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**Factors influencing adoption and utilization of information technologies  
in the traffic police department: case of Nairobi County, Kenya**

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**MBA/76843/2013**

A dissertation submitted in partial fulfilment for the award of degree in Master of  
Executive Business Administration  
Strathmore Business School



**May, 2016**

**DECLARATION**

This dissertation is my original work and has not been presented for a degree at any other university.

**Student's Name: Charles T. Thanga**

**Student's Number: MBA/76843/2013**

**Signed .....**

**Date .....**

**SUPERVISOR'S APPROVAL**

This dissertation has been submitted for assessment with my approval as the candidate's University Supervisor.

**Supervisor's Name: Prof. Ismail Ateya**

**Signed .....**

**Date.....**



## DEDICATION

This dissertation is dedicated to my family, which has been very supportive, full of encouragement and contributed to who I am today. I also thank the Almighty God for the gift of life.



## ACKNOWLEDGMENTS

I would like to thank my supervisor Prof. Ismail Ateya for the continuous support, motivation and immense knowledge during the development of this dissertation. His insights and guidance have helped finalize my research work despite the challenges. I would like to thank the traffic officers and their superiors who spent their valuable time to attend to the questionnaires despite their busy schedule; this research work would not have been possible without them.



## **ABSTRACT**

The study sought to examine factors influencing adoption and utilization of ICT in the traffic police department of the Kenya Police Service in Nairobi County. The descriptive-exploratory research design was adopted where the primary instrument for data collection was the questionnaire. 47 police officers, chosen out of a simple random sampling, participated in the study. Descriptive statistics were used to analyze the data which was then presented in tables and figures.

The main findings of the study were: majority of the study participants were aware of the information they needed to perform traffic policing effectively; the traffic officers required information of car ownership and insurance information; the respondents indicated that the significant use of ICT in the traffic police department is for communication. The study also found that timeliness of information was a very significant factor that affected traffic policing. Lack of training on use of ICT coupled with use of out dated ICT was the major constraints attributed to low utilization of ICT in traffic policing.

The study concluded that information on the owner of the car was a significant information resource for traffic policing. Also, although most of the information required by traffic police officers exists, it is not available to them in real time which limits their effectiveness in controlling, monitoring and preventing traffic issues that may arise. The study recommends implementation of an information sharing model and platform between relevant agencies to enhance traffic policing. This platform would include the traffic police department, Kenya Revenue Authority (KRA), insurance companies and the National Transport Safety Authority (NTSA). Information related to traffic policing should also be available to the personnel department in real time, to allow for efficient action to be taken.

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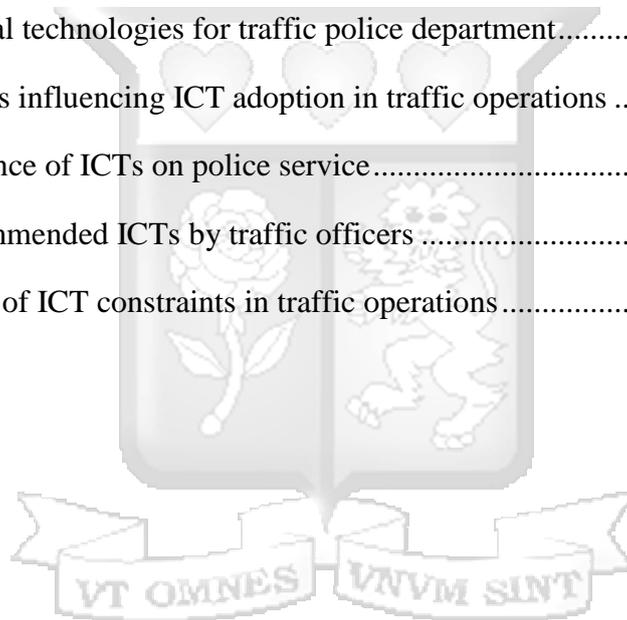
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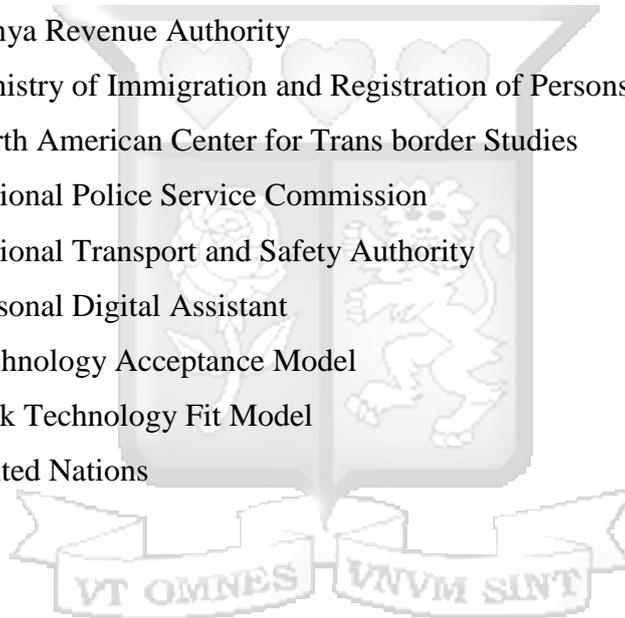
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## **ABBREVIATIONS/ACRONYMS**

<b>APFIS</b>	Automated Palm and Fingerprint Identification System
<b>CAD</b>	Computer-aided dispatch
<b>CCTV</b>	Closed Circuit Television
<b>CSI</b>	Crime Scene Investigation
<b>EIU</b>	Economist Intelligence Unit
<b>GIS</b>	Geographic information systems
<b>GPI</b>	Global Peace Index
<b>ICT</b>	Information Communication Technology
<b>IEP</b>	Institute for Economics and Peace
<b>JCF</b>	Jamaica Constabulary Force
<b>KRA</b>	Kenya Revenue Authority
<b>MRIP</b>	Ministry of Immigration and Registration of Persons
<b>NACTS</b>	North American Center for Trans border Studies
<b>NPSC</b>	National Police Service Commission
<b>NTSA</b>	National Transport and Safety Authority
<b>PDA</b>	Personal Digital Assistant
<b>TAM</b>	Technology Acceptance Model
<b>TFF</b>	Task Technology Fit Model
<b>UN</b>	United Nations



## CHAPTER ONE: INTRODUCTION

### 1.1 Background of the study

Today, the world is experiencing significant technological changes, Information Technology being at the center (Nunn & Quinet, 2010). Data innovation has changed the world into a little town by creating correspondence channels all around the world (Yalcinkaya, 2007). Individuals and associations use data advances to track new advancements in the security sector (Flanagin, 2010). These innovative improvements have enhanced the abilities of associations and have led to huge improvements inside and among these associations. The day to day use of ICTs in organizations has propelled a movement of adoption and utilization of ICTs in organization operations.

Among organisations utilizing data innovative frameworks, the police force can be said to have higher rates of using Information Technology frameworks (Nunn & Quinet, 2010). In addition, data is urgent to the police in doing their day by day obligations. This includes not just getting the right data in a timely and sufficient way, but additionally offering that data to associates and providing information to relevant information systems. Stakeholders within police organizations consider access to information relevant because it can improve the efficiency, effectiveness and quality of police work (Bouwman, Haaker & de Vos, 2008).

To carry out their tasks effectively, law enforcement experts at all levels rely on data. Brown (2001, p. 352) asserted: "by some records, around 92% of an officer's opportunity is spent getting, mixing, or dispersing data in some structure." While definite assessments of such rates are hard to make, access to and utilization of exact and convenient data is plainly basic to successful law authorization. Kumar (2012) has observed that the police authorities are confronted with expanding and overwhelming weight from the general society and media. ICT provides the only opportunity for bringing the effectiveness in police working environment by enabling the management of the vast amounts of data that police department's uses.

Traffic policing is information driven process which requires utilization of ICT amongst its personnel. According to Colvin and Goh (2005), technology innovation in traffic policing in the developed countries has had a significant increase in efficiency levels. However, in the developing countries' context, policing has not been able to reach similar levels of data

innovation. It is important therefore, to understand and examine the use of ICT in traffic policing in the context of developing countries.

In developing countries, road transport which is the most straightforward alternative in moving merchandise and people, is the most utilized form. In spite of the significance of the road transport, this area has experienced various difficulties. Statistics shows that while developing nations exclusively own 32% of the world's vehicles, they represent 75% of yearly mishap fatalities (Silas et al., 2011). In Tanzania, during the period between 2000-2008, the number of road crashes increased from approximately 14,500 to 20,600. Road mishaps have led to various outcomes including deaths, wounds, incapacitations and loss of properties, both of which lead to poverty in the nation (Nyamawe & Mbosso, 2014). In developing countries like Uganda, statistics indicate that casualties of traffic accidents have increased from 2,620 to 2,843 between the year 2010 and 2011 respectively. The fatalities mostly affect the young between the ages of 15 and 44 years thus destroying resourceful human potential (Lukyamuzi & Friday, 2014).

In Kenya, the traffic police department is responsible for collecting accident data on-site. The police department fills manual forms, which are presented to police headquarters, and subsequently to the Ministry of Roads and Public Works for analysis and planning (Otsyeno, 2011). A manual form is a single paper which is used by the police department to record accident information as they occur and is occasionally summarized and presented in excel charts. The statistics obtained from the manual forms are often inaccurate because follow-up examination of accident scenes and hospitals on accident casualties are not updated on the already compiled accident data (Kenga & Ozianyi, 2014). The technique used to oversee accident cases being manual make the registered cases vulnerable to misfortune and often prone to simple access by unapproved individuals (Mubaraka et al., 2013). Adoption of information communication technologies can assist the traffic police department to record, store and retrieve accurate data on traffic policing cases for enhanced traffic law enforcement.

According to the Kenya Medium Term Plan 2008 to 2012, the government and its stakeholders are engaged in efforts to integrate ICT and modern technologies in security and policing. One of the aims of this plan was to establish a modern functional forensic laboratory to support the ongoing war on crime that included the acquisition and preparing of the research center and the advancement of proper human ability to deal with this new

capacity. Secondly was the establishment of the Urban Area Camera Surveillance which is a national CCTV surveillance project to be piloted in four major urban locations in Kenya namely Nairobi, Mombasa, Nakuru and Kisumu. It was expected that this research was going to be conducted as a Public-Private Partnership (Government of Kenya, 2008). In light of such efforts by the government of Kenya and relevant stakeholders, it is important for the study to examine the adoption and utilization of these ICT initiatives on traffic policing in Kenya.

## **1.2 Statement of the problem**

In the six world regions, Africa though less mechanized, has the most elevated rates of street movement fatalities. An overview by WHO (2013) revealed that 37 out of the 44 nations have death rates well over the worldwide normal of 18 deaths for every 100,000 people. While the African Region has just 2% of the world's vehicles, it contributed to 16% of the worldwide death toll. Nigeria and South Africa have the most astounding casualty rates of 33.7% and 31.9% deaths for each 100,000 people respectively. More than one in four deaths in the African region happen on Nigeria's streets while the Democratic Republic of Congo (DRC), Ethiopia, Kenya, South Africa, Tanzania, and Uganda, contributed to 64% of all loss of lives on the streets in the Africa (Tenge, Mneria, Gekombe, Sanja & Ogalo, 2015).

In an information driven sector, there is need for increased use of ICTs among traffic policing agents in the developing countries. In developed countries, the use of ICTs has been in existence to assist traffic police departments in fighting traffic offences. In Kenya, there is very limited use of ICTs in traffic policing although from the year 2015, the Government of Kenya introduced the use of Close-Circuit Television (CCTVs) in managing traffic movement in the capital city, Nairobi. However, this initiative has not enhanced traffic management and policing as it has not been introduced in the traffic police department. The use of these technologies has also been haphazard only working independently for different agencies as there is lack of an integrated system that provides information to the traffic police department to effectively and efficiently manage road users.

There is evidence from past research that highlights the relationship between ICTs and the police service in Kenya. Kivoi and Mbae (2013) found out that police service lacks personnel in ICT to tackle crime using up to date technology. Ngugi et al. (2012) concluded

that police service had embraced ICT in its service delivery and that ICT employed in the police service affected service delivery. The study further concluded that investment in ICT, knowledge and skills in ICT, ICT infrastructure and ICT policy are poor.

These studies however did not implicitly focus on the traffic police department but rather investigated the police service in general. This study is an attempt to fill the gap in the use of ICT in traffic policing by examining factors influencing adoption and utilization of information technologies in the traffic police department of the Kenya police service in Kenya.

