

**EFFICACY OF INFORMATION TECHNOLOGY IN PROTECTING  
PERSONAL AND BUSINESS DATA IN NAIROBI COUNTY, KENYA**

**BY**

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## DECLARATION

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## **DEDICATION**

I dedicate this research work to the memory of Alfred Gitonga, Kenyatta University  
Lecturer and friend. Thank you for the insights and encouragement.

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## **ACRONYMS AND ABBREVIATIONS**

<b>AP</b>	Administration Police
<b>BPO:</b>	Business Process Outsourcing
<b>CAQDAS:</b>	Computer Assisted Qualitative Data Analysis
<b>CID:</b>	Criminal Investigation Department
<b>CIP</b>	Chief Inspector of Police
<b>CRA</b>	Commission on Revenue Allocation
<b>FDKP:</b>	Fiscal Decentralization Knowledge Program
<b>ID:</b>	Identity
<b>ICT:</b>	Information and Communication Technology
<b>ICTs:</b>	Information and Communication Technologies
<b>JMP:</b>	Joint Monitoring Program
<b>KDN</b>	Kenya Data Network
<b>KNBS:</b>	Kenya National Bureau of Statistics
<b>KRA</b>	Kenya Revenue Authority
<b>LPO</b>	Local Purchase Orders
<b>NCB:</b>	National Central Bureau
<b>QDA:</b>	Qualitative Data Analysis
<b>SMS</b>	Short Message Service

## **ABSTRACT**

The need for the identification of all persons in all jurisdictions in the world has become universal. However, the loss of identification documents whether through criminality or negligence has major security implications not only for the individual but also to entities that have perpetuities. Studies have shown that these challenges can be solved by embracing modern technology which many countries including Kenya are yet to achieve. This study examined the factors that limit the integration of Information Technology Communications (ICT) in the protection of personal and business documents and proposes measures that should be taken towards its integration. The study targeted a population of 150 individuals from the Kenya Police (KP), Kenya Data Network (KDN) and Kenya Revenue Authority (KRA) from which a sample of 110 respondents was selected. The survey design applied both qualitative and quantitative research methods to collect and analyze primary and secondary data. Self-administered questionnaires were distributed to the respondents using simple random sampling. Semi-structured interviews were also used to collect primary data. Secondary data was collected through reviewing information from previous related studies. The Statistical Package for Social Sciences (SPSS) was used for quantitative data while meaning condensation and categorization were used for qualitative data analysis. The study revealed that lack of an integrated ICT system is a challenge in tracking missing identities or even verifying the validity of provided information thus compromising the productivity and security of businesses and institutions. Results from this research study highlight the role of integrated ICT systems in enhancing the tracing of missing identity documents and in making corrections on inaccurate personal data.

## **CHAPTER ONE: INTRODUCTION**

### **1.1 Background Information**

Inaccurate personal data, misplaced identities, and documents have often impacted negatively on business prosperity, increased insecurity and exacerbated the economic downturn. A major threat to the smooth operations of every entity including businesses has been the tracing of lost identities and data verification especially in cases involving inaccurate identification data (Rattner, 2010). Various entities regularly publish disclaimers warning the public on irregular use of their lost identity documents, including but not limited to LPOs, Titles, Caveats Emptor and Caveat Venditor.

Vadaon (2010) suggests that, global firms should apply ICT in ensuring that identities are accurate and that they are not lost. According to Elliot (2006) firms face the challenge of tracking down lost identities and also verify inaccurate personal data to ensure that the right information can be traced whenever need arises. Information technology plays an increasingly important role in the implementation of most aspects of data and security policy, ranging from taxation and border control to the payment of welfare benefits and other forms of social security (Avgerou & McGrath, 2007).

In the United Kingdom (UK), the government introduced a biometric-based national identity card for the UK population in 2006. This undertaking had the possibilities of tracking down lost identity and verifying data about its citizens. Progress has been made given that they are at an advanced stage in the application of this technology (Agar, 2005). It is worth noting that the UK, unlike other European countries, has not had a national identity card since 1945. In 2002, the UK government began consultations

about a proposed ‘entitlement card’ (Whitely & Hosein, 2009). The studies were based on an innovative, technology driven Scheme that would be based on the use of biometric identifiers. The aim of this was to ensure that no individual would be able to register with the Scheme more than once. This would also ensure a large, effectively centralized database (the National Identity Register) which would store the identity details of all UK citizens aged 16 and over. The Register would also provide an audit trail of an individual’s identity registration.

In any country, a passport is a valuable document that should be kept in a safe place at all times. In countries such as Canada, once a passport has been reported lost or stolen, it is no longer valid and cannot be used to travel. This is to ensure that it is not used for fraudulent purposes (Brewer, 2000). Passport Canada, the Government of Canada or any representative of the Government of Canada cannot be held responsible for any difficulties one may encounter at border crossings if they attempt to use a passport that has been reported lost or stolen. Firms cannot also hold the government captive for the loss of their expatriates’ identities thus derailing search efforts and transferring the burden back to the companies involved. If one finds a passport, including one’s own passport that was previously reported as lost or stolen, it must be returned to Passport Canada with a letter that describes how, when and where it was found. Once a passport is reported lost or stolen, it is no longer valid and cannot be used for travel (Canadian Immigration Act, 1976). In the USA, the Progressive Identity project arose from the recognition that the next administration will face identification and authentication issues in a wide range of contexts. Americans are increasingly being asked to identify themselves, both in person and online (Home Office, 2002).

In Africa, cases of identity documents theft, loss of identity cards and inaccuracy in filling out data regarding individuals has been rampant. In South Africa (SA), one's ID has a barcode, a photo, and a unique ID number. Information (including age and gender but excluding race) is referenced under your ID number: accounts, criminal record, voting history, driver's license, etc. You need an ID in order to apply for a passport, bank account, driving license or tertiary studies, as well as to register as a voter. In most cases, employers also request a photocopy of the ID in order to process appointment letters. Voting history, as well as any firearm licenses, is usually documented in the ID booklet. As one's ID may be required for some of the functions listed above, some SA permanent residents may elect to keep their ID document on their person. Where the loss of IDs is experienced, people encounter various problems, and this also becomes a serious issue to firms who must always update their employees' data (Bundesam, 2001).

In Kenya, the Kenyan Revenue Authority (KRA) has incorporated a system called Simba, which aims at reducing backlogs and enhancing the custom clearing functions. However, the Simba system continues to cause unnecessary hitches mainly due to mishaps from the main network link. Thus, the Services such as cargo clearing and storage at the port remain inefficient, and corruption becomes rampant (Okulo, 2011). The explosion of information and communication technologies (ICTs) has enabled people living and working in different continents, countries and regions to communicate and share important information at the click of a button or a touch of a screen. Governments around the world, especially those in the West continue to invest heavily in research and development focused on enhancing ICTs breakthroughs. The aspect of increasing free flow of public information and sharing crucial information among

government agencies is a fundamental component that enables citizens to make informed and timely decisions. The development of databases is more urgent today as the world is facing major challenges in the national and homeland security spheres (Herman, 1996).

Most countries in the Sub-Saharan Africa (SSA) are lagging behind in science and technology, and they are yet to benefit from the use of ICTs (Vadaon, 2010). Until recently, SSA was the only region in the world that had neither intra-African nor direct international cable network access (World Bank, 2004). The region instead relied on expensive satellite communication thus making data collection and sharing very costly. Most departments of Kenyan government have not developed comprehensive databases that can provide adequate and meaningful information to the citizens (World Bank, 2011). This failure inhibits students, scholars and professionals from conducting meaningful analysis that could be useful for public policy formulation and implementation. In addition, the World Bank observed that the high data costs have prevented Kenya from becoming a bigger player in Business Process Outsourcing (BPO) as India and Philippines have done in the recent past thus improving service delivery and creating millions of employment for the youth (World Bank, 2011).

## **1.2 Statement of the Problem**

Inaccurate personal data and misplaced identities and documents is a global issue of concern. This has a major impact on businesses as their security and continuity is often placed on serious risks (Ernst & Young, 2004). For agencies such as Kenya Data Network (KDN), and Kenya Revenue Authority (KRA) who deal with data, inaccurate



information can be a big problem. This is further compounded by the situation where there is no integrated system to track missing identities, correct inaccurate personal data and documents. This can greatly compromise the productivity and security not only of businesses but for an entire country as well (Price Waterhouse Coopers, 2004).

Members of the public who have lost crucial documents including national identification cards, passports, title deeds, certificates, diplomas and degree certificates undergo unnecessary mental torture and waste valuable resources trying to get replacements (Siponen, 2001). Time spent on searching for lost identity documents is approximated to be around 48 man hours (Njeru, 2015).

Firms with employees who have lost identity cards or documents cannot deploy them to areas outside Kenya as expatriates. At the same time, even those deployed in Kenya as expatriates fail to proceed with their work whenever their documents are lost. This lowers the productivity of businesses thus putting them at risk of discontinuity and also making them insecure due to identities of their employees being compromised or in wrong hands (Longley and Kwok, 2007). According to Solms (2010) tracking inaccurate personal data is a major challenge that needs to be addressed. The current research study was guided by establishing ways through which ICT integration can be used as a solution to such security issues.

Failure to track lost documents affects business development by influencing “easy flow of work in progress” such as business transactions. If people perceive themselves as being obstructed to finish their business transactions then their commitment to full business productivity will be reduced (Yngstrom, 2009). However, the relationship

between the lost documents and business output has not been adequately studied, at least not in Nairobi. Therefore, this study sought to evaluate the factors hindering the integration of Information Communication Technology (ICT) in protecting personal and business data in Nairobi County.

### **1.3 Objectives**

The broad objective of the study was to examine factors challenging the adoption of information technology in protecting personal and business data in Nairobi County, Kenya. The specific objectives of this study were:

- i. To examine personal information security challenges in the absence of ICT in the management of personal data
- ii. To examine the challenges that organizations face in embracing information technology in protecting personal and business data.
- iii. To examine the appropriate measures that organizations can use to counter challenges in adoption of information technology in protecting personal and business data.

### **1.4 Research Questions**

The study sought to answer the following research questions:

- i. What are the challenges affecting personal information security in the absence of the integration of ICT in the management of personal data of persons in Nairobi County?
- ii. What challenges do organizations face in embracing information technology in protecting personal and business data?

- iii. What are the most appropriate measures that can be used by organizations to counter challenges in the adoption of information technology in protecting personal and business data?

