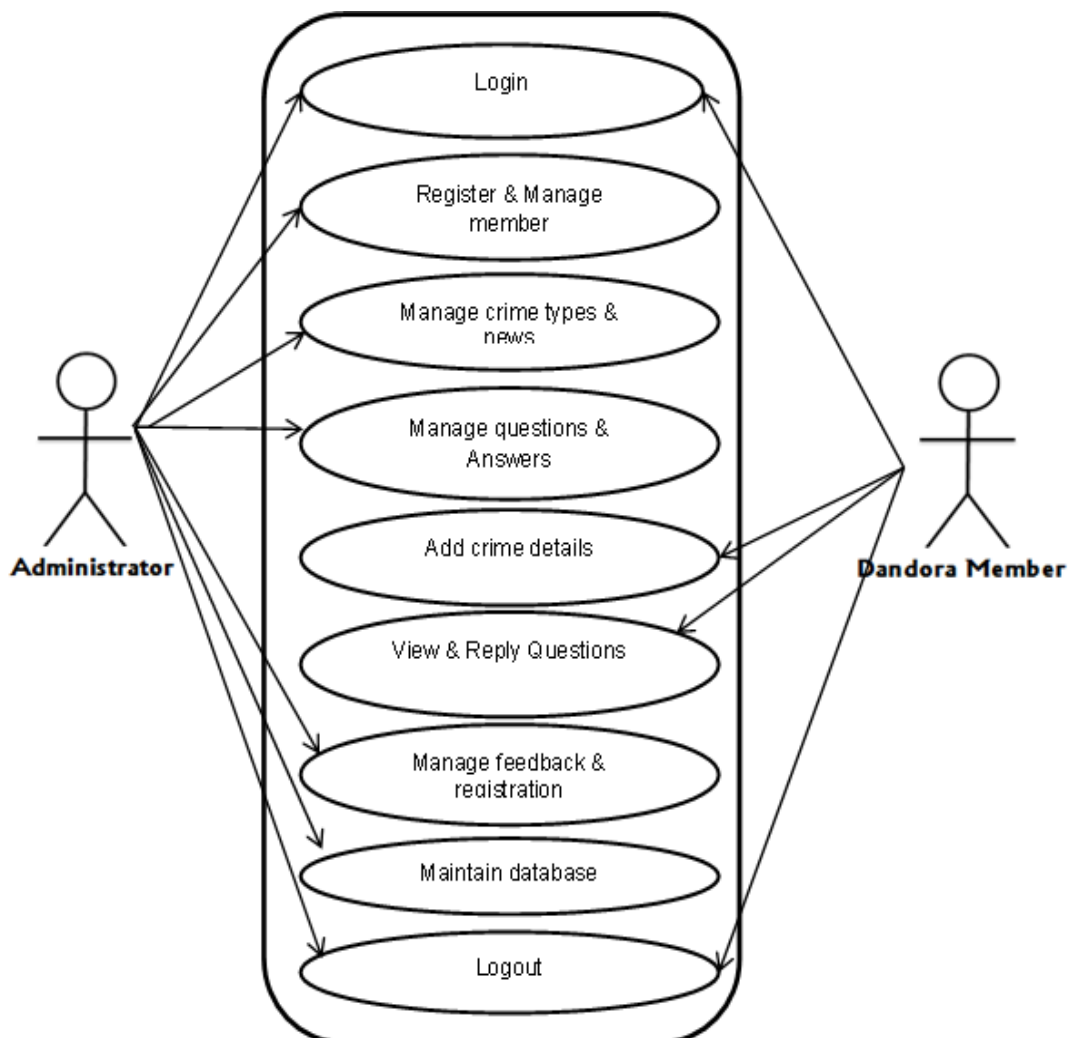
Figure 15: Use Case Diagram for Database Administrators and Members
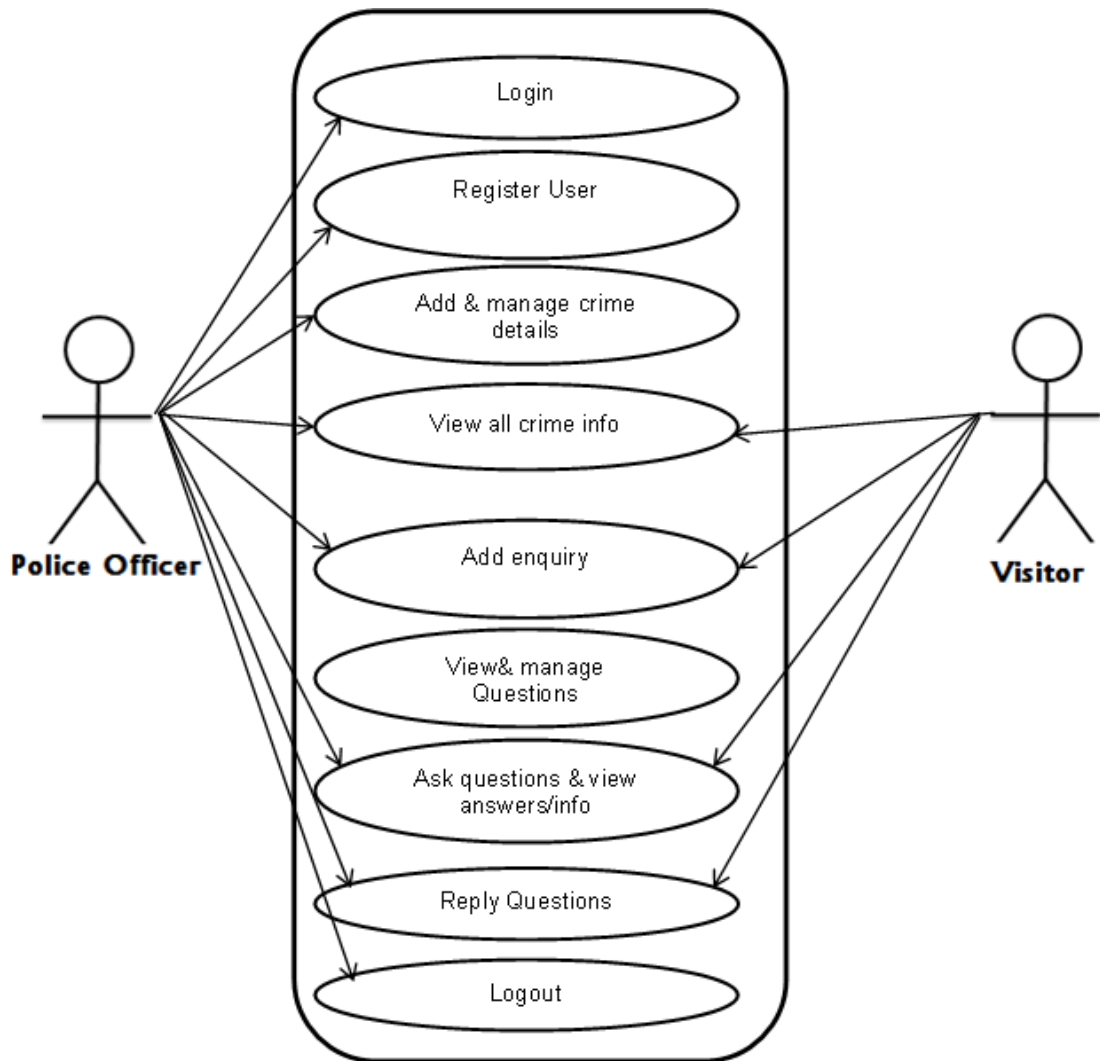
Figure 16: Use Case Diagram for Police Officers and Visitors

5.5.4   Non-Functional Requirements

A non-functional requirement specifies systems properties and constraints some of which are categorized as follows:

(a) **Usability:** Under normal circumstances users will not have to wait more than 20 seconds and on average no more than 10 seconds, for toolkit web content to load at 56kbps. Video and audio clips (if provided) may exceptionally take more than 20 seconds but no more than 30 seconds to download at 56kbps.

(b) Data protection and security: The requirement for storing and processing personal data is limited to the login details and personal data must be secured against unauthorized disclosure, in accordance with the Data Protection Act 1998.

5.3   User Interface Design

Prototype demonstrations: It is in this case when software interface of a computer-based demonstration version with limited functions, or a fully functioning version that the developer intends to improve before finally releasing it to the intended users.

In Information Technology, the user interface is everything designed into an information device with which a human being may interact. This fundamental reality of application development is that the user interface is the system to the users. What users want is for developers to build applications that meet their needs and that are easy to use. Some of these include:

5.3.1   Input Layout

It shows the major interface screens used in the capture of data into the computer database and they include:

(a) Home page screen

Figure 17 below shows the main screen to be displayed when the application is launched and has the following modules:

- Home

- Profile

- Help Desk

- Residents

- Police Settings

- Security

- Login

Figure 17: Home Page for the Online Reporting

(b) Login Link

It enables users to perform two main activities such as creating new user accounts and logging in authorised users as presented in **Figures 18** and **19** below.

- **Create accounts for new users:** Dialogue to enable new users to open accounts in the database

**E-COMMUNITY POLICING IN DANDORA
NAIROBI COUNTY**

User Registration

User Details

User Name:	Username
Full Name:	Fullname
National ID /PasspNo:	IDPassNo
Phone Number:	PhoneNo
Email Address:	EmailAddress
Enter Password:	Password
Re-enter Password:	ReenterPassword

Save   Cancel

Figure 18: Opening Account for a New User

- **Login Screen:** A registered user screen to allow access to most modules and also to share information. Those who forget the passwords can also be given a chance to reclaim the passwords using this interface in **Figure 19** below.

-

User Login

Username   Username

Password   Password

Login

Register now/ Forgot your password?

Figure 19: User Login

(c) Residents menu

The menu allows a resident to inform others on any crime news, through the News Desk and also to give suggestions which help the police on crime tendencies by using the following screens:

- **News Desk:** Any registered resident is able to inform the others about incidents and public awareness reporting using the screen given in **Figure 20** below.

Figure 20: News Desk Screen

- **Suggestion Box for the public/residents:** Residents can air their ideas, proposals and submissions by filling the electronic form indicated in **figure 21** below.

Public/Residents Suggestion Box

Have a good idea? Great, we'd love to hear it! As your police department it is our responsibility to be responsive to the needs of the residents that we serve. We welcome your suggestions in order to provide you with better service!

Your Privacy*

I would like to remain anonymous ▾

Comment*

Optional phone contact information

(XXX)   (XXXXXXXXXX)

Submit

Figure 21: Suggestion Form

(d) Security Menu

This section allows the police to give alerts based on reports made about crime areas as indicated in **Figure 22** below, which allows more information to the residents on current status of crime.

