THE UNIVERSITY OF NAIROBI

A Roadmap for the Adoption of Government

E-payments in Kenya

A research project submitted to the School of Computing and Informatics in partial fulfillment of the requirements for the award of the degree of Master of Science in Information Technology Management

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DECLARATION

Student Declaration

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

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Supervisor's declaration

This research has been submitted for review with my approval as a university supervisor.

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I dedicate this work to my mother, the late Jane Asiligwa a strong and gentle soul for her unwavering resolute to make me a better person through education and her teaching to trust in God.

ABSTRACT

Analogous to the motorists' roadmap that shows roads, directions and distances to a destination of a given region, A roadmap in this context is a detailed guideline that answers the "why-what-how" questions and lay out the required actions, the "to-do's." towards adoption of e-payments in the government of Kenya. For over a decade, the government of Kenya grappled with the idea of implementing a national payment gateway through which all payments for government services, levies, duties, and fines were to be electronically made. For a long period, industry players and policy makers in government had unsuccessfully developed varied strategies of achieving a cashless government payment system. These efforts failed to yield due to lack of a comprehensive roadmap that addressed pertinent issues that had to be dealt with for e-payments in government to be fully adopted.

This research was done by conducting a survey study on the government of Kenya about the adoption of e-payments. A random sample of the research population was drawn from ICT and Finance employees of 262 state corporations, 19 Ministries, and 47 counties to which a questionnaire was administered to gain an understanding and information on why there had been low uptake of e-payments in the government of Kenya. The data collected was analyzed quantitatively and qualitatively using descriptive statistical techniques. The results from these analyses have been used to propose a roadmap for the adoption of e-payments in the government of Kenya and any other similar setting.

General Terms - ICT, Payment systems, Government, payment gateway

Keywords - Adoption, Roadmap, Change management, E-Payments, E-government, Stakeholder engagement and information security

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LIST OF TERMINOLOGIES AND ACRONYMS

ATM	Automatic teller machine
EC	Electronic Commerce
B2G	Business to government
GOK	Government of Kenya
IFMIS	Integrated Financial management System
ICT	Information Communication Technology
KEPPS	Kenya electronic payments and settlement system
MDA	Ministries Departments and Agencies
KRA	Kenya Revenue Authority
NPG	National payment gateway
P2G	People to Government
PU	Perceived Use
TOE	Technology Organization Environment
TAM	Technology acceptance model

OPERATIONAL DEFINITIONS

E-payment – It is a form of financial exchange that takes place over information systems in form of digital financial instrument. (Legris et al., 2006)

Electronic payment and settlement system (EPSS) - Gross settlement system (RTGS) in which both processing and final settlement of funds transfer instructions take place continuously (i.e. in real time) from one bank to another. (GEAR, 2011)

Payment gateway - Is an online service provider that connects an electronic shopping cart or virtual terminal/POS to an electronic payment processor. (Karamjeet & Ashutosh, 2015)

G-Pay - Government Payment System that offers full electronic management from requisitioning through to settlement and offers the unique ability to verify a fund, reserve funds, locks funds and guarantee payments. (Beatriz and Mariana 2015)

Cashless payment system- This is a system where physical money is not the form of exchange; instead, the exchange is made electronically. (Marulanda & Paredes, 2015)

Issuing Bank - is the bank where a customer/Citizen maintains his/her account and the bank issues plastic cards directly to the consumers. (Ailya et al., 2011)

ICT infrastructure – ICT infrastructure is an overall name used to describe all the computer and communications hardware and software (GEAR, 2014)

CHAPTER ONE: INTRODUCTION

1.1. Background of the Study

Electronic payment is a form of financial exchange that takes place over information systems in form of digital financial instrument such as debit card, electronic Cheques, or digital cash. A payment gateway is a system that interconnects various payment systems through the Internet and facilitates real time, fast, reliable, and secure electronic financial transactions. Therefore, a payment gateway enables e-payments.

For over 10 years, progress has been made in automating government payment systems and financial services system in general. Government e-payment system was geared towards harmonizing the financial payments system intended to market Kenya as a financial hub in the region and a preferred investment option to reduce cost of business, increase efficiency, improve transaction accounting, increase revenue collection and eliminate corruption. As such, Kenya started by implementing the Kenya electronic payments and settlement system (KEPSS) in 2005 to carter for large value payments, time critical transactions and automation of interbank clearance.

The emergence of mobile money services and agency banking increased access to financial services. In order for the government to leverage on this, the concept of implementing a government payment gateway was conceived in 2011. The government envisaged that the payment gateway would:-

- Significantly reduce corruption and fraud.

- Provide online/real time monitoring and Reporting on Revenue collection for all government MDA's

- Provide a convenient easy and secure way of revenue collection across the country

- Reduce risks associated with cash handling e.g. Fraud and Cheques diversion

- Improve revenue accounting and reconciliation process

- Consolidate all government information on payments across the country.

- Avail timely information to government officers, and hence improve decision making hence service delivery.

- Increase Banks liquidity thus stabilizing the financial services sector as most of the Cash will be in banks .This will also improve the ability of banks to offer credit facilities since they will have money to lend their clients.

To facilitate the adoption of e-payments, the government did put up a legal and institutional framework for digitizing government payment services, thus the enactment of Kenya national payment systems act of 2011.

Since government financial management systems were largely manual and semi-autonomous from each other, it was difficult for the concept of E-payments to be adopted before automating these processes. The government thus implemented the Integrated Finance Management Information System (IFMIS) that is connected to the G-pay system and was to be integrated to various ERPs being run by different government agencies. The main purpose of IFMIS was and still is to manage allocated funds by the treasury to the government Ministries, Departments and Agencies. IFMIS did not have the capability to process payments (collections) made to different government offices via different payment systems.