### **1.5 Assumptions**

- i. Most of the inaccurate personal data result from human error and if a system that can trace these inaccuracies is in place, then data on persons in various firms and institutions can be verified and updated quickly without going obsolete.
- ii. The use of ICT could be applied through an integrated system that connects firms and institutions to a database. This would provide identity information required for correcting inaccuracies while that the same system provide a means of filling in data regarding lost and found identities and documents. This would thus provide a user interface for both the person reporting possession of such identities and documents and for companies and institutions that need to use or access them.

### **1.6 Justification of the Study**

Through Vision 2030, the Kenya government aims to improve the prosperity of all Kenyans through digitization, ensuring Kenyans enjoy affordable, efficient and fast service delivery. This would enable the country to achieve an average Gross Domestic Product (GDP) growth rate of 10% per annum by the end of the year 2030. By achieving this target, Kenya will be continuing with the tradition of macroeconomic stability that has been established since 2002. The informal sector is being supported in ways that will raise productivity and distribution and increase jobs, owner's incomes and public revenues. The country has made progress with the governance and

institutional reforms necessary in a bid to accelerate economic growth. Dealing with lost or missing ID's and other documents is one drawback that should be dealt with as swiftly as possible. To achieve this, there should be co-operation with the private sector to make available the benefits of new technologies, especially ICTs. This will include the integration of new technologies in terms of personal data. Having the security effects of the same may be suggested as being diagnostic and the way to deal with issues of lost or missing ID.

### **1.7 Significance of the Study**

In the wake of increasing terror attacks and rising insecurity trends, it is imperative that issuance, tracking and reporting of lost Identification Documents be made fast reliable and effective. ICT has been widely adopted in a variety of sectors such as in education, agriculture, medicine and even data processing. It is high time that it is adopted in information security, more so when it comes to identification of persons within a jurisdiction. Currently in Kenya, there is an urgent need for more effective ways of dealing with lost or missing identities and other documents. Adoption of ICT would also enable the search for personal information online for quick and efficient dispersion of information. This study aimed to provide useful recommendations and conclusions to policy makers and implementers by highlighting the shortfalls of the current system while showing the need for integrating technology in personal and business data.

The study filled the gap in the existing literature on lost identities. It helped refocus information security to important and new strategies for dealing with crime and criminals away from traditional and mundane knee-jerk reactions like curfews,

cordoning large swathe areas, swoops and issuing irregular edicts. A major significance would be the employment of scientific and technological approaches to dealing with issues surrounding lost identities and their implication for security.

### **1.8 Scope and Limitation of the Study**

The study limited its scope to the geographical region of Nairobi more so Dandora an area that is densely populated. It focused on ICT organizations, and the two selected were KDN and KRA, primarily police officers and selected members of the public. There was a problem of overcoming traditionally held ways of police work. The researcher being well known and respected by the respondents especially the National police officers and members of the public due to the position he held, found it a bit difficult to personally conduct the research. The initial respondents were too willing to give information that they held as positive or appealing to the researcher. The researcher, therefore, used research assistants to deal with this problem. However, the research was conducted to minimize errors of precision as much as possible through careful stratified and random sampling of the study population

## **CHAPTER TWO: LITERATURE REVIEW**

### **2.1 Introduction**

This Chapter involved literature related to the study. The review was done based on the research objectives. The research study was supported by a theoretical framework covering the convergence model and the Innovations Diffusion theory. This chapter also reviews previous studies done by other scholars based on the research topic.

### **2.2 Theoretical Review**

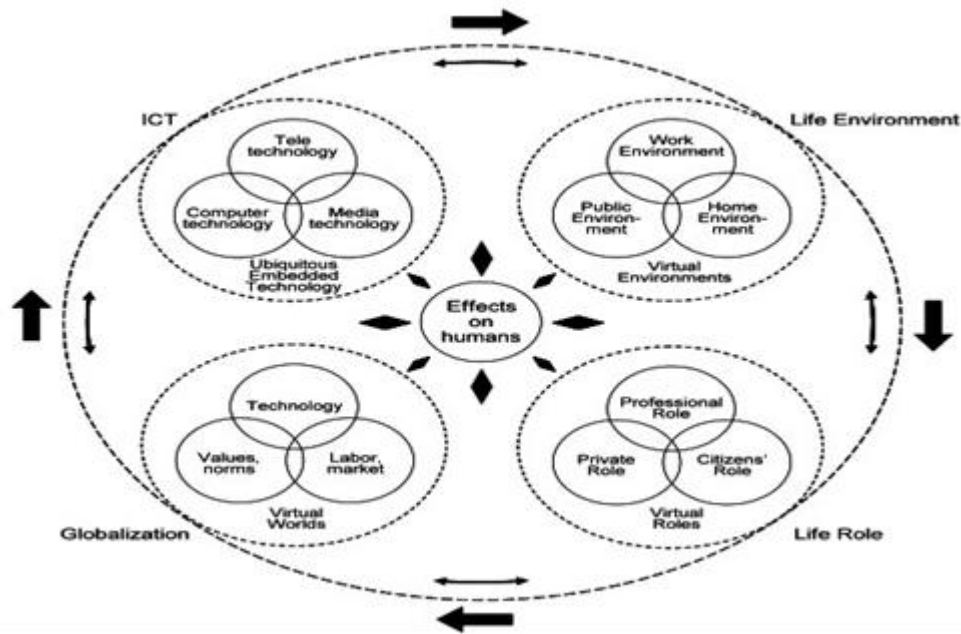
This study adopted the Convergence Theory on ICT, and the Innovations Diffusion theory to establish the relationship between ICT and security in as far as identification is concerned. Both theories illustrate ongoing changes in the society and go back to synthesize the theoretical applicability of ICT on the psychosocial work environment and computerization.

#### **2.2.1 Convergence Model**

Interdisciplinary research programs were initiated by (Bundersam, 2001) in the 1970s and then analyzed changes in society related to various periods in “the history” of ICT. The description of the convergence model is structured with reference to the following concepts Globalization, ICT, Life Environment, Life Role and Effects on Humans. Both Convergence and Interactions are important features in the model. There are four levels of analysis– individual, organizational, community, and societal. The Convergence Model could be seen as a synthesis or aggregation of the initial theoretical models (Udogu, 2008; Wilkins, 2012).

The convergence model is primarily a graphical illustration of ongoing changes in the Net Society. The present Network period is very much based on the convergence and integration of processes on various levels of analysis (Dent& Goldberg, 1999). Converging circles graphically reflect the ongoing processes. The converging technologies are computer technology, tele-technology and media technology. The convergence process is enforced all the time by smaller, cheaper, and more powerful technical components. ICT is increasingly being used in almost every activity and embedded in more and more things (ubiquitous computing). Convergence here means a move towards a common content.

Interaction means that technology interacts with the social world with values and beliefs. The study, therefore, integrates various components of technology and its various components to the social interactions that security presents; including but not limited to frictions. The study aimed to show a direct proportion between these interactions and how they affect each other. Therefore as the complexity of social interactions deepens, technology simplifies space and time. The complexity of emerging social media forums is an example, how can the issue of lost personal data be handled in a more modern way through the use of such new technological for a like the outgoing?



**Figure 1: Convergence Model**

Source: (Bundersam, 2001)

### 2.2.2 Innovation Diffusion Theory

The Innovation Diffusion Theory was put forth by Rogers (1986). The theory provided some insights into the understanding of the integrated national data. In the view of Rogers (1986), the theory widens and deepens the understanding of the diffusion dynamic process in, which new ideas are adopted. However, such an innovative mechanism that would revolutionize the old way of conducting business would have its enthusiasts, skeptics, and pessimists. The theory maintained that diffusion is a process that allows innovation to be transmitted among diverse users over time (Rogers, 1986).

Diffusion is referred to as a process by, which an innovation is communicated through certain channels over a specified duration of the members in a social system. According to Rogers (1995) an innovation is “an idea, practice, or object that is perceived to be



new by an individual or another unit of adoption” while communication is “a process in which participants create and share information with one another to reach a mutual understanding”.

This model is important because such transmission includes both orchestrated and unplanned dissemination of both new and creative ideas. Rogers (1995) also observed that new technologies elicit both positive and negative effects in the adoption process. According to Bergh and & Ketchen, (2009) the proliferation of ICTs is a major breakthrough with potential for social revolution. The breakthrough brought about by ICT raises no new questions from those raised when the technology of the telegraph, the telephone, newspaper, the radio and television were invented (Ortmeier, 2008). In the view of Rogers (1986), the innovation diffusion theory consists of four elements: innovation, communication channels, time, and social system. Innovation entails a broad category characterized by available knowledge in relation to a new concept. Communication channels provide means through which diffusion takes place among people and organizations. For diffusion on technology to take place, time must be factored as innovations are rarely adopted instantaneously. Social systems on the other hand encompass external influences such as the government and mass media. The study clearly indicates that from time to time, documents, books, writings get lost misplaced or intentionally altered to serve various ends. But, Rogers insists that by employing simple technology, difficult tasks can be increasingly made simple. As time evolves, as humans embrace the technological age, the adoption of ICT in all facets of human interactions will and is becoming obvious. The theory, therefore, guided the study and was its primary foundation.

## **2.3. Empirical Review**

### **2.3.1 Factors that Affect the Security and Integration of ICT into Personal Data**

In many cases, inaccuracies in data being held by a firm or institution arise from human error while feeding it into the system (Lewis, 2007). However, there are also cases where someone intentionally provides inaccurate personal data because of personal reasons knowing that he or she will not be caught and action taken. In cases where human error is involved, measures have been recalling the people to provide needed data in order to correct the error (Buxbaum & O'Shea, 2012). However, in cases where someone intentionally provides flawed data to a firm or institutions, it might not be feasible to recall the person as the intention was concealing identity and personal information (Kwak, et al., 2004; Lewis, 2007). Thus, in this case there is need to have a system that could ensure intentionally provided inaccurate personal data is reviewed and actual information established in order to correct the data and take action where needed. Most firms and institutions get disadvantaged where the intention to conceal information has been exercised by the persons involved (Udogu, 2008; Wilkins, 2012). According to Interpol Fact Sheet (2012), the global information sharing helps member countries to obtain direct access to a wide range of criminal databases. Such databases contain millions of records including fingerprints; DNA; stolen motor vehicles and firearms; child sexual exploitation images; stolen and lost travel documents; stolen administrative document and stolen work of Art (Coffey, et al, 1996). On a daily basis, member countries contribute the information which is eventually shared through secure police communication systems. The Interpol is continuously looking for modalities to extend access to the databases beyond its National Central Bureaus (NCBs).