E-COMMUNITY POLICING IN DANDORA
NAIROBI COUNTY
Welcome to E-Community Policing (Dandora Nairobi County)

Crime Hotspot Areas

Hotspot Area

Description

Location

Status

Save   Cancel

Figure 22: Registering Crime Hot Spot Areas

5.3.2 Database Design

Database design is the process of producing a detailed data model of a database. This logical data model in **Figure 23** below contains all the needed logical and physical design choices and physical storage parameters needed to generate a design in a data definition language, which can then be used to create a database.
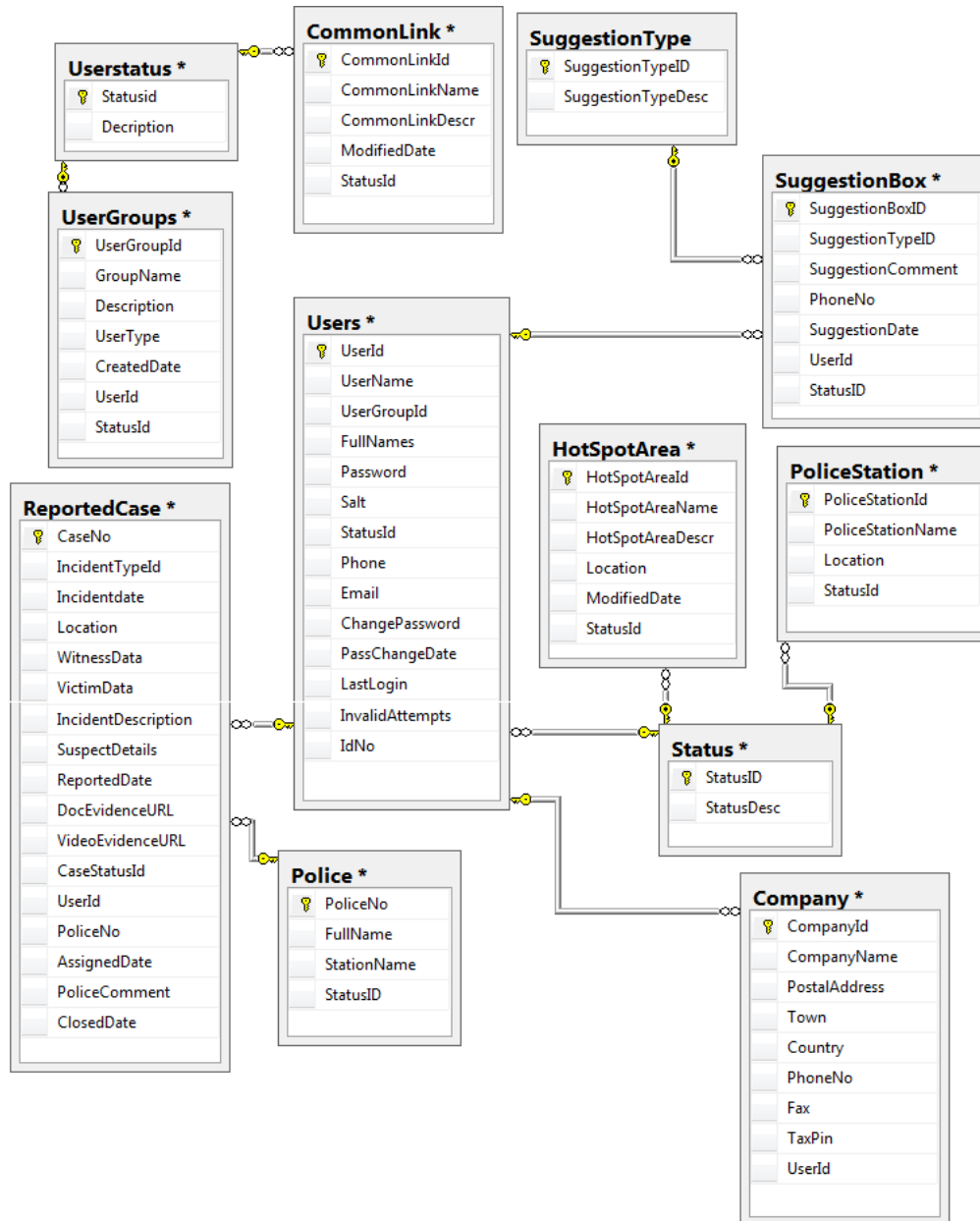
Figure 23: Database Model on Entity Relationships

There are six major tables **(from 5.11 to 5.16)** in the Entity Relationship Diagram extracted from the database where records are stored. Each table is made of three columns showing the variable names, data types used and a description of the variables as shown below:

Table 5.11: Reported Cases Table

Field Name	Data Type(Size)	Description
CaseNo(PK)	Varchar(50)	Reported Cases No
IncidentTypeID	Int	Incident Type ID
IncidentDate	Date/Time	Date the incident is reported
Location	Varchar(100)	Exact location of incident
WitnessData	Varchar(200)	Information from witness data
VictimData	Varchar(200)	Information concerning victim
IncidentDescription	Varchar(500)	Incident description
SuspectDetails	Varchar(500)	Details about suspects
ReportedDate	Date/Time	Date of reporting incident
DocEvidenceURL	Varchar(300)	URL for Evidence document
VideoEvidenceURL	Varchar(300)	URL for evidence video
CaseStatusID	Int	Case Status ID
UserID	Int	User ID Description
PoliceNo	Varchar(50)	Police number- receiving case
AssignedDate	Date/Time	Date police is assigned case
PoliceComment	Varchar(500)	Police comment
ClosedDate	Date/Time	When case is closed

Table 5.12: Police Table

Field Name	Data Type(size)	Description
PoliceNo(PK)	Varchar(50)	Police identification Number
FullName	Varchar(100)	Full Name of police officer
StationName	Varchar(100)	Station name
StatusID	Int	Police status

Table 5.13: Users Table

Field Name	Data Type(size)	Description
UserID(PK)	Int	User ID number
UserName	Varchar(100)	User Name to use in login
UsergroupID	Int	Group ID Number
FullNames	Varchar(100)	User Full Name
Password	Varchar(100)	Login password
Salt	Varchar(100)	Encrypting code identifier
StatusID	Integer	Status ID
Phone	Varchar(20)	Telephone contact number
Email	Varchar(50)	Email address
MustChangePassword	Bit	Must change password
PassChangeDate	Dae/Time	Password change date
LastLogin	Date/Time	Last login date
InvalidAttempts	Int	No of invalid login attempts
IdNo	Varchar(15)	National ID number

Table 5.14: Suggestion Box Table

Field Name	Data Type(Size)	Description
SuggestionBoxID(PK)	Int	Suggestion box ID No
SuggestionTypeID	Int	Type of suggestion to report
SuggestionComment	Varchar(500)	Comment on suggestion
PhoneNo	Varchar(10)	Phone number
SuggestionDate	Date/Time	Date of the suggestion
UserID	Int	User ID
StatusID	Int	Status ID number

Table 5.15: Users Group Table

Field Name	Data Type(size)	Description
UserGroupID(PK)	Int	User group ID number(1,2,3 or 4)
GroupName	Varchar(100)	Group Name e.g. administrator, investigators etc.
Description	Int	Group Description
UserType	Varchar(100)	User Type
CreatedDate	Varchar(100)	Date created
UserID	Varchar(100)	User ID
StatusID	Integer	Status ID

Table 5.16: Hotspot Areas Table

Field Name	Data Type(size)	Description
HotSpotAreaID(PK)	Int	Hotspot area ID number
HotSpotAreaName	Varchar(100)	Hotspot area name
HotSpotAreaDescr	Varchar(500)	Hotspot area description
Location	Varchar(100)	Hotspot area location
ModifiedDate	Date/Time	Date modified
StatusID	Integer	Status ID

5.3.3 Software Development

Waterfall approach to software development was used at this stage. Most specialists define three main principles of Waterfall namely: low customer involvement, strong documentation, and sequential structure. The residents/customers do not take part in Waterfall projects after the user requirement specification. Most customers consider this model of software development convenient because it allows them not to take part at all team meetings.

From the design interface for screens, database design and relational tables, coding was produced to transform the design layout into a code using the web based applications. At the stage of design the project documentation is complemented with new items. The initial documents were created in relation to the data captured from the residents.

Documentation was used at all stages of Waterfall project. All further stages of project realization were based on these documents. A strong documentation allowed a big advantage of Waterfall model because it allowed the developer to build the software according to the initial plan.

Fourth Generation Languages (4GLs), Graphical User Interface (GUI) tools, visual programming languages and off-the-shelf components were used to glue together and implement the code as indicated in **Appendix E**. The tools included:

- Microsoft Visual Studio.NET/c#
- Microsoft Windows 7 Operating System
- Microsoft Web Server: Internet Information Server(IIS)
- Internet Explorer 6.0 or later
- Microsoft SQL Server 2014
- JavaScript
- HTML

Hardware Requirements

These comprise mostly of the computer hardware and devices that are necessary for the implementation and running of the system. They include:

- At least a Pentium IV class processor.
- At least 3.0 GHZ Processor.

- At least 2GB of RAM.

- At least 200GB Hard disk Drive.

- A laser jet printer for generating reports.

User Characteristics

The user should be familiar with following:

- Working on a website.

- Using a browser to navigate through the links.

- Searching the required information.

- User should know how to search any police-station and criminal.

- User should know how to register any complaint or report.

The database administrator should be familiar with following:

- Working on a website

- Using a browser to navigate through the links

- Searching the required information

- Know how to search details

- Know how to register any criminal.

- He/she should be able to enforce security, validation rules, maintenance and backup procedures

5.4   Conclusion

This chapter encompassed user requirement specification with functional requirements, making use of UML diagrams and non-functional requirements such as user interface for input, output and database design as well as software and hardware requirements with summary and conclusion handled in chapter six.

CHAPTER SIX

SUMMARY OF THE FINDINGS, CONCLUSIONS AND

RECOMMENDATIONS

6.1   Introduction

The main purpose of the study was to formulate an online strategy for improving security through community policing in Dandora, Nairobi County and thus boosting the overall security in the area. This chapter seeks to give a summary of the findings, conclusion and recommendations. The summary of the findings have been demonstrated under main objectives namely, the types of crime reported, how the residents use ICT based technologies in fighting crime, the modes of passing information, challenges facing the implementation of community policing among others. It has focused on the logical discussion of the main findings of the study as contained in the research objectives.

6.2   Summary of Major Findings

After analysing quantitative and qualitative data with regard to the main objectives, the findings of the study were addressed as follows:

6.2.1   Types of Crime Reported in Dandora

The first objective of this study was to investigate the types of crime reported in Dandora, Nairobi County. After analysing qualitative and quantitative data recorded through questionnaires and document analysis and also testing the validity with regard to the objectives of the study, descriptive statistics such as frequencies, percentages and means were used. It revealed that majority of the residents of Dandora, 56.6% have been victims of crime in the last 12 months and a variety of crimes were reported with the major ones rated by the community being, drug abuse (13.8%),

robberies(13.1%), house break-ins(12.6%), domestic violence(11.1%), mugging(9.8%) and rape (9.3%), being on the higher side. Others which followed after are the illegal gangs, carjacking, assault, burglaries and forgeries in that order. The summary of findings indicated that mugging and rape cases are very high in Dandora Phase I, II and III while carjacking incidents are also comparatively experienced along the busy Komarock road stretching between Dandora phase I and III compared to other areas such as phase II, IV and V. There are several short-cut pathways connecting the different neighbouring estates of Dandora area such as Lucky Summer and Korogocho, which are adjacent to the dumpsite and even though preferred by residents to save time and cost, they are no go zones in the evening and even during the day, with criminals robbing and raping passers-by and disappearing into the dumpsite.

6.2.2   Use of ICT Based Technologies in Crime Prevention

The second objective was to establish how residents of Dandora use ICT based technologies in crime prevention. The findings revealed that most adults surveyed have access to at least one cell phone that can serve as a portable ICT tool in fighting crime either through Short Message Services (SMS), calling the police or supporting the administrative work. The residents are familiar with basic computer applications including the internet access through smartphones and cybercafés however they do not have a platform for sharing information with the police. The police also have inadequate infrastructure available for Internet facilities at Kinyago Police post, the DO's office and the chiefs' offices that are used for community policing. The police officers rely so much on police-to-police communication via their private cell phones as they are handy, however this is a price borne by the officers themselves in terms of calling cost.

6.2.3 Modes of Passing Information

The third objective of the study was to assess the modes of passing information between the community and the security agencies in Dandora. The findings revealed that reporting cases by crime victims to the authority is predominantly in person; however lesser cases are made through victim's friends and relatives who sought issuance of medical examination form, popularly known as P3, in cases involving assault. The police telephone lines such as 999 are no longer used by the residents and the police also support physical reporting since it gives a confirmation of correctness and authenticity of crime.

6.2.4 Challenges Faced by both the Community and the Police in Community Policing

The fourth objective of the study was to examine the challenges faced by both the community and the police in community policing. Data analysis and interpretation revealed that there is poor relationship between the community and the police in combating crime. The number of police service personnel compared to community ratio for adequate patrol is wanting. Over 60% of respondents also cited the response time of the police during crime being below average as many officers also use their personal vehicles and mobile phones to communicate with each other and with police headquarters.

