

**INFLUENCE OF INFORMATION COMMUNICATION TECHNOLOGY ON  
SUSTAINABILITY OF THE NATIONAL SURVEILLANCE SYSTEM PROJECT: A  
CASE OF CLOSED CIRCUIT TELEVISION (CCTV) PROJECT IN NAIROBI  
COUNTY**

**BY**

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**DECLARATION**

This research project report is my original work and has not been presented to any other university or institution for any award.

Signature..... Date.....

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L50/79977/2015

This research project report has been submitted with my approval as the University supervisor.

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## **DEDICATION**

This research project is dedicated to my wife Immaculate Njeri Rebo and my two children Siana Wanjira Gitahi and Andre John Kienyere Gitahi for their continued support throughout the process.

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## **ABBREVIATIONS AND ACRONYMS**

<b>CCTV</b>	:	Closed-circuit television
<b>CEO</b>	:	Chief Executive Officer
<b>GOK</b>	:	Government of Kenya
<b>ICT</b>	:	Information Communication Technology
<b>IT</b>	:	Information Technology
<b>NACOSTI</b>	:	National Commission for Science, Technology and Innovation
<b>PMI</b>	:	Project Management Institute
<b>PPP</b>	:	Public-Private partnerships
<b>SPSS</b>	:	Statistical Package for Social Sciences
<b>TAM</b>	:	Technology Acceptance Model
<b>TRA</b>	:	Theory of Reasoned Action
<b>TMS</b>	:	Top Management Support
<b>UN</b>	:	United Nations
<b>UNDP</b>	:	United Nations Development Program

## ABSTRACT

The purpose of this study was to determine the influence of information communication technology on sustainability of the national surveillance system project in Nairobi County. The objectives of the study were to establish how ICT infrastructure influenced sustainability of the CCTV project in Nairobi County, examined how ICT competence influenced sustainability of the CCTV project in Nairobi County, assess how ICT management support influenced sustainability of the CCTV project in Nairobi County and to establish how organizational culture influences sustainability of the CCTV project in Nairobi County. The study was guided by the theory of reasoned action and the adoption approach. It adopted a descriptive research design and targeted police officers trained in the CCTV system country wide and out of the target population, the researcher sampled 93 respondents through stratified random sampling. The study was interested with the 930 officers that are front line in the day to day interaction with the security surveillance CCTV system in Nairobi. The data needed for this study was collected through a questionnaire and analysed using statistical package for social sciences (SPSS V.24) and presented through percentages and frequencies in graphical and tabular manner and also utilized inferential statistics such as correlation and regression to establish variable relationship. Findings show that ICT infrastructure in terms of availability of computers, working broadband (internet) supply, and crisis management solutions and data security highly influenced CCTV project sustainability. ICT competence was also deduced to influence CCTV project sustainability to a large extent with emphasis on skills and certifications. ICT management support also had a huge influence on CCTV project sustainability more so on aspects of financial commitment, acquisition of infrastructure and Management knowledge of ICT and organizational learning and leadership. Finally organizational culture was also found to have an influence on CCTV project sustainability to a large extent. With the most widely used being hierarchical then competitive culture closely followed by innovative culture and lastly collaborative culture. The study recommended that the government and the police force should emphasize on boosting skills of the personnel through training and testing opportunities, and should be given incentives and additional resources. To better prepare for technology careers, the study recommends the police force to encourage the unit in charge to provide coordinated IT curricula, courseware, and online collaboration tools that help personnel achieve certification in technologies. It also recommends that ICT knowledge and attitude of the top management should be fostered as this determines whether the project would be willing to adopt innovative and sustainable ICT. Lastly it is recommended that progressive culture that would enhance CCTV project sustainability to be adopted and this would happen through boosting innovative and collaborative culture.

## CHAPTER ONE

### INTRODUCTION

#### 1.1 Background of the Study

Innovation in Information and Communications Technology (ICT) is without doubt one of the most remarkable developments in recent times. Virtually, no field can claim irrelevance of ICT in any of their operations. Equally, in governance, ICT has an array of applications that enable organisations and governments to achieve various objectives. Tomar (2009) observed that information technology is one of the most effective tool in decision-making process in modern day operations. Prevalence of ICT in modern operations has often obviated its definition partly because of differences in level of usage and an assumption of its necessity. The general definition of ICT is the application of technology to coordinate various players where knowledge is created and shared seamlessly, hence reducing transactional costs while improving operational efficiencies (Carugati & Rossignoli, 2011).

The role of ICT has evolved over the past decades from a supporting, back-office function to a key function, enabler and driving force for organizations and economies. It has become a dynamic and strategic asset for the successful achievement of an entity's mission and goals. ICT is essential to managing transactions, information and knowledge necessary to achieve and sustain particular mandates and goals. Hence, economies are becoming increasingly dependent on a well-functioning ICT infrastructure (Riggins & Weber, 2016). With regards to governance, ICT is an important factor in generating value. According to the UN (2011), economies with superior ICT governance have at least 20% higher operational efficiencies than those with poor ICT governance given the same strategic objectives.

In governance, ICT data is urgent to the stakeholders in conducting 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 consider access to information relevant because it can improve the efficiency, effectiveness and quality of security surveillance (Nunn & Quinnett, 2010). Effective ICT governance is a critical factor for successful ICT operation in organizations and economies and additionally it ensures ICT is aligned to and supports strategies and mandate. To this end, the ICT governance ensures that the decision making process on ICT direction, strategy and investments are driven by entities so as to enable close alignment of ICT with the needs (Riggins & Weber, 2016). The ICT governance structure and processes guarantee the

resolution of cross-cutting priorities and requirements at all governance levels. Effective ICT governance also contributes to better harmonization and coherence with respect to ICT project management methodologies and security levels (Flanagin, 2010). This study focused on the security aspect and in particular security surveillance systems.

ICT surveillance systems are systems that enable the monitoring and exploitation of data or content that is stored, processed or transferred via ICTs, including computers, mobiles phones and telecommunications networks (Frost & Sullivan, 2011). Surveillance is used by governments for intelligence gathering, prevention of crime, the protection of a process, person, group or object, or the investigation of crime (Marx, 2015). It is also used by criminal organizations to plan and commit crimes, such as robbery and kidnapping, by businesses to gather intelligence, and by private investigators. Surveillance can be understood as a violation of privacy, and as such is often opposed by various civil liberties groups and activists. Liberal democracies have laws which restrict domestic government and private use of surveillance, usually limiting it to circumstances where public safety is at risk. Authoritarian government seldom have any domestic restrictions, and international espionage is common among all types of countries (Kelly, 2009).

There are four types of surveillance namely: Counter surveillance which is the practice of avoiding surveillance or making surveillance difficult. Developments in the late twentieth century have caused counter surveillance to dramatically grow in both scope and complexity, such as the Internet, increasing prevalence of electronic security systems, high-altitude and large corporate and government computer databases (Birch, 2005). The other is Inverse surveillance which is the practice of the reversal of surveillance on other individuals or groups e.g., citizens photographing police to prevent police brutality. Also, counter-surveillance can be also used in applications to prevent corporate spying, or to track other criminals by certain criminal entities. It can also be used to deter stalking methods used by various entities and organizations. Lastly, Sousveillance is inverse surveillance, involving the recording by private individuals, rather than government or corporate entities (Lyon, 2007).

More recently, governments and their agencies are turning toward security surveillance as a means to increase public security. With the proliferation of inexpensive cameras and the availability of high-speed, broad-band wireless networks, deploying a large number of cameras for security surveillance has become economically and technically feasible (Schmidt, 2009). The main reason for heightened security surveillance has been cited to be crime prevention,

crime resolution and crime protection. With regards to public surveillance, closed-circuit television (CCTV) and improved street lighting are the most well developed public area surveillance measures for security that are in current use. In recent years, there has been a marked and sustained growth in the use of public area CCTV world over and more so in western nations, especially in the United Kingdom and United States (Savage, 2007).

Locally, the area of surveillance is an increasingly issue of discussion, through research centres, public debates, mass media, books, and peer-reviewed academic journals. The Government of Kenya has taken various measures to diversify the economy for sustainable development and one of the major steps is to transform Kenya into a digital society. The adoption of ICT has had significant positive consequences on security and consequently on the economy of Kenya (Githaiga & Kapiyo, 2014). With regards to surveillance, in May 2014, the government announced that the partially state-owned Kenyan communications provider Safaricom had been awarded a government tender to set up a new surveillance system for the Kenyan Police following continued attacks by terrorists and increase in insecurity in the country. The system was known as the Integrated Public Safety Communication and Surveillance System. When the surveillance system was made public, it was announced that the system would cost KES 12.3 billion (approximately US\$ 140 million) (Kenya ICT Action Network, 2014).

There are two elements to the project. First, the system links all security agencies in order to facilitate information sharing and public safety activities. Secondly, it establishes a surveillance camera system consisting of 1,800 CCTV cameras nationwide. These were installed in Nairobi, the capital, and the coastal city of Mombasa and connected to 195 police stations through a secure 4G network. The system has a facial and movement recognition capacities in real time. The main organising hub for the system is a monitoring centre in Nairobi where data collected is retained and analysed. The set-up of the project in Nairobi was completed by the end of 2015 and this study focused on the Nairobi County project (Kenya ICT Action Network, 2014).

## **1.2 Statement of the problem**

Most ICT projects have failed to meet their end goal which is satisfaction of end-user needs, development within budgeted costs, implementation on time, and development in accordance with organizational standards. This is mainly because many organizations practice adhoc project implementation. This is where project implementation often takes place in a rather chaotic and haphazard manner relying entirely on a system that is unstructured (Mukoya,

2009). With this kind of development, project success is unpredictable because the implementation process is constantly changed or modified as the work progresses. Schedules, budgets, functionality and product quality are generally inconsistent. Performance depends on capabilities of individuals and varies with their innate skills, knowledge and motivations. Project success that rests solely on such a development process provides no basis for long term productivity and project sustainability (Mukoya, 2009). According to Morara and Bowen (2013), such ICT projects are marred with poor resourcing ranging from infrastructure, inadequate funding and poor staffing owing to lack of management support and poor organizational culture.

Focusing on the Kenyan context, an ICT survey, (2015) revealed that many employees in public security service are ill equipped to effectively integrate ICT due to inadequacy in ICT infrastructure, training and acquisition of sub-standard, unfit or nearly obsolete equipment for determining what they learn and how. Absence of adequate funding to purchase ICT equipment, retraining and developing requisite human capital for the whole sector, are critical indicators of technology lag and the process pace which is very slow. This may lead to all benefits of ICT integration in security surveillance un-equitably realized or not being realized in the near future (Kenya ICT survey, 2015). Such findings closely relate to an adhoc process of running projects which could be the source of poor project implementation.

Clamour around the local scenario on such projects has been on the haphazard implementation by independent agencies as there is lack of an integrated system that provides information to the relevant authorities and in this case it is the Kenya Police Force and in turn information asymmetry issues on the National government hence a weak policy framework around security (Ogalo, 2016). It is amid such a background of ICT projects poor performance rate that this study questioned the efficacy of the current CCTV project dubbed the national surveillance system project. It particularly focused on the Nairobi County project. It assessed competency needs, management support, organizational culture and ICT infrastructural needs influence on project sustainability.

### **1.3. Purpose of the Study**

The purpose of this study was to determine the influence of information communication technology on sustainability of the national surveillance system project in Nairobi County.

### **1.4. Objectives of the Study**

This study was guided by the following objectives;

- i. To establish how ICT infrastructure influences sustainability of the CCTV project in Nairobi County.
- ii. To examine how ICT competence influences sustainability of the CCTV project in Nairobi County.
- iii. To assess how ICT management support influences sustainability of the CCTV project in Nairobi County.
- iv. To establish how organizational culture influences sustainability of the CCTV project in Nairobi

### **1.5. Research Questions**

The research questions for the study were:

- i. How does ICT infrastructure influence sustainability of CCTV project in Nairobi County?
- ii. How does ICT competence influence sustainability of CCTV project in Nairobi County?
- iii. What influence does ICT management support have on sustainability of CCTV project in Nairobi County?
- iv. What influence does organizational culture have on sustainability of CCTV project in Nairobi County?

### **1.6. Significance of the Study**

The findings of the study may help the security authority to understand the factors that influence sustainability of security surveillance project and make relevant decisions. The Ministry of internal and national government coordination may use the findings to formulate the appropriate ICT policies in line with the National Security Policy. The police administration may use the findings in making decisions on the type of ICT infrastructure to acquire as well as the managerial support necessary. The security authority may find the result of the study important in developing ICT policies that would maximize the potential of ICT in security management. Lastly, the study may be important to academics and practitioners of information technology in building their knowledge base since the information provided can enhance its theory and practice and be used for future research work.