Loss of identity cards and documents is a serious problem facing many people in Kenya today and firms find themselves disadvantaged in the process. This loss could either be by displacement, normal loss or through theft (Udogu, 2008; Wilkins, 2012). Identity and documents theft happens when someone steals your personal information and uses it without your permission. It is a serious crime that can wreak havoc with your finances, credit history, and reputation and it can take time, money, and patience to resolve (Kenya National Commission on Human Rights, 2007).

Information sharing as public policy gained more prominent after the international terrorist attack on the New York World Trade Center on September 11, 2001. The 9/11 Commission, an independent, bipartisan commission created in 2002, indicated the US government for lack of preparedness and immediate response to information known about planned terrorist attack prior to the event. Critical lessons can be drawn from the 9/11 Commission on the importance of sharing information across organizational boundaries by creating an Information Sharing Environment. Digital advances make information sharing an indispensable component in development (Udogu, 2008; Wilkins, 2012). Leveraging on the widespread access to the Internet and mobile phones, even among world's poorest households, potentially can make the sharing of information easier than ever before and offer varied opportunities for improving development systems. If the Internet connectivity expands to the rural areas of Kenya, the potential for online collaboration will not only be beginning and will get to levels that cannot be underrated or wished away. However, even without The internet, there are multiple other technologies that can fuel this drive for information sharing. For

example, Mobile phones are more affordable and, therefore, more widespread than the Internet (Kwak, *et al.*, 2004; Lewis, 2007)

### **2.3.1.1 Integration of ICT System**

The relationship between technological expertise and organizational decision making has always been complex and moving this to the public sector only increases the complexity. Developing an innovative database system that connects all Districts and Divisions in Kenya to track missing persons and documents is not only a timely project but also urgent. The increasing connectivity of the Internet and access to mobile phones in majority of Kenyan households underscore the need to enhance information sharing and reduce the costs and anguish that individuals suffer if they cannot trace a family member or crucial document (Kwak, *et al.*, 2004; Lewis, 2007). This study aimed to carrying out an investigation into inaccurate personal data and misplaced identities and documents to business continuities and security. The findings encouraged implementation of a system that will significantly reduce chances of complete loss of Identities and documents and also help in the correction of inaccuracies which arise in data entered thus ensuring business continuity and security. With a minimal initial cost for developing measures, including but not limited to ICT software, hardware and training personnel, the government can significantly cut down costs of replacing missing documents and burying unknown people (Buxbaum and O'Shea, 2012). In the developed world, such databases have significantly improved service delivery; enhance the free flow of public information, increased information sharing across government agencies and lowered the cost of conducting government businesses. It is envisaged that if a system to integrate lost identities to their consumers is established, that system will

positively influence public policy (Vltchek, 2009). The distinction between “authentication” and “identification” is key to understanding why some ID programs might work and why others clearly will not. (Heeks, 2006; Janneh, 2007).

### **2.3.2 Challenges Faced By Organizations in Embracing ICT to Trace Lost or Missing Identities**

Organizations have borne the brunt of having mundane technologies in the increasingly technology savvy times. A major component of operating costs for blue-chip organizations, countries and businesses is the purchasing of new technology and continuous updating of components. However, most businesses in the Africa are behind in science and technology, and they are yet to benefit from the use of ICTs. Until recently, most of Africa did not have an international fiber network (World Bank, 2004). The region instead relied on expensive satellite communication thus making data collection and sharing very costly. The Kenyan government mainstream Ministries are yet to develop comprehensive databases that can provide adequate and meaningful information to the citizens (World Bank, 2011). Their websites and internet portals are prone to hacking and interference

The World Bank observed that the high data costs have prevented Kenya from becoming a bigger player in Business Process Outsourcing (BPO) as India and Philippines have done in the recent past thus improving service delivery and creating millions of employment for the youth (World Bank, 2011). The high costs, taxes, corruption, and massive bureaucracies in operations and tendering are a major challenge to the country and other organizations in embracing technology in issues of

documentation. The “business as usual” attitudes of most business persons and citizens has also played a big part in assuming that it is the Governments responsibility to ensure their personal security and those of their effects.

### **2.3.3 Measures Taken By Organizations to Handle Missing and Lost Identities**

The modern trend of treating countries as corporations and businesses is gaining popularity around the globe. A country like Rwanda growing at over 9% has faced very many challenges. Its emergence as a dominant force and an economic powerhouse has made it become the fastest growing country according to the IMF in ease of opening new business in Africa (IMF, 2011). Business permits, identities, licenses acquisition time have been reduced to just 2 as compared to more than 15 in countries like Kenya (World Bank, 2011). This, however, has necessitated the Rwandan Government in 2015 to introduce a more secure and elaborate and traceable Identification document.

Overmeer (2012) observed a major threat in tracing lost identities and verifying inaccurate identification to the smooth operations of every business entity. This kind of threat has led many entities to incur the cost of publishing disclaimers on lost or stolen identities. Elliot (2006) suggested that global firms should apply ICT in ensuring that identities are accurate and that they are not lost, but the problem is how to track down lost identities and/or verify inaccurate personal data to get the right information.

Canadian passport is considered a valuable document that should be kept in a safe place at all times because once the passport has been reported lost or stolen, it is no longer valid and cannot be used for travel. This is to ensure that it is not used for fraudulent purposes (Brewer, 2000). Passport Canada, the Government of Canada or any

representative of the Government of Canada cannot be held responsible for any difficulties one may encounter at border crossings if they attempt to use a passport that has been reported lost or stolen. Firms cannot also hold the government captive for the loss of their expatriates' identities thus derailing search efforts and transferring the burden back to the companies involved. If one finds a passport, including ones own passport that you previously reported as lost or stolen, it must be returned to Passport Canada with a letter that describes how, when and where you found it (Lewis, 2007).

In South Africa, ones ID have a barcode, a photo, and a unique ID number. Information (including age and gender but excluding race) is referenced under your ID number: accounts, criminal record, voting history, driver's license, etc. You need an ID in order to apply for a passport, bank account, driver's license or tertiary studies, as well as to register to vote. In most cases, employers also request a photocopy of the ID in order to process the appointment. Voting history, as well as any firearm licenses, is usually documented in the ID booklet. Where the loss of these IDs is experienced, people encounter various problems, and this also becomes a serious issue to firms who must always update their employees' data (Bundesam, 2001).

In Kenya, the Kenyan Revenue Authority (KRA) has incorporated a system called Simba, which aims at reducing backlogs and enhancing the custom clearing functions (KRA, 2012). However, the Simba system continues to cause unnecessary hitches mainly due to mishaps from the main network link. Thus, the services at the port remain inefficient, and corruption is still rampant (Okulo, 2011).

Herman (1996) observed that Governments around the world, especially those in the West continue to invest heavily in research and development focused on enhancing ICTs breakthroughs. The aspect of increasing free flow of public information and sharing crucial information among government agencies is a fundamental component that enables citizens to make informed and timely decisions. The development of databases is more urgent today as the world is facing major challenges in the national and homeland security spheres (Herman, 1996).

### **2.3.3.1 Current Systems in Place**

Following the Geneva Conventions, treaties signed by nearly all nations set standards for humane treatment of people while providing tracking, message delivery and reunion services when war, upheaval, or natural disaster disrupts normal communication (Joint Monitoring Program, 2013). It is at this hour of confusion that American Red Cross (ARC) springs into action, bringing hope and help to those whose world spun out of control (Udogu, 2008; Wilkins, 2012). ARC understands that when separated families lose contact with their loved ones they suffer emotionally and physically and thus seeks to provide the humanitarian assistance by tracing and locating missed loved ones; exchanging family messages; providing information and referral services and reuniting people. ARC traces and, if possible, re-unite family members using a system of an international search for unforgotten family members (Folger&Skarlicki, 1999).

In Kenya, Ushahidi, which means ‘testimony’ in Swahili, was set up in response to the violence that followed presidential elections in Kenya in 2007/2008. It is an online crisis mapping platform that was originally used by anyone with access to the Internet