6.2.5 Design and Develop an ICT Based Solution

Lastly, on the objective to design and develop an ICT based solution that can support in community policing, most residents did not report their cases to the administration or the police stations mainly because of the process being complicated, police station and administration being far away, fear of being victimised, lack of confidence on

police and administration and some having other reasons like victims feeling the cases are petty, mugging deemed as normal, process is time consuming among others. There is therefore a need to explore other avenues of reporting or sharing information amongst the people of Dandora. A number of residents who have heard of online reporting are familiar with common computer applications such as the Internet yet it is less utilised. The residents would want to remain anonymous in most cases while reporting and they do believe online reporting can dispel fear of being victimised when they report or share remotely from cybercafés or by using Internet-enabled phones. This is likely to bridge the gap of sharing information based on the fact that majority believe that community policing has not been used to its maximum potential.

6.3   Conclusion

Conclusions made here are based on the findings of this study that undertook to establish formulating online strategy for improving security through community policing in Dandora. In view of the findings the study concludes the following:

6.3.1 Types of Crime Reported in Dandora

Nairobi Eastalnds, like other estates, has its own crimes types as the Kenya police service and the administrators get reports of these crimes, ranging from minor to nerve shattering episodes on daily basis. Dandora area is not left out as it registers all sorts of crimes ranging from drug abuse, robberies, house break-ins, domestic violence, mugging, rape, illegal gangs, carjacking, assault, burglaries among others. Residents have had their houses or businesses broken into, during the day and at night, at times as they watch. Some residents have been tricked into giving their hard earned cash with the promise of getting something in return. Cases of residents who were mugged at gunpoint are a popular story to most residents among others.

Retaliatory cases of residents also carrying out assault is also fast increasing and without second thoughts. Beating up a suspect in public is not new in the estates as they are known to pounce on an alleged lawbreaker so fast that even the police can barely save the situation. From stones to big sticks, beating up of cornered thieves to death within minutes is common and the residents not caring if they are breaking rules themselves. Crime rates in Dandora are high in general.

6.3.2 Use of ICT Based Technologies in Crime Prevention

The study findings revealed that a good number of residents of Dandora as well as the police service personnel have access to ICT tools; mainly the smartphones and have adequate ICT skills and can assist other residents who have difficulties in using computers. This basic computer skills, is available and it is only the platform which is missing to provide linkage especially from the police who have limited resources required for ICT facilities.

6.3.3 Modes of Passing Information

The police in Dandora area do not react to crime incidents reported on time by victims due to the ineffective channels used by the police service, in receiving those reporting crime. The police service is inadequately prepared in terms of the resources and manpower for logistics and equipment, among other causes. People on the other hand cannot give information on hot spot areas of crime since a number of them stay far from the police stations. Making inquiries all the time is also tedious unless announcements are made through other outlets such as *baraza*. It was evident that there is less number of police service personnel available to patrol the vast estate of Dandora area and this coupled with inadequate patrol vehicles, it means the police are left with no alternatives but to either make foot patrol or demand for transport from the victims themselves, when they report cases. Many officers also use their personal

vehicles and mobile phones to communicate with each other and with police headquarters as there is no steadfast communication means, between the officers on the ground and those at central control command. This explains why the response to crime scenes is sluggish and why there is a poor relationship between the community and the police in combating crime. This however is not unique in Kenya making it to cascade downwards to unproductive provision of information from the residents which could have been very helpful in combating crime in the area.

6.3.4   Challenges Faced By both the Community and the Police in Community Policing

Many cases of crime rates in Dandora-Nairobi County go unreported by the victims in the community, for fear of being victimized by the police when the crime victims report physically. This is because there is no reliable communication network infrastructure between the officers on the ground and the central control command. Residents feel very insecure with this mode of reporting and they feel some police officers might report them back to the criminals since their identities are exposed at reporting time which may lead to retaliation and victimisation by the police and make it easy for the criminal who may retaliate causing fear and this explains why there is delay in reporting or why they do not report at all

6.3.5   Design and Develop an ICT Based Solution

The use of information communication technology (ICT) has significantly altered the way developed countries deal with their security. They have taken advantage of developments in the ICT to improve on the institutional arrangements in crime detection and prevention. Fighting against crime requires an interconnected and coordinated tactics supported by strong ICT security system in reporting as well. All

these can be implemented by use of a web based system that links the residents with the police service department and the local administrators since it is not expensive to purchase, install and operate.

6.4   Recommendations

From the results of the study, the following recommendations address the respective groups for whom the findings may be relevant:

6.4.1   Police should use ICT to Enhance Community Policing

The policy makers in the country should consider making ICT a core area of attention in the devolved government from lower level of education in the school curriculum to those in employment since it is pivotal in the attainment of Vision 2030. It is only when ICT use is implemented is when service delivery and faster decisions can be made in the police service and possibly the government to allocate more funds towards the acquisition of computers in all police stations with and through reliable Internet networks. Since many Kenyans both educated and non-educated still have ICT phobia, nervousness and uneasiness about using computers in the offices due to their incompetency in ICT matters, it means that the police service is not left out and therefore it is necessary that they are trained in basic ICT skills, as crimes get sophisticated and complex day after day. Provision of pre-service and in-service ICT skills in areas such as training, networking, social issues and technical matters is a prerequisite for ICT competency, for every police officer. ICT is dynamic, even when people have been trained to handle ICT matters; there is need for continuous updates through ICT seminars, workshops and in service. This would ensure effective use of computers. Both senior and junior officers require more ICT training as they portrayed mixed levels of ICT incompetency in some areas. This measure would

ensure even-handedness is upheld in the provision of ICT services in all police stations across Kenya as well as interactions with the general public. Based on this finding that people are not using the Internet at all and mobile phones, to some extent to report crime, we would want to implement it in this system if possible.

6.4.2 Working in Partnership

The police and community should work in partnership not only to solve problems but also to reduce the fear of crime, physical and social disorder and neighbourhood decay. These relationships need to be based on trust by challenging people to accept their share of the responsibility, for both the residents and the police service, which will in turn enable parties to identify priorities and develop responses to solve their own problems. E-community policing can be an effective tool in the police service to aid in decision-making process, to help in operational planning, personnel deployment and resource allocation. It can strategically narrow the focus of their investigations rather than approach them in a broader, more random way that may require more time and effort to gather data and dispense services to people of Dandora for example, patrolling police officers may be more alert in particular areas of the community, at particular times, and about particular individual profiles based on the analysis of crimes, rather than randomly patrol their precinct. Equally, police and the administration representatives must cooperate inclusively with all local groups to develop the strategic framework needed for implementing a comprehensive e-community-oriented policing program in order to make it better off. The police service must move away from the concept of policing based on reactive defence of the community and move towards mobilising the community and its police to prevent crime by means of modern ICT based tools. It was also found that there is dismal cooperation between the police and community members who do not provide

information about crime to the police because the police equally do not always give feedback on cases reported by members of the community and residents seem to have lost confidence in the police.

6.4.3 Improve Internet Infrastructure

Smartphone ownership is currently increasing in the low-income neighbourhoods and among the lower-ranking officers in the National Police Service and this is likely to change the interaction between people and residents. Internet enabled infrastructure is emerging in all areas in Kenya and this will provide a better platform for the introduction of call centres and online crime reporting options however call rates and data bundle rates are still very high. The government therefore should lower the taxes on call charges in order to make it affordable by several people in the lower ranks of the economy, including the residents of Dandora. The police service on the other hand could also be supplied with tokens for data bundles and at least availability of Wi-Fi access points within the police stations to aid them in building facts based on responses from the community. Smart phones can allow Internet access as a tool to provide on-time information for the police and the residents irrespective of distance and time. Police leadership will be critical to ensure effective adaptation of new technologies, especially those that will contribute to improved oversight and promote accountability.

6.4.4 Embrace Online Reporting

The Kenya Police service does not have an application that can aid users who are newly joining the crime reporting system to report crimes and get details concerning the criminal cases. Embracing the online crime reporting system will commendably support the residents to report crime incidents online, view information on wanted

criminals and also view safety tips as well as any updates. On the other hand, police patrols will be stopped since crimes committed are reported directly online and this will ease on the crimes committed which in turn also save time. As a result the, crime reporting system needs to embrace these new technologies. This report has presented a simple, convenient, cost-effective, but efficient online crime reporting system with a user-friendly, sensitive and intelligible web interface whereby it can be accessed at any time provided there is Internet connection.

6.5   Suggestions for Further Research

Future research needs to be conducted into the interplay between community policing and national security. A web based strategy for community policing can be adopted as the primary policing strategy, with policing becoming a neighbourhood affair. Based on the analysis of the data and the subsequent findings, the following propositions for further research are presented;

6.5.1   This study was conducted in Dandora area in Nairobi County and therefore there is need to reproduce the study in a generic model for community policing that covers other parts of the county and the rest of country at large, through web site activation. Such studies might unearth other features which were not in this study. Further research could comprise additional variables such as technical support, ICT accessibility through infrastructure and software availability.

6.5.2   Future studies could be conducted on all the remaining counties other than Nairobi to allow comparison between crime-related issues across the country to allow adoption of e-community policing that is relevant and applicable to the whole country to make it stronger. This is because Nairobi as a city may

not report other crimes such as cattle rustling which may be common in rural settings among others.

6.5.3   Further research is recommended to widen the scope of this application to make the system provide crime galleries where numerous crime photos and videos captured about crime can be viewed by users and also avail the system to mobile phone users.

BIBLIOGRAPHY

(n.d.). Sahil Parikh (2010), The SaaS Edge "Tata McGraw-Hill".

(n.d.). Ellis, G. (2007). Introduction to the Oracle Database. Kansas.

(n.d.).
file:///D:/THIRD%20YEAR/projects/Online%20Crime%20Reporting%20Syst
em%20in%20PHP.htm.

Kenya Police Service Strategic Plan 2003-2007. (2007). 8.

Kombo & Tromp. (2006). *Proposal and Thesis Writing.* Nairobi: Paulines
Publications Africa.

Lincoln Police Department. (2015, May). *Community Based Policing*. Retrieved from
http://www.lincoln.ne.gov: http://www.lincoln.ne.gov/city/police/cbp.htm#

(SRIC), S. R. (2010). *An Overview of Crime incidents in Nairobi Region*. Retrieved
April 16, 2013, from http://www.nscpeace.go.ke/nsc/index.php/resource-
library/downloads/reports/76-an-overview-of-crime-in-nairobi-
regionsric/download

(2002, januaury 08). http://topicideas.org/how-to-online-crime-reporting-and-
management-system-pdf. Retrieved from http://topicideas.org/how-to-online-
crime-reporting-and-management-system-pdf

(2013). Retrieved from http://dc205.4shared.com/doc/-TxygTEo/preview.html

Adams, & Richard. (2002). Crime and Delinquency. *Implementing Community-
Oriented Policing: Organizational Change and Street*, 399-430.

Adeola, Falaki, & Olabode. (2014). E-neighborhood Management Architecture for
Crime Detection and Control in Nigeria.

Akiwumi. (2011). ommission of Inquiry into Post-Election Violence (CIPEV.

Alemika, & Chukwuma. (2004). *The poor and informal policing in Nigeria.* Lagos:
Center for Law Enforcement Education (CLEEN).

Alemika, C. (2004). *The Poor and Informal Policing in Nigeria, The Centre for Law
Enforcement Education (CLEEN).* Lagos.

Al-Mughrabi, D. K. (2012). *Bacterial Soft Rot Of Potatoes.* Retrieved June 9, 2012,
from http://www.potatoimmpact.com/pdf/Soft%20Rot%20E.pdf

American Society of Agricultural and Biological Engineers. (2011). *Implementation
of crop disease risk forecasts that rely on neural networks and medium range*

numerical weather prediction model output. Retrieved June 9, 2012, from http://elibrary.asabe.org/abstract.asp?aid=21889&t=2&redir=&redirType=

Andrade-Piedra et. al., J. L. (2005). *Simulation of Potato Late Blight in the Andes.I :Modification and Parameterization of the LATEBLIGHT Model.* Retrieved June 9, 2012, from http://apsjournals.apsnet.org/doi/pdfplus/10.1094/PHYTO-95-1191

Authority, M. P. (2004). Metropolitan Police Authority.

Bahadır, & Erhan. (2011). Contingency Theory Approach for Effective Community.