The fact that it took the central government too long to put in place a roadmap for the implementation of a national payment gateway, some government agencies went ahead and implemented their own payment gateways. For instance, KRA implemented its payment gateway that was used for payment and collection of taxes. The KRA gateway was an autonomous system that was customized for collection of taxes thus other government agencies found it difficult to use it for processing payments made to them .The KRA payment gateway was followed by implementation of Posta Pesa payment gateway by the Kenya posts co-operation. Through a ministerial circular to government Agencies, all government offices receiving any form of payment were directed to adopt Posta Pesa as their payment gateway. A few government Agencies adopted the Posta Pesa gateway while others had reservations towards this direction and did not adopt Posta Pesa. The government Agencies that adopted Posta Pesa maintained their own autonomous collection accounts with various financial institutions. This defeated the intent of the government having a national payment gateway. Over time, the KRA payment gateway was renamed as National payment gateway (NPG) though it continues to be used for electronic collection of Taxes. All this was due to lack of a comprehensive guide on the implementation and adoption of e-payments in government.

On 30th November, 2013, a presidential directive was given on government electronic payments that all government payments were to be cashless by 1st April, 2014. This never materialized. A task force was created to develop a workable framework for the implementation of government payment gateway through a gazette notice number 2725 of 24th April, 2014. The task force adopted a framework that had been developed by an earlier team that had done a pilot on the Posta Pesa payment gateway through the e-citizen portal. A hand full of payments for some services were migrated to this portal but majority of government payments were still cash based.

The following services could be paid via e-payments on the e-citizen platform:-

i. Office of the Attorney General

- Marriage – Registrar Certificate
- Marriage – Special License
- Search of Business Name
- Registration of Business Names

ii. National Transport and Safety Authority

- Application of Provisional Driving License
- Booking for a Driving Test
- Interim driver's License
- Certificate of Competence
- Endorsement of additional Classes
- Renewal of driver's License
- Amendment of driver's License Details

iii. Ministry of Interior and Coordination of National Government

- Application for a Passport

The Following services for the Ministry of Lands and Urban Development, though on the portal, were yet to be activated for e-payments

- Official Land Search – Nairobi
- Stamp Duty
- Rate Clearance Certificate

This portal was initially hosted on Amazon, which is outside local jurisdiction, making the data within the portal outside the Control of the Government of Kenya. This led to the requisition of hosting services at Safaricom and in December 2014, the portal was migrated

to Safaricom cloud following acquisition of hosting service. However, there still existed unresolved SLA issues with Safaricom. The provisioning of the infrastructure at Safaricom hosted environment was surpassed by the service requests from the few services that were active. The MDA's on this portal frequently experienced service outages forcing them to revert to manual system. This implied that the sizing of the system was inadequate and could not service all government payment services requests. The task force then recommended an immediate upgrade of the infrastructure collocated at Safaricom datacenter.

Moreover, an integration problem with existing systems at the MDA's cropped out. This was because the government initiated the project without having a foresight on integration. If adequate guidelines were in place, several integration issues would have been considered. These issues included:

     i.   Standard or nonstandard integration interfaces.

     ii.   SLA's with third party providers of this system

     iii.   Connectivity problems at MDA's

     iv.   Data format to facilitate seamless message exchanges.

     v.   Systems security issues

Having noticed these challenges, the Treasury Cabinet secretary reconstituted a task force on 4th May, 2015 with a fresh mandate of implementing a national payment gateway to facilitate government e-payments. Since then, no headway has been done so far.

As result of lack of this framework, some government agencies were opting to acquire and implement their own payment gateways. An example of this was KenTrade, which placed advertisement for expression of interest (EOI) for implementation of a payment gateway for the National electronic single window system.

E-payments for government services have had low uptake by Ministries, Departments and Agencies (MDAs) as well as resistance to change within the MDAs. To address this, a holistic approach should have been devised. This could only be achieved through development of a roadmap, which would address change management, stakeholder engagement, ICT infrastructure, Skills, business process harmonization, integrations, awareness, information security, and regulatory compliance that if not addressed, were impediment to adoption of government e-payments

1.2. Problem Statement

The government of Kenya handled millions of financial transactions from payments made to it for services rendered, levies, duties, and taxes. The sheer volume and variety of payments government agencies must contend with, coupled with a heightened focus on transparency, security and compliance, made the government payments domain truly unique hence the need for e-payments in government.

Although the government of Kenya had made efforts towards realizing an integrated cashless payment system, very little gains have been achieved due to very low uptake of the e-payments platforms provided. This was due to lack of a roadmap or universal guide that provided a management centric approach that provided clear guidelines on how e-payments could be implemented while taking into account the unique requirements of different Ministries, Departments and Agencies. In addition, the absence of this approach to addresses the issues of stakeholder engagement, change management, e-payments awareness, and inadequacy of ICT infrastructure in government resulted in wrong perception of government e-payments. Another issue was out-right resistance in some quarters and mistrust among government agencies on which MDAs should own and operate the Kenya national payment gateway through which government e-payments were to be done.

1.3. Purpose of the study

The purpose of this study was to identify key issues that hinder the adoption of e-payments in the government of Kenya from a management perspective and propose a roadmap for adoption of government e-payments that addressed these issues.

1.4. Objectives of the study

I. To establish reasons for slow adoption of government e-payment systems in Kenya

II. To evaluate the adequacy of existing government e-payment frameworks and suggest improvement

III. To develop a road map for adoption of e-payments in the government of Kenya

IV. To gain an understanding of the impact of change management, stakeholder engagement, ICT infrastructure, e-payments awareness and information security on adoption of e-payments in the government of Kenya

1.5. Research questions

In order to appreciate the importance of having a roadmap for adoption of e-payments in government, this research sought to answer the following questions:

    i.   How adequate are the existing frameworks for government e-payments adoption in Kenya?

    ii.   What were the reasons for slow adoption of e-payments in Kenya?

    iii.   How did change management, ICT infrastructure, Stakeholder engagement, e-Payments awareness and Information security affect the adoption of e-payments in the government of Kenya?