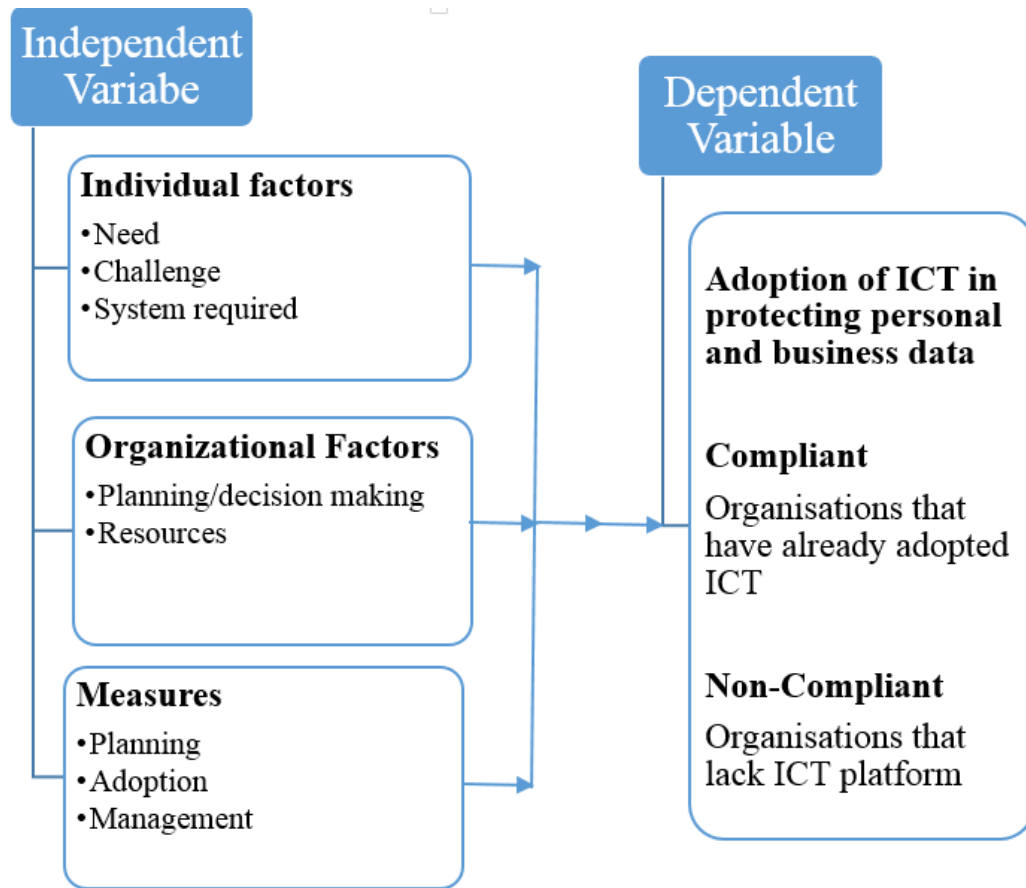


or a mobile phone to report incidences of violence or peace-building so they could be located in a central database. The Ushahidi is one of the few social enterprises that have the potential to dramatically change the face of how individuals and communities influence democracy and economic development around the world. The coders built a platform for justice and accountability using mobile phones, text messages and a Google map (Saylor, 2012). The M-Pesa in Kenya is an example of a successful project based on mobile technology. The service allows users to deposit money into an account stored on their cell phones, to send balances using Short Messaging Service (SMS) technology to other users (including sellers of goods and services), and to redeem deposits for regular money. Other M-Pesa enabled features payment services such as Lipana M-Pesa and Paybill services. M-Pesa has spread quickly and has become the most successful mobile phone-based financial service in the developing world. By 2012, a stock of about 17 million M-Pesa accounts had been registered in Kenya (Safaricom, 2012). This is an indication of how Kenyan can positively embrace the use of technology in their day to day lives. Manual systems of registration of missing documents, IDs and persons are also being applied to police stations where people book in Occurrence Book (OB) and also at the CID, where data is kept manually without a link to any database. Besides, there are locations in Nairobi where Advertisement Posts are used to post lost identities and other documents for the owners or people who know them to see and retrieve, at a price. Such ad posts have been mainly seen along Tom Mboya Street near Odeon Cinema and the Fire Station. However, these systems are quite ineffective and cannot guarantee that owners of such documents or even firms and institutions will eventually have access to them, not only because of the fluidity of the

City but because of various other reasons including but not limited to a systematic way of ensuring owner and document are reconciled. It is a good beginning, although these Post Ads are placed where serious Job Opportunities and vacancies are posted thus get lost in this more serious business of job searching. Another approach has been the manual collecting of lost or misplaced national Identifications by youth hired by businessmen, retaining this documents and advertising for them on FM radio and for a fee. This seems noble, but the capacity and legality of it poses various fundamental and ethical questions especially regarding the retaining of a person's National identification for profiteering. This also lost steam and was not viable as not everyone could afford the fees and very little number of IDs could be collected, beside the suspicion that those who advertised for these IDs were the ones who were fuelling for them to be stolen, macabre sort of supply and demand.

## **2.4 Conceptual Framework**

The conceptual framework (Figure 2) underlying this study was based on the concept that the integration of ICT in protecting personal and business data would enhance business transactions and output in Nairobi County. However, currently there is no ICT integration structure in place.



**Figure 2: Adoption and Integration of ICT in the protection of personal and business data.**

(Source: Author, 2015)

## 2.5 Gaps Identified From the Existing Literature

Buxbaum and O'Shea (2012) in their study on identification using Biometrics established that identification information in databases could be erroneous and may arise from wrong data entry or provision of inaccurate data by individuals, intentionally or otherwise. Lewis (2007) on the other hand posits that culture and globalization affect the integration of ICT in security matters. From the review of literature however, it is

not clear whether the same findings would apply in business context. Especially where employee's personal data is concerned. World Bank (2004: 2011) notes that African countries lag in ICT implementation and that this would affect comprehensive adoption of ICT. Aside from infrastructural challenges, there may be other shortfalls in the Kenyan context that could possibly derail the integration of ICT. According to Overmeer (2012), inaccurate identity information is a huge business risk and Wilkins (2012) adds that it is imperative for governments to invest in research and development with the focus of integration ICT in the population identification processes. It is however not evident whether such efforts have been put in place by the Government of Kenya. To this end, it was imperative to conduct an empirical study in Kenya on the integration of personal data on lost identities and documents.

## **2.6 Summary**

This chapter reviewed literature that is related to this study. It has provided an overview of the relationship between social issues and technology. It has brought out security challenges that are growing complex and need the engagement of technology to deal with conclusively. How individuals identify themselves in our country grows more complex by the year especially with the loss of identity cards and documents and inaccuracies in data recorded.

## **CHAPTER THREE: METHODOLOGY**

### **3.1 Introduction**

The chapter presents the research methodology adopted by the researcher. It explains the research design, sampling, target population, research techniques, sources and types of data, data analysis that were used to carry out the study.

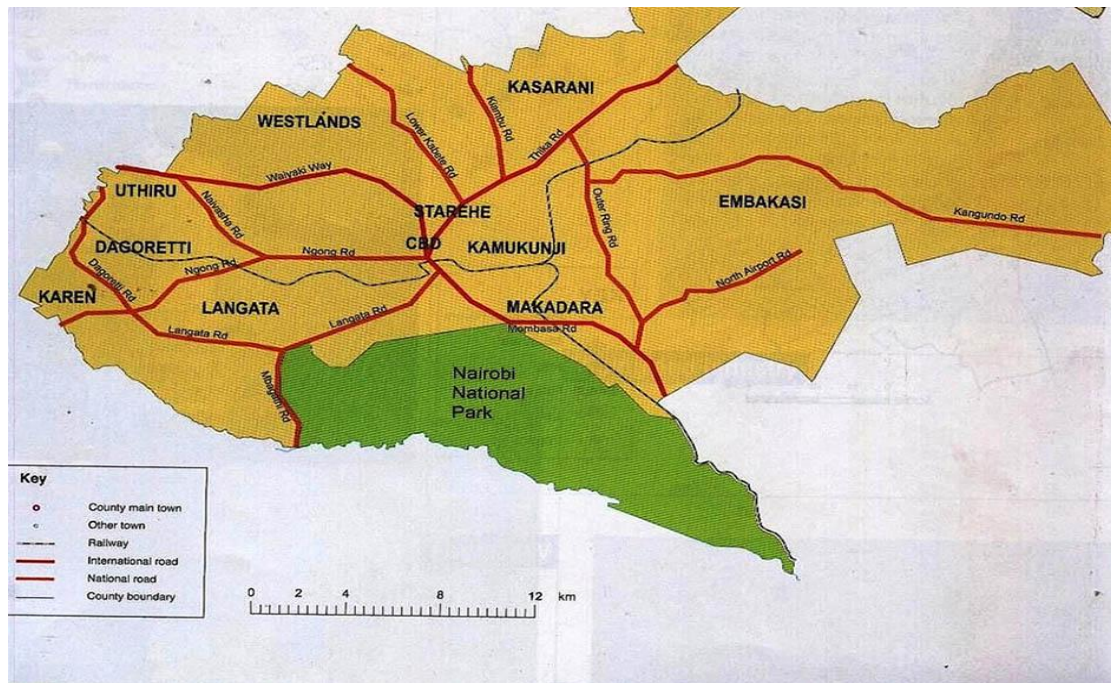
### **3.2 Research Design**

This study adopted a survey design. Survey research design is a scientific method that involves observing and describing the behaviour of a subject without influencing it in any way (Bell and Bryman, 2008). It was designed to gain more information about variables within the particular field of study. Its purpose was to provide a picture of a situation as it naturally happens (Burns and Grove, 2007). This descriptive research design was adopted because the study sought to describe the variable (effect on security of ICT integration in personal data maintenance) in a population (KDN, Kenya police and KRA employees and customers at Nairobi County). The objectives were stated clearly and a clear definition of the population also given. The instruments for data collection were tested for validity and reliability which were necessary for descriptive studies (Kothari, 2004).

### **3.3 Study Area**

This study was confined to Nairobi County only, which is the Capital City of the Republic of Kenya. According to the Kenyan National Bureau of Statistics (KNBS), Nairobi County has a population of about 3,138,369 in 2009; Male - 1,605,230 or 51.1 %, Female - 1,533,139 or 48.9 % (Kenya News Agency, 2012; Kenya National Bureau

of Statistics, 2009). The County is divided into the following constituencies: Dagoretti, Kasarani, Starehe, Westlands, Embakasi, Makadara, Langata and Kamukunji. The researcher ensured that the information obtained was representative of all citizens of the entire Nairobi County thus making it appealing to draw necessary conclusions about general feelings of all people. (Kenya Census, 2009; Kenya Integrated Household Budget Survey, 2005). Commission on Revenue Allocation(CRA) ranked Nairobi Country at the top in terms of both population and density. The total urban population is 26,122,722 or 67.7% and the rural population is 12,487,375 or 32.3% (KNBS, 2009).



**Figure 3: Map of Nairobi County**

Source Wikimapia (2014)

### **3.4 Study Population**

The researcher interviewed participants who were currently working for the KRA and KDN and also took views from the police, administrative officers, sampled businesses and the public through face to face interviews. The target population of the study was all employees of Kenya Revenue Authority, Kenya Data Networks and sampled clients and police of respective organizations. Accessible population was 110 respondents based on Nairobi County (Cochran, 2009). The study was based on KRA and KDN offices in Nairobi County hence the staff and clients, and police were used for the purpose of this study.

**Table 1: Accessible population**

Category	Police and other clients	KDN	KRA	Percentage
Regional Manager		1	1	1
Station Manager		8	3	10
Compliance			12	11
Audit		2	8	9
Taxpayer Services			12	11
Debt Management			6	6
Support Services		12	6	17
Human Resources		3	2	4
Finance		4	6	15
Policy Unit			4	3
Random Picks	15	5		13
<b>Total</b>	<b>15</b>	<b>35</b>	<b>60</b>	<b>100</b>

**Source: KRA HRM Department (2013), KDN HRD Department (2013)**

### **3.5 Sampling and Sample Size**

This study engaged purposive sampling approach because the researcher was particularly interested in participants who were currently in government and had policy related information pertaining to missing persons and documents. According to Kothari (2004) a sufficient sample for any study should be one that will enable the researcher to



make a correct inference about the entire population that is being studied. The fisher's formula was applied;

$$N = Z^2 pq / d^2$$

Where,

N= desired sample size

Z= standard normal deviation set at 1.96 (95% confidence level)

P= proportion of the targeted population that have the characteristic focusing in the study estimated at 50%.

$$q = 1 - p$$

d= degree of accuracy set at 0.05/ degree proportion of error that should be accepted in the study (0.05) that is 5%

$$\text{Thus } n = 1.96^2 * (0.5 * (1 - 0.5)) / 0.05^2$$

$$\text{Hence; } n = \frac{(1.96 * 1.96) * (0.5 * 0.5)}{(0.05 * 0.05)}$$

$$= 3.8416 * 0.25$$

$$0.0025$$

$$n = 384.16$$

$$nf = \frac{384.16}{1 + 384.16/150}$$

$$1 + 384.16/150$$

$$nf = 110.34$$

Therefore, the sample size that was adopted was 110.