### **1.3 General objective**

The general objective of the research was to investigate the factors influencing adoption and utilization of ICTs in the traffic police department of the Kenya Police Service in Kenya.

### **1.4 Research objectives**

The study was guided by the following specific objectives;

- i. To assess the information needs and challenges of the traffic police department in Nairobi County
- ii. To examine factors influencing ICT adoption in traffic police department in Nairobi County
- iii. To assess technologies that can be adopted to solve these information challenges of the traffic police department in Nairobi County
- iv. To propose a structure that can be adopted by the traffic police department to solve information challenges

### **1.5 Research questions**

The research aimed at responding to the following research questions;

- i. What are the information needs and challenges of traffic police department in Nairobi County?
- ii. What factors influence ICT utilization in traffic police department in Nairobi County?
- iii. What technologies can be adopted to solve information challenges of the traffic police department in Nairobi County?
- iv. What structure can be adopted to solve information challenges of the traffic police department in Nairobi County?

### **1.6 Significance of the study**

The study hopes to be of significance to a number of stakeholders. First, the study hopes to be useful to the Inspector General of Police and the Management of Kenya Police Service in making more informed decisions on the most effective ICTs that can be adopted to support traffic policing. Secondly, the study is useful to the public in Kenya, as it will aid in improving the performance and service delivery, which will boost public confidence in the Kenya Police Service. Thirdly, the study hopes to be of significance to scholars and academicians as it will provide insight into the use of ICT in law enforcement and suggests areas of further study on ICT use in security matters. The study also expects to add to the wealth of knowledge on the opportunities and challenges of adopting ICT in law enforcement.

### **1.7 Scope of the study**

The study was conducted in Nairobi County despite the fact that the traffic police department has operations all over Kenya. The study focused on the traffic police department who are or have been involved in traffic police operations within Nairobi County. The study examined factors influencing adoption and use of ICT, ICT technologies adopted and used in traffic policing and constraints facing adoption and use of ICT in traffic police department operations. The study was conducted from June 2015 to May 2016.

### **1.8 Limitations of the study**

Data availability was a limitation the study encountered and data concerning this area of study was difficult to obtain. The majority of the respondents were not ready to share information at their respective police stations due to fear of victimization. To delimit this, the researcher first sought for a letter of authorization from the Operations Commander, Nairobi County. Secondly, the researcher collected information from traffic officers at strategic locations around Nairobi where they were managing traffic. This was done in the mid-mornings after heavy traffic and in the evenings after traffic operations. Data was collected from officers in: Karen, Langata, Ngong Road and Kamukunji.

## CHAPTER TWO: LITERATURE REVIEW

### 2.1 Introduction

In this chapter, relevant literature that is related and consistent with the objectives of the study were reviewed. Important issues and practical problems are brought out and critically examined to determine the current facts relating to ICT adoption especially among the traffic police globally.

### 2.2 Information needs and challenges of traffic policing

Any action aimed at reducing challenges of road traffic safety must be based on relevant information that can be obtained with the help of a Road Safety Information System. Many European countries have different databases, owned by national agencies for road safety, but supported by information from other agencies and actors (Yalcinkaya, 2007). The foregoing author has argued that some of the more critical information for traffic policing include drivers and their behavior, types of vehicles involved and their condition, road condition and weather, traffic intensity and where and when accidents have occurred. Moreover, information on events/conditions when/where risks for accidents may increase, similar to activities performed by traffic police and sanctions applied on the results of various approaches and activities. These need to be related to traffic safety

According to Gikonyo (2013), lack of adequate information on the traffic flow patterns and behavior for decision makers in urban areas infrastructure development, ended up in infrastructural decisions that could not add value or increase smooth traffic flow in the urban centers. For instance, it was unfortunate the widened roads and the huge flyovers quickly led motorists to the congestion zones and keeping them waiting for longer hours (though in shorter distances) than before.

The Nairobi city, that has also increased other activities such as industrial growth, was and still is ill-equipped to handle the transport mobility for the increasing population. Traffic congestion is a common problem in Nairobi Central Business District (CBD) (NCC, 2007) since the amount of space in the CBD compared to the actual population is inadequate. Therefore, appropriate technologies, according to Gikonyo (2013) should be adopted to manage transport efficiently

In order to better provide security and prevent crime, Luen and Al-Hawamdeh (2001) argued that traffic police come into contact with a complex data and hence the need for

police to be information specialists. Such data is often held in an assortment of sources and arrangements. In the past, traffic police could easily get and utilize this data at a police headquarters; this involved identification of the most productive and convenient way to retrieve the information needed (Gottschalk, 2006).

Similarly, Holgersson (2005) studied the acts of traffic police and highlighted various circumstances where learning is required, for example, recognizing potential suspects, speaking with individuals, and utilizing data innovation to gather and break down data. In their study of the effectiveness of information and communication technology (ICT) in policing in Nigeria, Ibikunle and Adehifan (2009) concluded that use of ICT and other technologies enhances the performance and effectiveness of the police.

Usage of information technology can improve viability in police work in the event that it is incorporated with different authoritative practices which are perceived to take advantages of information accessibility (Garicano & Heaton, 2007). In the event that traffic police acknowledge use of data innovation, it can support their execution and worth (Gottschalk & Holgersson, 2006) since police assignments requires taking care of, and preparing immense volumes of information. The capacity of a Personal Computer (PC) to handle information and give opportune and precise data suggests the need for police to upgrade their work exercises (Tenge et al., 2015).

Technology allows police agents to have accurate, centralized and up to date information in real time. However, Collier (2006) suggested that police officers rely more on tacit, rather than direct and stated knowledge, to complete their duties. Lindsay, Cooke and Jackson (2009) found out that use of modern and mobile technologies resulted in a lessening in the measure of time to perform routine undertakings, leading to better time administration.

In India, Kumar (2012) study on the role of information and communication technology in Indian police revealed that criminals were one step ahead of the police in utilizing the most recent innovation including ICT. Indian police face a number of challenges as they perform their duties, the absence of coordinated data frameworks for the smooth working of the police, absence of capacity to import data to other related state level and national level organizations, and restricted capacity to analyze information because of different locations and analytical skills, among others.

In Uganda, Mubaraka, Jirgi and Nanyanzi (2013) conducted a case study on integrating ICT in Traffic Police Department in Uganda. The study discovered that the proposed system provided a reliable source of information for serving customers in finding and retrieving traffic offences information. This system could provide means for the traffic police to handle various traffic cases by removing delays which were experienced through the old system as cross-checking through the traffic records is often time consuming. Since implementation, the traffic police has benefited from the new system because there are no longer delays in storing and retrieving traffic offences at the central police station in case related government departments need information.

### **2.3 Factors influencing ICT use in traffic policing**

There are several challenges that have been cited in studies on the integration of ICTs in policing. Although these studies may not be exclusive to traffic policing, the challenges of ICT use in policing are broad in nature. Sethi (2013) conducted a study on the role of ICT in police force in India. The study suggested that for the Indian police force, and also those in developing world to meet the challenges of the coming decades, it is essential to have a police force which is up-to-date with ICTs in its daily work. Adoption and use of ICT in policing would enhance public confidence that the police force is effective and can serve the community efficiently.

Gikonyo (2010) conducted a study on use of information systems in Nairobi. The study revealed that most municipalities had adopted traffic lights as the outermost solution to control vehicle traffic in urban areas. Efficiency of such systems was dependent on other factors such as power availability, traffic flow patterns and technology used. Unfortunately most of these systems were static and lacked intelligence or decision making capabilities, creating very high levels of inefficiencies with huge losses. The study by Gikonyo (2010) concluded that these factors affected adoption and utilization of ICTs in traffic policing. Other omissions included the lack of integration of stakeholders, regulation frameworks and environmental factors as well.

Steenbruggen et al. (2012) study on challenges and obstacles in information sharing revealed that the problem with today's information systems is not their lack of information, but the difficulty to find or display the right information when needed. Information sharing between different governmental organizations is still in its early stages of development. Various studies have concluded that information quality and system quality are still major

hurdles for efficient and effective multi-agency emergency services, yet are crucial for the success of information systems.

The use of IT is influenced by the qualities of police work and association, sorts of data, the type of police knowledge and different operational techniques (Flanagin, 2010). Although new data advances resulting in better execution are actualized regularly in law implementation organizations, the normal enhancements may not be adhered to each time (Nunn & Quinet, 2010). By and large, in law enforcement offices with paramilitary associations, sending new data innovation may not come from the necessities of that specific police office; rather, it might be a general usage of new arrangement chosen before by the police administrators or strategy creators (Nunn & Quinet, 2010).

Busagala and Ringo (2013) concluded that limitations to full utilization of the e-policing include absence of essential skills, absence of ICT gear, less created ICT foundation, spending plan imperatives, absence of Internet availability, and low power and untrustworthiness of electric force supply. Other ICT-related barriers included inadequate computer skills among police officers, insufficient funds to facilitate various activities including training, inappropriate selection of police staff for training on ICT use, inadequate training programs, low Internet penetration and reliability and less developed ICT infrastructure

Familiarization is another idea that influences the use of data innovation. The more commonplace the framework, the more extravagantly they all utilize it (Williams & Aasheim, 2005). Dennis and Wixom (2002) demonstrated that preparation is the basic variable for usage of frameworks and framework administration. In their study, Busagala and Ringo (2013) found that all (100%) respondents agreed that there was no definite program for ICT training to improve user satisfaction, organization effectiveness, and user morale (Williams & Aasheim, 2005). Further, Ndanusa (2014) has argued that ICT systems themselves are not necessarily sufficient to foster the efficiencies that would be required to effectively tackle crime and security issues.

Research has shown modern policing to be knowledge intensive work which requires the fostering of a culture of knowledge management and the effective implementation of knowledge management systems (Ndanusa, 2014). In the foregoing study, 55% of the police respondents had no ICT skills, while regarding knowledge and awareness of using

technology in policing operations, only 4.5% of them indicated that the awareness is at a good level.

In Nigeria, material inputs in terms of funding, crime prevention/control, detection, investigation, traffic control and accident-prevention, communication and data-gathering research needs are not only inadequate but are unrealistic as well. The authorities of the Nigeria Police Force have always provided the technical details of these material inadequacies, even if sometimes exaggerated for obvious reasons (Ikuomola, 2011).

In Kenya, Kivoi and Mbae (2013) point to a lack of personnel in Information Communication Technology (ICT) to tackle crime using up to date technology, for example in cyber-crime. According to Nyongesa (2013), when data and other innovations are being introduced, the Police Service should not to be left behind. Procurement of Police Service hardware and devices to be at par with societal development.

Ogedebe and Babatunde (2012) suggested that key amongst the most greatest hindrances to ICT administration for the most part is an absence of correspondence between security offices. More noteworthy correspondence may incorporate sharing contextual investigations that showcase best practices or offering open answers for the general public needs on security issues. The administration must enhance data sharing and open discourse between all the security organizations in the general public. For instance, all workforce in the organizations must have email delivery and subscribe to an examination gathering where they can talk and share thoughts constantly on the web.

Hashim (2008) conducted a study on attitudes toward ICT of law enforcement officers in the Royal Malaysia Police. The study sought to measure the attitudes of the Royal Malaysia Police workforce towards the use of information and communication technologies in policing and then ascertain the relationship between these attitudes and the policeman's job experience and productivity. The study found that there were mediocre attitudes toward ICT and working with computers relative to usefulness, confidence, liking and anxiety.

#### **2.4 Potential useful technologies for traffic police operations**

Young et al (2014) assessed the use of computer models to simulate and assess the level of safety in existing systems. While ascertaining that there was no single measure which would link environment, events or behavior or crashes to provide a single measure of the safety for all the parts of the road system, he suggested checking which one or which

combinations would exactly work. This section of the study presents different ICTs that have been used in traffic policing around the world.

#### **2.4.1 Closed Circuit Television**

The ICTs generally utilized for observation is the Closed Circuit Television (CCTV). The CCTV is a camcorder that plays a major role in the identification of wrongdoing or security related indecencies in a general public as it occurs. CCTV cameras are utilized to screen and capture pictures of what happens in particular areas progressively. The pictures gathered are sent to a screen and recorded on tape or as computerized data. The cameras can be altered or set to examine a range or they can be worked by controllers. Screens can be viewed by controllers or left unmonitored (Ogunleye, Adewale, Alese & Ogunde, 2011).