1.6. Scope

This research was limited to the adoption of electronic payments in the government of Kenya. It sought to propose a roadmap for adoption of e-payments in the government of Kenya. It did not cover how to implement payment gateways and automation of government financial systems in general. This research was limited to people to government (P2G) payments, business to government (B2G) payments, and government to people payments. It did not include government-to-government payments (G2G) and transfer of funds within government MDAs. The study did not also include acceptance and adoption of government e-payments from the consumer perspective.

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CHAPTER TWO: LITERATURE REVIEW

This literature review focused on an overview of research conducted on electronic payments in government through the implementation of government electronic payment systems. The final section summarizes related research in development of government technology roadmaps and highlights the contribution that this study will make to the government of Kenya towards implementing and adopting e-payments.

2.1 E-payments in Government

As e-payments continue to take off in the public and private sectors, governments' commitment to the uptake of e-payment systems will continue to be crucial (Jamie M. et al., 2013). Governments around the world are increasingly using electronic platforms to collect taxes, procure goods, services, and other key transactions as part of a global shift away from cash payments. The 2011 Government E-Payment Adoption Ranking (GEAR) study highlights the need for a comprehensive approach by governments to improve service provision, infrastructure, social and economic context indicators, and policies. This includes e-government services to which e-payments are a critical component. Governments are also adopting innovative solutions to e-payments, including mobile payments systems, which may increase access to services by the unbanked (GEAR, 2014). In developing countries the effective implementation and adoption of comprehensive e-payment systems is essential for becoming market-based economies. E-payments provides great improvements in accounting and transaction audit procedures that aids governments to track taxes owed and potentially increase tax revenue. Moreover, the transparency unique in the introduction and use of government e-payment services is a tool for combating corruption. In particular, bringing transactions onto an electronic platform makes it easier to keep better track of cash flows and to increase accountability (GEAR, 2014). Emerging markets are looking to close the gap with developed countries in terms of providing e-payment services. The results so far have been mixed, with some countries having more success with e-payments adoption than others do. This success or failures are attributes to the approaches adopted. (GEAR, 2014)

According to the World Bank's general guidelines on the development of government payment programs of 2012, there are three major categories of government payments as highlighted below:

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i. Government to government payments(G2G) payments

ii. Government to people (G2P) and Government to Business(G2B) payments

iii. People to Government (P2G) and Business to government (G2P)

Among this payment systems, P2G (People to Government) & G2P (Government to people) Payments remain the focus area in government e-payment service (Upendra Nambur, 2011).

The US is among the earliest countries to successfully implement government e-payment services. Electronic benefits transfer E (BT) is an example of G2P payment that has increased the social welfare of USA's citizens (GEAR, 2012). India has also implemented e-payment services in government successfully (Karamjeet & Ashutosh, 2015).

2.2 Types of E-payment Systems

There are seven main types of electronic payment systems (Karamjeet & Ashutosh, 2015). These payment systems include:

Credit card –A credit card can be a magnetic striped of chip based plastic card that contains a consumers information that allows them to purchase goods online and pay for them later (Knur,2012). In this case, the purchaser borrows from the credit card company like Visa and pay later at a given interval.

Debit Card- Debit card is a prepaid card and also known as ATM card. An individual has to open an account with the issuing bank that gives the debit card with a personal ID number. When he/she makes a purchase, he enters the pin number on shop pin pad (Kaur, 2012 & Kumaga, 2010).This card is usually issued by financial institutions when opening an account with them.

Smart card: - It is made of plastic with an embedded microprocessor chip that holds important financial and personal information. The microprocessor chip is loaded with the relevant information and periodically recharged. In addition to these pieces of information, systems have been developed to store cash onto the chip. The money on the card is saved in an encrypted form and is protected by a password to ensure the security of the smart card solution (Kaur, 2012).

Electronic Cheques: - Electronic Cheques are messages that contain all the information found on an ordinary Cheques but it uses digital signature for signing and endorsing and has digital certificate to authenticate bank account (Kaur, 2012; Joseph, 2009).

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- **Electronic cash:** - E-cash facilitates transactions between customers without the need for banks or other third parties. When used, e-cash is transferred directly and immediately to the participating merchants and vending machines. E-cash usually operates on a smartcard, which includes an embedded microprocessor chip. The microprocessor chip stores cash value and the security features that make electronic transactions secure (Karuk, 2012 & Yang, 2009).
- **Mobile Money** –This is the use of mobile telecommunication operators to transfer money using mobile devices through sim-cards.

For government to be able to leverage on this e-payment systems, it was required to use a payment gateway. Payment gateways provide the platform for the utilization of these e-payment systems. A payment gateway is thus an enabler of e-payments (Ailya et al. 2011).

2.3 Payment Gateway.

A payment gateway is an online service provider that connects an electronic shopping cart or virtual terminal/POS to an electronic payment processor (Ailya et al., 2011). In this context, it is the government gateway to the rest of the payments infrastructure that could allow it to accept electronic forms of payment.

According to Koponen (2009), the function of a gateway is to authorize payments, and secure settlement of data to and from the merchant's online portal to the merchant's processor. The merchant processor in turn connects to the card association (or "network"), which connects to the card issuing bank.

2.4 Major Players of A payment Gateway

A payment gateway is composed of the following players (Ailya et al. 2011):

Customer (Payee) -   A customer or payee is an entity who will buy products by making payments in timely manner. In the case of government payment gateway, a customer will be the Citizen paying for a government service.

Merchants: A merchant is a seller who will receive payments made by customer. In this case, it will be the government

Banks: Two banks are involved:-

- Client bank: Client bank holds client's bank account and validate customer during account registration.

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- Merchant bank: Merchant bank holds merchant bank account. It is responsible of management and fraud control. In this case, Merchant bank will be the Central bank of Kenya where every government agency will have a holding/Collection accounts.

Mobile operators - These are new entrance providing mobile money services .Customers have accounts with the mobile operators.