### **1.7. Assumption of the Study**

The researcher assumed that the respondents will be honest, cooperative, factual (objectivity) and trustworthy in their response to the research instruments and will be available to respond to the research instruments in time. It was also the assumption of the researcher that the authorities in the security forces would grant the required permission to collect data from employees. The study further made the assumptions that there would be no serious changes in the composition of the target population that would affect the effectiveness of the study sample.

### **1.8. Limitation of the Study**

The study was limited by time and financial constraints. The data was collected from randomly selected police station in Nairobi County. The police authority in Nairobi County had numerous similarities making the sample almost homogenous.

Getting the respondents to be interviewed during working hours was a challenge as many of them were out in the field since some of the targeted security authorities were out on duty.

There was reluctance by the respondents to give information for fear of victimization. To counter this the respondents were assured on confidentiality of the information given and also by not identifying them through names in the data collection tool.

### **1.9. Delimitation of the Study**

To mitigate the above mentioned limitations the researcher undertook the measures below.

To ensure the study could be generalized for the whole country, the researcher ensured the scope of the research was focused on information provided from the headquarters which is the main control hub as opposed to selected police stations within Nairobi County and findings were generalized to other sub-stations.

To mitigate challenge of getting respondents during working hours, the researcher ensured prior arrangement and securing of appointments prior to meeting the targeted respondents to confirm availability of respondents.

To counter the fear of victimization challenge, respondents were assured on confidentiality of the information given and also by not identifying them through names in the data collection tool.

### **1.10. Definition of Significant Terms**

**Closed-Circuit Television (CCTV):-** For purposes of this study this referred to a self-contained surveillance system comprising cameras, recorders and displays for monitoring activities for purposes of security or information sourcing.

**Information Communication Technology:-** In this study, ICT is an umbrella term that includes any communication device or application, encompassing: radio, television, cellular phones, computer and network hardware and software, satellite systems and so on, as well as the various services and applications associated with them, such as video conferencing and distance learning.

**ICT surveillance systems:-** ICT surveillance systems in this study referred to systems that enable the monitoring and exploitation of data or content that is stored, processed or transferred via ICTs, including computers, mobiles phones and telecommunications networks.

**Project: -** A project is a ‘temporary endeavor undertaken to create a unique product, service or result. A project is temporary in that it has a defined beginning and end in time, and therefore defined scope and resources. It is unique in that it is not a routine operation, but a specific set of operations designed to accomplish some goals and objectives’. In this study the same meaning shall be retained.

**Surveillance: -** Surveillance in this study was the monitoring of behaviour, activities, or other changing information for the purpose of influencing, managing, directing, or protecting people.

**Sustainability of an intervention: -** In this study sustainability was defined as the process of introducing an innovation into an organization and fostering its use for a longer period to meet the needs of future generations.

**ICT Infrastructure: -** in this study ICT infrastructures refers to components that make up information technology and communication such as network infrastructure, software applications, cloud computing/data platforms and access devices, crisis management solutions, data security infrastructure, video surveillance intrusion detection, centralized and remote command and control, scalable decision-making process, the internet and reliable broadband

**ICT Competence: -** In this study refers to observable information technology and communication’s abilities, skills, knowledge, motivations or traits defined in term of the behaviours needed for successful job performance.

**ICT Management Support:** - management support in this study refers is when a senior management project sponsor/champion, the CEO and other senior managers devote time to review plans, follow up on results and facilitate management problems. Further, that the time spent should be in proportion to the cost and potential of the project.

**Organisation Culture:** - in this study is defined as a shared set of values which is typical of the people within the society/organisation and this has a bearing on how technologies are adopted.

### **1.11. Organization of the Study**

The research was organized in Five chapters. Chapter One introduced the research and presents the statement of problem, objectives, and research questions. The chapter also showed the significance, assumptions, limitations, and delimitations, organisation of the study and definition of significant terms. Chapter Two encompassed the literature review on the various aspects concerning ICT and its sustainability on security CCTV projects and provided a link between the dependent and independent variables which is the conceptual framework. Chapter Three discussed the methodology that was used to collect and analyse data while showing the target population, the sample population and the data collection instrument. Further it brought out the validity and reliability and ethical considerations for the study. Chapter Four presented the findings, analysis and interpretation of the data collected. Finally Chapter Five provided the findings, discussions, conclusions, recommendations of the study and recommendations for further studies.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1. Introduction**

This chapter sought to explore reviews on related literature on ICT and security surveillance sustainability. The areas examined included relevant theories on the topic, empirical literature and the conceptual framework. The theories reviewed were systems approach theory and population based approach. Empirical literature looked at studies done on the subject matter in line with the objectives. Finally, a conceptual framework was engaged to bring about the relationship between the dependent and independent variables.

#### **2.2. Theoretical Framework**

Various models and theories have been used to explain ICT adoption in various initiatives. Robson (2011) defined a theory as a set of interrelated constructs, definitions and propositions that present a systematic view of phenomena by specifying relations among variables, with the purpose of explaining and predicting the phenomena. Pedersen (2003) claims that studies on ICT adoption have generally taken three possible approaches: a diffusion approach, an adoption approach and a domestication approach. The models and theories used in this study were the adoption approach and the theory of reasoned action.

##### **2.2.1. The Adoption Approach**

The adoption approach describes and explains the adoption decision of users applying different individual and social decision making theories. Three widely used models include the Technology Acceptance Model (TAM), the Theory of Reasoned Action (TRA), and the extension of TRA into a Theory of Planned Behaviour (TPB) (Pedersen, 2003). The Technology Acceptance Model (TAM) is a theoretical model that explains how users come to accept/adopt and use a technology. Original TAM was proposed by Davis in 1989. The model suggests that when a user is presented with a new technology, a number of factors influence their decision regarding how and when they will use it. This includes its perceived usefulness and its perceived ease of use. However, the TAM does not account for the influence and personal control factors on behaviour. Other factors such as economic factors, outside influences from suppliers, customers and competitors are also not considered by the TAM (van Akkeren & Cavaye, 1999). This model adopts well established causal chain of beliefs, attitude, intention, actual behaviour, which was developed from the theory of reasoned action by social psychologists.

In Davis's study, two important constructs are identified; perceived usefulness and perceived ease of use. The perceived usefulness (PU) is defined as the degree to which an individual believes that using a particular system/technology would enhance his/her performance (Davis, Foxall & Pallister, 2002). The perceived ease of use (PEU) is defined as the degree to which an individual believes that using a particular system would be free of physical and mental efforts. These perceptions predict attitudes toward the technology adoption. Then the attitude develops the intentions to use and the intentions cause actual system usage. In many recent studies regarding technology, TAM is adopted extensively. TAM was adopted and showed that it contributes to the prediction of individual usage of technology (Fishbein & Ajzen, 2006). TAM assumes that perceived usefulness ("the degree to which a person believes that using a particular system would enhance his or her performance" and perceived ease of use ("the degree to which a person believes that using a particular system would be free of effort") with the influence of pre-existing external variables being the primary determinants for adoption of a new technology. Perceived ease of use has a direct effect on perceived usefulness and both determine the consumer's attitude toward use, which leads to behavioural intention to use the system and actual use of the system (Lu et al. 2003).

### **2.2.2. Theory of Reasoned Action**

To overcome the limitations of the TAM, the TRA was introduced which is a more general theory than the TAM. The TRA model includes four general concepts namely: behavioural attitudes; subjective norms; intention to use; and actual use. The TPB is an extension of the TRA and deals with conditions where the individual has no control of their behaviour. The domestication approach focuses on the process in which technology becomes an integral part of our everyday habits. Conceptual context distinctions are applied to new phenomena. Three important distinctions include work and leisure context; end-users that belong or do not belong to a demographic group; and the private and the public. This view is dominated by sociologist researchers and are often characterised by demographic variables such as age and gender (Pedersen, 2003). Further adoption factors identified by Kirby and Turner (cited by van Akkeren and Cavaye, 1999) include: ICT literacy of small business owner, lack of knowledge of derived ICT benefits, and dependence of the small customer on supplier. Other follow-up research by Julien and Raymond (cited by van Akkeren and Cavaye, 1999) identified three other factors that include: the organisation's infrastructure sophistication; level of competency, rationality and attitude in business decision processes; and the organisation's design and perception. This makes it relevant for this study focusing on the objectives in question.

### **2.3. ICT on sustainability of CCTV Projects**

The level of interest and investment in projects that bring information and communications technology (ICT) to the developing world has skyrocketed in recent years. This trend reflects the high and ever-increasing expectations placed on ICT in terms of quality of life improvement, empowerment and economic development for the affected communities (London and Hart 2004). Numerous multinational firms, particularly in the ICT sector, have begun to recognise the economic potential represented by the four billion people occupying the 'bottom of the pyramid' Prahalad (2004) in the developing world. They are initiating ambitious projects aimed at serving and developing these markets. Yet, given the high failure rate for such ventures and the absence of a business model proven to function in such uncharted territory, the demand for an enumeration of best practices is extremely high.

Public-private partnerships (PPPs) which are agreements between private sector, for-profit businesses and developing country public sector actors are currently held in extremely high esteem by those seeking ICT solutions to development challenges (London and Hart 2004). These partnerships enjoy broad support and are promoted by governments, international organisations, non-governmental organisations (NGOs) and private firms alike. In fact, the United Nations Millennium Declaration specifically recommends the creation of PPPs to ensure that the benefits of new technologies, especially information and communications technologies are available to all (Weigel & Waldburger, 2014). Because there are numerous potential benefits in public-private partnerships like increases in efficiency, financial resources, human capital, technology, market access, and technical expertise, as well as the ability to scale projects these partnerships are coming to be seen as the most efficient method for bridging the digital divide. Whether the reality matches the potential and whether the projects become sustainable and scalable is, however, another issue deserving analysis.

It is acknowledged that in any project, sustainability is vital and ICT related projects are not an exception. Sustainability is without doubt one of the most important challenges of our time and the immediate future. The recent world crises makes clear that a strategy focused on unlimited shareholder value is in the long term not successful, not even from a financial point of view. Sustainability in the context of sustainable development is defined by the World Commission on Environment and Development (1987) as forms of progress that meet the needs of the present without compromising the ability of future generations to meet their needs. This broad definition emphasizes the aspect of future orientation as a basic element of sustainability. According to Labuschagne and Brent (2006) when considering sustainability in projects, the

total life cycle of the project e.g. initiation-development-execution-testing-launch should be taken into account. But not just the life-cycle of the project is relevant. The project will produce a result, being a change in assets, systems, behaviour, etc. The result should also be considered over its full life cycle. And even another level further, also the life cycle of the product or service that the intervention produces should be considered.

Scholars noted that for ICTs to be sustainable, they require an enabling environment of strong political commitment, a liberalized telecommunications market, appropriate information infrastructures, participation of the private sector and non-governmental organizations (NGOs), capacity building, and the addressing of deeply-engrained socio-cultural barriers to achieve specific development objectives (Proenza, 2001; UNDP, 2004). This study will adopt UNDP (2007) parameters for security surveillance. Good practice regarding the use of security apparatus is based on the concept that providing security and respecting human rights can and should be consistent. This translates into implementation of policies and practices that ensure security provision is carried out responsibly, with any response being proportional to the threat. Proactive communication, community engagement, and grievance redress are central to this approach, often through collaboration between security and community relations departments (UNDP, 2007).

Security issues, while intersecting with environmental and social aspects in other performance standards should primarily cover community Health, Safety, and Security. This particular framework encompasses the following: Assessing the security risk the surveillance system operations may have or could create for communities, develop ways to manage and mitigate these risks, manage security issues responsibly, engage with public security and consider and investigate any security infringement. According to UNDP (2007) key principles that should guide a sustainable security surveillance system should provide interconnections that make the link between security and community relations. The system should ensure community engagement as to coordinate with community relations and ensure grievance mechanisms are in place. Security surveillance should be one that considers human rights in that providing security surveillance should be consistent with respect for human rights. The principles further denote that use of surveillance should ensure proportional responses. This is to mean use of surveillance should be defensive and preventive only. This study adopted these principles of sustainability for the security surveillance project in Nairobi County.