Wade (2003) reported that studies have shown a considerable degree of public support for CCTV systems. Tilley and Painter (1999) found that 67% of those studied 'did not mind' being seen by road cameras. However, 79% of respondents in the same study were of the conclusion that the nearness of CCTV would make them feel more improbable that they would get to be casualties of wrongdoing.

Different studies have demonstrated that individuals who are profiled by the cameras have diverse perspectives. In Pakistan, the Sindh police have as of now introduced 15 clandestine observation cameras at key areas around the city of Karachi and a further 40 destinations are to be secured in the near future. This move was taken as a result of an activity a year prior to introducing 100 movement cameras at the busiest street intersections in the city with an end goal of discovering speeding drivers and others liable for petty criminal offenses (Norris, McCahill & Wood, 2004).

Past research has found that CCTV reduced levels of fear of crime, therefore, many third world states are implementing them in order to reduce the crime rate in the society (Ogedebe, Dasuki & Makinde, 2014). According to Goold (2003), supporters and adversaries of CCTV have contended that closed circuit cameras can possibly change not just how the policing of urban areas is sorted out, but the working practices and states of mind of individual traffic policing personnel as well.

The techniques through which CCTV attempts to decrease crime rely on the following assumptions of deterrence: efficient deployment, self-discipline, presence of a capable guardian and detection (Ogunleye et al., 2011). However, the mechanisms by which CCTV

may prevent crime are numerous. This has been articulated by Armitage (2002) as: caught in the act, you have been framed, publicity, effective deployment, time of crime, memory jogging, appeal to the cautious, anticipated shaming and reporting changes. Ogunleye et al. (2011) concluded that as a management tool, CCTV can be utilized for occurrence lessening or post-episode examination, to go about as an impediment or to give significant backing to security. It can be utilized as a significant backing for a wrongdoing investigation.

Quarshie (2014) has suggested that police administrations in Africa embrace what their partners in developed nations use CCTV for; for example, observation of target premises and areas where police have knowledge that wrongdoing is prone to happen. These sorts of CCTV operations are utilized to remotely screen premises without having traffic police department occupied with long-term operational surveillance.

#### **2.4.2 Mobile devices and applications**

All together, for group policing to be viable and proficient, a quick method for correspondence is required. This can be brought by reception and utilization of ICT including cellular telephones (Sife, Kiondo & Lyimo-Macha, 2010). E-policing includes reception and utilization of ICT in policing operations. There are numerous meanings of e-policing. Boondao and Tripathi (2007) attempted to give highlights of e-policing definitions. Firstly, they characterized e-policing as the utilization of the Internet (i.e. organized PCs) to convey police administrations to people in general. This can allude to a site; email and fax are contact techniques that the general population can use beside the phone and eye to eye correspondence channels.

The proliferation of mobile phones has placed considerable opportunities and challenges as well to law enforcement. This has led to the development of the concept of forensic science in police investigations. Forensic Science is the use of forensic techniques and values to provide evidence to legal or related investigations (Jansen, Delaitre & Moenner, 2008). According to Curran, Robinson, Peacocke and Cassidy (2010), the cellular telephone scientific examination is the study of recouping advanced confirmation from a cellular telephone under forensically solid conditions utilizing acknowledged techniques. Computerized legal sciences have become quickly due to some degree of the expansion in cell phones (Harrill, 2007).

The existing generation of mobile phones is sophisticated and increasingly difficult to examine, however they can ultimately provide valuable evidence in prosecuting individuals. Quite often, the information obtained from a phone after intensive analysis techniques proves to be adequate for a conviction of a criminal by detectives involved with the case. Internal memory and external memory as well as the call and text records can all be analyzed to gain insight into the activities of the mobile's owner as well as who they have been speaking or exchanging messages with (Curran *et al.*, 2010).

Access to recuperated data from cell phones must be kept steady and unaltered, in the event that it is to stand up in court. The honesty of the recuperated information should accordingly be kept in place. This is a helpless procedure, yet as the years pass, progressions have been made to actually duplicate the data as altered pictures, and along these lines unaltered and unchangeable. Data saved on phones is stored as flash electronically erasable programmable (EEPROM) read-only memory (ROM) (Curran *et al.*, 2010).

In Jamaica, the Blackberry (smartphone) law implementation database has been introduced in the range of 550 handsets of movement and operational workforce over the island and the cell phone application has been utilized to check the genuineness of drivers' licenses and engine vehicle reports. In Kenya, particularly in Nairobi some of these developments have become central (Aker *et al.*, 2010). This is evidenced by groups in Nairobi utilize openly shared data to develop over five mobile matatu routing applications, Ma3Route, Sonar Flashcast, Matatu Maps, Digital Matatus and Transit App. These are now in use in Nairobi.

There are a few studies that depict the advanced use of mobile devices among traffic policing personnel. Tapia and Sawyer (2005) examined the usage and utilization of Personal Digital Assistant (PDA) and the utilization of 3G systems in a field trial, while Sørensen and Pica (2005) give an outline of the Mobile Data Terminals, individual radio and cell telephones utilized by vehicle reaction groups. In the Netherlands, portable innovation has been utilized as a part of some police areas. As in different nations, furnishing traffic police with significant and solid data is viewed as a center part of police work (Bouwman *et al.*, 2008). In Tanzania, Kiondo *et al.* (2013) study revealed that in Twatwatwa village, where the major ethnic group is the Maasai pastoralists, mobile phones were used to inform the police and other villagers whenever cattle robbery occurred.

### **2.4.3 In-Car Systems**

Koper, Taylor and Kubu (2009) argued that the high impact technologies in traffic enforcement include integrated databases; geographic information systems (GIS); computer-aided dispatch with global positioning system (GPS); video reconnaissance systems and remote access from patrol cars. There also exists technologies to enhance communication between organizations, for example utilization of power PC test systems; unique fingerprint readers; directed vitality gadgets; learning revelation (investigative) programming like information mining software (Busagala & Ringo, 2013).

In the United States, police cars are commonly furnished with camcorders to record the occasions in routine movement stops or crisis circumstances. The utilization of video in squad cars has been found to have noteworthy quality and the quantity of such introduced frameworks is expanding. The customarily acknowledged method of reasoning for recording law implementation-related exercises on video is to propel arraignments and case determination. However most, frameworks have lately been intended to screen the video stream and figure out whether certain basic occasions are occurring continuously (Jazayeri, Cai, Tuceryan & Zheng, 2010).

### **2.4.4 Computer-Aided Dispatch Systems**

According to Falaye, Adama and Agemerien (2013), the manual procedure of documentation and overseeing criminal records or data has a few challenges. There is the issue of postponement in getting the data in paper records; paper documents are once in a while harmed by water, nuisance or flame flare-up and can without much of a stretch be adjusted by an unapproved client. There is additionally the issue of missing criminal record documents which may have been brought about by robbery or wrongly put or kept by the officer(s) in control.. There are several computer-aided systems that the police are using or can use to enhance their fight against crime (Harris, 2007).

In the United States, Harris (2007) identified a number of new, technology-driven advances, including innovations related to (1) data collection and management (new record management systems, mobile data terminals, computer-aided dispatch (CAD) systems, information sharing via the internet, and (2) new data-driven police strategies (including Compstat, the use of computerized crime analysis and crime mapping software, and early warning/ early intervention systems targeting police misconduct). Recent reviews of

technology adoption by police agencies highlight the extent that these new technological innovations are being used.

Groff and McEwen (2008) found that 16.9% of US police agencies had adopted computer-aided dispatch (CAD) systems. There are two important features of CAD systems: (1) they provide a rich source of data because of the detailed information they contain on what patrol officers do, and (2) less than 20 % the citizen calls in a CAD system are for serious crime incidents. The rest are for incidents that affect the callers' quality of life to such an extent that they believe police intervention is necessary (McEwen, Ahn, Pendleton, Webster & Williams, 2004).

Another computer aided technology that has become popular in fighting crime is biometrics technology. The inception of biometrics technology which is an advanced computer technique now broadly embraced as a front line security process for both identity verification and crime detection, and also provides practical crime deterrent options (Falaye *et al.*, 2013).

#### **2.4.5 Automatic Number Plate Recognition**

Patel, Shah and Patel (2013) agreed that traffic control and vehicle owner identification has become a real issue in each nation.. Along these lines, it is unrealistic to repulse errant individual drivers on the grounds that the traffic personnel won't have the capacity to recover vehicle number from the moving vehicle in light of the velocity of the vehicle.

However, developments in technology have seen innovative measures adopted to address traffic control and traffic rules enforcement. Automatic Number Plate Recognition (ANPR) or License Plate Recognition (LPR) has been one of the useful approaches for vehicle surveillance. It is can be applied to a number of public places for fulfilling some of the purposes of traffic safety enforcement, automatic toll text collection, car park system and automatic vehicle parking system (You-Shyang & Ching-Hsue, 2010).

In the United States, organizations throughout the whole country are progressively embracing Automated License Plate Recognition (ALPR) advancements. This helps to improve their requirement and investigative capacities, extend their gathering of pertinent information, and expedite the tedious and time-consuming process of manually contrasting vehicle license plates and arrangements of stolen, needed, and different vehicles of interest (Roberts & Casanova, 2012).

In Kenya, new digitized activity lights and movement cameras were introduced in Nairobi County.. The cameras, financed by world Bank, are able to capture enrollment quantities of guilty parties' vehicles and photo their countenances which will then be transferred to the server room arranged at the area base camp. The Kenya National Road Safety Trust gave speed cameras to traffic policemen. In any case, these are handheld velocity cameras that can just take photograph confirmation and measure the rate of approaching vehicles. Policemen position themselves and stow away in ranges of blind spot. Sophisticated as they may, these cameras are not connected to any information system innovation (Tenge et al., 2015).

#### **2.4.6 Geographical Positioning Systems**

In Tanzania, Nyamawe and Mboss (2014) proposed a model for Adoption of ICT for tracking vehicles' over-speeding. The proposed system will make use of the potential of Global Positioning System (GPS), Global Positioning Satellites and Global System for Mobile communications (GSM) Innovation in conveying its administrations. Numerous specialists have proposed the utilization of front line advances to serve the objective of vehicle following. These advances include: Communication, GPS, and GIS (Geographical Information Systems), Remote Control, server systems and others (Al-Khedher, 2011). GSM and GPS-based vehicle area and following framework will give successfully, continuous vehicle area, mapping and reporting this data esteem and include by enhancing the level of administration gave (Harshadhabi, 2013).

Similarly, GSM coverage in Kenya is not at an advanced stage and would assist in e-traffic policing. The proposed model would allow the smooth use of GSM modems by the proposed framework in transferring information (speed and transport area) as Short Messaging Service (SMS) to a focal database. A GSM modem is a particular sort of modem which acknowledges a SIM card, and works with a membership to a portable administrator, much the same as a cell telephone (Harshadhabi, 2013)

#### **2.4.7 E-Trafiki Model**

Tenge et al. (2015) study proposed an E-Trafiki Model which would provide an Electronic Solution Architect for Police Highway Patrolling in Kenya. In the model, ANPR cameras have been incorporated into activity lights, speed cameras and observation cameras to battle wrongdoing and additionally movement guilty parties. But there is a requirement for a more

incorporated methodology in developing nations. Settling on such educated choices would enhance street movement watching to diminish streetcar crashes.

The centralized E-trafiki system should be linked to ANPR cameras to ensure that a few seconds after a plate is captured by the camera, the watch officer is furnished with data regarding the vehicle: whether the car was stolen, if involved in wrongdoing, if uninspected, or if uninsured. This will help activity police in settling on educated choices. Speed cameras ought to likewise be connected to implement speed limits. An electronic ticketing/reference framework ought to be connected to the E-trafiki framework to naturally archive and issue street guilty parties with tickets/references, through email and/or SMS cautions. The e-tickets/citations will save lots of time spent by motorists in cell and court proceedings (Tenge et al., 2015).

#### **2.4.8 Social media**

Studies (for example Cobb et al., 2014; Palen & Vieweg, 2008; Semaan & Mark, 2012) show benefits, effectiveness, and challenges of using Online Social Networks (OSN) by police in developed world. Nonetheless, requirement for OSN intervened correspondence, joint effort, and connectedness amongst nationals and police in developing countries is generally unexplored. In developing countries like India, police are investigating the adequacy of OSN as a correspondence channel to keep up lawfulness (Nayak, 2014). Similarly, Sethi (2013) agreed that ICT may become the interface between the police and public.