Below is the framework for the envisaged Kenya National payment gateway as presented in the Cabinet memorandum of March 2014.
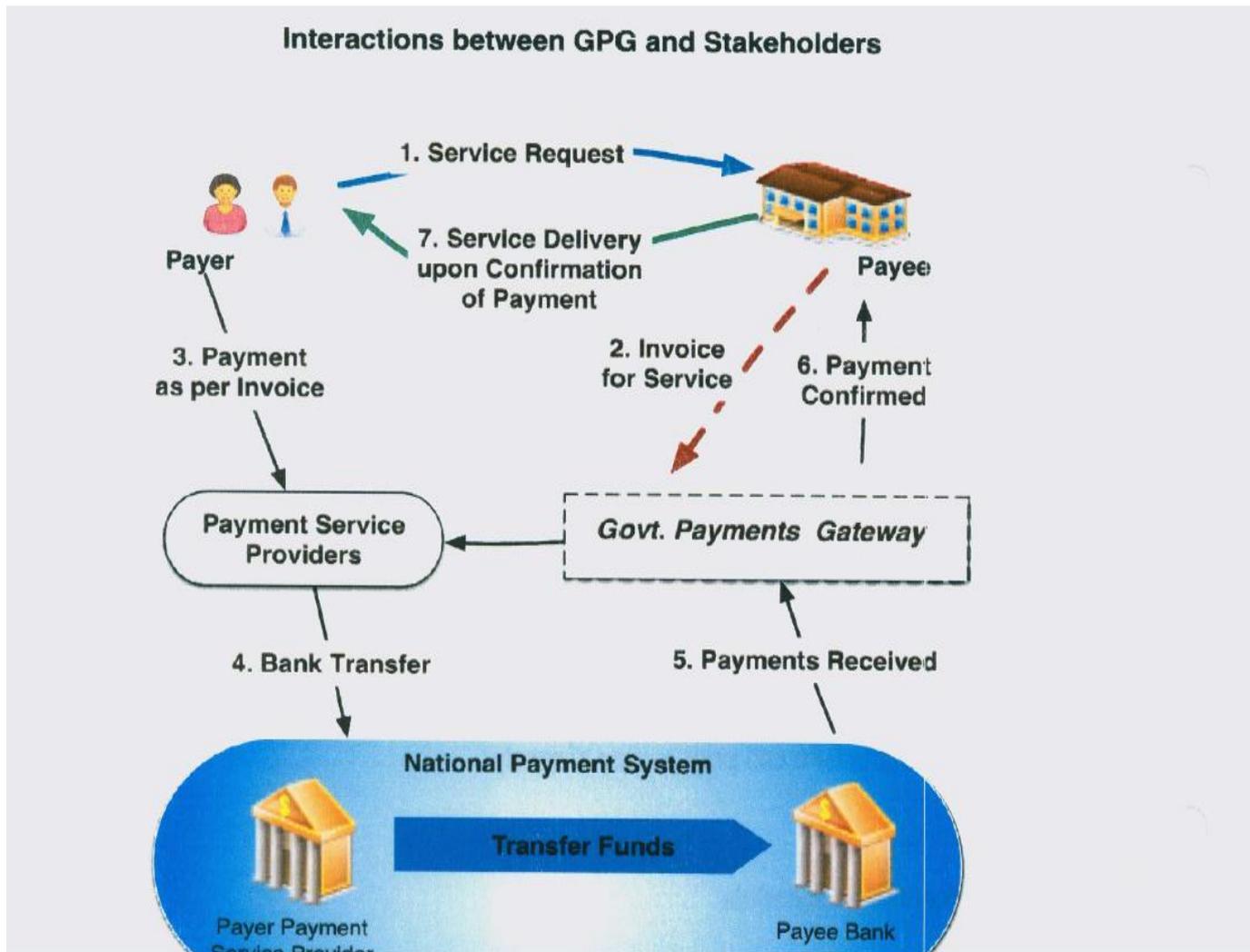
Figure 1: Kenya National Payment Gateway Framework for e-Payments (GOK Cabinet Memorandum, 2014)

The Kenya Government payment gateway (GPG) was to be a common service that would facilitate electronic payments by citizens to MDA's .The gateway would also enable the government MDA'S to make payments to citizens and businesses electronically in whichever electronic payment mode preferred by them. Banks, Mobile operators and other service

providers could offer their service through the payment gateway such that citizens and co-operates could have the widest possible choice of making payments to government. All government service providers were expected to connect to the government payment gateway subject to interface standardization and signing of SLA for offering the service (Beatriz and Mariana, 2015).

Payment instruments were mobile money, prepaid credit and debit cards, internet banking and KEPPS payment instructions. Each MDA was to have collection accounts linked to a specific catalogued service at the central bank of Kenya.

2.5 Types of Payment Gateways

There are two basic types of merchant account providers:-

Redirect

Providers that directs a customer to their respective login pages in order to process payment. The client is then redirected back to their store once the payment is processed. An example of this payment gateway is pay pal.

Transparent

These allow the customer to input their payment instructions securely to the order and go through the processing steps without ever leaving their store. In other words, these gateways do not redirect the customer to an external site whatsoever.

The best type of government e-payment gateway is supposed to be the hosted transparent where the government hosts the system and offer a single portal for all government payments (Marulanda & Paredes, 2015). Citizens visit this portal and select the service to pay and the method of payment. The gateway offer multichannel payment systems connected to various banks and mobile networks operators.

Other benefits of government operating its payment gateway include:

- Save on Payment Gateway Fees
- Custom Features.
- Offer Payment Gateway Product to Other Merchants

In their research, Csaba Csák et al. (2013) found that the choice of an adequate E-Payment method by governmental agencies will be crucial to the outcome.