Given (2008) observed that the use of purposive sampling signifies that the researcher sees sampling as a series of strategic choices about with whom, where and how to do your research. In addition, Babbie (2007) posited that smaller but focused samples are more often desirable than large samples for qualitative research.

### **3.6 Data Collection Instruments**

The qualitative data collection techniques employed in-depth interviews using semi-structured questionnaires for the senior officers who were limited in time due to the nature of their jobs. . Kahn and Cannell (2006) describe interviewing as ‘a conversation with a purpose’. For the majority of officers of lower cadres and who were easily available, a focused group discussion was employed. This was important as it enabled them to openly share their experiences with a bit of probing. In order to make the participants comfortable and at ease, this study conducted mainly a conversational, open-ended form of interview. According to Riessman, (2002), the most important aspect of the interviewers approach is conveying the attitude that the participants’ views are valuable and useful. The choice of data collection instruments required the researcher to be skilful at personal interaction, question framing, and gentle probing for elaboration as recommended by Rubin & Rubin (2005).

The researcher was responsible for setting up the interview environment that allowed participants adequate comfort and time to speak out their opinions of issues relating to missing persons and documents. The researcher used open-ended questions. The open-ended questions provided an opportunity for the participant to speak their mind without

limitation. However, the researcher also intervened and sought clarification or more in-depth information where necessary. The semi-structured interview approach was considered because it is easy to record interviews by taking down notes and classification of the responses. It also provided an opportunity to create a positive rapport between interviewer and respondent. This was useful in ensuring the participants understood the questions and provided answers without fear. In addition, the approach was relatively simple, efficient and practical especially when acquiring getting data about issues such as feelings, opinions, and emotions that may not be easily observed.

Well-structured questionnaire with both open and closed questions were applied in order to obtain information about the views on the integration of security systems and lost identities and /or documents.

### **3.7 Validity**

The validity of the research instruments was emphasized in this study due to its value in determining whether the research accurately measures what is envisioned to measure (Creswell 2009). The questions in the research instruments were therefore drafted to address specific objectives of the study. The research instruments also captured items under the existing circumstances to address content validity. The responses from the pilot study assisted in determining whether the questions and topics reflected in the instruments are accurately prompting the types of responses expected.

### **3.8 Reliability**

Reliability of the research was considered by ensuring that questions in the research instruments addressed the prevailing circumstances at the site of the study in relation to the study topic (Creswell 2009). The questions were further made consistent among themselves in relation to the subject under investigation hence the responses were fairly found to be consistent. A pilot study was done in Kabete division in Kiambu County. 10 police officers and 10 members of the public were given the same instruments to answer. The two results were subjected to correlation test using Cronbach Alpha. Nganga et al. (2009) supports that a correlation of 0.7 is the acceptable threshold, and thus the questionnaire were deemed reliable if it scores above 0.7.

### **3.9. Pilot Study**

A pilot study was done in Kabete division of Kiambu County. It was selected because it is not in the same County with the study area. A pilot study was used to test the feasibility of the study and also check the adequacy of the research instruments. The pilot study checked on any unforeseen problems respondents may encounter while interacting with research instruments and improvement of the instruments. It assisted in ascertaining the accuracy and consistency of the research instruments before embarking on the actual data collection.

### **3.10 Data Collection**

The study was informed by data sourced from both primary and secondary sources of data. Primary data was gathered by administering questionnaires to National Police Service officers, employees of Kenya Data Network and Kenya Revenue Authority and

members of the public. Senior officers from the police and both KDN and KRA were interviewed. Secondary data was extracted from the police Occurrence Book records.

### **3.11 Data Analysis**

The study employed Qualitative Data Analysis (QDA) since the data collected in this study was non-numeric in nature. According to Creswell (2009) QDA was ideal since it would enable the extraction of meaningful information from the responses obtained through data collection. The data that was collected was cleaned, coded and analyzed by use of a number of statistical operations and also the SPSS software was applied. SPSS came in handy in analyzing data collected on Likert scale on the questionnaire. The researcher also made good use of intuition, observation, as well as critical analysis of the entire primary, and secondary data gathered. According to Gubrium and Holstein (2002), QDA is the range of processes and procedures that move the qualitative data that has been collected into some form of explanation, understanding or interpretation of the participants' view on the subject matter under investigation. As such, QDA is usually based on an interpretative philosophy as it encompasses processes and procedures that transform qualitative data into explanations (Coffey, Holbrook & Atkinson, 1996). The objective of the analysis was to examine the meaningful and symbolic content of qualitative data collected.

The researcher transcribed the data from the recorded tapes and write-ups in summary format. Then the researcher then looked for themes and coded them appropriately. This included identifying passages of text and applying labels to them to indicate that they are examples of some thematic idea. The coding process assisted in the identification

and retrieval of ideas that belong to the similar thematic area. After coding the data and writing it in descriptive summaries of responses given were interpreted in terms of themes / concepts / ideas / interactions / processes and categorises. Since the qualitative data tends to be large, data collected was organized to avoid being overwhelmed by the lengthy interviews. Computer Assisted Qualitative Data Analysis (CAQDAS) was then used to efficiently manipulate the data and convert it into meaningful information.

### **3.12 Ethical Concerns**

According to guidelines for conducting research using human subjects, it was important to ensure that participants' protection was guaranteed. For this study, the required authorization letter was sought from Kenyatta University prior to conducting the research. As mandated by the Institutional Review Board (IRB), the protection of participants from safety, privacy, and welfare risks was ensured. The purpose of the research was introduced and adequate information provided about the study objectives. In particular, informed consent was sought from the participants with adequate information about (a) anonymity of participants; (b) voluntary nature of participation; (c) confidentiality of survey responses; (d) encouragement of participation; (e) freedom to stop participation at any time without explanation; and (f) contact information for the researcher. This enabled the participants to seek more information or voice any concerns. All through the study, the researcher ensured that participants understood clearly about their protection, the minimal risks for participating in the study, and that all results would be kept confidential and anonymous. Further, all the demographic data that was collected during the study was not included in personally identifying information such as name and address in order to guarantee participants anonymity and

confidentiality. Consequently, the raw data, survey information, and subsequent statistical analysis related to the study were kept in a safe custody.

### **3.13 Summary**

This chapter examined the qualitative survey research design and approach which was used for the study. The justification for using qualitative design was provided. In addition, the study site, the study population was described. The approach for selecting the samples and the sample sizes were presented and a justification for the sample size provided. In addition, the data collection instruments, and analysis procedures were comprehensively described. Lastly, the measures to protect participants' from pressure to participate, safety, and privacy risks were provided.

## **CHAPTER FOUR: RESULTS AND DISCUSSION**

### **4.1 Introduction**

This chapter presents an analysis of the data that was obtained from the questionnaire responses (Appendix III). The data was presented using bar charts and tables. This chapter reviewed the analysis of the existing system that was used by the organizations initially, the development of the proposed integrated ICT system on personal data of persons and businesses and its implications on the security, the objectives of the existing system, the proposed system and its software, and the evaluation of the existing and proposed system.

### **4.2 Results**

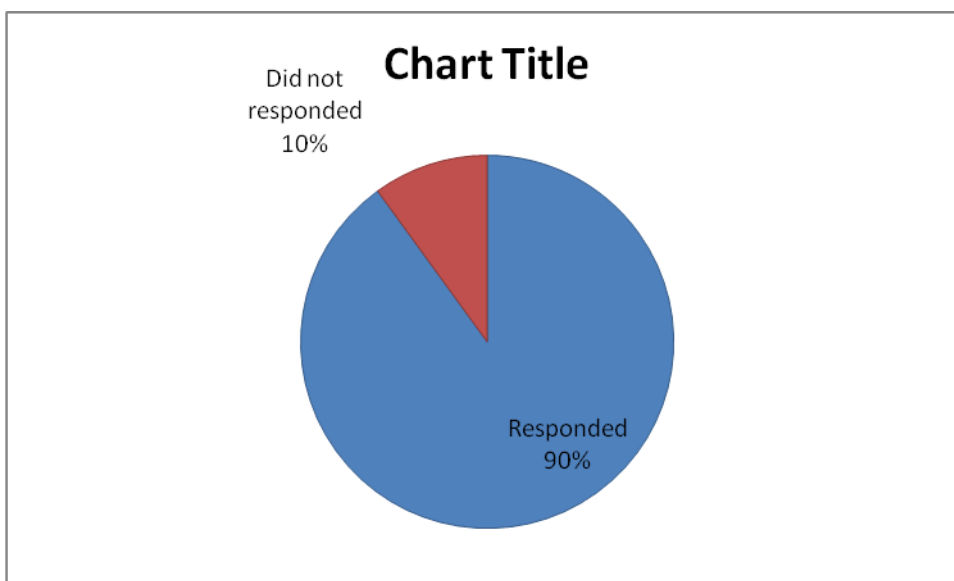
This section will show the results of the collected data and will present it in form of bar charts, pie charts and tables.

#### **4.2.1 Response Rate and Demographic Details**

##### **4.2.1.1 Response Rate**

The research recorded the number of respondents and those who did not respond. Its findings were as shown below. Figure 4 shows the total number of the people who responded and those who did not respond. Out of 100 questionnaires, 90% were responded to while 10% were not. According to a study conducted by Nulty (2008), the acceptable response rate is 50% of the sample used in a study. It is therefore, agreeable that the response rate for this study was extremely high.





**Figure 4: Response Rate**

Source: Field Survey (2015)

#### **4.2.1.2 Gender of the Respondents**

Table 2 illustrates the distribution of male and female respondents in the study. 55.6% of the responses were obtained from male respondents while 44.4% were obtained from female respondents.

**Table 2: Gender of the Respondents**

Category (gender)	Frequency	Percentage %
Male	50	55.6
Female	40	44.4
<b>Total</b>	<b>90</b>	<b>100%</b>

Source: Field Survey (2015)

#### 4.2.1.3 Age Category of the Respondents

Research findings in Table 3 indicate that majority of the respondents were between the age of 26-35. These are considered to be the digital generation and are assumed to be more knowledgeable about digital platforms and computer packages.