Quarshie (2014), on using ICT to fight crime, has suggested that the law authorization organizations in Africa can utilize the online networking. It is an incredible approach to convey data, and news of wrongdoing can rapidly spread over these systems. By sharing a reconnaissance camera picture on online networking, law requirement specialists might have the capacity to get tips with regards to the personality of the culprit. Online networking can likewise be an incredible spot to share tips for staying away from risky zones and tips for keeping safe against wrongdoing. By conveying an observation camera picture on social media, law authorization specialists might have the capacity to get tips with regards to the personality of the culprit (Kaur & Sharda, 2014).

## **2.5 Theoretical framework**

### **2.5.1 The Unified Theory of Acceptance and Use of Technology**

Venkatesh et al. (2003) developed the unified model through reviewing eight models which explain ICT usage, namely TRA, TAM, the motivational model, TPB, a model combining TAM and TPB, the model of PC utilization, DOI, and the social intellectual hypothesis. The motivation behind Unified Theory of Acceptance and Use of Technology (UTAUT) is to disclose a client's goals to utilize ICT. The model considers four factors which are: client acknowledgment and utilization conduct (in particular execution reckoning-) effort trust, social effect, and empowering conditions. There are four key directing variables in this model: sex, age, experience, and intentionality of utilization. The creators expressed that UTAUT gives an instrument to supervisors to evaluate the probability of accomplishment of innovation acquaintances and with comprehending the drivers of acknowledgment so as to plan mediations, for the occasion, preparing or promoting. UTAUT concentrates on clients who might be less eager to embrace and utilize new frameworks (Al-Haderi, 2013).

The significance of this theory to this study is its underlying proposition that an individual may use or not adopt ICT despite its availability in the organization. According to this theory, it would make no difference if the traffic police departments adopted ICT in traffic policing-for it does not guarantee that individual police officers will use this technology. The model argues that there is need to consider other factors despite the availability of the technology. The theory espouses the belief that adoption does not occur in isolation rather than in a social dynamic system. Thus, adoption and utilization of ICT in traffic policing will depend on the existing social system.

### **2.5.2 Model of the IT implementation process**

The study used the Model of the IT Implementation Process. Cooper and Zmud (1990) took Kwon and Zmud's (1978) model of the IT Implementation Process and developed it further. The model is based on the organizational change, innovation, and technological diffusion literature. The purpose of the model is to offer a directing and organizing framework for ICT implementation research.

Kwon and Zmud's (1978) stage model comprises six stages, namely initiation, organizational adoption, adaptation, acceptance and adoption, routinization, and infusion. In this manner, the model covers a usage procedure from the examining of hierarchical needs to a full and viable use of the technology in daily practice. The model also identifies

five contextual factors which impact on processes and products in each implementation stage: the characteristics of the user community, the organization, the technology being adopted, the task, and the organizational environment.

### **2.5.3 Information systems success model**

DeLone and McLean (1992) reviewed prior research and introduced a comprehensive taxonomy of factors contributing to the success of information systems. The authors examined the literature on Information Systems (IS) success and categorized success measures into six major categories: framework quality, data quality, use, client fulfillment, singular effect, and hierarchical effect. These categories are 18, interrelated and interdependent and provide a comprehensive view of IS success.

There are several studies (Goodhue & Thompson, 1995; Etezadi-Amoli, & Farhoomand, 1996; Yuthas & Young, 1998) that have been conducted on the validity of the model and have found a significant relationship between system quality, information quality, use, user satisfaction, individual impact, and organizational impact. System use was typically voluntary and was measured as frequency of use, time of use, the number of accesses, usage pattern, and dependency. Individual impacts were measured in terms of job performance and decision-making performance. System quality was measured in terms of ease-of-use, functionality, reliability, flexibility, data quality, portability, integration, and importance. Individual impacts were measured as quality of work environment and job performance. Information quality was measured in terms of accuracy, timeliness, completeness, relevance, and consistency. The individual impact was measured in terms decision-making performance, job effectiveness, and quality of work (Yuthas & Young, 1998)

The theory is significant to the study as it shows the importance and relationship between system quality, information quality, use, user satisfaction, individual impact, and organizational impact. This means that these variables all have to be linked so as to achieve adoption and utilization of ICT in traffic policing. These impacts must meet the individual impacts (traffic police officer) and thus achieve an organizational impact Traffic police department).

## 2.6 Conceptual framework

Figure 2.1 shows the conceptual framework in which the study was based. The independent variables of the study are the factors influencing the use of information technologies in Traffic Police Department operations. The types and forms of ICT tools used and challenges of ICT use in national security agencies' operations are also part of the independent variables. The dependent variable of the study is the use of ICT technologies in national security agencies' operations. The indicators include the wellbeing and security of officers, improved data collection and management, information sharing via the internet, data-driven police strategies and downsizing of police force manpower required. The intervening variable of the study was government policy.

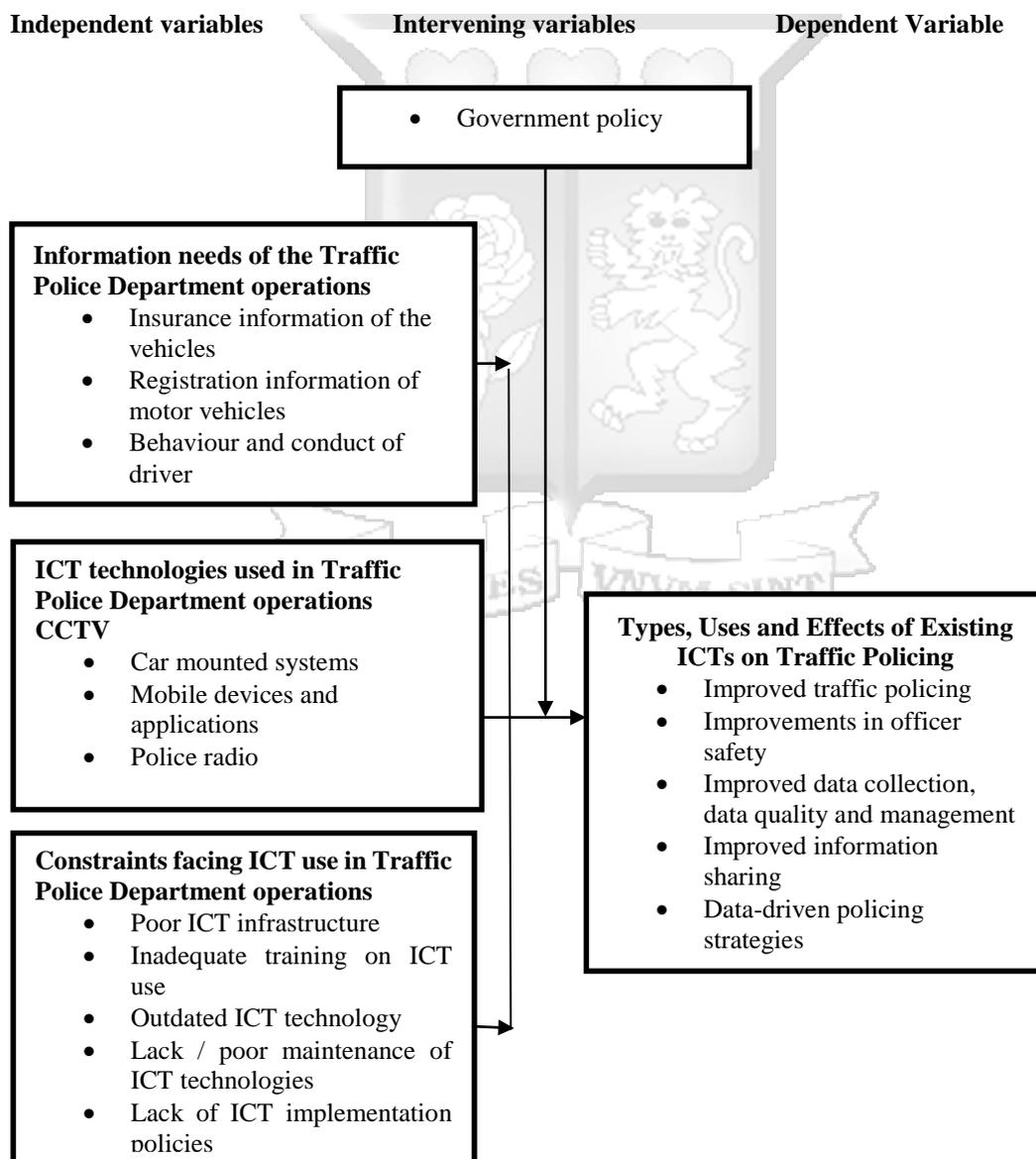


Figure 2.1: Conceptual Framework

## CHAPTER THREE: RESEARCH METHODOLOGY

### 3.1 Introduction

This chapter explains the methodology used in the study. A descriptive research design was chosen to achieve the objectives of the study. Questionnaires were adopted as the primary data collection instruments. Descriptive statistics (frequencies, percentages, mean and standard deviation) was used to summarize trends and observations.

### 3.2 Research Design

Research design alludes to the course of action of conditions for gathering and investigation of information in a way that that is systematic (Babbie, 2012). The study used the descriptive research design by using a sample survey. The descriptive design is ideal as the study sought to describe the use of ICTs in traffic police department. There are two forms of descriptive research designs, the longitudinal survey and the cross-sectional survey design.

The study adopted the cross-sectional survey design which involves the collection of data at one point in time unlike the longitudinal survey aims to collect data for a long duration of time from the same respondents. The cross-sectional survey design is appropriate as the researcher collected information from respondents within a specified period of time. The study also incorporated the exploratory research design. In this design, the researcher was exploring new areas of ICT use in traffic policing while also proposing a model that can be used by the traffic police department.

### 3.3 Study population

According to Ngechu (2004), population is a very much characterized set of individuals, administrations, components, and occasions, gathering of things or family units that are being explored to generalize the results. This definition assumes that the population is not homogeneous. The study target population was 3,672 traffic police officers in Nairobi County (Nairobi County Traffic Office, 2016). However, personal communication with the Traffic Police Department found that 865 officers were involved in traffic operations in Nairobi County at any one time as they worked in shifts either at the Traffic Police desk in their respective stations. The target population of the study is therefore 865.

### 3.4 Sampling methods

Ngechu (2004) underscores the importance of selecting a representative sample through making a sampling frame. A sample is a smaller and more accessible subset of the population that adequately represents the overall group. Sampling enables one to give an

accurate (though within acceptable limits) picture of the population as a whole, with respect to the particular aspects of interests of the study. The researcher adopted the Yamane (1967) sampling formula, Where;  $n$  = sample size,  $N$  = study population,  $e$  = tolerance at the preferred level of confidence, take  $\alpha = 0.05$  at 95% confidence level. The sample size was established as 94 respondents.

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

Thus, the sample of respondents was determined as follows;

$$\begin{aligned} n &= 865 / 1 + 865 (0.05)^2 \\ &= 865 / 9.1825 \\ &= 94 \end{aligned}$$

### 3.5 Data collection methods

A structured survey was utilized to gather the primary data. According to Kothari (2004), primary data is that which is collected afresh for the first time while secondary data is that data that has already been collected and passed through the statistical process. Questionnaires were chosen in this study because respondents of the study are literate and quite able to answer questions asked adequately.

According to Mugenda and Mugenda (2003), surveys are ordinarily used to acquire critical data around a population under study. Closed-ended surveys were utilized as a part of a push to monitor existing trends of ICT while open-ended questions allowed the researcher to identify new and emerging trends in ICT for traffic policing. The questionnaire was designed carefully and tested with a few members of the population for further improvements. This was done in order to enhance its validity and accuracy of data to be collected for the study.

The study used semi-structured questionnaires to collect primary data from the police officers through face-to-face interviews. Mugenda and Mugenda (2003) observed that, the pre-requisite to questionnaire design is the definition of the problem and the specific study objectives. The researcher assured the respondents about the confidentiality of their responses. The researcher obtained an introductory letter from the University and the

Operations Commander Traffic Nairobi County to collect data. The researcher, with assistance from the research assistant personally administered the questionnaires through interviews to allow for probing purposes. Care and control by the researcher were exercised to ensure all questionnaires issued to the respondents were received. To achieve this, the researcher maintained a register of questionnaires from each of the locations it was administered. Secondary data was collected from publications, websites, journals and books to complement primary data that was received from the questionnaire.