#### **2.4. ICT Competence and CCTV project sustainability**

Researchers have found that the level of an individual's knowledge of ICT directly affects the adoption of any given technology that is presented to the individual. End users who have an acceptable level of ICT knowledge are more likely to encourage ICT adoption and use in their companies (Teo & Ranganathan, 2004). A higher level of appreciation of ICT benefits by key stakeholders will directly influence considerations for further ICT adoption (Montazemi, 2006). Competencies are defined as observable abilities, skills, knowledge, motivations or traits defined in term of the behaviours needed for successful job performance. They are what is needed to get the job done. Adoption and use of ICT in security surveillance requires skilled staff and visionary leadership. Key stakeholders need to be knowledgeable about the potential that ICT presents in security surveillance and crime prevention. Where this knowledge is lacking, policies formulated by government and investments made towards implementation of ICT in the security sector, frequently miss opportunities to realize the desired reforms (Higgins & Moseley, 2011). Investment and planning for training ICT personnel seems to be treated as an additional cost rather than as an essential level for changes in surveillance and general security.

A major challenge identified in many developing countries regarding adoption and use of ICT in security is that there is no enough staff, and where there are, they are most likely IT professionals without any education experiences, skills, and/or qualifications. To effectively harness ICT for security purposes requires sustained investments in supporting personnel training in order to create new learning environment (Jimoyiannis, & Komis, 2007). Security officers play a critical role in implementation and use of ICT as they are at the centre of security management, implementation and innovation at public level. However, the security sector face a challenge of shortages of ICT staff and other IT professional that support adoption and use of it for surveillance. The sector continues to lose well trained ICT personnel to private sectors which seem to pay higher salaries (GOK, 2010).

According to Microsoft's White Paper (2014), ICT skills are vital to enabling individuals and organizations to leverage the full potential of information and communication technologies. Yet in many parts of the developing world, relatively few users have the skills to utilize ICT effectively. Fewer still have the expertise to develop ICT products or provide critical IT services. A shortage of skilled ICT workers will make organizations and economies reluctant to invest in ICT, thereby curtailing demand for domestic ICT products and services and leaving fewer opportunities for entrepreneurs and domestic ICT firms. A chronic shortage of skilled



ICT workers will impair a country's competitiveness not only in the ICT sector – one of the fastest growing areas of the global economy – but in many other more traditional sectors as well. To address these problems, policymakers, development organizations, and industry should work collaboratively on the following initiatives: 1). Provide incentives for ICT education and training at all levels. Institutions should offer ICT skills training and testing opportunities, and should be given incentives and additional resources for providing ICT skills training. ICT retraining and lifelong learning programs are also critically important to ensure that workers have the opportunity to strengthen their IT skills and thereby become more employable and productive. 2). Establish specialized certified training programmes for IT professionals and developers. The field of information technology (IT) covers all aspects of managing and processing information. IT professionals design, develop, support and manage computer software, hardware and networks. To better prepare for technology careers, governments should encourage institutions to provide coordinated IT curricula, courseware, and online collaboration tools that help personnel achieve certification in technologies. In addition, governments should encourage the private sector to establish certified training and testing centres to certify IT professionals.

Previous studies Mutula & Van Brakel (2007) emphasized the importance of skilled ICT personnel within the organisation or from outsourcing firms to assist in deploying and using ICT. Scupola (2010) found in his study of SMEs based in Britain that ICT adoption in the SMEs that participated in his research was enhanced when the SMEs had the services of employees who had the skills and knowledge in regards to ICT. Previous research has shown that organizations are increasingly depending on the skills their employees acquire during their career, and it is important for these organizations to be aware of their employee's knowledge and skills especially in regards to information technology (Cragg, 2002). Reynolds, Savage and Williams (2004) in their research found that top managers are less likely to adopt ICT if their employees are not familiar with the common ICTs used in the work place. This occurs because the institution may not be in the position to hire or train employees so that they may acquire the skills and knowledge needed to aid the company adopt and use ICT. The lack of suitable skilled employees and managerial staff with sufficient ICT knowledge is a significant factor that determines the implementations and use of ICT (MacGregor 2006). Allison (2009) found that when companies have skilled and knowledgeable employees their ability to adopt and use ICT increases, thus leading to successful adoption of ICT in their organizations. In Kenya, Chelubashi (2011) argues that lack of ICT competence may result in organizations not

understanding the potentials which technologies and specifically CCTV to enhance security can provide in the areas of efficiency enhancement and productivity. The study concludes that ICT competence has a positive influence on an organisation's inclination to adopt ICT generally.

## **2.5. ICT Infrastructure and CCTV project sustainability**

According to Singh, Das, and Joseph (2007), ICT infrastructure and governance facilitates the supply of e-government, and human capital stimulates the demand for ICT projects and e-government in a country. There is an opportunity to derive productivity and other benefits from an intelligent ICT infrastructure built on the pervasive computing paradigm. Furthermore, there is a need to protect investments already made in the existing ICT infrastructure (Gupta and Moitra, 2004). For instance, developing a security system based on the ICT infrastructure has played as a bedrock role. Internet allows access to multiple services, as a foundation to support the digital broadcast systems to apply a global digital network. It is a government's responsibility to determine the quality and quantity of the telecommunications networks to handle the new traffic resulting from the use of these new services' level of service quality (Wanga, Caob, Leckiea and Zhang, 2004). Khanh (2011) in his research hypothesizes that ICT infrastructure affects e-Government adoption positively.

According to Government of Kenya ICT policy (2005), inadequate ICT infrastructure has hampered provision of efficient and affordable ICT services in the country. There is therefore need to put more emphasis on provision of support infrastructure, such as, energy and roads, supporting software development, promotion of local manufacture and assembly of ICT equipment and accessories and further provision of incentives of ICT infrastructure. Telecommunication infrastructure is also a major issue that stands as an impediment to access of information, most people are not able to access digital information due to lack of the necessary infrastructure (GoK, 2007). This has left a bigger part of the population unable to access the digital information hence discouraging the adoption of ICT thus widening digital divide between developed and developing economies as well as between haves and have not, setting classes and levels of learning institutions rather than sink poverty levels and narrow economic gaps (ICT Authority of Kenya, 2014).

According to International Telecommunication Union's (2016) view on smart cities surveillance, such infrastructure entails ICTs specific to smart sustainable cities in that in addition to traditional ICT infrastructures such as network infrastructure, software applications,

cloud computing/data platforms and access devices the government could look into building automation, crisis management solutions, data security infrastructure, video surveillance intrusion detection, centralized and remote command and control, scalable decision-making process, the internet and reliable broadband.

Ghani and Said (2010), studied the practice of digital reporting among Malaysian local authorities. Their findings show how the lack of ICT facilities in these contexts is a deterring factor hindering adoption. In the specific case of telework, Unguream (2007) pinpoints that technological factors such as the capacity of the telephone network, connection and transfer speed, liberalization of the telecom market, and ease of use may be conducive to such innovations. However, this is not always translated into public policy. Kyriakidou et al. (2012) argue that while the European Commission has issued a number of policy documents aimed at fostering an information society and e-government, it has recently realized that a set of complementary measures was needed in order to facilitate a wider adoption of broadband services, such as the implementation of broadband networks. Other studies refine the notion that household access to the Internet is associated with higher demand for e-government services. In their study on the adoption and diffusion of e-disclosure laws, for example, McNeal et al. (2007) argue that the service or policy has to be salient among the general public if we are to expect that a higher rate of Internet access translates into higher demand. This is connected to the issues of ICT literacy and need-based demands mentioned before.

## **2.6. Management support and CCTV project sustainability**

The importance of top management support (TMS) has long been recognised in the ICT literature. TMS is generally promoted as being inherently good but there is clear evidence that too much TMS can be dysfunctional and lead to failure. A sufficient definition of top management support (TMS) is when a senior management project sponsor/champion, the CEO and other senior managers devote time to review plans, follow up on results and facilitate management problems (Brynjolfsson & Yang, 2006). The definition adds that the time spent should be in proportion to the cost and potential of the project. This is interpreted to imply that a project sponsor should spend more time on these activities, and the CEO and the other senior managers should make enough time to be aware of the project status and to intercede as necessary (Silvius, 2004).

With regards to ICT, top management support of ICT factor refers to owners and top management level of ICT knowledge and skill, education their willingness to adopt ICT and

their perception of ICT in relation to how it can help their companies gain a competitive advantage. According Chuang, Rutherford, and Lin (2007) research, support given by owners and top managers in regards to ICT adoption, is important for the successful adoption of ICT, thus a highly skilled and knowledgeable management is more likely to adopt ICT systems. Wojtkowski and Hardesty (2001) in their study revealed, that successful implementation of ICT initiatives within organizations, highly depend on their key managers being knowledgeable of new technological trends. Other studies especially in developing economies have cited the importance of key managers and owners having basic knowledge of ICT (Silvius, 2004).

In a study carried out in Indonesia, to ascertain the factors that drive adoption of ICT within SMEs, it was found that the level of ICT knowledge and attitude towards ICT of the owners of the companies, would determine whether that organization would be willing to adopt ICT (Utomo & Dodgson, 2001). In a study done by Caldeira and Ward (2002), the research found that companies that had found success in adopting ICT systems and infrastructure, had top management who were willing to adopt new systems to improve work output, or had partnered with an IT firm that offered consulting services and managed their ICT infrastructure. There exists plenty of research that shows the importance of owner and top management support to the successful implementation of ICT systems (Al-Qirim, 2004).

Owner and top manager factors relate to executive decisions that the owner or top manager must make, what financial commitments to commit to relating to the overall vision of the company or institutions, acquisition of new ICT infrastructure, whether the entity must consider ICT adoption or not, their knowledge and appreciation of ICT and new technological developments. This could be expected since the owner or top manager is the catalyst of all business undertakings in the company (Thong et al., 1995). The problem comes when the manager is reluctant to push for ICT adoption and developments. A well informed owner and or manager usually transform the project's objectives to grow the initiative further (Brynjolfsson & Yang, 2006). Where the owner or manager tends not to appreciate the value of ICT systems and applications, there is stifled development (Brynjolfsson et al., 2006). Previous studies have further shown that a combination of owner or top manager perspectives and attitudes towards ICT adoption and use, play an important role in the development of internal ICT competencies, and provide an important contribution to the development of an environment that enables ICT adoption and use in our case it is the security surveillance system (Caldeira and Ward, 2002).

Not surprisingly, the role of management is critical from a multitude of perspectives. Mulgan and Albury (2003) emphasize the importance of middle management as knowledge engineers as well as all people within the organization that act as knowledge intermediaries (Behn, 2008). In this intermediation, public managers have to bring specific competences that go beyond pure ICT skills because of the organizational impact of innovation (e.g. Hunnius and Schuppan, 2013). Such an organizational attitude has also been defined as organizational learning (Kim et al., 2007), which is also a key driver for the success of initiatives (Kassim and Hussin, 2013). As suggested by Walker (2013), organizations that promote internal interaction and collaboration will foster organizational learning and have a positive effect on the adoption of innovation. In this sense, interpersonal skills, clear responsibilities, and sound governance mechanisms are mentioned as important factors for favoring innovation (Janssen, 2012).

In addition to organizational learning, a proper leadership style can also be supportive by way of the clear definition of goals and strategies (Whitmore & Choi, 2010). The elements that foster motivation and the skills of internal actors are incentives for efficiency and readiness for innovation (Korteland & Bekkers, 2008). The issue of organizational leadership deserves specific attention. Because of the nature of public organizations, political leadership is a strong determinant of adoption as well as managerial leadership (Furuholt & Wahid, 2008). Expounding this view, Nasi and Steccolini (2008) observe that the adoption of accounting reforms by Italian local governments was strongly driven by the leadership of both chief financial officers and political administrators. Yet, a clear distinction between administrative and political responsibilities is necessary for the successful adoption of innovation (Ask et al., 2008). In a nutshell, organizational learning (e.g. solid training activities) and credible leadership are key drivers of adoption, diffusion and up scaling hence top management support.

## **2.7. Organizational Culture and CCTV project sustainability**

Another factor that contributes to the use or lack of use of ICTs is culture. System designers need to understand or undertake a systematic study of the organization and country within which the system will be implemented. Supporting this, Haliso (2011) opines that culture is a strong factor that dictates if technology will be accepted or not accepted. The challenge goes to system planners and programme writers to consider the local way of thinking, cultural setting, level of education and awareness. Culture may have different levels of analysis. It can be analysed as functional, professional, organizational, industrial, regional and national (Haliso, 2011). Tully (2013) states that the environment where one grows up can determine his or her ability to fully use modern technologies. Those introduced to technology at early age

tend to be more comfortable using any technology without any hindrances thus a positive influence towards their level of performance. However, the same cannot be said when it comes to the older generation who schooled and obtained their academic qualifications without sighting a computer. Some of these do occupy key positions in administration and find it very difficult to even think of an innovative way of doing things (Haliso, 2011). Others feel that the introduction of computers in the systems will threaten their positions and source of livelihood as a result.