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2.6 Challenges of Implanting E-Payments

Haruna Issahaku (2008) identified challenges to adopting e-payments in Africa as follows:

i. Lack of adequate and reliable infrastructure

ii. Security concerns by the population

iii. Inadequate skills due to low levels of computer literacy

iv. Lack of legal and institutional frameworks in government on e-payments

v. Integration issues

vi. Lack of knowledge and awareness on e-payments

vii. Lack of trust in electronic payments

Majority of these issues were in concurrence with this research although some of them are no longer impediments for the adoption of e-payments in the government of Kenya. Already the government of Kenya had dealt with some of the issues, for instance it had already constituted the legal framework through the enactment of Kenya national payment systems act of 2011(Kenya Law Reports, 2011). However, this legal framework was not as adequate as it did not bestow the responsibility of implementing e-payments to a particular government entity. In addition, these observations by Haruna Issahaku (2008) were to larger extent technical issues that did not address the human factors. His arguments do not take into consideration the change management issues and stakeholder engagement as proposed by Legris P. and Collerette P. (2006). In their model on e-government Kumar et al. (2007), suggested that for effective e-government adoption, the following should be considered: User characteristics (perceived risk, perceived control, and internet); Website design (perceived usefulness, perceived ease of use); Service quality and Client satisfaction perspectives. This was largely borrowed from the TAM model. Indeed, there were other frameworks and models developed in the area of e-government services, however, most of these frameworks were either for evaluating the impact of e-government services or for assessing its implementation. For instance, the framework for Evaluating the Impact of e-Government in developing countries as suggested by Ibrahim Otieno and Elijah Omwenga (2014) provided a guideline for assessing the impact of e-citizen from a citizen's perspective.

2.7 Technology Road Map

Abdoulmohammad G. Chofreh (2015) defined a roadmap as guiding structures that facilitate the execution of a set of pre-defined high-level activities that are deemed necessary to achieve specific objectives. In relation to this study, the adoption of e-payments involves execution of predefined high-level activities to achieve effective end-to-end adoption in government.

In their publication on US government cloud computing technology roadmap volume1, Lee Badger et al. (2014) contended that a roadmap identifies all aspects that need to be addressed prior, during and after technology implementation. In the government of Kenya e-payments case, the government started implementing a technology before putting in place a roadmap to address all aspects including the social dynamics of people for adoption of e-payments. Moreover, a carefully planned reform of government payment programs or the lack thereof' have far-reaching consequences on the modernization of the national payments systems. In the Australian public service technology roadmap (2013), it is argued that a road map highlights the opportunities available to agencies and sets forward a coordinated approach across government to adopt technology with the aim of delivering the strategic priorities   of the government.

As much as the assertions on technology roadmaps highlighted above are adequate, they presented high-level abstraction and fell short of addressing the challenges that could be faced in deploying technology in vast environments like in government. They did not consider the operational environment and mapping of the business case to the roadmap while at the same time taking care of the human factor. Roadmaps are mechanisms that enable organizations to visualize their critical assets, the relationships between stakeholders, technology and skills required for future and current market demands (Smith, 2005). The proposed   roadmap in this research considered how the government is organized, the environment and people (change management and perceptions) while addressing the challenges of infrastructure, awareness, and Security as identified by Haruna Issahaku (2008). Even if one considered the traditional software development methodologies and IT project management standards placed more emphasis on technological perspective and project management technical issues (Mumford & Henshall, 1979). Instead, they should have considered social dynamic issues like change management, awareness, perception and stakeholder involvement (David M. & Mike O., 2015). This did not imply that these models

as roadmaps for systems development and adoption were inadequate; they just came short of addressing the human issues effectively. For instance, Agile Software Development, that was a relatively different approach to IT projects management from classical software development approach, fell short of dealing effectively with adoption issues (Rashmi et al., 2013). Although it placed more emphasis on individuals and how they related other than on processes and tools, it was however centered on development and not on implementation and adoption (Rashmi et al., 2013). In fact, the proposed roadmap in this research will go a long way in making valuable contribution to agile software development approach especially to its last stages.

The Guide on Development and Implementation of Energy Technology Road Map (IEA, 2014) stated that for any technology Road Map to be effective it must involve:

- Stakeholder engagement

- Change management

- ICT infrastructure

- Conducting of awareness

- Compliance to regulatory frameworks

This informed the basis for this research to develop of a roadmap for adoption of e-payments in the government of Kenya.

2.8 Theoretical Framework

The development of a roadmap for the adoption of e-payments in government in this study was derived from the fusion of two models. These models are Technology, Organization and Environment framework (TOE) (Tornatzky & Fleischer, 1990) and Technology Acceptance Model (Davis et al. 1989). The TOE theory was based on technology adaptation. It identified three aspects of an enterprise's context that influenced the process by which it adopted and implemented a technological innovation: Technological context, Organizational context, and Environmental context (Oliveira, & Martins, 2011). The TOE theory did not address the human behavioral aspects in systems implementation but it was very solid on addressing technical and environmental issues. TAM proposed perceived usefulness (PU) and perceived ease of use (PEOU) as the fundamental determinants of ICT adoption.