### **3.6 Data analysis methods**

The successful data collection led to the data analysis process. This process is important as it makes data sensible. Data analysis tool used is dependent on the type of data to be analyzed depending on whether the data is qualitative or quantitative. The collected data was analyzed using mostly quantitative approaches.

Descriptive analysis was done using the Statistical Package for Social Sciences (SPSS). Descriptive statistics incorporated the application of absolute and relative proportions and frequencies, measures of central tendency and dispersion (mean and standard deviation respectively). To facilitate this, Likert Scale were used which enables easier presentation and interpretation of data. Frequency tables and graphs were used to present the data for easy comparison. On the other hand, completeness of qualitative data collected was coded according to emerging themes and included in the quantitative data. Qualitative data from the open-ended questions was presented verbatim.

### **3.7 Quality of research**

The questionnaire designed by the researcher based on the research questions was piloted to refine the questions before it was administered to the selected sample. A pilot test was conducted to detect weakness in design and instrumentation and to provide proxy data for selection of a probability sample. Mugenda and Mugenda (2003) asserted that the accuracy of data to be collected largely depended on the data collection instruments in terms of validity and reliability. The following section indicates the actions the researcher took to establish reliability and validity of the survey instruments

#### **3.7.1 Validity of research instrument**

According to Somekh and Cathy (2005), it is the extent to which the specimen of test things speaks to the substance the test is intended to quantify. Validity is the strength of our conclusions, inferences or propositions. More formally, Patton (2001) defined it as the best

available approximation to the truth or falsity of a given inference, proposition or conclusion. Content validity which is employed by this study is a measure of the extent to which information gathered utilizing a specific instrument speaks to a specific domain or content of a particular concept.

To establish the content validity of the research instrument the researcher sought guidance from the university supervisor and the defense panel to ensure that the questionnaire was measuring what it intended to measure. This helped to improve the content validity of the data that was collected and facilitated the fundamental amendment and adjustment of the exploration instrument subsequently upgrading legitimacy.

### **3.7.2 Reliability of research instrument**

The reliability of a research instrument is established by including numerous comparative things on a measure, by testing various example of people and by utilizing uniform testing methods. The researcher selected a pilot group of 14 respondents from the target population to test the reliability of the research instruments as recommended by Simon (2011). In order to test the reliability of the instruments, the researcher used Cronbach's Alpha function in SPSS.

The Cronbach alpha was used to measure the reliability of the Likert scale questions. The alpha value ranges between 0 and 1 with reliability increasing with the increase in value. The coefficient of 0.7 is a commonly accepted rule of thumb that indicates acceptable reliability (Mugenda & Mugenda, 2003). The reliability of the instrument was measured using SPSS. The Cronbach Alpha for the study research instrument was established at 0.75 which was deemed acceptable for research. The data from the pilot study was not incorporated into the study.

### **3.8 Ethical issues in research**

As pointed out by Saunders, Lewis, and Thornhill (2009), ethics in research refers to the appropriateness of one's conduct in connection to the privileges of the individuals who turn to the subject of one's work, or are affected by it. Cooper and Schindler (2011) contended that research ethics is the right behavior in research where the researchers are expected to conduct research in a moral and responsible way. The behavior of the researcher is not only moral but also relate to the use of the correct methodology. Researchers are therefore required to maintain high levels of ethics when conducting the study and in their general

relationship with the sponsor, respondents as well as the organizations they visit to interview.

The researcher upheld ethical consideration in the process of the study and assured the respondents that confidentiality was observed. The researcher obtained informed consent from every respondent in the study and ensured that they responded voluntarily. Thus, the ethical considerations for the study were anonymity, confidentiality, informed consent and voluntary participation in the data collection process of the study.



## CHAPTER FOUR: PRESENTATION OF FINDINGS

### 4.1 Introduction

This chapter presents findings of the study. The data is presented in tables and accompanied by the researchers' interpretation. The findings presented are: the response rate for the study, demographic information of respondents, information needs and information Challenges, ICT technologies adopted and used in traffic police department operations, factors influencing ICT adoption and utilization in traffic policing and constraints facing adoption and use of ICT in traffic police department operations.

### 4.2 Response rate

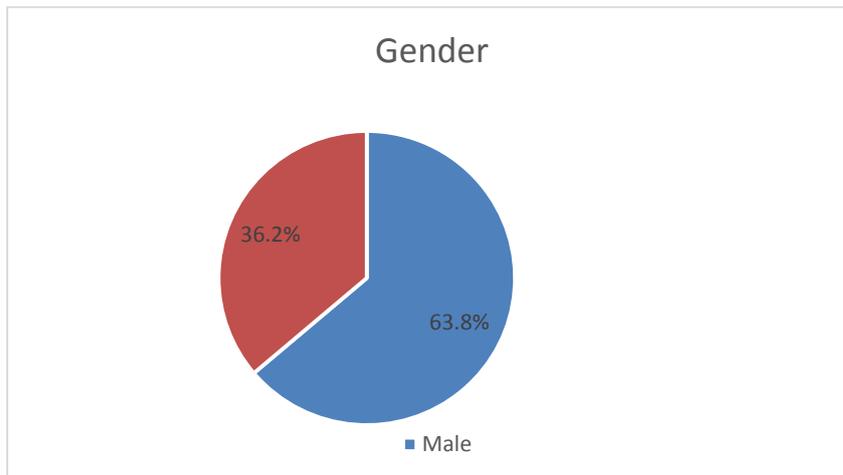
The sample size was 94 traffic personnel within Nairobi County. The researcher was able to collect 47 complete questionnaires which met criteria for data analysis and 14 questionnaires for the pilot which weren't included in the analysis. This represented a response rate of 50 % which is adequate for research as Nulty (2008) recommended.

### 4.3 Demographic Information

#### 4.3.1 Gender

It was important to establish the gender composition of the respondents as past studies has found a significant difference in perceptions and attitudes towards ICTs among men and women. Figure 4.1 depicts that a higher proportion of the traffic police officers who participated in the study were male (64 %) compared to their 32 % female respondents. These findings support Oweke, Muola and Ngumi (2014) who found out that there were more male police officers compared to their female counterparts. Sanda and Kurfi (2103) showed that there are gender specific gaps in ICT knowledge and use. Gender therefore becomes important for the study as it influences the perceptions of police officers towards ICT utilization in the Traffic Police Department.

**Figure 4.1: Gender Distribution among Respondents**



Source: Survey Data (2016)

#### 4.3.2 Level of education

In regard to the participant's level of education, the results indicate that 53 % were secondary school level as shown in Table 4.1. This finding agrees with Kihiko (2013) who found that 78 % of the respondents among police officers had a secondary level of education. The college and undergraduate level respondents were attributed to the senior rank officers' included in the survey.

**Table 4.1: Education among Respondents**

Education Level	Frequency	Percent
Undergraduate	9	19.1
College	13	27.7
Secondary	25	53.2
<b>Total</b>	<b>47</b>	<b>100.0</b>

Source: Survey Data (2016)

#### 4.3.3 Experience as traffic officer

Table 4.2 shows the experience of the traffic police, the findings revealed that 28 % were 6-10 years. These results support that of Kihiko (2013) which showed that 86 % of respondents had worked for more 10 years therefore had experience in the police work and were in a position to give useful insights into the use of ICT in traffic.

**Table 4.2: Experience among Respondents**

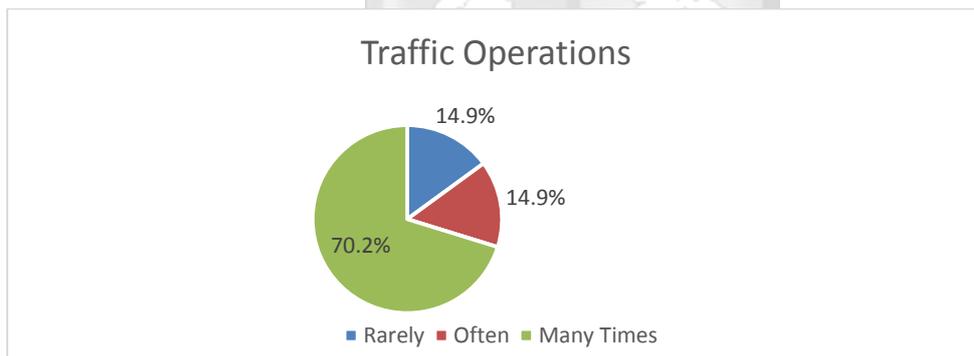
Years of Experience	Frequency	Percent
Less than 5 years	10	21.3
6-10 years	13	27.7
11-15 years	11	23.4
16-20 years	9	19.1
Above 21 years	4	8.5
<b>Total</b>	<b>47</b>	<b>100.0</b>

Source: Survey Data (2016)

#### 4.3.4 Involvement in traffic operations

Seventy percent of the study participants had been involved in traffic operations many times, 15 % were often and rarely responses respectively as depicted in Figure 4.2. The majority of respondent had been involved in several traffic operations and was therefore able to provide insight into ICT and traffic policing.

**Figure 4.2: Traffic Operations among Respondents**



Source: Survey Data (2016)

#### 4.3.5 ICT training in traffic policing

The study found that 66 % had no form of ICT training in traffic policing as shown in Table 4.3. In their study on factors influencing service delivery in the police service, Ngugi et al. (2012) concluded that investment in ICT and knowledge and skills in ICT as poor. Similarly, Busagala and Ringo (2013) found that among the constraints for e-policing included inadequate ICT preparing; unseemly determination of police staff for preparing on ICT use; insufficient preparing programs.

**Table 4.3: ICT training in traffic policing**

ICT Training in Traffic Policing	Frequency	Percent
Yes	31	66.0
No	16	34.0
<b>Total</b>	<b>47</b>	<b>100.0</b>

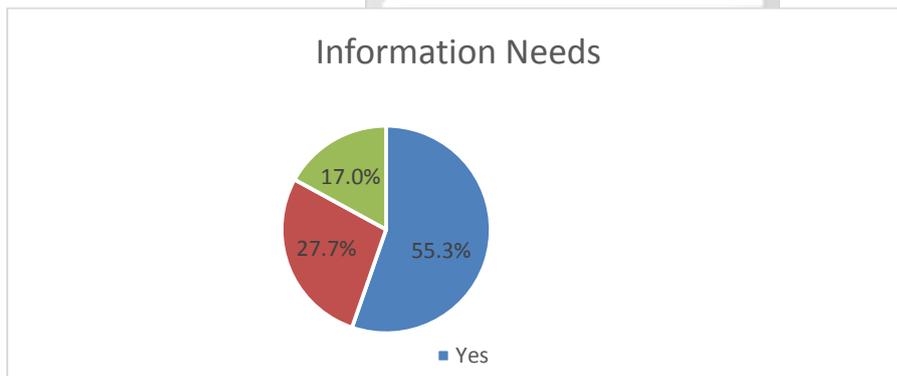
Source: Survey Data (2016)

#### 4.4 Information needs and information challenges

##### 4.4.1 Information required for traffic police to do their work

Figure 4.3 shows that 54 % were aware of the kind of information they needed to do their work effectively. It was important for the study to establish the type of information that police thought was required for them to do their job. Twenty-nine percent indicated they needed information on car ownership and 28 % indicated they required to know insurance information without having to make stops in traffic to check.

**Figure 4.3: Knowledge of Information Required by Traffic Police**



Source: Survey Data (2016)

##### 4.4.2 Accessibility for traffic police of needed information

Descriptive statistics were conducted to summarize respondents' answers to the accessibility of information, which is presented in Table 4. According to the results, the highest ranked statement was Information about activities performed by traffic police and sanctions applied (M=2.70; SD = 0.74) and the least ranked item was Feedback on the results of various approaches and activities (M= 1.48; SD = 0.68)

**Table 4.4: Information accessibility among traffic police**

	Fully Accessible	Largely Accessible	Partly Accessible	Very Little Accessible	Mean	Standard deviation
Information about factors linked to accidents	44.7%	19.1%	19.1%	17.0%	2.08	1.15
Information about consequences of accidents	53.2%	27.7%	12.8%	6.4%	1.72	0.92
Information on events/conditions when/where risks for accidents may increase	66.0%	10.6%	17.05	6.4%	1.63	0.98
Information about activities performed by traffic police and sanctions applied	8.5%	21.3%	61.75	8.5%	2.70	0.74
Feedback on the results of various approaches and activities	63.8%	25.5%	10.6%	0.0%	1.48	0.68

Source: Survey Data (2016)

#### 4.4.3 Information factors affecting police operations

Table 5 shows a summary of the descriptive statistics for information factors that affect police operations. The highest mean score was observed for timeliness of information (M= 4.12; SD = 1.19), this was followed by storage of information (M= 3.78; SD = 1.18) accuracy of information while the least mean score was availability of information (M= 2.97; SD = 1.28). These findings corroborate those of Kumar (2012) who found the absence of capacity to impart data to other related state level and national level organizations, and multiple entries of the same data and limited ability to analyze information because of different locations and analytical skills.