Baker et. al., K. M. (2007). *Comparative analysis of models integrating synoptic forecast data into potato lateblightrisk estimate systems.* Retrieved June 9, 2012, from http://www.sciencedirect.com/science/article/pii/S0168169907000348

Baker, K. M. (2008). *Regional Variability in Crop Specific Synoptic Forecasts.* Retrieved June 11, 2012, from http://www.cabi.org/GARA/FullTextPDF/2008/20083298181.pdf

Berners, T. (2014, April Tuesday). *HTML.* Retrieved april uesday, 2014, from Wikipedia: http://en.wikipedia.org/wiki/HTML#References

Bezdek, J. C. (1993). *Fuzzy Models --- What Are They, and Why.* Retrieved August 11, 2012, from http://www.cs.cmu.edu/Groups/AI/html/faqs/ai/fuzzy/part1/faq-doc-2.html

Bourke, P. (n.d.). *Use of Weather Information in the Prediction of Plant Disease Epiphytotics.* Retrieved June 9, 2012, from http://www.annualreviews.org/doi/abs/10.1146/annurev.py.08.090170.002021

Bowman, D. (2009).

Brenda. (2011, 5 11). *Challenges facing the police force.* Retrieved 3 23, 2013, from http://www.kenyaplex.com: http://www.kenyaplex.com/discussionforum/9476-challenges-facing-the-police-force.aspx

British Telecommunications. (2005).

Bureau of Justice Assistance. (1994). *Bureau of Justice Assistance: Understanding Community Policing.*

Bureau., P. R. (2015, january 5). *Population Reference Bureau. (2015, March 17). Uganda on Track to Have World's Highest Population .* Retrieved march 17,

2015, from Growth|Worldwatch Institute. Retrieved March 17, 2015, from www.worldwatch.org:: http://www.worldwatch.org/node/4525

BusinessDailyAfrica. (2013, January 31). *Mobile app enables more Kenyans to report crime*. Retrieved April 17, 2013, from http://www.businessdailyafrica.com: http://www.businessdailyafrica.com/Kenya-launches-app-to-enable-public-to-report-crime/-/539546/1680522/-/6qvxt3z/-/index.html

Canadian Police College. (2007). E-Policing in Police Services.

CapitalFM. (2013, April 17). *Nairobi crime spiralling out of control – report*. Retrieved April 17, 2013, from http://www.capitalfm.co.ke: http://www.capitalfm.co.ke/news/2013/04/nairobi-crime-spiralling-out-of-control-report/

Castillo, J. J. (2009). *Research Population.* Retrieved November 2, 2012, from http://explorable.com/research-population.html

Center, I. P. (2012). *Agricultural research for development.* Retrieved November 10, 2012, from http://cipotato.org/press-room/press-releases/potato-becomes-the-new-star-crop-in-kenya

Centre, N. C. (2012). *Summary of a Study on Organized Criminal Gangs in Kenya.*

Chambers, Denney, & Pieris. (2014). *Community policing through bicycle patrolling in Sri Lanka: An incipient post-conflict strategy.*

Chan, David , B., Margot, L., & Sally , D. (2001). E-policing: The Impact of Information Technology on the Police. *Criminal Justice Commission*.

Charlotte, G., Weisburd, D., Telep, C. W., Vitter, Z., & Bennett, T. (2014). Community-oriented policing to reduce crime, disorder and fear and increase satisfaction and legitimacy among citizens:. *A systematic review. Journal of Experimental Criminology 10*, 399–428.

Citizen. (2013, April 17). *Crime On The Rise In Nairobi, Police Report Says*. Retrieved April 17, 2013, from http://www.citizennews.co.ke: http://www.citizennews.co.ke/news/2012/local/item/9586-crime-on-the-rise-in-nairobi-police-report-says

Cochran, W. G. (1977). *Sampling techniques (3rd ed.).* New York: :John Wiley & Sons.

Coleman. (1996). Citizens, cops, and city hall: creating an inclusive team, FBI Law Enforcement Bulletin Vol.69 (2). 7-10.

Colloquia. (2003). The Institute for Policy Research.

Communications Authority of Kenya. (2014). *Kenya's Mobile Penetration hits 80 per cent*. Retrieved from http://www.ca.go.ke/: http://www.ca.go.ke/

Community Policing Consortium. (1994). *Understanding community policing: A frame - work for action.*

Contreras-Medina, L. M., & et.al. (2009). Mathematical modeling tendencies in plant pathology.

Cooke et. al., B. (2006). *The Epidemiology of Plant Diseases, 2nd Edition, 239.* Retrieved June 9, 2012

Cornell University. (2009). *Potato/Tomato Late Blight Decision Support System (DSS).* Retrieved June 9, 2012, from http://newa.cornell.edu/index.php?page=potato-late-blight-dss

court, s. (2011, December 13). *Ssegonja Paul v Uganda (Criminal Appeal No.42 of 2000)/Uganda* . Retrieved march 16, 2015, from legal information institute. Retrieved march 16, 2015, from http://www.ulii.org:: http://www.ulii.org/ug/judgment/supreme-court/2002/10

Data Mining 101: Tools and Techniques. (2006). Retrieved June 9, 2012, from http://www.theiia.org/intAuditor/itaudit/archives/2006/august/data-mining-101-tools-and-techniques/

Davies. (2004). *Insitiute for Public Policy Research*.

Davis, R., Henderson, & Merrick. (2003). PolCom in Mozambique - Local adaptations of community policing. *Police Practice and Research, Vol. 4, No. 3*, 285-300.

Denney, L., & Jenkins, S. (2013). *Securing communities: the what and the how of community policing.*

Dinnen, S., & McLeod, A. (2009). Policing Melanesia – international expectations and local realities. *Policing and Society*, 148.

DTREG. (2012). *DTREG: Software For Predictive Modeling and Forecasting.* Retrieved June 11, 2012, from http://www.dtreg.com/

DTREG. (2012). *Multilayer Perceptron Neural Networks.* Retrieved September 4, 2012, from http://www.dtreg.com/mlfn.htm

DTREG. (2012). *Multilayer Perceptron Neural Networks.* Retrieved September 4, 2012, from http://www.dtreg.com/mlfn.htm

Dufka. (2010). Force Operational Handbook. Nigeria: Report Shines Light son Nigerian Police Corruption. August 18th. *The paperwork issue*.

Ellis, G. (2007). *Introduction to the Oracle Database.* Kansas.

Ericson, R. V., & Haggerty, K. D. (1997). *Policing the Risk Society.* Oxford: Clarendon Press.

Fakhroutdinov, K. (2014). *Activity Diagrams.* Retrieved April 5, 2014, from http://www.uml-diagrams.org/activity-diagrams.html

field, S. S. (n.d.). *The Use of Clean Seed Potato boosts production in Kenya.* Retrieved June 9, 2012, from http://www.fidafrique.net/IMG/pdf/css_potato_mktg.pdf

Francl, L. J. (2007). *The Disease Triangle: a plant pathological paradigm revisited.* Retrieved October 10, 2013, from http://www.apsnet.org/edcenter/instcomm/TeachingArticles/Pages/DiseaseTriangle.aspx

Frilander, M., Lundine, J., Kutalek, D., & Likaka, L. (2014). New technologies for improving old public security challenges in Nairobi. *New technologies for improving old public security challenges in Nairobi*, 11.

Futronics Group. (2005).

Futronics, G. (2005). *The New Police E-Macs. Electronic Mobile Access Control System.* Retrieved January 12, 2014, from http://www.e-policing.net Visited, 2005-08-29

Garson, G. D. (2008). *Handbook of Research on Public Information Technology.*

Gill, C., Weisburd, D., Telep, C., Vitter, Z., & Bennet, T. (2014). *Community-Oriented Policing to Reduce Crime, Disorder and Fear and Increase Satisfaction and Legitimacy among Citizens: A Systematic Review,".*

GMO Safety. (2002). Retrieved December 5, 2012, from http://www.gmo-safety.eu/basic-info/257.tiny-fungus-massive-impact.html

GOK. (2010). *Agricultural Sector Development Strategy 2010 - 2020.* Retrieved June 9, 2012, from http://www.kilimo.go.ke/kilimo_docs/pdf/ASDS_Final.pdf

GOK. (2012, March 16). *Plant clinics in Kenya.* Retrieved June 9, 2012, from Ministry of Agriculture: http://www.kilimo.go.ke/index.php?option=com_content&view=article&id=459:plant-clinics-in-kenya&catid=235:success-stories

Gopal, S. (1998). *Artificial Neural Networks for Spatial Data Analysis.* Retrieved June 11, 2012, from http://www.ncgia.ucsb.edu/giscc/units/u188/u188.html

Gordon, H. (nd). *Qualitative research in information.* Retrieved April 13, 2013, from consideration of selected: http://epress.anu.edu.au/wp-content/uploads/2011/08/part-ch04.pdf

Gudmestad, N. C. (2012). *Forecasting Late Blight and Fungicide Application Technology.* Retrieved June 9, 2012, from http://www.scientificsocieties.org/aps/proceedings/lateblite/papers/lb005.htm

Hall, O. P. (2002). *Artificial Intelligence Techniques Enhance Business Forecasts.* Retrieved August 10, 2012, from http://gbr.pepperdine.edu/2010/08/artificial-intelligence-techniques-enhance-business-forecasts/

Haykin, S. (2005). *Neural Networks A comprehensive foundation second edition.* India: Pearson Education (Singapore) Pte Ltd.

Heald, C. (2009). *Reforming Community, Reclaiming the State: The Development of Sungusungu in Northern Tanzania.* CRC Press, Taylor & Francis Group.

Higgins, & Oliver. (2004). Rising to the collection challenge.

Higgins, Oliver. (2004). Rising to the collection challenge.

IBMCorporation. (2011). *KNN Algorithms.* Retrieved June 9, 2012, from http://publib.boulder.ibm.com/infocenter/spssstat/v20r0m0/index.jsp?topic=%2Fcom.ibm.spss.statistics.help%2Falg_knn.htm

Independence Missouri Police Department. (2011). *Policing Strategy: The Need for Change.*

Infonet-Biovision. (2012). *Potato - Information on Diseases.* Retrieved June 9, 2012, from http://www.infonet-biovision.org/default/ct/139/crops#_1824_1063

Infonet-Biovision. (2012). *Potato Seed Production.* Retrieved September 5, 2012, from http://www.infonet-biovision.org/default/ct/259/crops

InfoResources Focus. (2008). *Potatoes and Climate Change.* Retrieved June 9, 2012, from http://www.inforesources.ch/pdf/focus08_1_e.pdf

Iriberri A., L. G. (2007). *Claremont Graduate University.* chicago: Natural Language Processing and e-Government: Extracting Reusable Crime Report Information.

Jacobson, I., Spence, I., & Bittner, K. (2011). Retrieved March 18, 2014, from USE-CASE 2.0 The Guide to Succeeding with Use Cases: file:///E:/Documents%20and%20Settings/Lenny%20Lemuel%20Kariuki/My%20Documents/Downloads/Use-Case+2_0_Jan11.pdf

Jane Muthoni, D. N. (September 2009). A review of constraints to ware Irish potatoes. *Journal of Horticulture and Forestry Vol. 1(7)* , pp. 098 - 102. Retrieved from http://www.academicjournals.org/jhf/PDF/Pdf2009/Sept/Muthoni%20and%20 Nyamongo.pdf

Jensen et. al., L. (n.d.). *Potato Late Blight.* Retrieved June 11, 2012, from http://www.cropinfo.net/Potatoblight.htm

Jhanjeri, & Mohali. (2015). International Journal Of Business Management.

Johnson, S. B. (2005). *Potato Facts: Late Blight Prediction in Maine.* Retrieved from http://www.umaine.edu/umext/potatoprogram/Fact%20Sheets/lateblightpredic tion.pdf

Johnston, P. (2011, 07 04). *If the police are the public, let the public vote*. Retrieved from http://www.telegraph.co.uk: http://www.telegraph.co.uk/comment/columnists/philipjohnston/8616869/If-the-police-are-the-public-let-the-public-vote.html

Jorgensen, N. 0. (1979). *Kenya ,Shelter sector study and AID's experience.* USAID/Kenya.

Justice, T. N. (1345). rtr.

Justice, T. N. (1998). *The evolution and development of police technology.*

Juta, L. (1995). *South African Police Service Act, 1995 (Act no 68 of 1995)* .