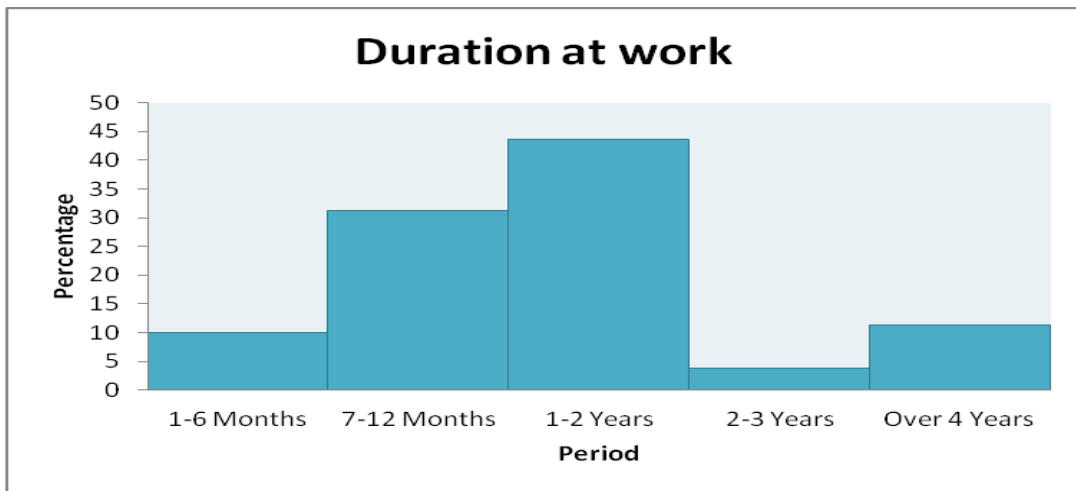
**Table 3: Age Category of the Respondents**

<b>Age</b>	<b>Frequency</b>	<b>Percentage</b>
18-25 years	18	20
26-35 years	43	48
36-45 years	20	22
46-55 years	5	6
Over 55 years	4	20
<b>Total</b>	<b>90</b>	<b>100%</b>

Source: Research Data (2015)

#### 4.2.1.4 Employment Time (Duration at Work)

From figure 5, we can deduct that, collectively, respondents with shorter work experience periods at their respective organizations were the majority as opposed to the more experienced ones. Therefore, they are less likely to have any knowhow of what measures the organization has put in place as far as data protection and recovery is concerned. However, these more of newly employed persons could be adopt more easily any new technology introduced at their organisations as opposed to the older employees that are likely to stick to the old ways of doing business.



**Figure 5: Duration at Work**

Source: Field Survey (2015)

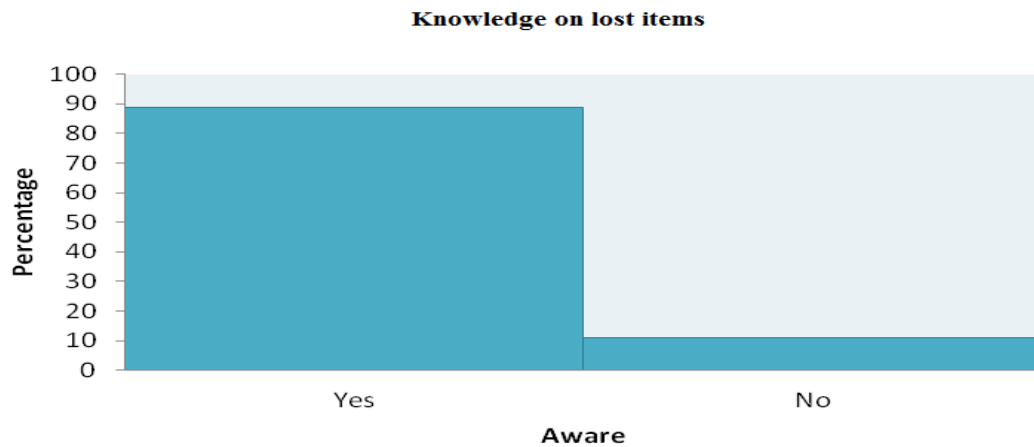
#### **4.2.2 Personal information security challenges**

##### **4.2.2.1 Lack of link between finders and owners of lost documents**

The research set out to establish the percentage of people that have knowledge on lost items. Some respondents representing a small minority were not aware of lost documents.

One respondent, Jane\*\* said she was not aware of anyone having lost his/her documents. She had never lost a document either.

Figure 6 show that 89% of respondents had knowledge of lost documents while only 11% of the respondents did not. The study could not establish a direct link between those who found lost documents and the owners. Thus posing a challenge as far as reunification of documents and their respective owners is concerned.

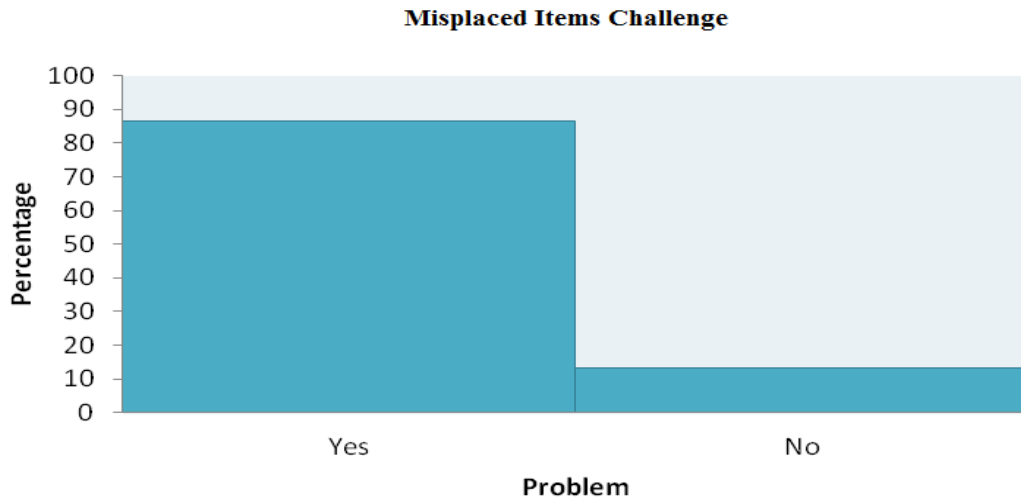


**Figure 6: Knowledge of lost items**

Source: Field Survey (2015)

#### **4.2.2.2 Misplaced Items challenge**

According to study findings in Figure 7, 87% of the respondents agreed that lost items are a problem to individuals, government and business continuity. Therefore, the majority felt that it was important to put effective ways to trace lost documents in order to enhance service delivery and business continuity. However, two respondents Mary\*\* and Kamau\*\*, felt that the issue of lost documents should be personal and therefore should not affect the public. They proffered that carelessness is to blame for loss of official documents.



**Figure 7: Misplaced Items challenge**

Source: Field Survey (2015)

#### **4.2.2.3 Inefficient methods of tracing lost information**

Table 4 shows that majority of the respondents (45%) were dissatisfied with the manner in, which lost identification documents are traced in Kenya. This is a significant representation of the challenge faced by most people when they lose their personal documents as far as tracing them is concerned.

Otieno\*, a police constable and on condition of anonymity held that in his 10 years of working for the police service, He was unhappy on the lack of an effective system of tracing lost documents. He indicated that, “There is very little we can do when reports are made here concerning loss of important documents. We just record the details and request the client to fill an abstract form for replacement. Bas! These are loopholes for deceit and theft.”

**Table 4: Satisfaction with ID Tracing (If Lost)**

<b>Extent of satisfaction</b>	<b>Frequency</b>	<b>Percentage %</b>
Very satisfied	1	1.1
Satisfied	5	5.6
Neutral	20	22.2
Dissatisfied	40	44.5
Very Dissatisfied	23	25.6
Missing system	1	1.1
<b>Total</b>	<b>90</b>	<b>100</b>

Source: Field Survey (2015)

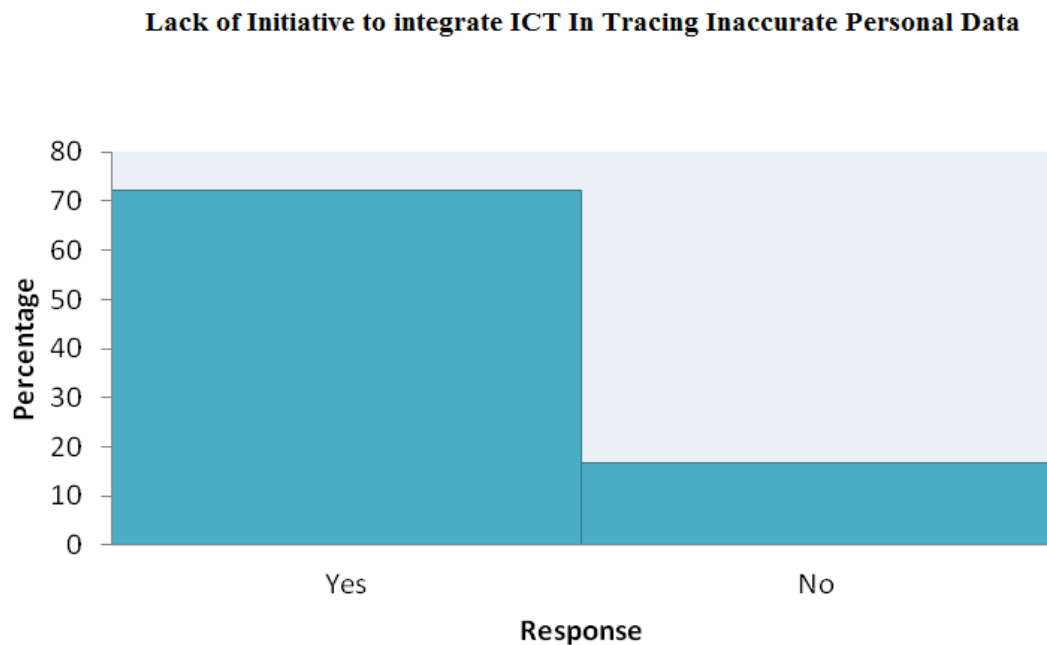
### **4.2.3 Challenges that organizations face in embracing information technology in protecting personal and business data.**

#### **4.2.3.1 Lack of Initiative to integrate ICT in managing personal and business data across different organizations**

From figure 8, 72% of the respondents believe that lack of initiative to integrate ICT in managing personal and business data affects the level of success in terms of tracing missing identity cards and documents. Missing/untraceable personal/business data is likely to hamper the daily operations of an organization and subsequently spill over to its general output in terms of profit and loss. Therefore, to contain such an effect, organizations need to prioritize and budget for ICT integration to secure

personal/business data. Prioritization could be done through strategic planning and budgeting.