**Table 4.5: Information Factors Affecting Police Operations**

Factors	Not At All	Little Extent	Moderate Extent	Great Extent	Very Great Extent	Mean	Standard Deviation
Timeliness of information	4.3%	8.5%	12.8%	19.1%	55.3%	4.12	1.19
Availability of information	12.8%	25.5%	29.8%	14.9%	17.0%	2.97	1.28
Accessibility of information	8.5%	23.4%	25.5%	21.3%	21.3%	3.23	1.27
Accuracy of information	10.6%	14.9%	25.5%	27.7%	21.3%	3.34	1.27
Storage of information	6.4%	6.4%	23.4%	29.8%	34.0%	3.78	1.18
Capture of information	14.9%	8.5%	14.9%	27.7%	34.0%	3.57	1.43
Confidentiality of information	10.6%	10.6%	17.0%	21.3%	40.4%	3.70	1.38

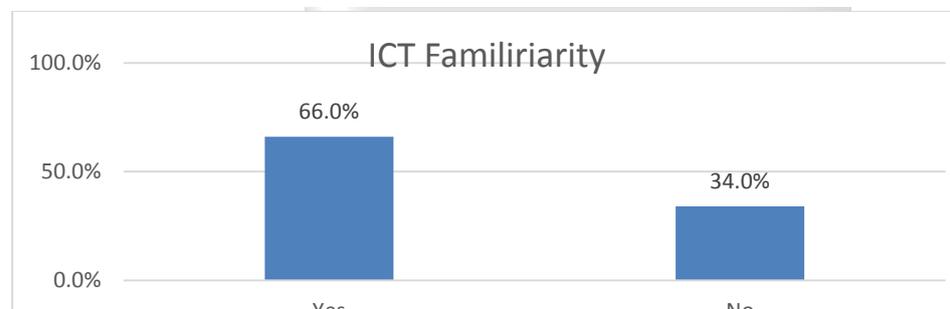
Source: Survey Data (2016)

## 4.5 ICT technologies adopted and used in traffic police department operations

### 4.5.1 ICT familiarity among traffic police officers

The study sought to establish ICT familiarity among traffic police, the results indicated that 66 % were ‘yes’ responses compared to 34 % who were ‘no’ as shown in Figure 4.4. Familiarization is another idea that influences utilization of data innovation. The more they know well the framework, all the more extravagantly they utilize it (Williams & Aasheim, 2005). This finding implies that police officers are familiar with some of the ICTs but these are not utilized in traffic police department.

**Figure 4.4: Traffic Police familiarity with ICT**



Source: Survey

Data (2016)

### 4.5.2 ICTs adopted in traffic police department

The study findings showed that CCTVs were the mostly adopted for of ICT in the traffic police department, 28 % cited mobile phones whereas 15 % indicated car communication systems as depicted in Table 4.6.

**Table 4.6: ICTs Adopted in Traffic Police Department**

	Frequency	Percent
CCTV	27	57.4
Car Systems	7	14.9
Mobile Phones	13	27.7
<b>Total</b>	<b>47</b>	<b>100.0</b>

Source: Survey Data (2016)

### 4.5.3 Traffic police access to ICTs

The results revealed that 68 % did not think that traffic police had access to ICTs along with 21 % who were not sure while only 11 % were positive about traffic police access to ICT as depicted in Table 4.7.

**Table 4.7: Access to ICTs among Traffic Police**

	<b>Frequency</b>	<b>Percent</b>
Yes	5	10.6
No	32	68.1
Not Sure	10	21.3
<b>Total</b>	<b>47</b>	<b>100.0</b>

**Source: Survey Data (2016)**

#### **4.5.4 Use of ICTs in traffic policing**

Table 4.8 shows that 77 % indicated that there was no use of ICTs in traffic policing whereas 23 % answered that there was the use of ICT. Gottschalk and Holgersson (2006) argues that if police officers accept utilization of information technology, it can boost their performance and value. The nature of police undertakings requires taking care of and preparing immense volumes of information. The capacity of a PC to handle information and give auspicious and exact data coordinates the necessities for police to upgrade their work exercises (Tenge et al., 2015). However, the findings show that traffic police are not utilizing ICTs in traffic policing.

**Table 4.8: Utilization of ICTs in traffic policing**

	<b>Frequency</b>	<b>Percent</b>
Yes	20	22.6
No	27	77.4
<b>Total</b>	<b>47</b>	<b>100.0</b>

**Source: Survey Data (2016)**

#### **4.5.5 Potential technologies to enhance traffic police operations**

Table 4.9 shows a summary of study participants' opinions on the potential technologies that can be adopted to enhance effectiveness of traffic police operations. The highest mean score was seen on Recording/video streaming capabilities in police vehicles (M= 4.06; SD = 1.25) and the least was Video-based surveillance (CCTV) (M= 1.82; SD = 1.04). Video streaming and live recording systems in police vehicles were highly ranked as a potential technology. This was mostly attributed to the major traffic operation such as the "alcoblow" detection stops.

The recording was ranked as important as it would show the behavior of motorists who ran over the roadblocks. In the United States, use of video in police cars has been found to have critical quality and the quantity of such introduced frameworks is increasing. The traditionally accepted rationale for recording law enforcement related activities on video is to help advance prosecutions and case resolution (Jazayeri, Cai, Tuceryan & Zheng, 2010).

In India, Sethi (2013) found that monitoring is done via cameras mounted on the squad cars. Research has shown that police organizations consider mobile access to information relevant because it can improve the efficiency, effectiveness and quality of police work (Bouwman, Haaker & de Vos, 2008).

Ogunleye et al. (2011) concluded that as a management tool, CCTV can be utilized for episode decrease or post-occurrence examination, to go about as an obstruction or to give significant backing to security. It can be utilized as a significant backing for a criminal investigation. The findings show that CCTV was poorly ranked as a potential technology for traffic policing in Kenya. One of the respondents was pessimistic of the effectiveness of using CCTVs in traffic policing. According to one of the respondent:

‘There is no effectiveness of CCTVs in traffic police in my opinion... We have CCTVs in the CBD and other major roads but they have not deterred traffic crime commission... There is also the issue of who is accessing the footage and this “staff” can be bribed to give or destroy evidence of traffic crimes or general crimes.’

**Table 4.9: Potential technologies for traffic police department**

Factors	Not At All	Little Extent	Moderate Extent	Great Extent	Very Great Extent	Mean	Standard Deviation
Video-based surveillance (CCTV)	57.4%	8.5%	27.7%	6.4%	0.0%	1.82	1.049
Automatic Number Plate Recognition	10.6%	17.0%	6.4%	66.0%	0.0%	3.27	1.097
Recording/video streaming capabilities in police vehicles	6.4%	6.4%	17.0%	14.9%	55.3%	4.06	1.258
Automated traffic control systems	12.8%	10.6%	10.6%	19.1%	46.8%	3.76	1.462
Mobile data center/applications	0.0%	14.9%	46.8%	23.4%	14.9%	3.38	0.922
License plate and driver’s license recognition	0.0%	12.8%	34.0%	53.2%	0.0%	3.40	0.712

**Source: Survey Data (2016)**

This finding supports Quarshie (2014) suggestion that police services in Africa adopt what their counterparts in developed countries use CCTV for, such as surveillance of target premises and locations where police have intelligence that crime is likely to occur. These types of CCTV operations are used to remotely monitor premises without having to have police officers engaged in long-term operational surveillance. According to Quarshie, the use of CCTVs has not been commensurate with the resources afforded to police services

and as such has not had a positive effect on maintaining traffic law and order in developing counties, of which Kenya belongs to.

#### 4.6 Factors influencing ICT adoption in traffic operations

The most significant factors influencing adoption of ICTs in traffic operations were perceptions and attitudes (M= 3.80; SD = 1.22) and the least significant factor was organizational culture (M= 2.06; SD = 1.43) as shown in Table 4.10. Ndanusa (2014) found that the majority (55 %) of the police respondents had no skills in ICTs and therefore perceived and had negative attitudes towards use of ICTs in traffic policing. Among the respondents, police who work as ICT persons have skills on computer use. In regard to knowledge and awareness of using technology in policing operations, the results showed that a meager 5 % indicated that the awareness is at the good level.

**Table 4.10: Factors influencing ICT adoption in traffic operations**

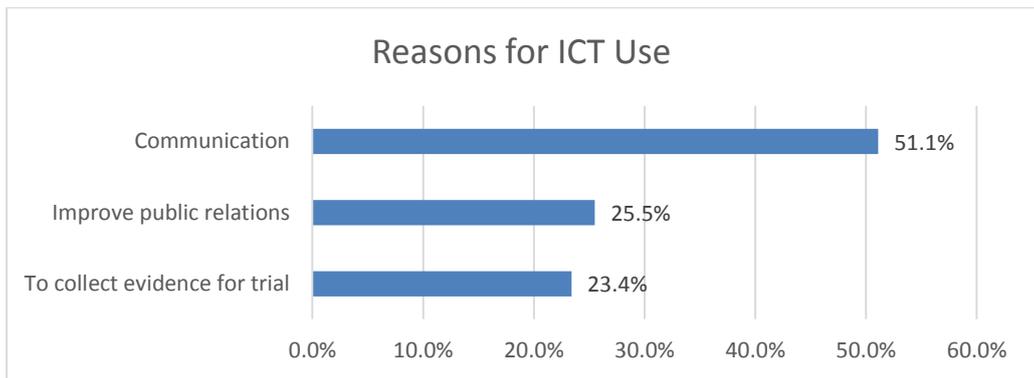
Factors	Not At All	Little Extent	Moderate Extent	Great Extent	Very Great Extent	Mean	Standard Deviation
Cost	6.4%	6.4%	23.4%	29.8%	34.0%	3.79	1.17
Infrastructure	14.9%	8.5%	14.9%	27.7%	34.0%	3.57	1.42
Staff training	10.6%	10.6%	17.0%	21.3%	40.4%	3.70	1.38
Budgetary constraints	14.9%	4.3%	19.1%	19.1%	42.6%	3.70	1.44
Perceptions and attitudes	6.4%	10.6%	14.9%	31.9%	36.2%	3.80	1.22
Organizational culture	59.6%	4.3%	14.9%	12.8%	8.5%	2.06	1.43

Source: Survey Data (2016)

##### 4.6.1 Primary reason for ICT uses among the traffic police

The study found that communication (51 %) was the most significant reason for using ICTs in traffic operations; this was followed by the need to improve public relations (26 %) and to collect evidence for trials (23 %) as illustrated in Figure 4.5

**Figure 4.5: Reasons for using ICTs**



Source:

Survey Data (2016)

#### 4.6.2 Influence of ICTs on police service

On the influence of ICTs on police service, the results showed that 60 % were of the idea that ICTs had an influence compared to 40 % who did not think so as shown in Table 4.11. Karake (2014) has argued that major activities related to the transport system can be handled easily with the electronic devices. ICT use can cover such aspects as a number of activities such as: registration of all types of motor vehicles, issuance of driving licenses, issuance of permits for light and heavy vehicles, taxation and fee collection through cash and bank and control of pollution through checking etc. Thus, electronically saved data will be useful for the effective traffic management.