K., M. B. (2006). *Project Report Of Online Book Store System.* New Delhi: Tata McGraw-Hill.

Kabira, J., Kinya, P., & et.al. (2003). *Availability and utilization of superior chipping potato varieties by fast food outlets in three Kenyan urban centres.* Retrieved September 5, 2012, from http://www.acss.ws/Upload/XML/Research/71.pdf

Kamau, P. (2010). *Managing Challenges Facing Small and Medium Enterprises in Nairobi Central Business District. Journal of Research Abstracts, JRA, Volume 4, 2010., 4.*

KANUE. (1980). chicago: donc-johns.

Kenya Police. (2010). The Kenya Police, Annual Crime Report.

Kenya_Police. (2010). *Annual Crime Report for the year.* Nairobi: Gov Press.

Kenya_Police. (2012). *Revised Draft Policy in Community Policing in Kenya*.

Kerlinger, F. (2002). Foundations of Behavioural Research.New Delhi. *Surjeet Publications*.

Kirk et. al., W. (2012). *Michigan Potato Diseases - Late blight.* Retrieved September 5, 2012, from http://www.potatodiseases.org/lateblight.html

Kirk, W., & et.al. (2004). *Michigan Potato Diseases.* Retrieved September 4, 2012, from http://www.potatodiseases.org/lateblight-bulletin.pdf

Kirk, W., & et.al, &. (2012, July). *Potato Diseases - Late blight.* Retrieved September 4, 2012, from http://www.potatodiseases.org/lateblight.html

Kirk, William; al, & et. (2012). Retrieved September 4, 2012, from Potato Diseases Late Blight: http://www.potatodiseases.org/lateblight.html

KNHCR. (2014). *KENYA : One Year in Office for Uhuru Kenyatta and Wiliam Ruto.*

KNHRC. (2008). *On the brink of precipice: A human Rights Account of Kenya's Post-2007 Election Violence.*

Kogel, W. (2002). *Faster Training of Neural Networks for Recommender Systems.* Retrieved March 31, 2013, from http://www.wpi.edu/Pubs/ETD/Available/etd-0501102-130405/unrestricted/wkogel.pdf

Kornhauser, R. R. (1978). *Social Sources of Delinquency: An appraisal of Analytic Models.* Chicago: University of Chicago Press.

Koza, J. R. (2012). *Genetic Algorithms and Genetic Programming.* Retrieved August 11, 2012

Kubrin, C., & Wo, J. C. (2016). *Social Disorganization Theory's Greatest Challenge: Linking Structural Characteristics to Crime in Socially Disorganized Communities.* Chicago: University of Chicago Press.

lalasticlala. (2015, march 10). *Top 10 Countries With The Highest Crime Rate In 2014 - Politics -.* Retrieved march 16, 2015, from Nairaland. Retrieved March 16, 2015, from http://www.nairaland.com:: http://www.nairaland.com/1894963/top-10-countries-highest-crime

LeBeuf. (2006). E-Policing in Police Services Definitions, Issues and Current Experiences.

LeBeuf, M. (2006). *Royal Canadian Mounted Police.*

LeBeuf, M. (2006). *Royal Canadian Mounted Police.*

LeBeuf, M.-E. (2008). Royal Canadian Mounted Police. *E-Policing in Police Services Definition, Issues and Current Experiences.*

Lenz, G., & Moeller, T. (2008). *Choosing a Software Development Model.* Retrieved November 15, 2013, from http://flylib.com/books/en/2.634.1.23/1/

Lerdorf, R. (2006, May Thursday). *PHP.* Retrieved April Wednesday, 2014, from Wikipedia: http://en.wikipedia.org/wiki/PHP

Livingston, & Steven. (2013). Africa's Information Revolution: Implications on Crime, Policing, and Citizen Security.

Livingston., & Steven. (2013). *Africa's Information Revolution: Implications for Crime, Policing, and Citizen Security.*

Lombardo, & Lough. (2007). Broken Windows, Community Building, and Satisfaction with the Police . *Community Policing*, 134.

Ludman, B. (2013, May 12). *Community Policing Forums*. Retrieved May 12, 2013, from http://www.joburg.org.za/index.php?option=com_content&do_pdf=1&id=88 &limitstart=1: http://www.joburg.org.za/index.php?option=com_content&do_pdf=1&id=88 &limitstart=1

Mads Frilander, Jamie Lundine, David Kutalek,Luchetu Likaka. (2014). *New technologies for improving old public security challenges in Nairobi.*

male. (234344). red. In hffhfh, *dgdkjfahfaf* (pp. 12-56). hghhg: fgfhh.

Marcel, E. L. (2008). *E-Policing in Police Services - Definitions, Issues and Current Experiences.*

Margaret, N. (2014). *System Analysis and Design.* Kampala.

Margaret, N. (2014). *System Analysis and Design.* Kampala.

Martin, M. (2003). Community Policing: Restoring Justice? . *Social Policy Times*.

Masese, & Mwenzwa. (2013, February 8). A community Vigilante Group - Human Rights Watch. p. 49.

Maximino. (2014). *The impact of community policing: Meta-analysis of its effects in U.S. cities.*

Maximino. (2015). *Community-oriented policing strategies: Meta-analysis of law enforcement practices.*

Maximino, M. (2014). *The impact of community policing: Meta-analysis of its effects in U.S. cities.*

Maximino, M. (2014). *The impact of community policing: Meta-analysis of its effects in U.S. cities.*

Maximino, M. (2014). *The impact of community policing: Meta-analysis of its effects in U.S. cities.*

Maximino. (2014). *The impact of community policing: Meta-analysis of its effects in U.S. cities-.*

Merriam, S. B. (2013). *Qualitative research a guide to design and implementation.* Ankara: Nobel Publications.

Metropolitan Police Authority. (2004). Metropolitan Police Authority.

Michael Widenius's daughter, M. (2006). *MySQL Database.* Ohio: Virident tachIOn Publshers.

Microsoft Corporation. (2010). *Microsoft Environmental Research Workshop 2010.* Retrieved June 11, 2012, from http://research.microsoft.com/en-us/events/environmentalresearch2010/ERW2010.pdf

Mike, K. (2008). *Preliminary Investigation and information gathering.* Kampala.

Miner, R. (2009). Retrieved November 19, 2012, from http://www.downv.com/Linux/download-RapidMiner-10033726.htm

Mizubuti, E. S., & Forbes, G. A. (n.d.). *Potato Late Blight IPM in the Developing Countries*. Retrieved September 10, 2013, from https://research.cip.cgiar.org/confluence/download/attachments/37192047/IPM_Mizubuti.pdf?version=1&modificationDate=1273385164000

Mugenda, A. (2008). *Social Science Research: Theory and Principles* . Nairobi: Acts Pres.

Multilayer Perceptron Neural Networks. (2012). Retrieved September 4, 2012, from http://www.dtreg.com/mlfn.htm

Muo, K., & Nderitu, J. H. (2012). *Policy Implementation and Its Economic Impact on Potato.* Retrieved August 10, 2012, from http://www.kari.org/biennialconference/conference12/docs/POLICY%20IMPLEMENTATION%20AND%20ITS%20ECONOMIC%20IMPACT%20ON%20POTATO%20MARKETING%20VALUE%20CHAIN%20IN%20KENYA.pdf

Mutambo, A., & Hajir, A. (2015). Daily Nation. *147 students killed in cold-blooded raid on campus.*

Muthoni, J. (2009). A review of constraints to ware Irish potatoes. *Journal of Horticulture and Forestry Vol. 1(7)*, pp. 098 - 102. Retrieved from http://www.academicjournals.org/jhf/PDF/Pdf2009/Sept/Muthoni%20and%20 Nyamongo.pdf

Muthoni, J., & Nyamongo, D. (2009). *A review of constraints to ware Irish potatoes.* Retrieved August 10, 2012, from http://www.academicjournals.org/jhf/pdf/pdf2009/Sept/Muthoni%20and%20N yamongo.pdf

Nation, D. (2013, April 17). *Crime hot spots mushroom throughout the country.* Retrieved April 17, 2013, from http://www.nation.co.ke: http://www.nation.co.ke/News/Crime%20hot%20spots%20mushroom%20thro ughout%20the%20country/-/1056/940632/-/1wsno1/-/index.html

National Crime Research Centre. (2012).

National Crime Research Centre. (2012).

National Steering Committee on Peace building and Conflict Management. (2011). SCENARIO BUILDING. *National Conflict Mapping and Analysis: Peace and Conflict Trends in Kenya.*

NCPE. (2005a). The National Intelligence Model Business Process. 14.

Nestel, T. (2006, March). *Using Surveillance camera systems to monitor public domains.* Retrieved from http://www.chds.us: http://www.chds.us

Nyetta, K. (2007). *Small Business Market Research Reports.* San Antonio.

Nyoro, J. K. (2012). *Agriculture and Rural Growth in Kenya.* Retrieved August 10, 2012, from http://www.tegemeo.org/documents/other/Agriculture.pdf

Oireachtas Library & Research Service. (2012). *Community policing in Ireland, No. 7.*

Olang , S., & Okoth , O. (2012). Taking Stock of Socio-economic Challenges in the Nairobi Slums. pp. 17-18.

Olang, S., & Okoth, O. (2012). *Taking Stock of Socio-economic Challenges in the Nairobi Slums*, 17-18.

Olang, S., & Okoth, O. (2012). Taking Stock of Socio-economic Challenges in the Nairobi Slums.

Olanya, O. M., Nyankanga, R. O., & et.al., &. (2008). *Development of Tuber Blight (Phytophthora infestans) on Potato Cultivars Based on In Vitro Assays and*

Field Evaluations. Retrieved January 10, 2013, from
http://hortsci.ashspublications.org/content/43/5/1501.full.pdf+html

Omukubi, N. (2011, July 7). *LIVING IN EASTLANDS, NAIROBI*. Retrieved April 14,
2013, from http://jamhurimagazine.com:
http://jamhurimagazine.com/index.php/lifestyle/3169-living-in-eastlands-
nairobi.html

online-crime-reporting-and-management-system-pdf. (2002, januaury 08).
topicideas.org .

Onyeozili, E. C. (2005). *Obstacles to Effective Policing in Nigeria.* Africa Resource
Center.

Pande et. al., A. (2009). *Late Blight Forecast Using Mobile Phone Based Agro
Advisory System.* Retrieved June 11, 2012, from
http://dl.acm.org/citation.cfm?id=1697863

Peel's, S. R. (1829). *Principles of Law Enforcement.*

Pelser, E. (1999, September). Institute for Security Studies. p. 10.

Police, K. (2010). *Annual Crime Report for the year.* Nairobi: Gov Press.

Police, K. (2010). Kenya Police Crime Report for the Year.

Police, K. (2012). *Revised Draft Policy in Community Policing in Kenya*.

Police, T. K. (2010). The Kenya Police, Annual Crime Report for the Year 2010.

Potato Late Blight. (n.d.). Retrieved June 9, 2012, from
http://www.cropinfo.net/Potatoblight.htm

Potato seed production. (n.d.). Retrieved June 9, 2012, from http://www.infonet-
biovision.org/default/ct/259/crops#2721

Putt, J. (2010). Australian Instite of Criminology. *Community policing in Australia*.

Rapid Miner. (2009). Retrieved November 19, 2012, from
http://www.downv.com/Linux/download-RapidMiner-10033726.htm

Ratcliffe. (2008). The Three-i model. 110.

Ratcliffe. (2008). The Three-i model.