In developing countries, most dominant cultures hinder them from adopting ICT. Punnett and Ricks (2010) define societal/organisational culture as a shared set of values which is typical of the people within the society/organisation and this has a bearing on how technologies are adopted. Tarafdar and Vaidya (2006), comment that the challenge for managers is to cultivate an organisational culture that supports innovation. According to them, studies suggest that the core values of a firm can influence the firm towards choosing a particular strategic alternative or technology. Singh (2008) states that culture and cultural fit are more important in smaller organisations. This is because smaller firms have the likelihood of being entirely enveloped in one culture whereas in large organisations several cultures may be present. Discussions on new and innovative ideas within smaller firms have a positive influence on managers in terms of developing and adopting applications of new technology (Apulu & Latham, 2009).

Tharpe (2014) in his study brings out different types of organizational culture that a firm could adopt namely; innovative culture whereby this type of culture promotes creativity and has a business-like approach to work. Members of staff are encouraged to be inventive even where risks are obvious. This type relies on business process transformations and challenges. There is then the collaborative culture which is an open and friendly place to work where people share a lot of themselves. The environment created with the culture type is that of a family. Members of staff are loyal to the employer while the leaders play the role of advisors. Processes are familiar to all and have been the same over the years. Change is rare.

The hierarchical culture which is the other type of culture focus on coordination of processes; Functions are carried out within organized structures and use of policies is depended upon to give guidance. Procedures that provide high performance results and are stable and efficient are the main objectives of this culture type (Zheng, 2013). There is also the competitive culture where members of staff compete and seek to meet organizational objectives in a highly

competitive manner. The organization depends and enjoys high reputation and success in their market environment putting emphasis on competitive costs and being the corporate leaders.

## **2.8 Conceptual Framework**

According to Donald (2016) a conceptual framework is a diagrammatical representation of dependent variables and independent variables. Mugenda and Mugenda (2003) defined an independent variable as a variable that the researcher manipulates in order to determine its effect or influence on the dependent variable. A dependent variable is caused by the independent variable and indicates the influence arising from the effects of independent variables (Mugenda & Mugenda, 2003). The independent and dependent variables were linked in the following framework. The conceptual framework of this study engaged ICT competence, ICT infrastructure, management support and organizational culture as brought out in the literature reviewed both general and empirical. This formed the independent variables. Sustainability of CCTV project constituted the dependent variables.

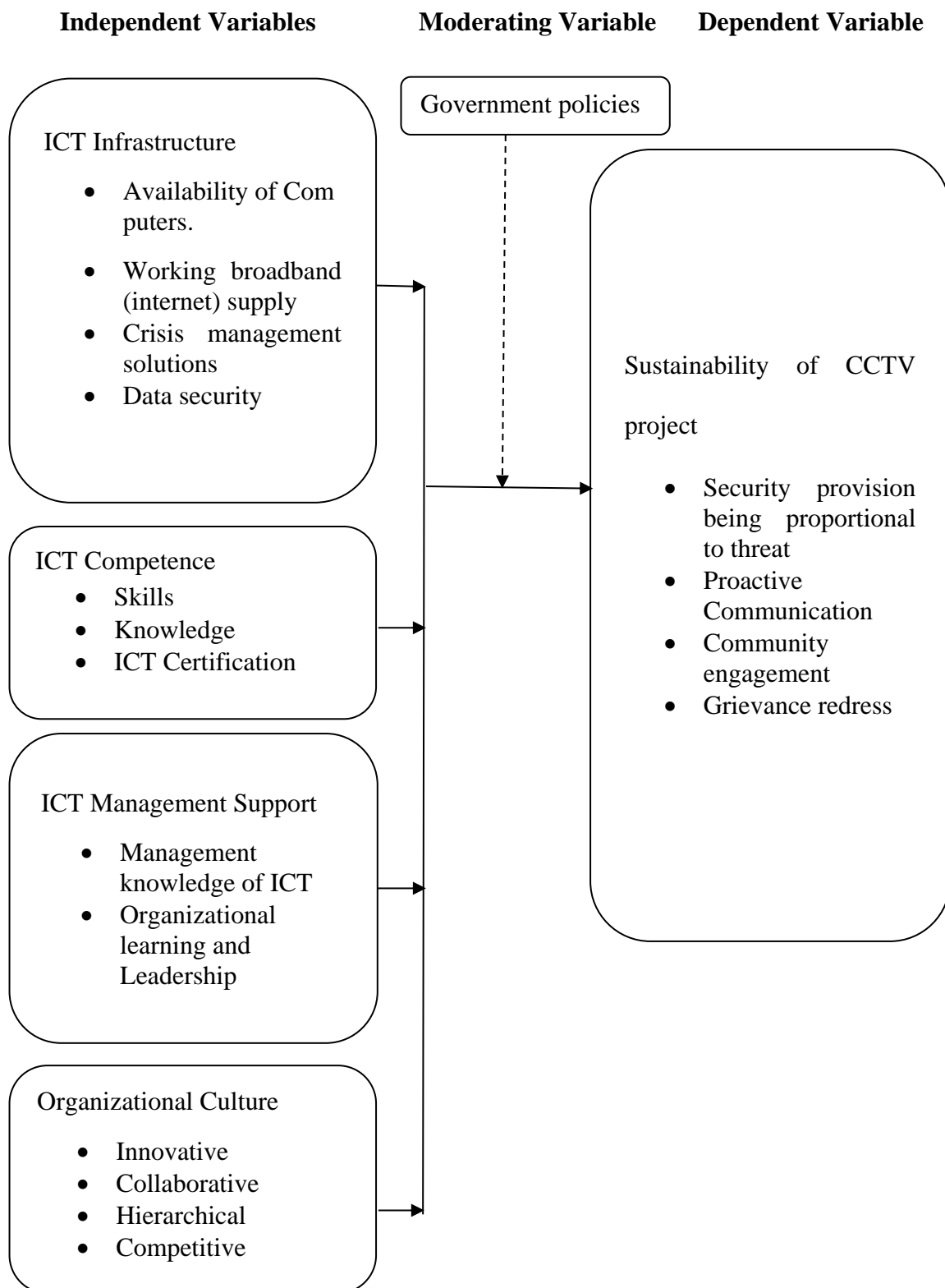


Fig 1: Conceptual Framework



## **2.9 Summary of Literature Review and Knowledge Gaps**

The increasing digitization and connectedness of our world has revolutionized the way we communicate, work, live, learn and play. With rapid urbanization and the global drive towards building smarter cities, Info-Communication Technology (ICT) solutions now play an ever increasing role in almost every aspect of our lives, transforming the way governments and enterprises deliver their services at an unprecedented rate. Information technology (IT) will play a critical role in strengthening Kenya's National security against potential future attacks (Ogalo, 2016). Specifically, IT will help enable the nation to identify potential threats, share information more readily, provide mechanisms to protect the nation, and develop response capabilities. IT offers great possibilities for the welfare and health and safety of people. In order to use all the benefits of this great technology, special care should be taken of a number of challenges such as mobile security and secure identification.

The aim of literature review was to provide an in depth review of academic research on themes of the study. This chapter gave an elaborate discussion of ICT parameters and how they relate to project sustainability alongside the relevant theoretical and conceptual framework.

Information and Communication Technology (ICT) has been promoted as being able to increase the efficiency and effectiveness of work. There are also signs that the pervasive use of ICTs are globally leading to the transformation of some societies to a new kind of society which is the information or knowledge society (Unwin, 2009). As ICTs become more pervasive, it seems logical that it should be used to influence development strategies. Statements have been made that ICTs can be used in so-called "leapfrogging" strategies of development, where intermediate stages of industrialization are skipped in order to reach the information society (Toyama, 2011). In spite of increasing criticism of such "leapfrogging" strategies, a multitude of ICT projects have been launched concurrent with the growth in prominence of ICT on worldwide policy agendas during the late 1990s (Kaur & Sharda, 2014). However, many of these projects have failed, and the sustainability of ICT initiatives is a problem with few success stories.

In reaction to this, many different approaches to ICT in security management have been developed, each with its own set of sustainability challenges. Most studies done on ICT and sustainability focus more on cyber security and ICT adoption on business entities; for instance researchers such as Zaworski, (2015) have undertaken studies around the factors that influence adoption of ICT by SMEs in the developed world. Yousaf, (2016) did a study to understand the impact of internal factors such as perceived usefulness, ease of use and cost of deployment

on adoption of ICT among banks in the developing world and particularly Kenya. This research study, therefore, aimed at reducing this knowledge gap acknowledging disconnect between adoption of ICT on security surveillance and particularly focusing on a County project.

This study was timely as it came amidst uproar of too much commercial and political interest in government projects. Others feel that technology alone is insufficient to counter insecurity. They argue that the government should sort out the basics and invest in police reforms, attitude and behaviour change, police communication, police coordination and response to crime, anti-corruption measures, forensics, and effective prosecution of cases (Githaiga & Kapiyo, 2014). It is amidst this realization that the current study aimed to investigate influence of information communication technology on sustainability of security surveillance project with focus to security surveillance camera, Nairobi County.

## CHAPTER THREE

### RESEARCH METHODOLOGY

#### 3.1. Introduction

This chapter of the study covered the research approach the study adopted including the research design, how the data was collected, the rationale behind the methods and the validity and reliability of the chosen research methods. It provided a description of the methodology the researcher used.

#### 3.2. Research Design

According to Cooper & Schindler (2003) a research design is a framework for specifying the relationship among the study's variables and outline procedures for every research activity ranging from sampling procedures to data collection to analysis and presentation of findings. There are several designs that can be undertaken in research design, these include: exploratory, descriptive, causal, experiments, survey and case study (Bless, Smith, & Kagee, 2008). The study adopted a descriptive survey design because the main purpose of this study was to obtain a general overview of the CCTV project regarding aspects related to its sustainability.

Descriptive survey is a research enquiry and its purpose is the description of the state of affairs as it exists at the present since the researcher has no control over variables and can only report what is happening (Kothari, 2008). According to Burns and Grove (2003), descriptive research is designed to provide a picture of a situation as it naturally happens. It may be used to justify current practice and make judgment and also to develop theories. The purpose of descriptive research is to observe, describe and document aspects of a situation as it naturally occurs (Mugenda & Mugenda, 2003). It does not look for any two specific relationships, nor correlate two or more variables.

#### 3.3. Target Population

A population entails all items in a field of research. Mugenda and Mugenda (2003), define a population as being made up of the entire group of people or items a research is going to be carried out on before a sample size is selected. The population however must be carefully chosen and defined in order to come up with best results. This is due to the fact that a population that does not have characteristics of the study will lead to different results. A target population is a set of units that have observable characteristics which will be used to generalize the results of the study (Mugenda & Mugenda, 2003). Thus, the target population defines those units for

which the findings of the survey are meant to generalize. This differentiates it from the population which is the whole population the study is interested in. The target population for this study was the 930 police officers trained in the CCTV system country wide (IPOA, 2016). In particular, it targeted the following directorates; command, control and communications, human capital development, operations and police reforms. The target population table was as below

*Table 3.1: Target Population*

Strata	Target Population	Percentage
<b>Command, control and communications</b>	256	27.6
<b>Human capital development</b>	134	14.9
<b>Operations</b>	390	42.1
<b>Police Reforms</b>	146	15.4
<b>Total</b>	<b>930</b>	<b>100</b>

Source: IPOA (2018)

### 3.4. Sample Size and Sampling Procedure

#### 3.4.1. Sample Size

A sample is a representation of the population. The study is only interested with the officers in the 195 police stations that are front line in the day to day interaction with the security surveillance CCTV system in Nairobi. Out of the 930 police officers trained in the CCTV security surveillance system in Nairobi, this study selected 10% of those as the sample size to make 93 respondents from the directorates in the police force namely; command, control and communications, human capital development, operations and police reforms departments (IPOA, 2016). This was in line with Mugenda and Mugenda (2008) who support that a sample size between 10% and 30% of the population is representative enough to support the study.

The sampling frame was as below

*Table 3.1: Sample size*

Strata	Target Population	Percentage	Sample
<b>Command, control and communications</b>	256	10	26
<b>Human capital development</b>	134	10	13
<b>Operations</b>	390	10	39
<b>Police Reforms</b>	146	10	15
<b>Total</b>	<b>930</b>		<b>93</b>

Source: IPOA (2018)

### **3.5. Sampling procedure**

This section outlined the methods used to select the respondents relevant for this study.

A sample is a representation of the population. It is also defined as a subset of the population under the study. A good sampling in research for an entire population can be accurately done by collecting data from a small portion of the entire population and the results obtained from the sample could be generalized for the whole population. This study employed probability sampling and specifically stratified sampling. Stratified random sampling is possible when it makes sense to partition the population into strata based on a factor that may influence the variable that is being measured. Stratification enabled the researcher get views from all key sub-groups which are the directorates in the police force namely; command, control and communications, human capital development, operations and police reforms departments.