An individual's intention to use a system is explained and predicted by his perception of the technology's usefulness and its simplicity (Hart & Ojiabo, 2012). In the case of e-payment systems, it was the government employees' perception either as individuals or as an organization as a whole towards the concept that should have been addressed through change management and awareness. As much as these models addressed both the technical and human issues, they did not sufficiently address the issue of change management, stakeholder engagement and other none technical perceptions like information security.
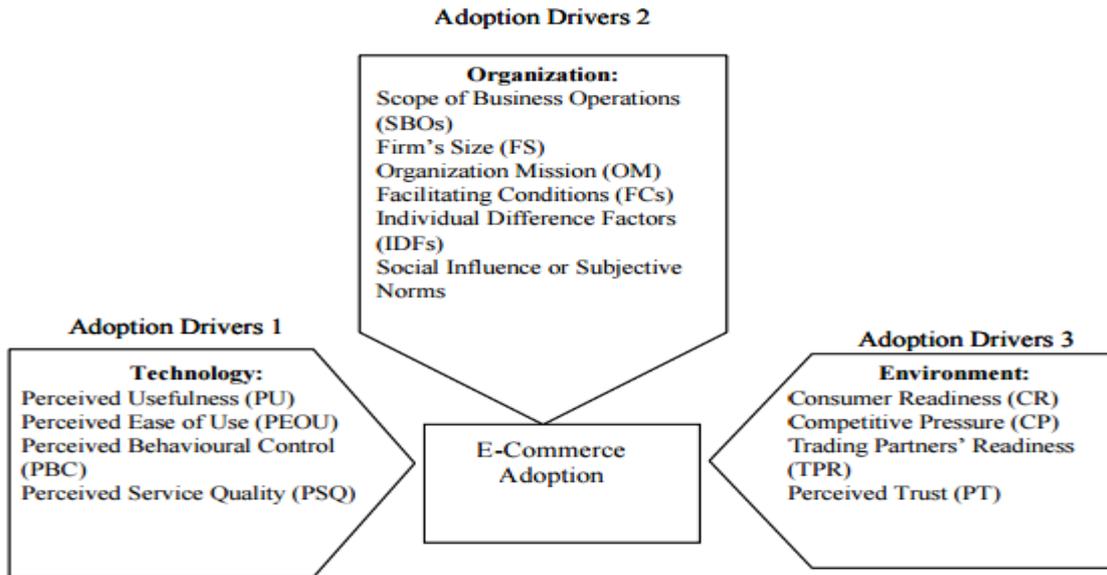
Figure 2 Integrated TAM and TOE Framework for Technology adoption (Hart O. and Ojiabo U., 2012)

2.9 Conceptual framework

The two frameworks presented above were used to advance different theories on how to adopt a technology in an enterprise. The proposed framework in this study took into account the importance of technical, environment, organizational and perception issues. It also emphasized the important role played by human factors like change management, stakeholder engagement, information security concerns and awareness as depicted in the diagram below. The framework proposed that stakeholder engagement should be done when dealing with the identified issues affecting e-payments adoption in the government of Kenya. In this model, Technology was addressed by ICT infrastructure and awareness, Environment was integrated to ICT Infrastructure and Stakeholder engagement. Organization covered broadly under stakeholder engagement, awareness and Change Management. This model extended the integrated Model of TAM and TOE by including security and risk aspects as suggested by

Muhammad S. et al. (2010), in the publication on Risk perception and adoption of technology.
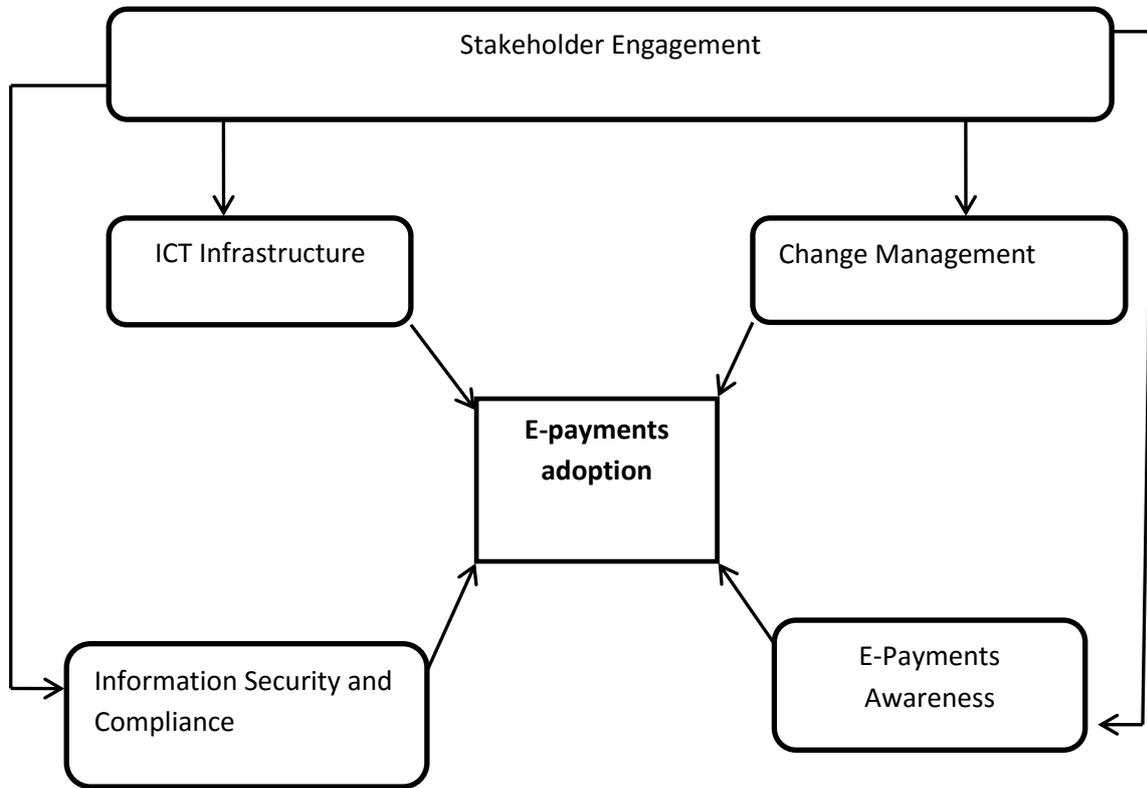
Figure 3 : Conceptual Framework (Author, 2016)

Stakeholder engagement in this model is the process of involving those groups, people or entities who affect and/or could be affected by the government's e-payments initiative. In order to achieve successful adoption of e-payments in government, this model proposed that stakeholder engagement was to be effected at each level of government of Kenya's e-payments initiative. In this Model, ICT Infrastructure refers to the technologies or the composite hardware, software, network resources and services required for the existence, operation and management of government e-payments environment. The ICT Infrastructure allows the government to deliver e-payments services to its citizens. This Model identified Change management as critical aspect of adoption of e-payments in the government of Kenya. Change Management provides guidance on how the government would prepare, equip and support individuals to successfully adopt the change from manual and legacy systems to e-payments benefits realization. The model proposed that awareness had to be

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done within Kenyan government MDA's to develop the knowledge   and understanding about government e-payments and communicate its benefit hence eliminating misconceptions about e-payments among stakeholders. Awareness equips stakeholders with adequate and right information about government e-payments and enhances MDA's trust in the system thus hastening its adoption (Choudrie, & Dwivedi, 2005). Perceived risk and perceived behavioral control   is defined as fear of losing personal information and fear of being monitored on the internet (Warkentin et al. 2002). In the proposed model the risk perceptions over information was addressed through information security and compliance. If MDA's and their employees had control over how personal information was going to be used, and the control of how and when information could be acquired, adoption of e-payments would have been easier (Warkentin et al. 2002).