Ratcliffe. (2003). Intelligence-led policing: Trends and Issues in Crime and Criminal
Justice. 248. Retrieved from http://www.jratcliffe.ne:
http://www.jratcliffe.net/research/three_i_model.htm

Reynolds, A. (2013, February). Gov't Making Use of ICT in Fighting Crime. Retrieved May 13, 2013, from http://www.rcmp-grc.gc.ca: http://www.rcmp-grc.gc.ca/pubs/ccaps-spcca/e-policing-police-eng.htm

Roberts, E. (2000). Retrieved August 11, 2012, from Neural networks: http://www-cs-faculty.stanford.edu/~eroberts//courses/soco/projects/2000-01/neural-networks/Architecture/feedforward.html

Rossi, V., & et..al. (2010). *A Web-based Decision Support System for Managing Durum Wheat Crops.* Retrieved November 2, 2012, from http://www.cgssementi.it/wp-content/uploads/2011/03/Decision-Support-System3.pdf

Rouse, M. (2007). *software requirements specification (SRS).* Retrieved Jan 15, 2014, from http://searchsoftwarequality.techtarget.com/definition/software-requirements-specification

Royal Canadian Mounted Police. (2007). *E-Policing in Police Services.*

Royal Canadian Mounted Police. (2016). *http://www.rcmp-grc.gc.ca/pubs/ccaps-spcca/e-policing-police-eng.htm.* Retrieved from Royal Canadian Mounted Police: http://www.rcmp-grc.gc.ca/pubs/ccaps-spcca/e-policing-police-eng.htm

Royal Canadian Mounted Police. (2016). *http://www.rcmp-grc.gc.ca/pubs/ccaps-spcca/e-policing-police-eng.htm.* Retrieved from Royal Canadian Mounted Police: http://www.rcmp-grc.gc.ca/pubs/ccaps-spcca/e-policing-police-eng.htm

Ruteere, M., & Pommerolle, M. (2003). Democratizing security or decentralizing repression: the ambiguities of community policing in Kenya". *African Affairs*, 601.

Saferworld. (2008, February). *Implementing community-based policing in Kenya.*

SaferWorld. (2008). Implementing Community-Based Policing in Kenya.

Scheider, M. (2008). *Community Policing Dispatch- The e-newsletter of the COPS Office.*

Scheider, M. (2008). Community Policing Dispatch.

Schumann, G. L., & D'Arcy, C. J. (2005). *Late blight of potato and tomato.* Retrieved September 4, 2012, from http://www.apsnet.org/edcenter/intropp/lessons/fungi/oomycetes/Pages/LateBlight.aspx

Schwabe, D. (2007). *An Object Oriented Approach to Web-Based Application .* mkasoft.com (2012).

Scientia Agricola. (2008). *Obtaining weather data for input to crop disease-warning systems: leaf wetness duration as a case study.* Retrieved June 9, 2012, from http://www.scielo.br/scielo.php?pid=s0103-90162008000700013&script=sci_arttext

Scott, W. R. (2002). *Organizations: Rational, Natural, and Open Systems* (Vol. 5th ed). New Jersey: Prentice Hall, Englewood.

Segrave M & Ratcliffe J. (2004). Community policing: A descriptive overview. *J 2004, Community policing: A descriptive overview.*, 2.

Sherrod, P. H. (2003-2012). *DTREG Predictive Modeling Software.* Retrieved September 4, 2012, from http://www.dtreg.com/DTREG.pdf

Shock et. al., D. C. (1996). *Validation and Adaptation of the "BLITECAST" Model for Prediction of Potato Late Blight Development in Oregon.* Retrieved June 9, 2012, from http://www.cropinfo.net/AnnualReports/1996/Bliter96.htm

Smith. (2004). Online Reporting. *Law & Order*, 52.

Smith, S. W. (2011). *The Scientist and Engineer's Guide to.* Retrieved August 11, 2012, from http://www.dspguide.com/ch26/2.htm

Sommerville, I. (2003). Software Engneering Eighth editin. Kansas.

Sparrow, M. K. (1988). *Implementing Community Policing.*

Sparx Systems Pty Ltd. (2013). Retrieved January 5, 2013, from http://www.sparxsystems.com/uml-tutorial.html

Spice, M. (2002). Secure Reporting of Non-urgent Incidents and Crimes.

Spicer. (2002). *Secure Reporting of Non-Urgent Incidents and Crimes-2002*, 12.

Spicer, M. (2002). *Secure Reporting of Non-urgent Incidents and Crimes.*

Spotlight. (2012). Community policing in Ireland. *7.*

SQA. (2007). *Evolutionary Prototyping.* Retrieved January 2, 2013, from http://www.sqa.org.uk/e-learning/IMAuthoring01CD/page_10.htm

Stergiou, C., & Siganos, D. (2012). *Neural Networks.* Retrieved August 11, 2012, from http://www.doc.ic.ac.uk/~nd/surprise_96/journal/vol4/cs11/report.html

Stravru, A. (2002). Results of a Citywide Victim Survey), Nairobi. *Crime in Nairob, 4.*

Stravru, A. (2010). Results of a Citywide Victim Survey, UN Habitat. *Crime in Nairobi*.

Suzette, H. (2009). *Reforming Community, Reclaiming the State.* Boca Raton, Florida: CRC Press.

Tariq, A., & Rafi, K. (2012). *Intelligent Decision Support Systems- A Framework.* Retrieved April 8, 2013, from http://www.iiste.org/Journals/index.php/IKM/article/view/2492/2514

The University of Waikato. (2012). *Weka 3: Data Mining Software in Java.* Retrieved June 11, 2012, from http://www.cs.waikato.ac.nz/ml/weka/

Tommy. (2009). *Research Reports.* washington.

Uchida, J. Y. (2013). *Phytophthora infestans.* Retrieved February 4, 2013, from http://www.extento.hawaii.edu/kbase/crop/Type/p_infest.htm#REFERENCES

UN-Habitat. (2007). Nairobi: Crime in the city. *Global Report on Human Settlements 2007*.

United States Dept of Justice. (2013, May 12). *TECHNOLOGY: Upgraded to "Must Have".* Retrieved May 12, 2013, from http://www.cops.usdoj.gov: http://www.cops.usdoj.gov/Default.asp?Item=2464

Wayua, C. (2014). *Causes And Effects Of Insecurity In Kenya*.

Weather Based Forecasting of Crop Yields, Pests and Diseases - IASRI Models. (2007). Retrieved May 25, 2012, from http://www.isas.org.in/jisas/jsp/volume/vol61/issue2/ranjanaagrawal.pdf

Weill, & Olson. (1989). An Assessment of the Contingency Theory of Management Information Systems. 61.

Weill, P., & Olson, M. H. (1989). An Assessment of the Contingency Theory of Management Information Systems. *Journal of Management Information Systems*, 61.

WEKA User Manual. (2012). Retrieved June 11, 2012, from http://www.gtbit.org/downloads/dwdmsem6/dwdmsem6lman.pdf

Whitaker, G. P. (1980). *Coproduction: Citizen Participation in Service Delivery*.

WHO. (2013). *Epidemiology.* Retrieved September 10, 2012, from http://www.who.int/topics/epidemiology/en/

Williamson, T. (2008). *The handbook of knowledge based policing: Current*.

Wong, K. C. (2009). "A Chinese Theory of Community Policing", in Dominique. *Community Policing: International Patterns and Comparative Perspectives*, 215.

World Bank Report- 2003. (2003). 27.

Young, N. (2009). *Understanding the Research Process and Methods. An Introduction to Research Methods.* Las Vegas: Acts Press.

Zhong, L. (2009). "Community Policing in China: A new era of mass line policing". *Community policing and peacekeeping*, 171-172.

APPENDICES

APPENDIX A: QUESTIONNAIRE FOR POLICE OFFICERS AND ADMINISTRATORS

Example of a questionnaire schedule: Police and Administration Personnel

Theme: INTEGRATING ICT AND ONLINE STRATEGY FOR IMPROVING SECURITY THROUGH COMMUNITY POLICING IN DANDORA, NAIROBI COUNTY

Questionnaire Reference Number:

Read out the following:

We are carrying out an evaluation on INTEGRATING ICT IN BOOSTING E-COMMUNITY POLICING TO AID IN SECURITY DISPENSATION IN DANDORA, EASTLANDS-NAIROBI. Your answers will be treated with confidentiality for the purpose of evaluating the impact of IT-based services, and in ensuring the success of the project report. All responses will remain anonymous.

In this survey, approximately 384 people will be asked to complete a questionnaire that asks questions about how ICT can be used to assist in community policing in Dandora. Completion of this survey will take approximately 5-10 minutes.

Your participation in this study is completely voluntary. There are no foreseeable risks associated with this project. However, if you feel uncomfortable answering any questions, you can withdraw from the survey at any point. It is very important for us to learn your opinions.

Your survey responses will be strictly confidential and data from this research will be reported only in the aggregate. Your information will be coded and will remain confidential. If you have questions at any time about the survey or the procedures,

you may contact on this number-0751-266-127. Introduce yourself and we will call

you at our cost.

Thank you in advance for your time and support

Computer Literacy awareness and infrastructure

1. Where are you stationed?

   - ❑ Police Dept.

   - ❑ Local Administration

   - ❑ Other _____

2. Do you use a computer or other ICT device in <u>your office</u> or in <u>another location</u> (for example, at home, cyber café) to assist you in administrative activities?

   - ❑ Yes

   - ❑ No

3. Do you have access to the Internet in your work place?

   - ❑ Yes

   - ❑ No

4. If YES, on average how often do you use the Internet in administrative work?

   - ❑ Less than once a month

   - ❑ Once a month

   - ❑ Once every two weeks

   - ❑ Once a week

   - ❑ Two or three times a week

   - ❑ Daily

5. And where else do you access the Internet?

   - ❑ Home computer

   - ❑ Cybercafé

- ❑ Work
- ❑ Cell phone

6. Other than **cell phone,** which of the following computer facilities are you <u>aware of?</u> : (*read out the options and tick all that apply*)

- ❑ Email
- ❑ MSOffice Applications *for example, Word processing, Access, Excel, PowerPoint*
- ❑ Other application

  (Specify)_____

7. Which of the following computer based facilities have you <u>used</u>? (*read out the options and tick all that apply*)

- ❑ Email
- ❑ MSOffice Applications *for example, Word processing, Access, Excel, PowerPoint(ask what and record)*
- ❑ *ALL*
- ❑ None of the above

<u>Crimes and Reporting</u>

8. Is there an existing community policing programme in your area?

- ❑ Yes
- ❑ No

9. If YES, has it helped to improve security in the community and the neighbourhood?

- ❑ Yes
- ❑ No
- ❑ I do not know

10. If NO, why do you think community policing has not achieved much? [*Tick as appropriate*].

- ❑ Inadequate commitment by both the police and the community
- ❑ Too much influence from local members in the community
- ❑ Fear of being victimized during reporting
- ❑ Administration is distant from being reached
- ❑ Offices of administration can only be reached during working hours
- ❑ Any other(Specify)_____

11. Which types of crime are reported in your office? **[Please rate the crimes]**

Crime	1=Not common	2=Less common	3=Common	4=Very common	5=Not sure
Car jacking					
Robberies					
Burglaries					
Mugging					
Assault					
Drug abuse					
Domestic violence					
House break-ins					
Illegal gangs (cartels)					
Rape and attempted rape					
Forgeries					

❏ Any other

(Specify)_____

12. How do crime victims reach your desk to report cases of incidents in the neighbourhood?

❏ Physically in person

❏ Through other friends and relatives

❏ By calling 999 or mobile phone number

❏ Others

(Specify)_____

13. Do you guarantee the confidentiality and security of information received from the community?

❏ Yes

❏ No

14. Have you heard of online reporting of crimes?

❏ Yes

❏ No

15. If YES

(a) Do you think online reporting of crime is an appropriate technology for this area?

❏ Yes

❏ No

(b) Why do you think so?

_____

_____

16. Suppose the victims reported crime by use of computers remotely, do you think it will help in solving some of the problems in community policing for example, anonymity for fear of being victimized, 24 hours a day etc.?

    ❑ Yes

    ❑ No

17. Do you think community policing is being used to its full potential in curbing crime in the area?

    ❑ Yes

    ❑ No

    ❑ I do not know

18. If NO, do you have any suggestions that can boost community policing in the area?

    _____

    _____

19. Which of these tools do you use to communicate with the base station when on patrol?

    ❑ Very High Frequency radio

    ❑ Private cell phone

    ❑ Others (Specify)_____

20. Any suggestions on improving your communication to enhance e-community policing?

    _____

    _____

21. Do you think community policing is being used to its full potential in curbing crime in the area?

    ❑ Yes

    ❑ No

    ❑ I do not know

22. If NO, give any suggestions that can boost community policing in the area?

_____

_____

23. How can community policing be improved in Dandora? Make suggestions

_____

_____

_____

_____

Thank you very much for taking the time to answer the questions.