With stratified sampling one should partition the population into groups (strata), obtain a simple random sample from each group (stratum) and collect data on each sampling unit that was randomly sampled from each group (stratum). The method works best when a heterogeneous population is split into fairly homogeneous groups. Under these conditions, stratification generally produces more precise estimates of the population than estimates that would be found from a simple random sample.

### **3.6. Data Collection Instruments**

Data collection instruments according to Cooper and Schindler (2003), are tools used for gathering empirical evidence in order to gain new insight about a situation and answers questions that prompt the undertaken research. This study used questionnaires to collect primary data.

Questionnaires are a series of written questions on topics about which respondent's views or perceptions are sought (Mugenda & Mugenda, 2003). Chandran (2004) explains that open-ended questions or unstructured questions are those for which alternatives are not provided while close-ended questions or structured questions provide alternatives for the respondents to choose from. The questionnaires in this study used both open and closed ended questions.

### **3.7. Pilot Test**

The data collection instruments used in this study needed to be pre-tested for efficiency. Pilot testing was conducted to detect weakness in the data collection instruments and procedures that were used to carry out the study. As Mugenda and Mugenda (2003), argue, pilot testing of tools helps the researcher assess the efficiency and enhance clarity of the instruments and their use.

Cooper, Donald & Schindler, (2003) further explain that pre-testing allows errors to be identified and corrected. It also acts as a tool for training the research team prior to the actual data collection time. This study pilot tested the questionnaire in at least 10% of the sampled population to make 9 respondents as supported by Kothari (2004). Care was taken not to include the pilot test results in final data computation as they were only for purposes of streamlining the research instrument.

### **3.7.1. Validity of the Instruments**

Validity is the degree to which an instrument measures what it purports to measure. It estimates how accurately the data in the study represents a given variable or construct in the study (Kimberlin, 2008). Content validity of the research instrument was established through careful definition of the research on the basis of the reviewed literature. In addition, opinion was sought from experts in the field of inquiry especially the supervisors and lecturers in the faculty. The suggestions made facilitated the necessary revision and modification of the research instrument thereby enhancing its validity. As a result, from the outcome of the experts, the following amendments were made on the research instruments:

For Section B, the parameters being assessed were amended to include more objective oriented items in line with the research questions while for Section C Double-barrelled questions were identified, and the informal fallacy was amended. Section D had ambiguous, hanging statements which were amended. Finally for sSection E which had Non-value adding parameters to the study were amended and some content incorporated into previous items that tied in together with the variables in those sections. Also, the alignment, formatting and font was appropriately adjusted to conform to required standards.

### **3.7.2. Reliability of the Instruments**

Reliability is the tendency towards consistency (Shenghverzy, 2003) and therefore, different measures of the same concept or the same measurements repeated over time should produce the same results (Treiman, 2009). Reliability was increased by including many similar items on a measure, by testing a diverse sample of individuals and by using uniform testing procedures. Data from the pilot test was utilized to update the data collection tool. Cronbach's alpha based on internal consistency was calculated using SPSS to establish the reliability of the survey instrument. A reliability analysis was carried out to measure the extent to which the indicators were without bias. For ease of using the tool the constructs were tested separately. Findings are displayed in Table 3.2.

Table 3.2: Reliability Analysis

Variable	Cronbach's Alpha
ICT Infrastructure	.791
ICT Competence	.856
ICT Management Support	.794
Organizational Culture	.832

The Cronbach's Alpha values lie between .79 and .85: an indication that the internal consistency of the items under measurement were considered to be good. The results are consistent with Field (2009) who contends that Cronbach's alpha value that is at least 0.70 suffices for a reliable research instrument.

### 3.8. Data Collection Procedures

The questionnaires were administered to respondents with the help of a research assistant. The research assistant started by explaining to all participants in the study the role they were expected to play and the importance of providing honest information through a cover letter forwarding the questionnaire. The research assistant also assured the participants that the information they gave would be treated with strict confidence. An envelope marked "questionnaire" and thesis topic was provided so that once the respondent completed the questionnaire, they sealed it to ensure confidentiality was maintained and guarded against potential victimization from any quarters. The research assistant also ensured respondents had adequate time to complete the questionnaires. The questions contained sub-headings where necessary to guide the respondents respectively.

### 3.9. Data analysis Techniques

Data analysis according to Bless et al., (2008), is the process of organization, manipulation and interpretation of data collected. Cooper and Schindler (2003) argue that data analysis involves reducing accumulated data to manageable size, developing summaries, looking for patterns, and applying statistical techniques such as tables, charts, and percentages. Data analysis for this study integrated qualitative and quantitative methodology in order to derive meaning from the data collected. The data was analyzed using statistical package for social sciences (SPSS V.24) and presented through percentages and frequencies in graphical and tabular manner.

### 3.9.1. The Multiple Regression Analytical Model

The study will also engage a regression analytical model to establish the link between the dependent and independent variables as below:

$$(Sustainability\ of\ CCTV\ project = \beta_0 + \beta_1(ICTinf)_1 + \beta_2(ICT\ Comp)_2 + \beta_3(TMS)_3 + \beta_4(ORG.\ CULT)_4 + Error\ Term)...$$

Where:

Sustainability of CCTV Project = Depicts the dependent variable measured in terms of:

- Security provision being proportional to threat
- Proactive Communication
- Community engagement
- Grievance redress

ICT Inf = ICT infrastructure

ICT Comp = ICT competence

TMS = Top Management Support

Org. Cult = Organizational Culture

### 3.10. Ethical consideration

Ethics are beliefs and rules about what is right and wrong. According to Freaedrich and Ferrell (2008), research ethics emphasizes on determining what is right and wrong during the research period. The goal of ethics in research is to ensure that the researcher follows the right procedure in the collection and, analysis of data and recommendation of the research findings. Value and judgment plays a critical role when one makes ethical decisions during the research process (Ferrell, Freaedrich, & Ferrell, 2008). However; unethical activities are pervasive and include violating none disclosure agreements with the parties who provide data to the researcher, breaking respondents confidentiality, misinterpretation of results, deceiving people and avoiding legal liability. It was made clear to the respondents that the participation was voluntary and that the respondents are free to decline or withdraw any time during the research period. No identification was required from the respondents to avoid tracing the answers to



individuals. The researcher assured the respondents of confidentiality by stating that the research was only for academic purposes. The researcher also sought permission from the relevant authority such as the Kenya Police and the National Commission for Science, Technology and Innovation (NACOSTI) which is the body that accredits research institutes and approve all scientific research in Kenya.

### 3.11. Operational Definition of Variables

This section defines the variables in specific ways in which they will be measured in this study.

Details are provided in table 3.2.

*Table 3.3: Operational definition of variables*

Objective	Variables	Indicators	Measurement Scale	Method of Data Collection	Data Analysis
To establish how ICT infrastructure influences sustainability of security surveillance project in Nairobi County.	ICT infrastructure on sustainability	<ul style="list-style-type: none"> <li>No. of Computers.</li> <li>Proof of a working broadband supply</li> <li>Proof of Crisis management solutions</li> <li>Evidence of Data security</li> <li>Presence of a Centralized and remote command and control and CCTVs</li> </ul>	Ordinal scale	Questionnaire	Descriptive statistics. Percentages Frequencies Correlations
To examine how ICT competence influences sustainability of security surveillance project in Nairobi County.	ICT competence on Sustainability	<ul style="list-style-type: none"> <li>Evidence of Observable abilities</li> <li>Evidence of Skills</li> <li>Evidence of CCTV project Knowledge</li> <li>Proof of ICT Certifications</li> <li>Proof of Motivations and trainings on CCTV Surveillance project</li> </ul>	Ordinal scale	Questionnaire	Descriptive Statistics Percentages Frequencies Correlations
To assess how ICT management support influences sustainability of security	ICT management support on sustainability	<ul style="list-style-type: none"> <li>No. of Tech savvy in management</li> <li>Frequency of Financial commitments towards CCTV project</li> </ul>	Ordinal Scale	Questionnaire	Descriptive Statistics Percentages Frequencies Correlations

surveillance project		<ul style="list-style-type: none"> <li>• Frequency of acquisition of ICT infrastructure</li> <li>• Demonstrable Management knowledge and appreciation of ICT</li> <li>• Demonstrable Organizational learning and Leadership.</li> </ul>			
To establish how organizational culture influences sustainability of the CCTV project in Nairobi	Organizational culture on sustainability	<ul style="list-style-type: none"> <li>• Demonstrable CCTV project Innovation</li> <li>• Proof of Collaborative culture in CCTV project</li> <li>• Demonstrable Hierarchical culture in CCTV project</li> <li>• Evidence of Competitive culture in CCTV project</li> </ul>	Ordinal scale	Questionnaire	Descriptive Statistics Percentages Frequencies Correlations
To determine CCTV Project sustainability	Project sustainability	<ul style="list-style-type: none"> <li>• Proof of implementation of policies enacted for sound security provision in CCTV project</li> <li>• Evidence of proactive communication in CCTV project implementation</li> <li>• Evidence of community engagement in CCTV project</li> </ul>	Ordinal scale	Questionnaire	Inferential statistics Percentages Frequencies Correlations Regression

## CHAPTER FOUR

### DATA ANALYSIS, PRESENTATION AND INTERPRETATION

#### 4.1. Introduction

This chapter presents the summary of the analyzed data. The results are presented based on the objectives of the study with the aim of determining the influence of information communication technology on sustainability of the national surveillance system project in Nairobi County. The findings are presented in this section in form of percentages and frequency distributions, mean and standard deviations. An analysis of the variables and model estimates are presented in this chapter. The analysis of the findings is based on the specific objectives of the study. Descriptive and Inferential statistics were utilized.

#### 4.2. Questionnaire Return Rate

The researcher targeted a sample of 93 respondents from the directorates in the police force namely; command, control and communications, human capital development, operations and police reforms departments. Out of these respondents 75 fully filled questionnaires were received and it equated to 81 percent. This is a reliable response rate for data analysis as any response above 50 percent is regarded adequate (Punch, 2003). Table 4.1 displays the findings

*Table 4.1: Response Rate*

<b>Police Department</b>	<b>Target Population</b>	<b>Returned Questionnaire</b>	<b>Percentage (%)</b>
<b>Command, Control and Communications</b>	26	24	26
<b>Operations</b>	39	22	24
<b>Police Reforms</b>	15	18	19
<b>Human Capital Development</b>	13	11	12
<b>Total</b>	<b>93</b>	<b>75</b>	<b>81</b>

#### 4.3. Demographic information

This subsection describes the basic statistical characteristics of the respondents. This includes gender, period of service in the force, level of education achieved, department and position in the force.

#### 4.3.1. Gender of the Respondents

The findings show that the majority of the respondents were male at 74% (56) while the Female were 26% (19) as shown on Table 4.2. This is an indication that both genders were well represented in the study.

Table 4.2: Gender

Gender	No. of Workers	Percentage
Male	56	74
Female	19	26
<b>Total</b>	<b>75</b>	<b>100</b>

#### 4.3.2. Period of service at Kenya Police

The study then sought to find out the period the respondents had served in the Kenya police service. From the findings, majority 48% (36) had served between 11-15 years, 43% (32) had served above 15 years and 7% (5) had served 6-10 years while 3% (2) had served 1-5 years. This is an indication that the majority of the respondents had good experience in the police force adequate to respond to internal matters like the surveillance project in the police sector. Findings are shown in Table 4.3.

Table 4.3: Period of service

Period of Service	No. of Workers	Percentage
1-5 Years	2	3
6-10 Years	5	7
11-15 Years	36	48
Above 15 Years	32	43
<b>Total</b>	<b>75</b>	<b>100</b>

#### 4.3.3. Level of Education

The study also sought to find out the level of education of the respondents. From the findings it was revealed that majority had attained Undergraduate Diploma 72% (54) while 28% (21) had attained graduate level education. There was no response for Primary and Secondary level

education as all of them had already passed beyond that level. The findings are an indication that the respondents were well learned and could articulate issues in the research instrument and respond accordingly. Findings are presented in Table 4.4.