CHAPTER THREE: RESEARCH METHODOLOGY

In this chapter, the procedures used in conducting this study are provided. It entails targeted population, research design, research sampling and sampling techniques, analysis techniques and data collection tools that were used.

3.1 Research Design

In this study, a descriptive survey research design was used. Descriptive survey research design is a scientific method that involves participants answering questions administered through interviews or questionnaires (Jackson, S.L, 2009). It is concerned with collecting data in order to answer questions concerning the status of the study. A descriptive research design was used because the research problem was well understood and structured (Mugenda & Mugenda, 2003). Descriptive research design provided a complete description of the case under study without bias.

3.2 Survey Research

This research was conducted as a survey study. Survey research is a study that involves the collection of data from a sample of elements drawn from a well-defined population using a questionnaire (Penny, 2000). A survey obtains information that describes existing phenomena by seeking to understand their perception, attitude, behavior, or values. Survey research is therefore a type of descriptive research (Mugenda & Mugenda, 2003). This research was conducted to explore the adoption of government e-payments in Kenya and determined how ICT Infrastructure, Awareness, Change management and Information security impacted on the e-payments adoption. This approach enabled the researcher to examine the data within the specified context of the research scope. This method was used because it was useful in describing the characteristics of widely dispersed government entities on e-payments and ensured a more accurate sample to gather targeted results in which conclusions were drawn and important decisions made. It also offered many modes in which it could be administered offering options for cost effectively reaching out to target population in remote areas (Dillman Don, 2000). In this case, an online questionnaire was used. Descriptive survey research enabled the researcher to explore e-payments in the government of Kenya with samples that accurately represented the population about whom generalizations were made (Porter & Stephen R., 2004). Porter and Stephen R. (2004) suggested that to get more accurate responses, respondents had to be as open and as honest as possible. The survey study

provided an avenue for more honest and unambiguous responses because it gave respondents the option of remaining anonymous.

3.3 Target Population

Target population is generally a large collection of individuals or objects that are the focus of a scientific query (Mugenda and Mugenda, 2003). It refers to the total group of individuals from which the sample might be drawn. This research targeted heads of information communication technology (ICT) and Finance in 19 government Ministries, 262 state corporations and 47 counties. These respondents were involved in shaping the direction of automation of business processes and finance management in their respective government offices in Kenya.

3.4 Sample Design

In this study, the population was stratified before sampling. Stratification is the process of grouping members of a population with the same characteristic into groups before sampling is done (Mugenda & Mugenda, 2003). There were three primary strata in the design. The groups were both IT professionals and Finance professionals from Ministries, Counties and State Corporations. This method was preferred as each of this groups represented different interests in government thus members of each group had an equal chance of being selected in this research study.

Having known the population size, the sample size was determined by first determining the sample size of each subgroup (Mugenda & Mugenda, 2003). The following formulae as developed by Yamane (1967) and cited by Harper and Glenn (2013) in determining the sample size that was used.

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

Where n = sample size,

N = the population size

e = Level of precision.

Sample size for Ministries = $(19)/ \{1+ (19(0.05^2))\} = 18$

Sample size for Counties = $(47)/ \{1+ (47(0.05^2))\} = 41$

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Sample size for State Corporations = $(331)/\{1+ (331(0.05^2))\} = 181$

Table 1: Sample size (Author 2015)

CATEGORY	POPULATION FREQUNCY	SAMPLE SIZE
Ministries	19	18
Counties	47	41
State Corporations	265	181
TOTAL	**331**	**240**

3.5 Study Variables

Dependent variables

i.   e-payments adoption

Independent variables

i.   ICT infrastructure

ii.   Awareness of government e-payments

iii.   Information security and Compliance

iv.   Change management

v.   Stakeholder engagement

3.6 Data Collection Tools and Method

An online questionnaire was developed and administered to the respondents. E-mail addresses of the respondents were acquired from various government professional groups like the ICT caucus for vision 2030 and from the Treasury for Heads of finance. Sampled members were sent an e-mail that described the study and provided the URL for an online survey. A reminder was sent via e-mail to the respondents approximately at an interval of two (2) days for a period of three (3) weeks. The online portal remained open for a period of three (3) weeks. The researcher used web administered questionnaires by survey monkey to ensure efficiency, cost effectiveness and that the questionnaires were administered to respondents in the same way and format. The use of questionnaires was selected to collect both qualitative and quantitative data. The questions were both closed and open-ended. The closed ended questions had multiple choices with scales from which the respondents could choose from options given. This ensured accurate uniform collection of quantitave data. Open ended

questions were used to collect data by providing the respondents with an opportunity to give their independent views about the subject matter without being limited unlike in the closed questions. In general, the questionnaire sought to determine if the available government e-payments frameworks are adequate and determine how lack of adequate ICT infrastructure, e-payments awareness, change management, stakeholder engagement and information security concerns affect the adoption of e-payments in government. Each question was designed to address the objectives and research questions in this study (Mugenda & Mugenda, 2003). The questionnaire was segmented into five sections each addressing each research variables. The sections were as follows:-

SECTION A: This section was concerned with the collection of general information about the respondents and e-payments in their respective government organizations.

SECTION B: The objective of this section was to establish the adequacy of ICT infrastructure in MDA's to support government e-payments and determine whether its inadequacy affects the adoption of e-payments in government.