**Table 4.11: Influence of ICTs on police service**

Influence of ICTs on Police Service	Frequency	Percent
Yes	28	59.6
No	19	40.4
<b>Total</b>	<b>47</b>	<b>100.0</b>

Source: Survey Data (2016)

#### 4.6.3 ICTs recommended for traffic police

The traffic police that participated in the study recommended various ICT options that can enhance traffic operations in the department. Table 4.12 shows that 62 % recommended CCTVs and Computer Aided Dispatch, 19 % were car plate recognition systems and insurance status information

**Table 4.12: Recommended ICTs by Traffic Officers**

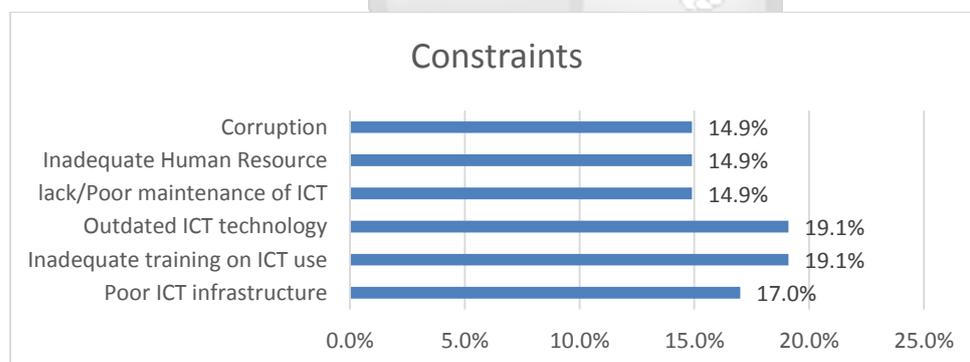
	Frequency	Percent
CCTV	29	61.8
Car Plate recognition System	9	19.1
Insurance Status Information	9	19.1
<b>Total</b>	<b>47</b>	<b>100.0</b>

Source: Survey Data (2016)

#### 4.6.4 Constraints of ICT use in traffic operations

The study found that there were several constraints to the use of ICT among traffic personnel. Nineteen percent indicated inadequate training on ICT use as well as outdated ICTs, 17 % cited poor ICT infrastructure, 15 % cited inadequate human resources and corruption respectively as shown in Figure 4.6. Studies have shown modern policing to be knowledge intensive work which requires the fostering of a culture of knowledge management and the effective implementation of knowledge management systems (Ndanusa, 2014). The majority (55%) of the police respondents had no such skills, however. Among the respondents, police who work as ICT persons have skills on computer use. Regarding knowledge and awareness of using technology in policing operations, Ndanusa found that a meager 5 % indicated that the awareness is at a good level.

**Figure 4.6: Constraints Attributed to Low ICT use in Traffic Operations**



Source: Survey Data (2016)

#### 4.6.5 Influence of constraints on ICT use in traffic operations

The identified constraints to ICT use in the traffic police department were found to influence traffic operations to a great extent (49 %), very great extent (28 %) and moderate extent (23 %) as shown in Table 4.13.

**Table 4.13: Effect of ICT Constraints in Traffic Operations**

	<b>Frequency</b>	<b>Percent</b>
Very Great Extent	13	27.7
Great Extent	23	48.9
Moderate Extent	11	23.4
<b>Total</b>	<b>47</b>	<b>100.0</b>

**Source: Survey Data (2016)**

#### **4.7 Conclusion**

This chapter presented the study research findings which were presented in graphs and tables and researcher interpretation. These findings were compared and contrasted with the studies in the literature review. The next chapter of the study presents the summary of findings, conclusion and recommendations.



## **CHAPTER FIVE: DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS**

### **5.1 Introduction**

This chapter presents the discussions of the proposed model and the study's conceptual framework, the proposed model link with the study objectives, advantages of the proposed model and its limitations. The chapter also includes conclusions and discussions of the study.

### **5.2 Information needs and challenges of traffic police department in Nairobi County**

In order to determine the usefulness of a particular information technology technique to an organization; there is a need to understand the type of information that the organization perceives will be best provided by use of ICTs. The objective of the traffic police is to ensure safe movement on the road, prevent traffic violations, act appropriately against violators, and play a preventive role against accidents. To achieve this objective, traffic police require information. To this end, the study sought to establish the information needs of traffic police that would require the use of ICTs.

The findings revealed that majority (53.3 %) of the study participants were aware of the information they needed to effectively perform their jobs. The findings revealed that the traffic officers needed information of car ownership and (29.0%). This information was required in order to know the identity of the car owner and their behavior. These findings support Pristina (2015) study which found that Kosovo Traffic police required information on car ownership in order to monitor the behavior of the driver.

Further, 27.7 % cited that they required insurance information of a particular vehicle. The traffic officers by further probing explained that the manual inspection of the insurance status of a vehicle contributes to traffic congestion and also takes time and energy. With regard to information accessibility among traffic police officers, information about factors linked to accidents was also cited as the most significant type of information for traffic personnel.

The study established that present use of ICT in the traffic department is for communication purposes (51.1 %), followed by the need to improve public relations (25.5 %) and to collect evidence for trial (23.4 %). The findings revealed that perceptions and attitudes ( $M= 3.80$ ;  $SD = 1.22$ ) towards ICT use in traffic policing was ranked the most significant factor

influencing ICT adoption. The least ranked influential factors were attributed to the organizational culture (M= 2.06; SD = 1.43).

The reviewed literature showed that traffic police face certain information challenges.. According to the respondents, having this information allows the department to choose the right means at the right time and place. It will also make it easier to better focus on what to focus on: drivers' behavior, road condition, the condition of vehicles and kind of vehicles. The major challenges of getting this information was because it was in possession in other agencies and not therefore available in real time for traffic policing.

### **5.3 Factors influencing use of ICT traffic police department in Nairobi County**

The study also sought to determine the factors influencing utilization of ICTs that affected traffic police operations. The study found that timeliness of information (M= 4.12; SD = 1.19) was the highest ranked factor. Traffic police are often involved in the real-time monitoring of the roads and therefore need information at a moment's notice. This implies that traffic police should have the means to access information in a timely manner to effectively control traffic. The least ranked factor was the availability of information (M= 2.97; SD = 1.28). This was attributed to the fact that most of the information that traffic police need is available through the e-Citizen platform and other government agencies such as KRA and NTSA, however, traffic police officers did not have access to it in a timely manner.

The study found lack of training on ICT use and outdated ICT technology as the major factors attributed to low utilization of ICT in traffic policing. Through probing, the researcher found that ICT traffic policing was not practiced during training of police officers. This therefore contributes to low utilization of modern ICTs in the department since most of the officers are not confident in the use of these technologies where available. According to study participants, these constraints affected traffic policing to a great extent (48.9 %). Inadequate training on ICT use in traffic policing is not provided for in traffic police training courses outlines. This means that the traffic police graduates begin their work relying on making stops on major roads which also contribute to traffic congestion.

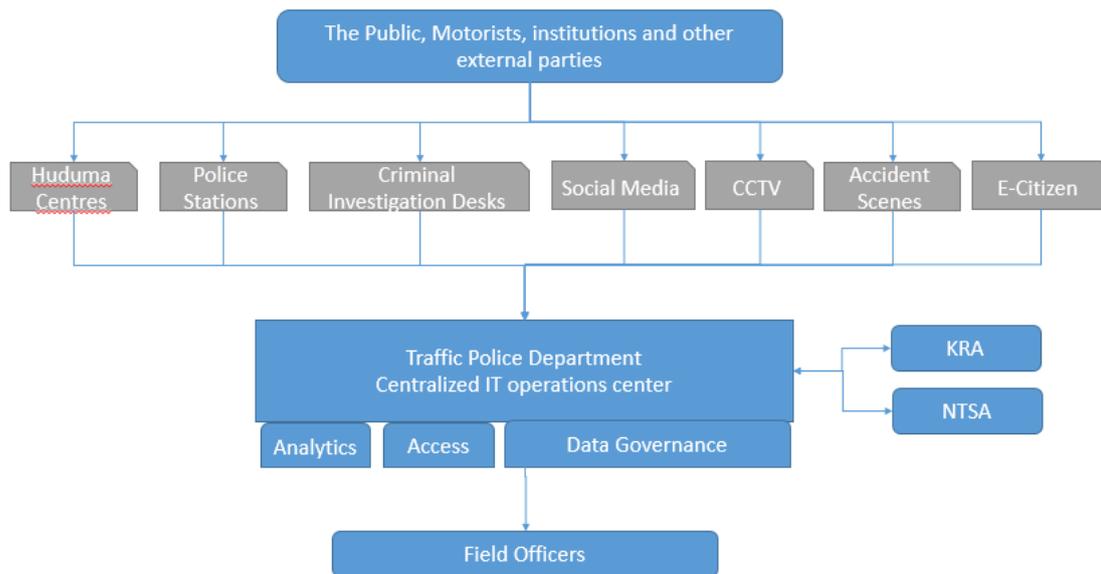
### **5.4 Probable technologies that can solve information challenges in Nairobi County**

The study sought to establish the potential technologies that could be adopted by the traffic police department in Nairobi County. The study first asked the study participants to indicate their familiarity with ICTs. The majority of the respondents indicated yes (66.0 %) which

meant that traffic police were aware of ICT use in traffic policing. CCTV was cited (57.4 %) was the most popular ICT mode of traffic policing. This is attributed to the much-publicized campaign of installing CCTVs along major highways and the city center. The other mentioned ICT adopted were mobile phones (27.7 %) and car systems (14.9 %). Sixty-eight percent of the study participants did not think that the police had access to ICT. Seventy-seven percent did not think that there was use of ICT in traffic policing in the department. However, among the potential technologies that could be adopted were recording/video streaming capabilities in police vehicles (55.3 %), automated traffic control (46.8 %) systems and license plate and driver's license recognition (53.2 %).

### **5.5 Proposed model to solve information challenges of traffic police department in Nairobi County**

The Government of Kenya in the last 5 years implemented e-Government/Huduma centers that allow the public to obtain services across the country. These centers use electronic information that can be analyzed, and made available to the field offices. Figure 5.1 shows the proposed model. In this proposed model, traffic information from the public, institutions and other external parties is available and accessible between institutors involved in the registration of vehicles, traffic offenses and ICT that monitors traffic movement in a centralized IT operations center. These institutions include Huduma Centers, Police Stations, and Criminal Investigation Desks, Social Media, CCTV accident scenes and other sources. This center would be responsible for the security, analytics, access and governance of traffic data. At the end-user level, this information would be available to traffic officers involved in traffic operations in real time through easily accessible information technology such as Smartphones and iPads.



**Figure 5.1: Proposed Model for the Traffic Police Department, Nairobi County (Source: Author, 2016)**

### 5.5.1 Components of the structure

#### a. Huduma Centers

The government initiative to have Huduma Centers was based on the Vision 2030 to have internet based service delivery. Through the Huduma Centers, the public can apply, the source for government documents through an online platform. Currently, Huduma Centers are popular for applications and renewal of driver licenses, Transport licenses and PSV licenses via the e-Citizen platform where applications are made online and printed on forms presented to the Huduma centers personnel for processing.

#### b. Police Stations

Police stations remain an important source of information on traffic. Traffic police collect information on a daily basis on accidents. This information is captured on the P41 form. However, this information is in analog format and therefore makes it difficult for making decisions and observing trends. In This proposed system, data captured in the P41 form is captured in digital format and shared to the central information system.

#### c. Criminal Investigation Department

The Criminal Investigation Department (CID) department conducts investigations on stolen cars. This information would also be shared in the centralized information systems and would assist traffic police in the identification of stolen cars around the country when spotted during traffic operations.

#### **d. Social Media**

The social media is a public driven initiative which is a great resource for communication of traffic issues in real time. There are several social media that are dedicated to traffic issues, the most prominent in Kenya is the twitter handle @Ma3Route. A lot of information is communicated in these platforms that include: stolen cars, complaints from the public about officers, flooding on major roads and traffic jams.

#### **e. CCTV**

Globally, CCTVs have been used for security management. CCTVs are placed in strategic positions to collect information on traffic and also for gathering criminal activities. In its Vision 2030, the government reiterated its commitment to using CCTVs for security purposes. These can also be used for traffic policing as the data collected from CCTVs is made available in the centralized information systems. CCTVs can be an important resource for the traffic department by providing video footage of accidents, constant traffic monitoring and control. According to the Second Medium Term Plan 2013-2017, the government is in the process of installing of CCTV cameras in Nairobi, Mombasa, Kisumu and Nakuru (Including establishment of a command control center with an Integrated Security Intelligence and Surveillance System).

#### **f. National Transport Safety Authority (NTSA)**

The NTSA was founded as the lead authority in Kenya for road transport and safety in 2012. Its core functions include; registration and licensing of motor vehicles, Advising the Government of Kenya on national policy with regard to road transport system; Developing and implementing road safety strategies; conducting research and audits on road safety; Compiling inspection reports relating to traffic accidents and co-coordinating the activities of persons and organizations dealing with matters relating to road safety.