*Table 4.4: Level of Education*

<b>Period of Service</b>	<b>No. of Workers</b>	<b>Percentage</b>
<b>Primary</b>	0	0
<b>Secondary</b>	0	0
<b>Undergraduate</b>	54	72
<b>Graduate</b>	21	28
<b>Total</b>	<b>75</b>	<b>100</b>

#### **4.3.4. Police Department**

The study then sought to find out the police departments the respondents worked in. Findings revealed that most respondents 32% (24) worked in the command, control and communications department while 30% (22) worked in operations department 24% (18) worked in police reforms department and finally 14% (11) worked in human capital development department. This is an indication that the respondents were well distributed in the departments and able to give all rounded information regarding the police force. Findings are shown in table 4.5

*Table 4.5: Police Department*

<b>Police Department</b>	<b>Frequency</b>	<b>Percentage</b>
Command, Control and Communications	24	32
Operations	22	30
Police Reforms	18	24
Human Capital Development	11	14
<b>Total</b>	<b>75</b>	<b>100</b>

#### **4.3.5. Position in the Department**

The study further sought to establish the position the respondents held in the various police departments. Findings reveal that the majority were department officers' 27% (20), then office administrators 24% (18), senior officers 21% (16). They were closely followed by departmental managers at 16% (12), then deputy directors 8% (6) and lastly department directors 4% (3).

This is an indication that the study solicited views from all levels of management in the police force hence well distributed in obtaining views. Findings are shown in table 4.6

*Table 4.6: Police Positions*

<b>Police Positions</b>	<b>Frequency</b>	<b>Percentage</b>
Directors	3	4
Deputy Directors	6	8
Managers	12	16
Senior Officers	16	21
Office Administrators	18	24
Department Officers	20	27
<b>Total</b>	<b>75</b>	<b>100</b>

#### **4.4. ICT Infrastructure Influence on Sustainability**

The study then sought to find out ICT infrastructure influence on sustainability of the security surveillance project. The study first sought to seek whether the respondents were aware that Information Communication Technology was adopted in the Kenya Police service. From the findings 100% (75) were aware of ICT being adopted at the police force. Further the study sought to find out whether the respondents were conversant with Closed circuit television (CCTV) security surveillance implemented in Nairobi County. Again for this question there was 100% (75) response to the affirmative.

Statements were then asked on how the respondents viewed ICT infrastructure influence on sustainability of CCTV project in Nairobi. From the findings it was revealed that the security surveillance project is sustainable with a centralized remote command and control station with CCTVs going by 100% (75) who responded to the affirmative. Another 100% (75) were of the opinion that the CCTV project is sustainable with the availability of computers, and a further 100% (75) were of the opinion that a working constantly supplied internet would ensure CCTV project sustainability. 94% (70) affirmed that sustainability of the project would be enhanced through Data security and 88% (66) were of the opinion that crisis management solutions need to be part of the infrastructure if the project is to be sustainable. The above findings are an indication that the respondents were aware of infrastructural aspects that would ensure CCTV project sustainability in Nairobi County. Findings are shown in table 4.7

*Table 4.7: Statements on ICT infrastructure*

<b>Statements on ICT infrastructure</b>	<b>Frequency</b>	<b>Percentage (%)</b>	<b>Total</b>
<b>Availability of Computers.</b>	75	100	<b>100% (75)</b>
<b>Centralized and remote command and control and CCTVs</b>	75	100	<b>100% (75)</b>
<b>Working broadband (internet) supply</b>	75	100	<b>100% (75)</b>
<b>Data security</b>	70	94	<b>100% (75)</b>
<b>Crisis management solutions</b>	66	88	<b>100% (75)</b>

There was also a need to establish the extent which ICT infrastructure had an influence on CCTV project sustainability. Findings revealed that to a very large extent 98% (74) availability of computers and a centralized remote, command and control and CCTV station had an influence on CCTV project sustainability. This is an indication that access of digital information through the CCTV in easily, centralized and controlled manner is priority at the Kenya police force. The respondents 96% (72) also supported to a very large extent that a working broadband and data security were necessary for CCTV project sustainability. This is indicative of a police force that is supportive of a reliable, efficient and secure surveillance system which is tantamount to smart cities surveillance aspects. As with regards to crisis management solutions, 92% (69) responded to a large extent that it has an influence on CCTV project sustainability. Findings are presented in table 4.8.

*Table 4.8: Extent of influence of ICT Infrastructure on project sustainability*

<b>ICT Infrastructure Aspects</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>1</b>	<b>Total</b>
<b>Availability of Computers.</b>	98%	2%	0	0	<b>100%</b>



<b>Centralized and remote command and control and CCTVs</b>	98%	2%	0	0	<b>100%</b>
<b>Working broadband (internet) supply</b>	96%	0	4%	0	<b>100%</b>
<b>Data security</b>	96%	4%	0	0	<b>100%</b>
<b>Crisis management solutions</b>	92%	6%	2%	0	<b>100%</b>

#### **4.5. ICT Competence Influence on Sustainability of CCTV Project**

The study then sought to find out competence in ICT and its influence on sustainability of CCTV project. It first sought to find out statements on ICT competence. Findings revealed that observable personnel abilities were what the respondents thought had more influence on sustainability of such a project going by 98% (74) responding to the affirmative. This is an indication that personnel at the police force rate highly presentation of demonstrable capacity to apply knowledge and skills simultaneously in order to complete a task or perform an observable behavior. This was closely followed by motivations and trainings on the CCTV project and skills in handling ICT and specifically on the CCTV project both at 96% (72). This is an implication that any support offered to the personnel to enable them get to their full potential in enhancing knowledge and skills is deemed to influence CCTV project sustainability.

ICT certifications were affirmed up to 94% (70) and finally knowledge on ICT and specifically on the CCTV project 92% (68). This is an indication that credentials among the personnel in charge of the day to day running of the CCTV project are highly esteemed. These findings are presented in table 4.9

*Table 4.9: Statements on ICT competence*

<b>Statements on ICT competence</b>	<b>Frequency</b>	<b>Percentage (%)</b>	<b>Total</b>
<b>Observable personnel abilities</b>	74	98	<b>100% (75)</b>
<b>Motivations and trainings on the CCTV project</b>	72	96	<b>100% (75)</b>
<b>Skills in handling ICT and specifically on the CCTV project</b>	72	96	<b>100% (75)</b>
<b>ICT Certifications</b>	70	94	<b>100% (75)</b>
<b>Knowledge on ICT and specifically on the CCTV project</b>	68	92	<b>100% (75)</b>

Further the study sought to establish the extent upon which the aspects of ICT competence had an influence on CCTV project sustainability. Findings show that 98% (74) of the respondents agreed to a very large extent that observable personnel abilities influence project sustainability. Hence demonstrable capacity to apply knowledge and skills is highly regarded in CCTV project sustainability. 92% (69) agreed to a very large extent that motivations and trainings on the CCTV project are an influence to project sustainability thus implying that support offered to the personnel to enable them get to their full potential ranks highly in the CCTV project in terms of influencing sustainability. Also another 92% (69) responded that skills in handling ICT and specifically on the CCTV project to a very large extent have an influence on project sustainability. This implies that proficiencies acquired through ICT training and/or experience to a large extent has an influence on project sustainability.

Unexpected results 78% (59) were recorded when it came to knowledge on ICT and specifically on the CCTV project. It could be implied that knowledge alone without the skillset is not sufficient to sustain a project hence the mixed response. These findings are presented in table 4.10

*Table 4.10: Extent of influence of ICT competence on project sustainability*

<b>ICT Competence Aspects</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>1</b>	<b>Total</b>
<b>Observable personnel abilities</b>	98%	2%	0	0	<b>100%</b>
<b>Motivations and trainings on the CCTV project</b>	92%	8%	0	0	<b>100%</b>
<b>Skills in handling ICT and specifically on the CCTV project</b>	92%	4%	4%	0	<b>100%</b>
<b>Knowledge on ICT and specifically on the CCTV project</b>	78%	8%	14%	0	<b>100%</b>
<b>ICT Certifications</b>	66%	14%	20%	0	<b>100%</b>

#### **4.6. ICT management support Influence on Sustainability of CCTV Project**

The study further sought to establish the influence of management support on sustainability of CCTV project. It came out clearly that financial commitment on ICT and specifically the CCTV project had a huge influence on sustainability of the CCTV project going by all the respondents 100% (75) responding to the affirmative. This is an indication that financial support accorded to the project highly influences the CCTV project sustainability. Acquisition of ICT infrastructure and specifically for CCTV project ranked in second in response 98% (74). This indicates that the foundational ICTs to support the project are considered to be a huge influence towards the project success. Findings also revealed that management support for organizational learning and leadership influences the project highly going by the response 96% (72). This implies that developing the knowledge and analytic capacity to adapt, evolve, and learn in an ever-changing technological environment is key in the CCTV project. A further response of 96% (72) showed that management knowledge and appreciation of ICT and specifically for CCTV project is a major influence towards project sustainability. Executive decisions made by top management in handling ICT and specifically the CCTV project had a response rate of 92% (70). This is an implication that quality decisions that support the execution of the overall project goal play a major role in the CCTV project sustainability. Availability of a Tech savvy management had a response rate of 92% (70) and was also highly ranked in ensuring project sustainability. Table 4.11 shows these findings

*Table 4.11: Statements on ICT management support*

<b>Statements on ICT management support</b>	<b>Frequency</b>	<b>Percentage (%)</b>	<b>Total</b>
<b>Financial commitments on ICT and specifically the CCTV project</b>	75	100	<b>100% (75)</b>
<b>Acquisition of ICT infrastructure and specifically for CCTV project</b>	74	98	<b>100% (75)</b>
<b>Management support for organizational learning and leadership</b>	72	96	<b>100% (75)</b>
<b>Management knowledge and appreciation of ICT and specifically for CCTV project</b>	72	96	<b>100% (75)</b>
<b>Executive decisions made by top management in handling ICT and specifically the CCTV project</b>	70	92	<b>100% (75)</b>
<b>Availability of a Tech savvy management</b>	70	92	<b>100% (75)</b>

There was further a need to ascertain the extent upon which ICT management support influenced the project sustainability. It was shown that 98% (74) agreed to a very large extent that financial commitment on ICT and specifically the CCTV project. Also another 98% (74) showed that acquisition of ICT infrastructure and specifically for CCTV project to a very large extent influences CCTV sustainability. Another majority of 92% (69) supported to a very large extent that management support for organizational learning and leadership influences sustainability. A combined response of 100% (75) further showed that to a great extent management knowledge and appreciation of ICT and specifically for CCTV project influences sustainability of the project with majority responding to a very large extent. Another combined response of 84% (63) indicated that to a large extent executive decision made by top management in handling ICT and specifically the CCTV project influences CCTV sustainability with emphasis being on the large extent option. Lastly, a combined response of 76% (57) supported that availability of Tech Savvy management influences project sustainability. Findings are shown on table 4.12

*Table 4.12: Extent of influence of ICT management support on project sustainability*

<b>ICT management support</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>1</b>	<b>Total</b>
<b>Financial commitments on ICT and specifically the CCTV project</b>	98%	2%	0	0	<b>100%</b>
<b>Acquisition of ICT infrastructure and specifically for CCTV project</b>	98%	2%	0	0	<b>100%</b>
<b>Management support for organizational learning and leadership</b>	92%	4%	4%	0	<b>100%</b>
<b>Management knowledge and appreciation of ICT and specifically for CCTV project</b>	52%	48%	0	0	<b>100%</b>
<b>Executive decisions made by top management in handling ICT and specifically the CCTV project</b>	24%	60%	6%	10%	<b>100%</b>
<b>Availability of Tech Savvy management</b>	20%	56%	24%	0	<b>100%</b>

#### **4.7. ICT organizational culture influence on Sustainability of CCTV Project**

This section presents the findings on ICT organizational culture influence on sustainability of CCTV Project. Findings reveal that the most popular culture and that which influences CCTV sustainability is the hierarchical organizational culture going by 96% (72) who supported this. This is an indication that focus here is majorly on coordination of processes and functions are carried out within organized structures. 92% (68) revealed that competitive organizational culture had an influence in project sustainability making it the second popular culture in the targeted respondents. This implies that staff compete and seek to meet organizational objectives in a highly competitive manner. This was an unexpected result as such kind of a culture would be expected to be found in a corporate/business setting. Innovative organizational culture was supported by 80% (60) of the respondents which indicates that the targeted respondents promote creativity and innovativeness in the work place. This was expected being an ICT related project. Lastly 74% (56) supported that there exists a collaborative organizational culture implying that the departments are open and friendly places to work where people share a lot of themselves. However this result was unexpected as the response rate ought to have been

high by virtue of ICT related projects being more about collaborations, partnerships and integration. Findings are shown on table 4.13

*Table 4.13: Statements on ICT organizational culture*

<b>Statement</b>	<b>Frequency</b>	<b>Percentage (%)</b>	<b>Total</b>
<b>CCTV project is sustainable with</b>			
<b>Hierarchical organizational culture</b>	72	96	<b>100% (75)</b>
<b>Competitive organizational culture</b>	68	92	<b>100% (75)</b>
<b>Innovative organizational culture</b>	60	80	<b>100% (75)</b>
<b>Collaborative organizational culture</b>	56	74	<b>100% (75)</b>

Next the study sought to find out the extent upon which the organizational culture had an influence on CCTV project sustainability. Findings reveal that to a very large extent Hierarchical organizational culture influences CCTV project sustainability going by 98% (2) who supported this. Closely following was competitive organizational culture which was supported to a very large extent by 94% (70) of the respondents. Innovative organizational culture was supported to influence the CCTV project to a very large extent by 84% (63) of the respondents. Lastly, collaborative organizational culture was supported by 80% (60) of the respondents to influence CCTV sustainability to a very large extent. Findings are shown in table 4.14

*Table 4.14: Extent of influence of ICT organizational culture on project sustainability*

<b>Statement</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>1</b>	<b>Total</b>
<b>CCTV project is sustainable with</b>					
<b>Hierarchical organizational culture</b>	98%	2%	0	0	<b>100% (75)</b>
<b>Competitive organizational culture</b>	94%	6%	0	0	<b>100% (75)</b>
<b>Innovative organizational culture</b>	84%	16%	0	0	<b>100% (75)</b>
<b>Collaborative organizational culture</b>	80%	20%	0	0	<b>100% (75)</b>

#### 4.8. Inferential Statistics

The inferential statistics involved the use of linear regression analysis to determine the significance of the coefficients of the independent variables in explaining the variation in dependent variables. Model summary was used to determine the proportion of the dependent variable explained by the explanatory variables while ANOVA was used to determine the fitness of the model used in the analysis. The relationship between variables was established through Correlation analysis.