APPENDIX B: QUESTIONNAIRE FOR RESIDENTS
An example of a questionnaire schedule: The Community

INTEGRATING ICT IN BOOSTING E-COMMUNITY POLICING TO

AID IN SECURITY DISPENSATION IN DANDORA, EASTLANDS-

NAIROBI

Questionnaire Reference Number:

Read out the following:

We are carrying out an evaluation on INTEGRATING ICT IN BOOSTING E-COMMUNITY POLICING TO AID IN SECURITY DISPENSATION IN DANDORA, EASTLANDS-NAIROBI. Your answers will be treated with confidentiality for the purpose of evaluating the impact of IT-based services, and in ensuring the success of the project report. All responses will remain anonymous.

In this survey, approximately 384 people will be asked to complete a questionnaire that asks questions about how ICT can be used to assist in community policing in Dandora. Completion of this survey will take approximately 5-10 minutes.

Your participation in this study is completely voluntary. There are no foreseeable risks associated with this project. However, if you feel uncomfortable answering any questions, you can withdraw from the survey at any point. It is very important for us to learn your opinions.

Your survey responses will be strictly confidential and data from this research will be reported only in the aggregate. Your information will be coded and will remain confidential

Thank you in advance for your time and support

Respondents view

24. Gender

- ❑ Male

- ❑ Female

25. What age group are you?

- ❑ Under 16

- ❑ 16 – 24

- ❑ 25 – 44

- ❑ 45 – 59

- ❑ 60 +

26. What is your level of education?

- ❑ Primary School

- ❑ High School

- ❑ College

- ❑ Other……………………………….

27. From the following list please tick the section in which you live/work (or the one nearest to you)?

- ❑ Dandora I

- ❑ Dandora II

- ❑ Dandora III

- ❑ Dandora IV

- ❑ Dandora V

Community Policing, Crimes and reporting

28. Is there police patrol in the estate?

❑   Yes

❑   No

29. How do you categorise the level of security based on the following?

[Tick one in each case]

	Very good	**Good**	**Average**	**Below average**	**Do not know**
How is the overall security in the estate?					
How do you categorize police patrol in the estate?					

30. Do you work with the police in fighting crime in Dandora?

❑   Yes

❑   No

31. Are you happy with the length of time the police take to respond to crime?

❑   Yes

❑   No

32. How would you categorise the response and level of relationship based on the

following?

33. *[Tick one in each case]*

	Very good	**Good**	**Average**	**Below average**	**Do not know**
How would you rank the period of response time of police in times of crime?					
How do you rate the quality of relationship between you and the police in combating crime?					

34. Have you ever reported a crime to the police station or to your area

   administrators?

   ❑ Yes

   ❑ No

35. If yes, how satisfied were you with the way you were treated?

   ❑ Very Satisfied

   ❑ Satisfied

   ❑ Neither satisfied nor dissatisfied

   ❑ Dissatisfied

   ❑ Very Dissatisfied

36. Have you been a victim of crime within the last 12 months?

   ❑ Yes

   ❑ No

37. Did you report the crime?

   ❑ Yes

   ❑ No

38. If you did not report the crime, why not?

- ❑ The process is complicated and take long

- ❑ The police and administration is far away

- ❑ Fear of being victimized by the police or administration

- ❑ Lack of confidence in the police and administration

- ❑ I felt it petty

- ❑ Other (Specify)_____

39. How safe do you feel in your community?

- ❑ Very Safe

- ❑ Fairly Safe

- ❑ A bit unsafe

- ❑ Very unsafe

40. Is there an existing community policing programme in your area?

- ❑ Yes

- ❑ No

41. If YES, has it helped to improve security in the community and the neighbourhood?

- ❑ Yes

- ❑ No

- ❑ I do not know

42. If NO, why do you think community policing has not achieved much? *[Tick as appropriate]*

- ❑ Lack of commitment by both the police and the community

- ❑ Too much influence from local members in the community

- ❑ Fear of being victimized during reporting

❑ Administration offices are distant from being reached

❑ Offices can only be reached during working hours

❑ Any   other

(Specify)_____

43. Which types of crime are reported in your office? **[Please rate the crimes]**

Crime	1=Not common	2=Less common	3=Common	4=Very common	5=Not sure
Car jacking					
Robberies					
Burglaries					
Mugging					
Assault					
Drug abuse					
Domestic violence					
House break-ins					
Illegal gangs (cartels)					
Rape and attempted rape					
Forgeries					

❑ Any other

(Specify)_____

44. How do crime victims reach the police and administration offices to report cases

of incidents in the area?

❑ Physically in person

- ❑ through other friends and relatives

- ❑ By calling 999 or mobile phone number

- ❑ Others **(Specify)**_____

45. Is the current mode of reporting ideal for victims of crime?

  ❑ Yes

  ❑ No

46. Do you feel confident, safe and secure if you alert the police and administration when you give information to assist in the community?

  ❑ Yes

  ❑ No

Computer Literacy awareness and Infrastructure

47. Do you use a computer or other ICT device in <u>your office</u> or in <u>another location</u> (for example, at home, cyber café)?

❑ Yes

❑ No

48. Do you have Internet access at home or at work place?

❑ Yes

❑ No

49. If YES, on average how often do you use the Internet in administrative work?

  ❑ Less than once a month

  ❑ Once a month

  ❑ Once every two weeks

  ❑ Once a week

  ❑ Two or three times a week

  ❑ Daily

50. And where else do you access the Internet?

- ❑ Home

- ❑ Cybercafé

- ❑ Work

- ❑ Other (***Specify for example, cell phone***)_____

51. Which of the following computer facilities are you <u>aware of?</u> : (*read out the options and tick all that apply*)

- ❑ Email

- ❑ MSOffice Applications *for example, Word processing, Access, Excel, PowerPoint*

- ❑ Other application (Specify)_____

52. Which of them have you <u>used</u>? (*read out the options and tick all that apply*)

- ❑ Email

- ❑ MSOffice Applications *for example, Word processing, Access, Excel, PowerPoint(ask what and record)*

- ❑ *ALL*

- ❑ *None of the above*

53. Have you heard of online reporting of crimes?

- ❑ Yes

- ❑ No

54. If YES, do you think it will disadvantage those who cannot/do not use computers compared to those who have?

- ❑ Yes

- ❑ No

55. Suppose the victims reported crime by use of computers remotely, do you think it will help in solving some of the problems in community policing for example, anonymity for fear of being victimized, 24 hours a day service etc.?

❑ Yes

❑ No

56. Have you ever used the Police website to report crime?

❑ Yes

❑ No

57. Do you think community policing is being used to its full potential in curbing crime in the area?

❑ Yes

❑ No

❑ I do not know

58. If NO, give any suggestions that can boost community policing in the area?

_____

_____

_____

59. How can community policing be improved in Dandora? Make suggestions

_____

_____

_____

_____

Thank you very much for taking the time to answer the questions.

APPENDIX C: PROCEDURE AND TIME FRAME

This part shows a Gantt chart indicating the work plan and when the research begins and ends.

Table 4.1 1: Research schedule and time table

TIME	Jul 2014	Aug 2014	Sep 2014	Oct 2014	Oct 2014	Dec 2014	Jan 2015	Feb 2015	Mar 2015	Apr 2015
Proposal writing	▓	▓	▓							
Data preparation				▓	▓					
Field work						▓	▓	▓		
Analysis								▓	▓	
Design									▓	▓
System Development						▓	▓	▓		
Final Report Writing	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓
	Jul 2014	Aug 2014	Sep 2014	Oct 2014	Oct 2014	Dec 2014	Jan 2015	Feb 2015	Mar 2015	Apr 2015

APPENDIX D: DATA COLLECTION BUDGET

Laptop	60,000
Personal Computer	30,000
Cell phone	10,000
Modem	2,500
Internet Connection	4,500
Air-time	10,000
Transport	10,000
Agents in data collection	20000
Stationery	10,000
TOTAL	**157,000**

APPENDIX E: SOURCE CODE SAMPLE

Home page screen
Method for loading user menus

```
public ActionResult Menus(int Id)
{
        try
        {
                if (CurrentUser.UserId == 0)
                        return RedirectToAction("Login", "Account", new { returnUrl = ""
});
                List<Menu> model = bl.GetMenus(Id).ToList();
                return PartialView("_Menus", model);
        }
        catch (Exception ex)
        {
                Utils.LogError("Menus", ex);
                return RedirectToAction("Login", "Account", new { returnUrl = "" });
        }
}
```

Method for loading Home page items e.g. News and updates

```
public ActionResult Index()
{
        var model = bl.GetNewDesks().Where(x => x.StatusID ==
(int)Statuses.Active).OrderBy(x => x.Id).ToList();
        ViewData["newalert"] = model;
  return View();
}
```

Method for loading News extra details

```
[HttpGet]
public ActionResult NewDetail(int Id = 0)
{
        try
        {
                var model = bl.GetNewDesk(Id);
                if (model == null)
                        model = new NewDesk();
                return View(model);
        }
        catch (Exception ex)
        {
                Utils.LogError("Login", ex);
        }
        return View();
}
public ActionResult About()
```

```
{
        return View();
}


public ActionResult Contact()
{
        return View();
}
```

Creating accounts for new users

This method retrieve all maintained Users to a list

```
[HttpGet]
public ActionResult Users(int id = 0)
{
        LoadUsergroups();
        var data = bl.GetUsers().Where(x => x.UserGroupId == id).ToList();
        ViewBag.GId = id;
        return View(data);
}
```

Method for Checking whether user exist or not using User Id

```
public ActionResult UserMaintenance(int id = 0, int gId = 0)
{
        try
        {
                var model = bl.GetUser(id);
                LoadUsergroups();
                if (model == null)
                {
                        model = new User();
                        model.UserGroupId = gId;
                        model.ChangePassword = true;
                }
                return View(model);
        }
        catch (Exception ex)
        {
                Utils.LogError(CurrentUser.UserName, ex);
                Danger("Error Loading User Maintenance! see log for details.", true);
        }
        return RedirectToAction("Users");
}
```

Method for saving user record i.e. New Record or Modification

```
[HttpPost]
public ActionResult UserMaintenance(User model)
{
        try
        {
                if (ModelState.IsValid)
                {
```

```
                                string Sql = "";
                                model = bl.processUserPass(model);
                                var usr = bl.GetUser(model.Id);
                                if (model.Id == 0)
                                {
                                        var usrexist = bl.GetUser(model.UserName);
                                        if (usrexist != null)
                                        {
                                                Danger("UserName " + model.UserName + "
Already Exist", true);
                                                return RedirectToAction("Users", new { id =
model.UserGroupId });
                                        }
                                }
                                else
                                {
                                        if (usr.UserName != model.UserName)
                                        {
                                                var usrexist = bl.GetUser(model.UserName);
                                                if (usrexist != null)
                                                {
                                                        Danger("UserName " + model.UserName +
" Already Exist", true);

                                                        return RedirectToAction("Users", new { id =
model.UserGroupId });
                                                }
                                        }
                                }
                                //validate Police
                                var PoliceGrp = bl.getSettingParam("Police_group");
                                var PoliceGrpId = PoliceGrp != null ? PoliceGrp.ParamValue : "4";
                                if (model.UserGroupId==int.Parse(PoliceGrpId))
                                {
                                        var usrexist = bl.GetPolice(model.UserName);
                                        if (usrexist == null)
                                        {
                                                Danger("Police ID Not Maintained '" +
model.UserName + "'", true);
                                                return RedirectToAction("Users", new { id =
model.UserGroupId });
                                        }
                                }
                                if (usr == null)
                                {

                                        Sql = "insert into
users(username,UserGroupId,FullNames,Password,Salt,StatusId,Phone,Email,ChangePasswo
rd,PassChangeDate,LastLogin,INVALIDATTEMPTS,IdNo)Values('" + model.UserName +
"','"
                                                + Convert.ToInt16(model.UserGroupId) + ",'" +
model.FullNames + "','" + model.Password + "','" + model.Salt + "',1 " +
```

```
                                    ",'" + model.Phone + "','" + model.Email + "'," +
Convert.ToInt16(model.ChangePassword) + ",GETDATE(),GETDATE()," +
model.InvalidAttempts + ",'"+ model.IdNo +"')";
                          }
                          else
                                  Sql = "Update users set username='" + model.UserName +
"',UserGroupId=" + Convert.ToInt16(model.UserGroupId) + ",FullNames='" +
model.FullNames + "',Password='" + model.Password + "',Salt='" + model.Salt +
"',StatusId=" + Convert.ToInt16(model.StatusId) +
                                  ",Phone='" + model.Phone + "',Email='" +
model.Email + "',IdNo='" + model.IdNo + "',ChangePassword=" +
Convert.ToInt16(model.ChangePassword) + ",INVALIDATTEMPTS=" +
Convert.ToInt16(model.InvalidAttempts) +
                                  " where UserId=" + model.Id + "";


                          ExecSql(Sql);
                          Success("Record Saved Successfully.", true);
                          Audit.LogAction(this.Request, "Save User Details for " +
model.UserName, CurrentUser.UserId,
this.ControllerContext.RouteData.Values["controller"].ToString());
                          return RedirectToAction("Users", new { id = model.UserGroupId });


                  }

          }
          catch (Exception ex)
          {
                  Utils.LogError(CurrentUser.UserName, ex);
                  Danger("Error Saving User Maintenance! see log for details.", true);
          }
          return RedirectToAction("Users", new { id = model.UserGroupId });
}
```