#### **g. Kenya Revenue Authority (KRA)**

Kenya Revenue Authority as the revenue body for the government registers ownership of vehicles which have been imported to Kenya and also register transfer of ownership of vehicles.

#### **h. E-Citizen platform**

This is a platform provided by the Government of Kenya to deliver Government to Citizen (G2C) services to Kenyan citizens and foreign residents via the internet with capability to pay via mobile money, debit Cards and eCitizen agents. The platform offers wide variety

of services among them, driving license application, renewal, and search for motor vehicles, among others.

#### **i. Centralized IT Operations Centre**

This is the central IT operations team that plays the role of shared services for the entire traffic department in Kenya. It supports and maintains information and communication technologies that are used to collect, analyze, correlate and disseminate information. It is composed of below components;

- i. **People** – The success of any information system relies on its human resource capacity. the success of the proposed model requires an IT professional staff within the traffic department
- ii. **Processes/Procedures** – These refer to the manner in which data is collected, stored and analyzed by each of the data collection points to be accessible and available for users of the centralized IT operations center. Data governance is a set of processes that ensures that important data assets are formally managed throughout the enterprise. Data governance ensures that data can be trusted and that people can be made accountable for any adverse event that happens because of low data quality.
- iii. **Technology** – Analytics and visualization platform that consolidates all data, analyzes the data, generates visualization for consumption, Security platform to secure the data and collect events on who is accessing what, Integration platforms based on Service Oriented Architecture (SOA) to allow for secure integration to various sites/institutions.

#### **5.5.2 How it works**

Information sources and information flow in general (from source to centralized database to officers) with reference to some of the above components. The public applies or renews DL, raise complaints or reports lost cars, accident reports at police stations, a copy of this information is stored in institutions like Huduma Center, NTSA, KRA. The information is then pushed to a centralized IT ops center for analysis and storage for the purpose of use by traffic department. Police systems like CCTV, car-mounted system collect information that is transmitted to the centralized IT operations center.

At the centralized IT operations center, huge analytics systems use data models to analyze the data, transform and generate insights for use by officers. A data visualization system is

used to render the information in a format that is easy to understand like table summaries, graphs, geographic, and more. Security of this information is very critical hence the center will have systems that enforce security and access to information stored.

Handheld devices are used by field offices to access information and receive alerts/notices. This ensures that the office spends enough time in the field service the public as opposed to current situation where offices have to go back to police stations for briefs or file offenses or accident information.

### **5.5.3 Advantage of proposed model for traffic department**

The researcher envisages several advantages of the proposed model for traffic department compared to the existing systems;

- i. Integration of sources of information from collection points to NTSA, to KRA, to central IT ops center to police officers in the field
- ii. An officer can obtain near real-time information and alerts on smart devices
- iii. An officer is well-informed at all time, can access historical information to study patterns
- iv. An officer is converted to a knowledge worker who is capable of transforming him/herself to a smart worker
- v. The public is served better
- vi. Decisions are made faster
- vii. Knowledge is created, disseminated and assured over a long period of time.
- viii. P41 forms will be online and available to ministry of roads and public works in near real-time
- ix. KRA and NTSA can ride on the model for automated revenue collection
- x. The new electronic number plates tagging can be added to the proposed structure as emerging technologies.

### **5.5.4 Challenges and barriers of implementing proposed model**

The respondents foresaw several challenges and barriers that may hinder the effective implementation of the proposed model.

- i. Information technology policy in police departments

In the current traffic department, there is no policy on use and adoption of information technology. There is a need for an IT policy which will be used to govern how information

is collected, how long it's stored, security requirements and access right. There is a need for formulation of an IT policy framework specific for implementing the proposed model.

ii. Poor staffing of specialized IT professionals

There is a shortage of information technology professionals in the police department in general. There is a need for education and training on information technologies among traffic police department.

iii. Integration of other institutions like the NTSA/KRA

There is a need for a simulation process between the different agencies as proposed in the model. This would require an establishment of a team of the different agencies to formulate a foundation for the proposed model. This team would be able to identify the processes and procedures of collecting information for the IT operations center.

iv. Financial resources allocation

A major hindrance for the adopting information technologies in the police and the traffic police departments has been a lack of financial resources. There is a need for budgetary allocations for the traffic department that allow for the implementation of information technologies.

## 5.6 Conclusions

Information communication technologies are an important resource for the present organizations. Traffic police departments around the world have adopted modern ICTs to enhance traffic policing. The study set out to determine the factors influencing adoption and utilization of information technologies in the traffic department. In terms of the information needs of traffic police, the study concludes that information on the owner of the car was a significant information resource for traffic police. The study concludes that this information was vital for traffic personnel as they would identify the owner of a vehicle and their behavior history on the roads.

The study concludes that information about factors linked to accidents was the most significant type of information that traffic police officers required in Nairobi County. The study concludes that the major information challenge facing traffic police officers was the timeliness of the information. The study concludes that although most of the information required by traffic police officers exists; it is not available to them in real time and this limits their effectiveness in controlling, monitoring and preventing traffic issues that may

arise. The study concludes that traffic police in Nairobi County are familiar with ICT and its contribution towards traffic policing. The study concludes that CCTVs have the potential to enhance traffic policing in Nairobi County.

### **5.7 Recommendations**

The study makes the following recommendations based on the study findings:

- i. The study recommends implementation of an information sharing platform between agencies to enhance traffic policing. This platform would provide information to traffic police on car ownership, driver behavior and also insurance information in real time. Information from e-citizen, Huduma centers and KRA should be integrated to the centralized IT operations center for synchronization as members of the public acquire and register for driving licenses online.
- ii. That information related to traffic police should be available to the personnel department in real time. This information platform should be available on mobile phones or mobile gadgets that traffic police may have with them in strategic locations. Traffic Policing is a highly complex, information-led activity that requires the integration of multiple data sources, often in short time frames. The sensitive nature of most information and the severe consequences of possible errors further increase the relevance of adequate design and use of ICT.
- iii. That the government should provide more funding, adequate training towards existing information technologies used in the traffic police department. There should be regular ICT technical training for serving traffic police officers. Similarly, the traffic police training colleges should also introduce a curriculum on ICT use in traffic policing while adequate funding would allow traffic department in Nairobi County to procure modern information technologies.

### **5.8 Suggestions for further study**

The study investigated the factors influencing adoption and utilization of information technologies in the traffic department. The study was limited to Nairobi County. The study further limited its scope to information needs, information challenges faced and potential technologies that can be adopted to solve these information challenges. The study recommends for a similar study around the remaining 46 counties.

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## APPENDICES

### APPENDIX A: LETTER OF INTRODUCTION

Charles Thanga  
Strathmore University, Business School  
P.O. Box 21993  
Nairobi  
0733297911  
  
cthanga@gmail.com

Date 19-May-15

Dear Sir/Madam,

RE: Request for your indulgence survey on use of information technology within Traffic department of the Kenya Police Service

For my final business school project, I am examining ***FACTORS INFLUENCING ADOPTION AND UTILIZATION OF INFORMATION TECHNOLOGIES IN THE TRAFFIC POLICE DEPARTMENT, NAIROBI COUNTY***. As a member of the traffic police department of Nairobi County I am inviting you to participate in this research study by completing the attached survey.

Thank you for taking the time to assist me in my educational endeavors. The data collected will provide useful information regarding on how ICT and modern technologies are being used in the police service and the constraints facing their use and the types of Information technologies used. If you require additional information or have questions, please contact me at the number listed below.

Thank you in advance

Sincerely

## APPENDIX B: QUESTIONNAIRE FOR TRAFFIC POLICE DEPARTMENT

I am Charles Thanga, a post-graduate student at the Strathmore University. I am undertaking a study titled: ***FACTORS INFLUENCING ADOPTION AND UTILIZATION OF INFORMATION TECHNOLOGIES IN THE TRAFFIC POLICE DEPARTMENT, NAIROBI COUNTY***

The study is meant for academic purposes. The information provided in the interviews will remain strictly confidential and anonymous. The information will be used only for the purposes of this study whose findings will be used to assist me to meet the requirements of a degree in Masters of Executive Business Administration. Your participation is highly appreciated.

### Part A: General Information

A1. What is your gender?

- Male
- Female

A2. What is your highest level of education?

- Postgraduate
- Undergraduate
- College
- Secondary
- Primary
- Others (*Specify*).....

A3. How long have you worked with this institution?

- Less than 5 years
- 6-10 years
- 11-15 years
- 16-20 years
- Above 21 years

A4. How often have you been involved in traffic operations?

- Never
- Rarely
- Often
- Many times

A5. Have you received any training on ICT use in traffic policing?

Yes

No

A6. If yes, what was the theme of the training?

.....

.....

.....

**Part B: Information needs and Information Challenges**

B1. Do you know or understand the information you require in order to do your job?

Yes

No

Not sure

B2. What information do you require in order to do your job better?

.....

.....

B3. Please rate accessibility for traffic police of needed information for operational planning

	Fully	Largely	Partly	Very little
Information about Factors linked to accidents				
Information about consequences of accidents				
Information on events/conditions when/where risks for accidents may increase				
Information about activities performed by traffic police and sanctions applied				
Feedback on the results of various approaches and activitiesB4				

B4. Please indicate to what extent these information Factors affect police operations. On a scale of 1-5 where 5= Very great extent, 4= Great extent, 3= Moderate extent, 2= little extent and 1= Not at all.

<b>Factors</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
Timeliness of information					
Availability of information					
Accessibility of information					
Accuracy of information					
Storage of information					
Capture of information					
Confidentiality of information					
Others ( <i>Specify</i> ).....					

**Part C: ICT technologies adopted and used in traffic police department operations**

C1. Are you familiar with information and communication technologies as a police officer?

- Yes
- No

C2. What information technologies have been adopted in the traffic police department?

(Multiple choices allowed)

- CCTV
- Car systems
- Border control systems
- Computer-aided dispatch
- Social Media
- Mobile Phones
- Gps
- Other (*Specify*) .....

C3. Are you trained to make use of the technologies available to the police force?

- Yes
- No

C4. Does Kenya police have access to these technologies?

- Yes
- No
- Not sure

C5. Do you use any of the information and communication technologies in your daily job?

- Yes
- No
- Not sure

C6. Have you been able to curb traffic offenses with modern technologies available to the police officers?

- Yes
- No

If no, why?

.....

.....

.....

C7. To what extent can the following potential technologies be used to enhance traffic police operations in Kenya? On a scale of 1-5 where 5= Very great extent, 4= Great extent, 3= Moderate extent, 2= little extent and 1= Not at all.

<b>Factors</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
Video-based surveillance (CCTV)					
Automatic Number Plate Recognition					
Recording/video streaming capabilities in police vehicles					
Automated traffic control systems					
Mobile data center/applications					
License plate and driver's license recognition					

**Part D: Factors influencing adoption of ICT in traffic police operations**

D1. The table below shows the perceived Factors influencing adoption of ICT in traffic police department operations. Please indicate to what extent these Factors influence this adoption. On a scale of 1-5 where 5= Very great extent, 4= Great extent, 3= Moderate extent, 2= little extent and 1= Not at all.

Factors	1	2	3	4	5
Cost					
Infrastructure					
Staff training					
Budgetary constraints					
Perceptions and attitudes					
Organizational culture					

**Part E: Constraints facing adoption and use of ICT in traffic police department operations**

E1. What is the primary reason why the police use information technology?

- Collect evidence for trial
- Curb crime
- Use for internal affairs investigations
- Improve public relations.
- Protect officers from false accusations.
- Others (Specify) .....

E2. Do you think information technologies have enhanced the improvement of the police service?

- Yes
- No

E3. Which of the information technologies do you prefer or recommend?

.....  
 .....

E4. What are the constraints facing the use of ICT in traffic police operations?

- Poor ICT infrastructure
- Inadequate training on ICT use
- Outdated ICT technology
- Lack / poor maintenance of ICT
- Other (Specify) .....

E5. To what extent do these constraints affect the operations or traffic police in their duties?

- Very great extent
- Great extent
- Moderate extent
- Little extent
- Not at all

E6. What suggestions could you make to improve ICT use in traffic police operations?

.....  
.....

E7. Any other comments on ICT use in traffic police operations that we may not have discussed?

.....  
.....