Correlation results show that ICT infrastructure has a strong positive relation with Sustainability of CCTV Project (R = 0.778). ICT competence showed a strong positive relationship with Sustainability of CCTV Project (R= 0.618). ICT management support had a moderate positive relationship with Sustainability of CCTV Project (R = 0.542). Organizational culture also displayed a moderate positive relationship with Sustainability of CCTV Project (R = 0.506). Results are as in Table 4.15

*Table 4.15: Co-relation Results*

<b>Variables</b>	<b>Sustainability of CCTV Project</b>	<b>ICT infrastructure</b>	<b>ICT competence</b>	<b>ICT management support</b>	<b>Organizational culture</b>
<b>Sustainability of CCTV Project</b>	1				
<b>ICT infrastructure</b>	.778	1			
<b>ICT competence</b>	.618	.640**	1		
<b>ICT management support</b>	.542	.686	.695	1	
<b>Organizational culture</b>	.506	.413	.566	.680**	1

\*\*correlation is significant at 0.01 level

## Regression Analysis

To further establish the relationship between the Sustainability of CCTV Project, ICT infrastructure, ICT competence, ICT management support and Organizational culture a multiple regression analysis was conducted. The regression model was as follows;

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \varepsilon$$

Where;

Y = Sustainability of CCTV Project

$\beta_0$  = constant

X<sub>1</sub> = ICT infrastructure

X<sub>2</sub> = ICT competence,

X<sub>3</sub> = ICT management support

X<sub>4</sub> = Organizational culture

$\varepsilon$  = the error term of the model.

Determination coefficient (R squared) was carried out to determine the proportion of the variation in dependent variable that is attributed to the changes in the independent variables. The study established R<sup>2</sup> of 0.651 which implies that 65.1% of the variation in Sustainability of CCTV Project is attributed to the changes in explanatory variables (ICT infrastructure, ICT competence, ICT management support and Organizational culture). It means that the goodness of fit test is adequate. A correlation coefficient of 0.806 depicts there is a good linear dependence of Sustainability of CCTV Project, ICT infrastructure, ICT competence, ICT management support and Organizational culture hence a strong correlation between the dependent variable and Independent variables. The above information is shown in table 4.16 below

*Table 4.16: Summary of the Model*

Model	R	R Square	Adjusted R square	Std. Error of the estimate
1	.806 <sup>a</sup>	.651	.619	.34567

a. Predictors: (constant), ICT infrastructure, ICT competence, ICT management support and Organizational culture)



b. Dependent Variable: Sustainability of CCTV Project

### ANOVA (Analysis of Variance)

ANOVA is utilized to establish the significance of the relationship between Sustainability of CCTV Project and the independent variables. Findings show there is a significant joint relationship between ICT infrastructure, ICT competence, ICT management support and Organizational culture at 95% level of confidence given the level of significance 0.003 which is below P value of 0.05. Table 4.17 shows the findings

Table 4.17: ANOVA

Model	Sum of Squares	Df	Mean square	F	Sig.
<b>Regression</b>	0.067	11	0.006	1.000	0.003 <sup>a</sup>
<b>Residual</b>	0.054	9	0.006		
<b>Total</b>	0.121				

a. Predictors: (constant), ICT infrastructure, ICT competence, ICT management support and Organizational culture)

b. Dependent Variable: Sustainability of CCTV Project

### Regression Coefficient Results

Table 4.18: Regression coefficient results

Model	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	T	Sig.
<b>(Constant)</b>	0.049	0.045		1.071	0.097
<b>ICT infrastructure</b>	0.041	0.025	0.258	1.612	0.024
<b>ICT competence</b>	1.704	0.507	0.573	3.361	0.003
<b>ICT management support</b>	0.016	0.004	1.052	4.522	0.000
<b>Organizational culture</b>	0.493	0.181	0.372	2.718	0.009

Dependent Variable: Sustainability of CCTV Project

Source: Research Findings

Hence the model:  $Y = 0.049 + 0.041 X_1 + 1.704X_2 + 0.016 X_3 + 0.493 X_4 + \varepsilon$

The above model shows that when all other variables are constant then the Sustainability of CCTV Project is 0.049. A unit increase in ICT infrastructure translates to 0.041 increase in

Sustainability of CCTV Project. Also a unit increase of ICT competence translates to 1.704 increase in Sustainability of CCTV Project. A unit increase in ICT management support translates to 0.016 increase in Sustainability of CCTV Project. Lastly a unit increase in Organizational culture translates to 0.493 increase in Sustainability of CCTV Project. This is an indication that ICT infrastructure, ICT competence, ICT management support and Organizational culture affect the Sustainability of CCTV Project. The error term explains all of the variations in Sustainability of CCTV project that cannot be explained by the dependent variables.

0.024 P value of ICT infrastructure indicates that it is statistically significant going by the threshold value  $P < 0.005$ . The same applies for P values of 0.003 and 0.000 for ICT competence and ICT management support. Finally also a P value of 0.009 for Organizational culture implies that it is statistically significant. It can thus be deduced that all predictors (dependent variables) have a significant effect on Sustainability of CCTV Project.

Findings also show that the model is statistically significant at 5% level of significance.

## CHAPTER FIVE

### SUMMARY OF FINDINGS, DISCUSSION, CONCLUSION AND RECOMMENDATIONS

#### 5.1 Introduction

This chapter is a documentation of the study summary of findings, discussion of findings, conclusions derived from the findings and recommendations for action and further research.

#### 5.2. Summary of Findings

This study focused on the influence of information communication technology on sustainability of the national surveillance system project in Nairobi County. The objectives that guided this study were: To establish how ICT infrastructure influences sustainability of the CCTV project in Nairobi County, to examine how ICT competence influences sustainability of the CCTV project in Nairobi County, to assess how ICT management support influences sustainability of the CCTV project in Nairobi County and lastly to establish how organizational culture influences sustainability of the CCTV project in Nairobi.

##### 5.2.1. ICT Infrastructure influence on CCTV project sustainability

It was noted that all the respondents were aware that Information Communication Technology was adopted in the Kenya Police service and that they were all conversant with Closed circuit television (CCTV) security surveillance implemented in Nairobi County. With regards to ICT infrastructure 100% (75) of the respondents supported that the security surveillance project is sustainable with a centralized remote command and control station, and also with the availability of computers and a working constantly supplied internet. 94% (70) affirmed that sustainability of the project would be enhanced through Data security and a further majority above 80% was of the opinion that crisis management solutions need to be part of the infrastructure if the project is to be sustainable.

Findings also revealed that to a greater extent with regards to infrastructure, availability of computers and a centralized remote, command and control and CCTV station had the most influence on CCTV project sustainability recording a 98% (74) response. This is an indication that centralized management is key in the CCTV project. Closely following was a working broadband and data security as being necessary for CCTV project sustainability. This had a response of 96% (72). This is indicative of a police force that is supportive of a reliable, efficient and secure surveillance system. 92% (69) further responded that crisis management

solutions have an influence on CCTV project sustainability. The above results were further reinforced by inferential statistics results that showed that overall ICT infrastructure has a strong positive relation with Sustainability of CCTV Project ( $R = 0.778$ ).

### **5.2.2. ICT Competence influence on CCTV project sustainability**

Under competence in ICT and its influence on sustainability of CCTV project, findings revealed that observable personnel abilities were what the respondents thought had more influence on sustainability of such a project going by 98% (74) who supported this. It is an indication that presentation of demonstrable capacity to apply knowledge and skills is highly ranked among the personnel. This was closely followed by motivations and trainings on the CCTV project and skills in handling ICT and specifically on the CCTV project both at 96% (72). This is an implication that any support offered to the personnel to enable them get to their full potential is highly regarded. ICT certifications were affirmed up to 94% (70) and finally knowledge on ICT and specifically on the CCTV project 92% (68).

In terms of extent of influence of competence aspects to CCTV project sustainability, observable personnel abilities were found to be most influential, closely followed by motivations and trainings which tied with skills in handling ICT and specifically on the CCTV project which recorded 98% (74), 92% (69) and 92% (69) respectively. Knowledge on ICT and specifically on the CCTV project recorded a relatively low response in terms of extent of influence which was unexpected. Inferential statistics revealed that ICT competence showed a strong positive relationship with Sustainability of CCTV Project ( $R = 0.618$ ).

### **5.2.3. ICT management support on CCTV project sustainability**

It came out clearly that financial commitment on ICT and specifically the CCTV project had a huge influence on sustainability of the CCTV project going by all the respondents 100% (75) responding to the affirmative. Acquisition of ICT infrastructure and specifically for CCTV project ranked in second in response 98% (74). Further, findings also revealed that management support for organizational learning and leadership influences the project highly going by the response 96% (72). Management knowledge and appreciation of ICT and specifically for CCTV project is also a major influence towards project sustainability going by 96% (72) response. Executive decisions made by top management in handling ICT and specifically the CCTV project had a response rate of 92% (70). This tied with availability of a Tech savvy management.

The above implied that financial support accorded to the project, foundational ICTs to support the project, developing the knowledge and analytic capacity to adapt, evolve, and learn in an ever-changing technological environment and quality decisions that support the execution of the overall project goal play a major role in the CCTV project sustainability. This was further strengthened by the inferential statistics that revealed that ICT management support had a moderate positive relationship with Sustainability of CCTV Project ( $R = 0.542$ ).

#### **5.2.4. ICT organizational culture on CCTV project sustainability**

In terms of organizational culture influence on Sustainability of CCTV Project, findings show that the most popular culture and that which influences CCTV sustainability is the hierarchical organizational culture going by 96% (72) who supported this. Closely following is competitive organizational culture which had a 92% (68) response then followed by innovative organizational culture which was supported by 80% (60) of the respondents. Lastly, collaborative organizational culture was supported by 74% (56). Such kinds of findings are an indication that coordination of processes and functions are carried out within organized structures hence hierarchical culture being the most influencing culture. It also shows that staff compete and seek to meet organizational objectives in a highly competitive manner. The innovative culture shows that to some extent there is promotion of creativity and innovativeness in the work place. Though recording a lower response, results also indicated that there are open and friendly places to work where people share a lot of themselves. This was strengthened by inferential statistics where organizational culture displayed a moderate positive relationship with Sustainability of CCTV Project ( $R = 0.506$ ).

Such kind of results could be tied to current assessment of the respondents experience with the CCTV project and could be said to come from an informed point of view.

### **5.3. Discussion of finding**

#### **5.3.1. ICT Infrastructure influence on CCTV project sustainability**

Availability of computers and a centralized remote, command and control and CCTV station is an indication of provision of efficient and affordable ICT services according to the Kenya ICT policy (2005). Additionally, the endowment of ICT infrastructure in the CCTV project is indicative of smart sustainable cities which in addition to traditional ICT infrastructures such as network infrastructure, software applications, cloud computing/data platforms and access devices it looks into building automation, crisis management solutions, data security infrastructure, video surveillance intrusion detection, centralized and remote command and

control, scalable decision-making process, the internet and reliable broadband. This is consistent with International Telecommunication Union's, (2016) study.