Kioko, an unemployed youth said that since documents are held somewhere in this country either at banks, Mpesa shops, on streets poles, there should be one mandated body or system tasked with the management of lost documents and their subsequent retrieval.



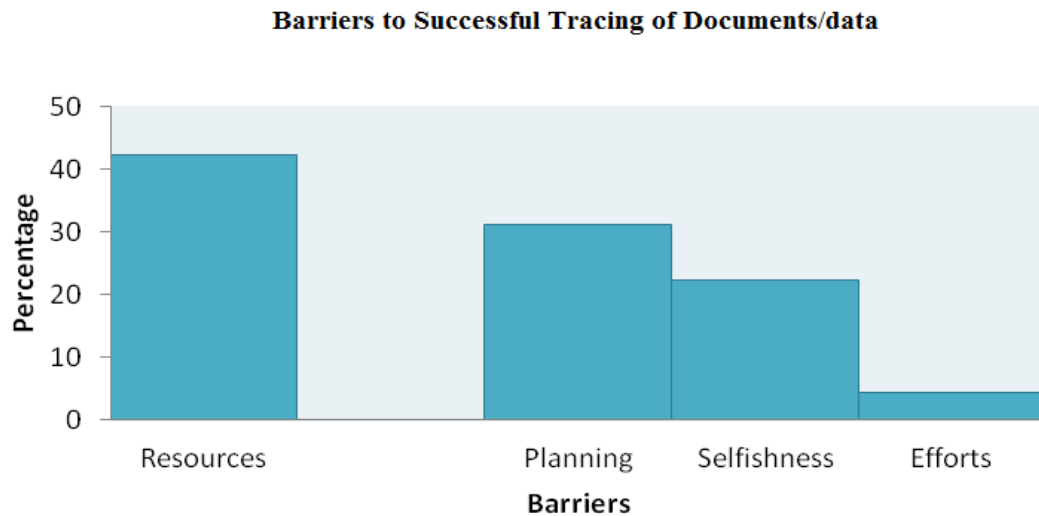
**Figure 8: Lack of Initiative to integrate ICT in Tracing Inaccurate Personal Data**

Source: Field Survey (2015)

#### **4.2.3.2 Limited Resources (time and money)**

Figure 9 shows that according to 42% of the respondents, resources (time and money) are the most significant barriers to successful tracing of lost documents/data as opposed to the rest of the factors that were analysed example, planning, selfishness, and effort

barriers. Timothy\* an employee from KRA felt that the National Identification which is the basis of all transactions, more so initial, should be traceable. He recounted of cases where paperwork of organization has being disarrayed due to the missing document. This has led these organizations to incur losses running into millions in back taxes.



**Figure 9: Barriers to Successful Tracing of Documents/data**

#### **4.2.4 Appropriate measures that organizations can use to counter challenges in adoption of information technology in protecting personal and business data.**

##### **4.2.4.1 Planning**

Secondary data obtained through reviewing past studies, indicated approximately an 80% success rate as far as the adoption in organizations that planned to prioritize the usage of ICT was concerned e.g American Red Cross (Wilkins, 2012). Organizations that did not plan were unable to integrate/initiate the usage of ICT in data management.



#### **4.2.4.2 Adoption**

The adoption of ICT in the management of personal and organization data is a success story in western countries (Brewer, 2000). However, the adoption of ICT systems in third world countries is fairly challenged (Worldbank, 2004). Responses across reviewed studies indicate that over 80% respondents were assertive over the need to adopt ICT in data management. Majority of respondents were overly enthusiastic that integration of ICT would enhance data security both at personal and organizational levels.

#### **4.2.4.3 Improved Management of ICT systems**

Study findings in Table 5 show that 50% of the respondents cited the need to put in place efficient data management systems i.e through ICT. ICT systems need to be managed in an efficient and secure manner to reduce the frequency of system downtimes and the possibility of hackers having access into the stored data. It is necessary to improve on initiative since it has impact on the success level of tracing lost documents. Mercy\* from Kenya Data Network, actually wondered why no Kenyan has come up with a system that can effectively help in the tracing of lost document. Such an initiative would be timely, she posed.

**Table 5: Management of Missing Documents and IDs**

<b>Extent of Management of missing IDs</b>	<b>Frequency</b>	<b>Percentage %</b>
To a very great extent	38	42.2
To a great extent	35	38.9
Neutral	10	11.1
To a small extent	6	6.7
Missing System	1	1.1
<b>Total</b>	<b>90</b>	<b>100</b>

Source: Field Survey (2015)

#### **4.3: Bivariate and Multivariate Analysis Using SPSS**

Bivariate and multivariate analysis were done to establish the statistical significant of the findings. A 2-tailed Pearson's correlation was carried out at 0.05, level of significance to check for possible relationship between availability of resources, need for efficacy and influence of management. Existence of a relationship between the three variables would mean that a particular variable affects the adoption of ICT (dependent variable). From the results it was clear that there was a weak positive correlation between the variables. The correlation was highest between availability of resources and influence by management (0.322). This means that the impact of availability of resources increases with every corresponding increase in the influence by management on the adoption of ICT. The lowest correlation coefficient exists between the impact of need for efficacy and availability of resources on the adoption of ICT. Table 6 below

shows the correlation coefficients between various variables that influence the adoption of ICT in Nairobi, Kenya.

**Table 6: Pearson's Correlation Coefficient**

<b>Control variables</b>	Availability of resources	Need for Efficacy	Influence by Management
Availability of resources	1	<b>.174</b>	<b>.322</b>
Need for Efficacy	<b>.174</b>	<b>1.000</b>	<b>.251</b>
Influence by Management	<b>.322</b>	<b>.251</b>	<b>1.000</b>

Multivariate analysis was conducted with an aim of formulating an ideal model for the data. The regression model used for the analysis was defines as:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3$$

Where,  $\beta_i$  s are the coefficients;  $i = 1, 2, 3$

$Y$ =Adoption of ICT

$X_1$ = Availability of Resources

$X_2$ = Need for Efficacy

$X_3$ =Influence by Management

From the study results, the value of the coefficient of determination was .385 (R Squared=0.385). This means that the model explains 38.5% of the variability of the data. R is the correlation between the dependent variable and the independent variables. The value (0.621) indicates that there is a high correlation between the dependent variable and independent variables. This implies that the model fits the data although the data could be explained better if the sample was increased. Table7: presents the model summary details.

**Table 7: Regression Model Summary**

Model	R	R Squared	Adjusted R Squared	Std Error of the Estimate	Durbin-Watson
1	.621	.385	.364	.916	.945

The model defined above is important in predicting the values of the dependent variable. From the analysis, the researcher obtained the values of the coefficients  $\beta_0$ ,  $\beta_1$ ,  $\beta_2$  and  $\beta_3$  as 1.373, 0.974, 0.243 and -0.004 respectively. Further the researcher sought to investigate whether all the variables included in the model were significant. From the analysis, availability of resources was the only variable that had a significant effect in predicting the rate of adoption of ICT in Nairobi. As a result the model reduces to:

$$Y=1.373+0.974X_1$$

Although the other variables were included in the model they did not have significant influence on the predicting the rate at which ICT had been adopted in Nairobi, Kenya. A variable is said to have a significant influence on the model if the level of

significance, (in this case at 95% level of significance) is less than 0.05. Table 8 represents the values of the coefficients for the model.

**Table 8: Coefficients**

Model 1	Unstandardized Coefficients		Standardized coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	1.373	.279		4.919	.000
Availability of resources	.974	.151	.579	6.444	.000
Need for Efficacy	.243	.134	.159	1.810	.074
Influence by Management	-.004	.021	-.016	-.170	.865

From the study results, it was clear that the youth are more responsive towards ICT and technology. Since the youth make up the largest proportion of the Kenyan population, the adoption of ICT in protecting personal and business data is not an issue of perception but resources. The linear regression carried out for this study clearly indicates that among the variables used to define the model for adoption of ICT, availability of resources was the most significant. From previous research, the low use of ICT in protecting personal and business data is attributed to poor management, poor

planning and selfish ideologies among people in positions of power. Despite the fact that most developing countries such as Kenya face the challenge of inadequate resources, the available ones are mismanaged through inefficient systems. Incorporation of ICT in the Kenyan registration system will have several benefits including time efficacy, security and easy management of the national database.

#### **4.4 Summary**

Chapter four gives a detailed analysis of the study in regards to the integration of ICT in security and its linkages to businesses in Nairobi. The first part of the chapter gives the responses obtained from the questionnaires while the second part gives the findings from the interviews. Findings have indicated that indeed there could be a relationship between the process of tracing and replacing of ID cards on business performance. There is also an indication that ICT can be integrated in security as far as identification documents are concerned.

## **CHAPTER FIVE: SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS**

### **5.0. Introduction**

This chapter comprise of the summary of findings, conclusion and recommendation to the research on the evaluation on the factors affecting security and integration of information communication technology into personal data of persons and businesses with reference to Nairobi County, Kenya.

### **5.1 Summary of Findings**

#### **5.1.1 Personal information security challenges**

Based on the analysis of 90 respondents, 89% of the total respondents indicated that they had knowledge on lost ID's and other legal documents which could have a security impact on their daily business transactions. 11% of the total respondents stated that they did not have knowledge on any lost ID or documents which, suggests that majority of respondents gave responses that could be used to find out the purpose of the study and therefore the findings. From the study it can be concluded that knowledge on lost ID and other documents poses security issues on normal business on-goings and transactions through the data collection and analysis.

Based on the analysis of 90 respondents, 83% of the total respondents indicated that inaccurate personal data had an effect on the security and handling of personal documents. While 17% of the total respondents stated that inaccurate personal data did not have an effect on the day to day business transactions. From the study it can be concluded that inaccurate personal data had an effect on the day to day business

transactions by the transactions not going to completion by deliberate refusal by service providers.

Based on the analysis of 90 respondents, 87% of the total respondents indicated that unauthorized or unintended activity or misuse by authorized database users, database administrators, or network/systems managers, or by unauthorized users or hackers such as inappropriate access to sensitive data or inappropriate changes to the database programs, structures or security configurations affected normal and timely day to day transactions

According to 23% of the respondents, unauthorized access or hacking of the sampled institutions databases never affected either of these business transactions. It can therefore be concluded that institutions databases need to be integrated with a person's personal data so that changes on improper information about person's details can easily be altered or changed.