Login to accounts
Method for user Log in and user record validations
```
[HttpPost]
public ActionResult Login(LoginViewModel model, string returnUrl)
{
        try
        {
                if (ModelState.IsValid)
                {
                        string validateMsg = "";
                        Session["UserName"] = "";
                        Session["UserId"] = "";
                        var user = bl.GetUser(model.UserName);
                        if (user == null)
                        {
```

```
                                    validateMsg = "Incorrect Username!";
                                    ModelState.AddModelError("", validateMsg);
                                    return RedirectToAction("LoginError", new { Resp =
validateMsg });
                            }
                        if (user != null)
                        {
                                    string resp = "";
                                    if (user.StatusId != 1)
                                    {
                                            validateMsg = "Your Account has been
Locked.Contact Administrator";

                                            ModelState.AddModelError("", validateMsg);
                                            //return View();
                                            return RedirectToAction("LoginError", new { Resp
= validateMsg });
                                    }
                                    if (user.ChangePassword == true)
                                    {
                                            return RedirectToAction("ChangePass", new {
userid = user.Id });
                                    }
                                    //----- Validate User
                                    if (bl.ValidateUser(user.Id, model.Password, out resp) ==
false)
                                    {
                                            var inv = bl.getSettingParam("INVALIDLOGIN");
                                            int wrongattempts = 3;
                                            if (inv != null)
                                                    wrongattempts =
Convert.ToUInt16(inv.ParamValue);
                                            if (user.InvalidAttempts > wrongattempts)
                                            {
                                                    validateMsg = "You have exceeded
maximum Attempts!";

                                                    user.StatusId = 3;
                                                    bl.SaveUser(user);
                                                    validateMsg = "Your Account has been
Locked.Contact Administrator";

                                                    ModelState.AddModelError("",
validateMsg);

                                                    //return RedirectToAction("Login");
                                                    return RedirectToAction("LoginError", new
{ Resp = validateMsg });
                                            }
```

```
                                        else
                                        {
                                                validateMsg = resp;
                                                user.InvalidAttempts = user.InvalidAttempts
+ 1;

                                                bl.SaveUser(user);
                                                ModelState.AddModelError("",
validateMsg);

                                                return RedirectToAction("LoginError", new
{ Resp = validateMsg });
                                        }
                                }
                                else
                                {
                                        int sessionTimeout = Utils.GetSessionTimeOut();
                                        user.InvalidAttempts = 0;
                                        user.LastLogin = DateTime.Now;
                                        bl.SaveUser(user);
                                        UserPrincipalSerializeModel serializeModel = new
UserPrincipalSerializeModel();

                                        serializeModel.UserId = user.Id;
                                        serializeModel.UserGroupId = user.UserGroupId;
                                        serializeModel.FullNames = user.FullNames;
                                        serializeModel.UserName = user.UserName;
                                        serializeModel.roles = new string[] { };
                                        serializeModel.LcyDate = DateTime.Now;
                                        serializeModel.FcyDate = DateTime.Now;
                                        var userData =
JsonConvert.SerializeObject(serializeModel);
                                        FormsAuthenticationTicket authTicket = new
FormsAuthenticationTicket
                                                (1, user.Id.ToString(), DateTime.Now,
DateTime.Now.AddMinutes(sessionTimeout), false, userData);
                                        string encTicket =
FormsAuthentication.Encrypt(authTicket);
                                        HttpCookie faCookie = new
HttpCookie(FormsAuthentication.FormsCookieName, encTicket);
                                        Response.Cookies.Add(faCookie);
                                        Session["UserName"] = user.UserName;
                                        Session["UserId"] = user.Id;
                                        //--- Log
                                        Audit.LogAction(this.Request, "Logged in to the
system", user.Id, this.ControllerContext.RouteData.Values["controller"].ToString());
                                        if (string.IsNullOrEmpty(returnUrl))
                                                return RedirectToAction("Index", "Home");
```

```
                                        else
                                                return Redirect(returnUrl);
                                }
                        }
                        else
                        {
                                validateMsg = "Incorrect Username and/or Password!";
                                ModelState.AddModelError("", validateMsg);
                                return RedirectToAction("LoginError", new { Resp =
validateMsg });
                        }
                }
        }
        catch (Exception ex)
        {
                ModelState.AddModelError("", ex.Message);
        }
        return View();
}
```

Informing residents on crime news
Method load maintained News and display them in a list

```
public ActionResult NewDesks()
{
        try
        {
                var model = bl.GetNewDesks().OrderBy(x => x.Id ).ToList();
                Audit.LogAction(this.Request, "Viewed NewDesks", CurrentUser.UserId,
this.ControllerContext.RouteData.Values["controller"].ToString());
                return View(model);
        }
        catch (Exception ex)
        {
                Utils.LogError(CurrentUser.UserName, ex);
                Danger("Error Loading NewDesk! see log for details.", true);
        }
        return View();
}
```

Method for checking whether New already exist or not

```
[HttpGet]
public ActionResult NewDesk(int Id =0)
{
        try
        {
                var model = bl.GetNewDesk(Id);
```

```
                    if (model == null)
                    {

                            model = new NewDesk();
                            model.NewsDate = DateTime.Now;
                            model.NewsEndDate = DateTime.Now.AddDays(7);
                            model.UserId = CurrentUser.UserId;
                            model.StatusID = (int)Statuses.Locked;

                    }
                    return View(model);

            }
            catch (Exception ex)
            {
                    Utils.LogError(CurrentUser.UserName, ex);
                    Danger("Error Loading NewDesk ! see log for details.", true);

            }
            return View();

    }
```

Method for saving/Modifying New Records

```
[HttpPost]
public ActionResult NewDesk(NewDesk model)
{
        if (ModelState.IsValid)
        {
                try
                {
                        model.NewsHeader = model.NewsHeader.ToUpper();
                        bl.NewDeskSave(model);
                        Audit.LogAction(this.Request, "Added/Modified New Id " +
model.Id, CurrentUser.UserId,
this.ControllerContext.RouteData.Values["controller"].ToString());
                        Success(Msg_SavedSuccess, true);
                        return RedirectToAction("NewDetail", new { Id = model.Id });
                }
                catch (Exception ex)
                {
                        Utils.LogError(CurrentUser.UserName, ex);
                        Danger("Error Saving NewDesk! see log for details.", true);

                }
        }
        return RedirectToAction("NewDesks");
}
```

Suggestion box for the public and residents
Method for loading all suggestions posted to a list then display

```
 public ActionResult SuggestionBoxs()
```

```
{
        try
        {
                var model = bl.GetSuggestionBoxs().OrderByDescending(x =>
x.Id).ToList();
                Audit.LogAction(this.Request, "Viewed Suggestion Boxs",
CurrentUser.UserId, this.ControllerContext.RouteData.Values["controller"].ToString());
                return View(model);
        }
        catch (Exception ex)
        {
                Utils.LogError(CurrentUser.UserName, ex);
                Danger("Error Loading Suggestion Box! see log for details.", true);
        }
        return View();
}
```

Method for checking whether Suggestion already exist or not

```
[HttpGet]
public ActionResult SuggestionBox(int Id = 0)
{
        try
        {
                var model = bl.GetSuggestionBox(Id);
                if (model == null)
                {
                        model = new SuggestionBox();
                        model.SuggestionDate = DateTime.Now;
                        model.StatusID =(int) Statuses.Active;
                        model.UserId = CurrentUser.UserId;
                }
                var SuggestionType = (from b in bl.GetSuggestionTypes().OrderBy(x =>
x.Id).ToList() select new SelectListItem { Text = b.SuggestionTypeDesc, Value =
b.Id.ToString() }).ToList();
                ViewBag.SuggestionType = SuggestionType;
                return View(model);
        }
        catch (Exception ex)
        {
                Utils.LogError(CurrentUser.UserName, ex);
                Danger("Error Loading Suggestion Box! see log for details.", true);
        }
        return View();
}
```

Method for saving/Modify Suggestion being posted

```
[HttpPost]
```

```
public ActionResult SuggestionBox(SuggestionBox model)
{
        if (ModelState.IsValid)
        {
                try
                {
                        bl.SuggestionBoxSave(model);
                        Audit.LogAction(this.Request, "Added/Modified SuggestionBox " +
model.Id, CurrentUser.UserId,
this.ControllerContext.RouteData.Values["controller"].ToString());
                        Success(Msg_SavedSuccess, true);
                }
                catch (Exception ex)
                {
                        Utils.LogError(CurrentUser.UserName, ex);
                        Danger("Error Saving SuggestionBox! see log for details.", true);
                }
        }
        return RedirectToAction("MySuggestions");
}
```

Registering crime hot spot areas
Method loads all maintained Hot spot areas to a list then displays
```
public ActionResult HotSpotAreas()
{
        try
        {
                var model = bl.GetHotSpotAreas().OrderBy(x => x.Id).ToList();
                Audit.LogAction(this.Request, "Viewed HotSpot Areas",
CurrentUser.UserId, this.ControllerContext.RouteData.Values["controller"].ToString());
                return View(model);
        }
        catch (Exception ex)
        {
                Utils.LogError(CurrentUser.UserName, ex);
                Danger("Error Loading HotSpot Areas! see log for details.", true);
        }
        return View();
}
```
Method to check whether Hotspot is already maintained or not
```
[HttpGet]
public ActionResult HotSpotArea(int Id = 0)
{
        try
        {
```

```
            var model = bl.GetHotSpotArea(Id);
            if (model == null)
            {
                    model = new HotSpotArea();
                    model.ModifiedDate = DateTime.Now;
            }
            var HotSpotStatu = (from b in bl.GetHotSpotStatuses().OrderBy(x =>
x.Id).ToList() select new SelectListItem { Text = b.Desc, Value = b.Id.ToString() }).ToList();
            ViewBag.HotSpotStatu = HotSpotStatu;
            return View(model);
    }
    catch (Exception ex)
    {
            Utils.LogError(CurrentUser.UserName, ex);
            Danger("Error Loading HotSpot Area! see log for details.", true);
    }
    return View();
}
```

Method for posting new or modified Hotspot area

```
[HttpPost]
public ActionResult HotSpotArea(HotSpotArea model)
{
    if (ModelState.IsValid)
    {
            try
            {
                    bl.HotSpotAreaSave(model);
                    Audit.LogAction(this.Request, "Added/Modified HotSpot Area " +
model.Id, CurrentUser.UserId,
this.ControllerContext.RouteData.Values["controller"].ToString());
                    Success(Msg_SavedSuccess, true);
            }
            catch (Exception ex)
            {
                    Utils.LogError(CurrentUser.UserName, ex);
                    Danger("Error Saving HotSpot Area! see log for details.", true);
            }
    }
    return RedirectToAction("HotSpotAreas");
```