### **5.3.2. ICT Competence influence on CCTV project sustainability**

According to Microsoft's White Paper (2014), ICT skills are vital to enabling individuals and organizations to leverage the full potential of information and communication technologies thus skills in handling ICT and specifically on the CCTV project by the officers is an added advantage to the force and the project as a whole. Knowledge on ICT and specifically on the CCTV project is synonymous with ICT adoption rate. This is in agreement with (Teo & Ranganathan, 2004). These researchers found that the level of an individual's knowledge of ICT directly affects the adoption of any given technology that is presented to the individual. End users who have an acceptable level of ICT knowledge are more likely to encourage ICT adoption and use in their companies (Teo & Ranganathan, 2004). Scupola (2010) found in his study of SMEs based in Britain that ICT adoption in the SMEs that participated in his research was enhanced when the SMEs had the services of employees who had the skills and knowledge in regards to ICT. This is in line with this study.

The influence of motivations and trainings on the CCTV project shows that the police force has effectively harnessed ICT which requires sustained investments for security purposes through supporting personnel training thus creating a new learning environment as is supported by Jimoyiannis, & Komis, (2007). Through the certifications, the police unit covers all aspects of managing and processing information as it implies IT professionals design, develop, support and manage computer software, hardware and networks (Microsoft's White Paper, 2014). The competence displayed from the findings are in agreement with Chelubashi (2011) work as they are indicative of the Kenya police force understanding the potentials, technologies and specifically CCTV to enhance security can provide in the areas of efficiency enhancement and productivity. The study concludes that ICT competence has a positive influence on an organization's inclination to adopt ICT generally.

### **5.3.3. ICT management support on CCTV project sustainability**

The huge influence of financial commitment to CCTV project sustainability can be interpreted to imply that top management should spend more time on resourcing the project and should make enough time to be aware of the project status and to intercede as necessary as is consistent with Silvius (2004) study. Also by virtue of management knowledge and appreciation of ICT and specifically for CCTV project being a major influence towards project sustainability

indicates that top management support of ICT factor refers to owners and top management level of ICT knowledge and skill, education, their willingness to adopt ICT and their perception of ICT in relation to how it can help their companies gain a competitive advantage. According Chuang, Rutherford, and Lin (2007) research, support given by owners and top managers in regards to ICT adoption, is important for the successful adoption of ICT, thus a highly skilled and knowledgeable management is more likely to adopt ICT systems and this study reports similar findings. Wojtkowski and Hardesty (2001) in their study revealed, that successful implementation of ICT initiatives within organizations, highly depend on their key managers being knowledgeable of new technological trends. Other studies especially in developing economies have cited the importance of key managers and owners having basic knowledge of ICT (Silvius, 2004). Both studies are in line with the findings of this study.

Management support for acquisition of infrastructure indicates top management who were willing to adopt new systems to improve work output as is consistent with Caldeira and Ward (2002). The research found that companies that had found success in adopting ICT systems and infrastructure, had top management who were willing to adopt new systems to improve work output, or had partnered with an IT firm that offered consulting services and managed their ICT infrastructure. Generally empirical literature maintains that owner and top manager factors relate to executive decisions that the owner or top manager must make, what financial commitments to commit to relating to the overall vision of the company or institutions, acquisition of new ICT infrastructure, whether the entity must consider ICT adoption or not, their knowledge and appreciation of ICT and new technological developments. This could be expected since the owner or top manager is the catalyst of all business undertakings in the company as is also supported by Thong et al., (1995).

#### **5.3.4. ICT organizational culture support on CCTV project sustainability**

Haliso (2011) opines that culture is a strong factor that dictates if technology will be accepted or not accepted. The challenge goes to system planners and programme writers to consider the local way of thinking, cultural setting, level of education and awareness. Culture may have different levels of analysis. It can be analysed as functional, professional, organizational, industrial, regional and national.

The hierarchical culture which is most utilized at the CCTV project focuses on coordination of processes. Here, functions are carried out within organized structures and use of policies is depended upon to give guidance. Procedures that provide high performance results and are

stable and efficient are the main objectives of this culture type. The same is in agreement with Zheng (2013). There is also the competitive culture which appeared to be the second popular in influencing the CCTV project where members of staff compete and seek to meet organizational objectives in a highly competitive manner. The organization depends and enjoys high reputation and success in their market environment putting emphasis on competitive costs and being the corporate leaders.

Tharpe (2014) in his study brings out the innovative culture whereby this type of culture promotes creativity and has a business-like approach to work. Members of staff are encouraged to be inventive even where risks are obvious. This type relies on business process transformations and challenges. This was the third popular culture among the targeted respondents hence in line with Tharpe (2014) study. There is then the collaborative culture which is an open and friendly place to work where people share a lot of themselves. The environment created with the culture type is that of a family. Members of staff are loyal to the employer while the leaders play the role of advisors. Processes are familiar to all and have been the same over the years. Change is rare. This came out as an influencing culture in the CCTV project.

#### **5.4. Conclusions**

The study concludes that the independent variables have a significant influence on the dependent variable. ICT infrastructure in terms of availability of computers, working broadband (internet) supply, and crisis management solutions and data security highly influence CCTV project sustainability.

ICT competence also is deduced to influence CCTV project sustainability to a large extent as depicted by the findings. Emphasis is on skills and certifications then knowledge has a moderate influence according to findings.

The study also concludes that ICT management support has a huge influence on CCTV project sustainability more so on aspects of financial commitment, acquisition of infrastructure and Management knowledge of ICT and organizational learning and leadership.

It is further concluded that organizational culture influences CCTV project sustainability to a large extent. With the most popular being hierarchical then competitive culture closely followed by innovative culture and lastly collaborative culture according to this study.



## **5.5. Recommendations**

Recommendations have been made in this study for the Police unit in-charge of the CCTV project to provide incentives for ICT education and training at all levels. The unit should also offer ICT skills training and testing opportunities, and should be given incentives and additional resources for providing ICT skills training. These programs are critically important to ensure that workers have the opportunity to strengthen their IT skills and thereby become more employable and productive.

The study also recommends that the police force should establish specialized certified training programmes for IT professionals and developers in the department. The field of information technology (IT) covers all aspects of managing and processing information. IT professionals design, develop, support and manage computer software, hardware and networks. To better prepare for technology careers, they should encourage the unit in charge to provide coordinated IT curricula, courseware, and online collaboration tools that help personnel achieve certification in technologies. In addition, governments should encourage the private sector to establish certified training and testing centres to certify IT professionals.

The study recommends that Top management should devote time to review plans, follow up on results and facilitate management problems. ICT knowledge and attitude of the top management should be fostered as this determines whether the project would be willing to adopt innovative and sustainable ICT.

It is also recommended that the department should foster progressive culture that would enhance CCTV project sustainability. Innovative and collaborative culture should be boosted. Such culture should consider the local way of thinking, cultural setting, level of education and awareness.

## **5.6. Recommendation for Further Studies**

1. The study recommends further studies to be done utilizing the same independent and dependent variables on a private company.
2. A study could be done focusing on cross-border comparative analysis to establish similarities and differences across different geographical regions. Could be between a developed and a developing country.
3. A study could be done assessing the most effective variable in CCTV sustainability.
4. Studies could be done focusing on each independent variable and studied exhaustively to bring out the efficacy of each.

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## APPENDICES

### Appendix I: Introductory Letter

Dear Respondent,

I am a student at The University of Nairobi. In order to fulfil the requirements of Masters of Arts in Project Planning and Management; I am undertaking a research project on “The Influence of Information Communication Technology on Sustainability of Security Surveillance Project in Nairobi County. Therefore, I kindly request your assistance in providing data by filling out the accompanying questionnaire. The information provided will exclusively be used for academic purposes and will be held in strict confidence.

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

## Appendix II: Questionnaire for Police officers interacting with the CCTV System

The questions in this Questionnaire are for academic purposes only and information given will be treated with high level of confidentiality.

### SECTION A: PERSONAL INFORMATION

1. Gender

Male  [ ]

Female  [ ]

2. For how long have you worked at Kenya Police service?

1-5 years  6- 10 years  11-15 years  more than 15 years

3. (a) What is your highest Level of education?

Primary  Secondary  Undergraduate

Graduate

4. In what department in Kenya police do you work?

Command, Control & Communications  Operations

Police Reforms  Human Capital Development

5. (b) What position do you hold in the department?

Directors  Deputy Directors  Managers  Senior Officers

Office Administrators  Department Officers

**SECTION B: ICT INFRASTRUCTURE INFLUENCE ON SUSTAINABILITY OF CCTV PROJECT**

7. Are you aware of Information Communication Technology adopted in the Kenya Police service?

Yes [ ] No [ ]

8. Are you aware and conversant with Closed circuit television (CCTV) security surveillance implemented in Nairobi County?

Yes [ ] No [ ]

9. If yes, which of the statements below best describe how you view ICT infrastructure influence on sustainability of CCTV project in Nairobi County (tick as appropriate)

Statement	Tick
Security surveillance project is sustainable with	
Availability of Computers.	
Working broadband (internet) supply	
Crisis management solutions	
Centralized and remote command and control and CCTVs	
Data security	
Other _____	

10. To what extent would you agree that ICT infrastructure is a huge influence to CCTV sustainability? Whereby: 4= Very Large Extent, 3= Large Extent, 2= Moderate Extent, 1= No extent (Tick as appropriate)

Statement	4	3	2	1
CCTV project is sustainable with				
Availability of Computers.				
Working broadband (internet) supply				
Crisis management solutions				
Centralized and remote command and control and CCTVs				
Data security				



SECTION C: ICT COMPETENCE INFLUENCE ON SUSTAINABILITY OF CCTV PROJECT

11. which of the statements below best describes how you view ICT competence influence on sustainability of CCTV project in Nairobi County (tick as appropriate)

Statement	Tick
CCTV project is sustainable with	
Observable personnel abilities	
Skills in handling ICT and specifically on the CCTV project	
Knowledge on ICT and specifically on the CCTV project	
ICT Certifications	
Motivations and trainings on the CCTV project	
Other _____	

12. To what extent would you agree that ICT competence is a huge influence to CCTV project sustainability? Whereby: Where 5= Strongly disagree, 4=Disagree, 3=Neutral, 2=Agree and 1= Strongly agree) (Tick as appropriate)

Statement	5	4	3	2	1
CCTV project is sustainable with					
Observable personnel abilities					
Skills in handling ICT and specifically the CCTV project					
Knowledge on ICT and specifically the CCTV project					
ICT Certifications					
Motivations and trainings on CCTV project					
Other _____					

SECTION C: ICT MANAGEMENT SUPPORT INFLUENCE ON SUSTAINABILITY OF CCTV PROJECT

13. which of the statements below best describes how you view ICT management support influence on sustainability of CCTV project in Nairobi County (tick as appropriate)

Statement	Tick
CCTV project is sustainable with	
Availability of a Tech savvy management	
Executive decisions made by top management in handling ICT and specifically the CCTV project	
Financial commitments on ICT and specifically the CCTV project	
Acquisition of ICT infrastructure and specifically for CCTV project	
Management knowledge and appreciation of ICT and specifically for CCTV project	
Management support for organizational learning and leadership.	
Other _____	

14. To what extent would you agree that management support for ICT is a huge influence to CCTV project sustainability? Whereby: Where 5= Strongly disagree, 4=Disagree, 3=Neutral, 2=Agree and 1= Strongly agree) (Tick as appropriate)

Statement	5	4	3	2	1
CCTV project is sustainable with					
Availability of a Tech savvy management					
Executive decisions made by top management in handling ICT and specifically CCTV project					
Financial commitments on ICT and specifically CCTV project					
Acquisition of ICT infrastructure and specifically CCTV project					
Management knowledge and appreciation of ICT and specifically for CCTV project					
Management support for organizational learning and leadership.					
Other _____					

**SECTION D: ORGANIZATIONAL CULTURE INFLUENCE ON SUSTAINABILITY OF CCTV PROJECT**

15. Which of the statements below best describes how you view Organizational culture influence on sustainability of CCTV project in Nairobi County (tick as appropriate)

Statement	Tick
CCTV project is sustainable with	
Innovative organizational culture	
Collaborative organizational culture	
Hierarchical organizational culture	
Competitive organizational culture	
Other _____	

16. To what extent would you agree that organizational culture is a huge influence to CCTV project sustainability? Whereby: Where 5= Strongly disagree, 4=Disagree, 3=Neutral, 2=Agree and 1= Strongly agree) (Tick as appropriate)

Statement	5	4	3	2	1
CCTV project is sustainable with					
Innovative organizational culture					
Collaborative organizational culture					
Hierarchical organizational culture					
Competitive organizational culture					
Other _____					

THANK YOU FOR YOUR PARTICIPATION