### **5.1.2 Challenges that organizations face in embracing information technology in protecting personal and business data.**

Based on the study findings, it can be concluded that lack of an initiative to integrate ICT in protecting personal and business data, and insufficient resources (time and money) do hamper efforts made to trace lost and missing identity documents as 42% of the respondents agreed. Other than that, it can also be concluded that lack of planning on the part of the involved agencies such as the various businesses also affect the same process since many employers still use old methods of identifying their employees. This is as supported by 31% of the respondents. Only 5% of the sampled population agreed



that the efforts put in place by the responsible agencies are insufficient to adequately address the issue of lost and missing identities. This leads to the conclusion that institutions that produce identification documents should embrace ICT so as to streamline the issuance and tracing of the documents.

### **5.1.3 Appropriate measures that organizations can use to counter challenges in adoption of information technology in protecting personal and business data**

According to the study findings, it is evident that organizations indeed do make effort to solve the problems of lost and missing documents e.g. IDs. However, more measures i.e. in planning/budgeting, research, adoption and management need to be put in place so as to facilitate speedy integration of ICT in the protection of personal and business data. One of the institutions that have made such effort is the Government, which has invested heavily in research and development focusing on enhancing ICTs breakthroughs. According to 34% of the sampled population this effort by the government will go a long way to address the issue of missing and lost identity documents.

At business level, 55% of the respondents agreed that private businesses have also started giving out biometric identity documents which may be easily traceable in the event that they get misplaced. For personal documents such as certificates, it was noted that businesses only expressed interest while verifying an individual's credentials and no longer require them once the hiring process is completed.

## **5.2 Policy Implications of the Research Findings**

Based on the study findings, the study proposes the following guidelines on policies at various levels.

### **5.2.1 Factors Affecting Personal Information Security and ICT Integration.**

There are various factors that affect the integration of ICT in the protection of personal and business data. Factors such as time, money should not be the sole determinants of the availability of such a system. The other limitations that were raised in this study need to be addressed as well. The individual needs for ICT integration to secure their personal data should be considered and the challenges experienced for lack of ICT integration should be considered as sufficient justification to kick start the adoption process by the relevant organisations e.g the government.

### **5.2.2 Organizations Challenges in embracing information technology in protecting personal and business data.**

Most organizations face a dual challenge of resource and manpower when new technology is to be employed in the advance of their operations. The computer age made most professions redundant and not conforming to the new technological age. Documents that used to rely on seals, watermarks and simply engravings to authenticate or prove ownership were found to be easily counterfeited and manipulated. This posed a great challenge to organizations then. Criminals and misfits devised ways of beating the system with ingenious and sometimes complex networks.

Walton (2006) says Identity theft issues and cases started arising in the early 1990s. To militate against major losses and costs, organizations found it not only necessary to

embrace technology but a necessity to embrace it in the securing of their identities. Forgeries and counterfeits needed to be eradicated. Forensic investigators were employed and trained to arrest and come up with ways of beating fraudsters. Computers brought with them a sense of security and networks that made it more complicated for criminals to infiltrate organizations. The securing of identities for these organizations broke new grounds and fields. Countries are finding it increasingly challenged to develop new ways of securing their citizens and their personal documents. As late as April 2014, the Government of Kenya awarded albeit controversially a tender to Safaricom Ltd, a private company rights to develop a security infrastructure that integrates major facets of personal information of persons. This system that is under investigation by the Kenyan parliamentary committee on Security and Administration is seen as a good measure to integrate security and help create a substantive database on people. According to Ngechu (2014), the telecommunication giant would install 18,000 state of the art surveillance cameras across all towns. These cameras have the ability to pick out faces and connect them to a central database that identifies features and tags them.

### **5.2.3. Embracing Technology and Its Challenges**

Uncertainties could be minimized by reducing friction between the local population and the people working in various organizations mainly government parastatals through installation of integrated ICT system; this is likely to reduce negative effects on the ICT program implementation use. Also careful collaboration and planning with partners would help cut down uncertainty of program use.

#### **5.2.4 Institutions (Police, KRA, KDN) Databases**

Better design of the integrated ICT Programs for security purposes would greatly enhance collaboration between the local leadership, government operatives and all the international and local businesses. This may lead to avoidance of time wastage and improvement of the business environment in Nairobi County.

### **5.3 Suggestions for Further Research**

The areas for further research should include a study of whether the provision of services by businesses and government bodies such as Kenya Police and KRA can be used to benefit the people in terms of business progression through an integrated ICT system. This could otherwise be used to encourage adverse security repercussions, in equal measure to the local community, the government and business organizations such that it may enhance the prospects of sustainability of such integrated ICT programs.

### **5.4 Conclusion**

Findings emanating from this study indicate that factors affecting the integration of ICT into the protection of personal and business data in Nairobi County include insufficient resources, traditional and mundane approaches to data management, lack of innovativeness, and lack of a support infrastructural network. These factors alone may not help provide quick fix solutions to the pertinent issues surrounding the organizations with regard to security of personal data of persons and businesses. However, when these study factors are analyzed statistically and independently, the relationship between these variables provide some relative framework that provokes thought. From the study's findings, it is evident from statements by the majority of the respondents that, if

organizations made efforts towards the integration of ICT programs to enable trace lost ID and other documents, they would influence the ability to tackle security issues with regard to alteration of incorrect data and recovery of lost ID's.

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## APPENDICES

### APPENDIX I: WORK PLAN

Month /Activity	February- April 2014	May- July 2014	August- October 2014	November 2013 – February 2015	March- July 2015	August- October 2015
Concept paper development						
Literature search and Development of Proposal						
Presentation of proposal for defense and Corrections						
Development of Thesis and Research instruments						
Iterations and Supervisors counsel						
Submission of Final Thesis and Defence						

**Source: Author, (2015)**

**APPENDIX II: BUDGET**

Item	Unit cost	Cost (Kshs)
Travelling expenses	Item	5,000
Hiring of research assistant	Item	8,000
Computer/typing services	Item	1,000
Printing and Photocopying of Thesis	Item	3,000
Binding of Thesis 7 copies	150	1,050
Research Permit	Item	5,000
Printing and Photocopying of Thesis	Item	6,000
Hard binding, 7 copies	280	1,960
<b>Total</b>		<b>31,010</b>
10% Contingency		3101
<b>Grand Total</b>		<b>34111</b>

**Source: Author, (2015)**

### **APPENDIX III: QUESTIONNAIRE**

Instructions:

My Name is Andrew Gitau Kimani, a Master of Arts student at Kenyatta University. I have cleared my course work and am currently embarking on a research project.

This questionnaire has been prepared for the sole purpose of getting feedback from you in relation to a survey that is conducted on, ‘the integration of ICT in personal data of persons and businesses in Nairobi County’. You are requested to place an X in the provided box after the question. This may take less than 25 minutes to complete. Please provide responses that show personal and independent opinions on issues being asked. This is purely academic research, and thus your confidentiality is guaranteed.

#### **PART I: PERSONAL INFORMATION**

**Please indicate Your Gender**

Male

Female

**Please indicate your age bracket**

16-25yrs

26-35yrs

36-45yrs

46-55yrs

over 55yrs

**Please indicate how long you have been in your profession (If employee of KDN or KRA)**

1-6 Months

7-12 Months

1-2 Yrs.

2-3yrs

over 4 Yrs.

## **PART II:**

### **Tracing Missing Identity Cards and Documents**

**Do you know anything Misplaced or Lost Identities and Documents?**

Yes

No

**Do you think Misplaced or Lost Identities and Documents is a problem to you or your firm?**

Yes

No

**If yes, how satisfied are you with the manner in which tracing of these IDs and documents have been carried out in Kenya, especially Nairobi?**

Very

Satisfied

Neutral

Dissatisfied

Very

satisfied

dissatisfied

**Do you think Missing Identity Cards and Documents could be linked to Business Failure?**

Yes

No

**To what extent do you think Missing Identity Cards and Documents problem is being managed?**

To a very  
great extent

To a great  
extent

Neutral

To a  
small

To a very  
small extent

extent

**a) Please RANK the following Barriers to achieving successful tracing of Missing Identity Cards and Documents based on a scale of 1 to 10?**

Rank

Lack of sufficient resources

Poor initial planning

Selfishness of people holding them

Lack of efforts in tracing them by their owners

**From Your Opinion, do you think tracing Missing Identity Cards and Documents is crucial for achieving business sustainability and security?**

Yes, it is	No, it is not	I Don't know
important	important	

**As per Your Knowledge, how do you think Missing Identity Cards and Documents affects business or institutional performance?**

Strongly	Affected	Neutral	affected	Strongly
Affected	Positively		negatively	affected
positively				negatively

### **PART III**

### **Tracing Inaccurate Data**

**Based on the options in the table below, please tick What Explains Your Views on Tracing Inaccurate Data**

	YES	NO	Neutral
It is important to trace inaccurate personal data and make corrections			
lack of sufficient infrastructure is to blame for improper data entry			
Inaccurate personal data is a major logistical issue in service delivery			
Human error is entirely to blame for inaccurate data, and there is no need for a tracking system			
Inaccurate data details performance thus should be traced and corrected			
You cannot trace inaccurate personal data			

**Does Lack of Initiative affect the success level in tracing inaccurate personal data?**



Yes

No

Don't

Know

**Please give a brief explanation of how you think inaccurate data could be traced**

**Do you have a System of tracking inaccurate personal data in your organization?**

Yes

No

Don't

Know

#### **PART IV:**

**Integration of ICT System and Use in the Tracing of Missing Identity and Documents and In Correcting Inaccurate Data**

**To what extent do you think Current Systems of tracing missing or lost identity cards and documents and tracing and correcting inaccurate data have been effective?**

To a very  
great extent

To a great  
extent

Neutral

To a  
small  
extent

To a very  
small extent

**Which of the following statements is true or false based on the Integrated ICT System? (Put an X where appropriate)**

TRUE                      NEUTRAL      FALSE

ICT systems could be useful in the tracing missing or lost identity cards and documents and tracing and correcting inaccurate data

Integration of ICT systems with a central database could be the best solution to the problem

There is no need to worry about tracing missing or lost identity cards and documents and tracing and correcting inaccurate data

Such a system cannot be affected

The system will be cost-ineffective

There is no need for the integrated ICT system for the tracing missing or lost identity cards and documents and tracing and correcting inaccurate data

**THANK YOU FOR PARTICIPATING**