SECTION C: The main questions were on e-payments awareness in government. This section seeks to establish if lack of awareness results to misconceptions about e-payments in government. This involved evaluating the perceived usefulness, perceived ease of use, computing skills and information about technical support.

SECTION D: Questions were to determine whether change management is a major issue in adoption of e-payments in Kenyan government. The questions sought to establish the impact of change management on successful adoption and implementation of e-payments in the government of Kenya.

SECTION E: The main questions in this section sought to demonstrate how information security concerns influence the perception and trust in government e-payments thus affecting its adoption.

SECTION E: The questions in this section sought to provide proof of the assertion that stakeholders ought to be engaged at all stages of e-payments implementation to enable successful adoption of e-payments in the government of Kenya.

3.7 Reliability and Validity

Reliability is a measure of the degree to which a research instrument yields consistent results or data after repeated trials (Mugenda & Mugenda, 2003). Validity is the degree to which results obtained from the analysis of the data actually represent the phenomenon under study (Mugenda & Mugenda, 2003). Reliability was ensured in the data collected through carefully selecting the sample in order to avoid bias. The questionnaire was subjected to peer reviews and scrutiny from subject area experts. A pilot study was conducted to verify reliability of the online questionnaire and relevant adjustment were done accordingly. Cronbach's alpha index (Cronbach, L. J., 1951) was used to assess the internal consistency (average correlation) of items in the online questionnaire thus gauging its reliability. Unlike Test-Retest and Split halves methods of testing reliability that required repeating of the test or splitting the test sample, Cronbach's alpha required a single administration of the test to yield a unique estimate of reliability (Carmines G. & Zeller A., 1979). Some questions were designed to provide more information about the subject under investigation and ensured determination of consistency in the responses given. The survey findings have been validated by statistical analysis models i.e. regression analysis, correlation analysis and analysis of variance.

Reliability Analysis

Reliability analysis for this study was done using Cronbach's Alpha (Cronbach, L. J., 1951). Cronbach's Alpha is used to measure the internal consistency of the research instrument. According to Borsboom (2009), reliability is defined as the consistency of measurements within an instrument measuring the same thing. For the study to be reliable, the Alpha values for all variables under study in the study questionnaire had to be above 0.6. Cronbach Alpha for this study was 0.758. The summary of the scales generated via SPSS for each study areas are indicated in Table 4.

Table 4. 1 Reliability Analysis for the variables

Scale	Items	Cronbach's Alpha
Adoption of E-Payment Systems	10	.759
ICT Infrastructure	8	.767
E-Payment Awareness	7	.725
Change Management	10	.717
Stakeholder engagement	5	.734
Information Security and Compliance	10	.844
Average	**0.773**	**0.758**

Validity Analysis

Data collected from responses to the online questionnaire was coded for processing. After receiving the responses, the questionnaires were checked for completeness and consistency. The data was then systematically organized to enable analysis. The collected data was qualitatively and quantitatively analyzed. For quantitative analysis, the number of responses per question for or against an assertion made was done. As stated above the following models of statistical analysis were done to validate the findings of this study.

3.7.1 Correlation Analysis

correlation analysis to determine whether any relationship exited between the dependent variable (Adoption of e-payment system in government) and the independent variables (adequacy of ICT infrastructures, awareness of   e-payment system, e-payment security and compliance, change management and stakeholder engagement). In addition, the strength of this relationship was determined. The study findings, established a strong, positive and significant relationship between adoption of e-payments in the government of Kenya thus the theory advanced in this researched was confirmed to be true.

3.7.2 Multiple Regression Analysis

The findings of this study were subjected to regression analysis to determine if the independent variables (adequacy of ICT infrastructures, awareness of e-payment system, e-payment security and compliance, change management and stakeholder engagement) have a significant relationship with the dependent variable (Cohen & West, 2003). It was also used

to indicate the relative strength of different independent variables on dependent variable of this study. This was used to indicate which variable affects the adoption of e-payments in government more.

 The regression model used is as follows:-

$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + e;$

Where X_1 = Adequacy of ICT infrastructure;

X_2 = Awareness of e-payment system;

X_3 = E-payment security and Compliance;

X_4 = Change Management,

X_5 = Stakeholder engagement.

3.7.3 Regression Coefficient

This model was used to determine the significance of the relationship between adoption of e-payments in Kenyan government and the dependent variables (Cohen & West, 2003). Should the relationship prove to be significant, then the assertions in this study about the variable are confirmed to be true. The formulae used to determine the relationship is as follows:

Adoption of e-payment = $B_1 X_1 + B_2 X_2 + B_3 X_3 + B_4 X_4 + B_5 X_5$

Where X_1 = Adequacy of ICT infrastructure

X_2 = Awareness of e-payment system

X_3 = Information security and Compliance

X_4 = Change management

X_5 = Stakeholder engagement

B_{1-5} = Unstandardized coefficient

3.7.4 Analysis of Variance (ANOVA)

This research used one way between groups ANOVA model to indicate the level of variation in adoption of e-payment system that is attributable to adequacy of ICT infrastructure, Awareness of e-payment system, E-payment security and Compliance, Change

Management and stakeholder engagement (Patrick D. & Andrew J., 2009). This was measured as a percentage. Should the results indicate a higher percentage of variance that is attributed to the hypothesized variables, then the null hypothesis is accepted.

This analysis was done using Statistical Package for Social Science (SPSS) version 22 and the inbuilt analysis tools within the online questionnaire system i.e. Survey Monkey.

For qualitative analysis, this was done using the reports generated and presented as tabulations, frequency distribution tables and charts.

3.8 Data Presentation

In this survey, frequency distribution tables were used to show the distribution of responses for specific variable and the number of subjects in a given category (Lindlof et al.2002). Grouped Frequencies to combine responses for easier interpretation and where the response categories in the questionnaire are given in intervals (Lindlof et al. 2002). Graphs have been used to demonstrate the trend of distribution of the responses more easily; histograms, frequency polygons pie charts and bar charts have also been used (Mugenda and Mugenda 2003).

3.9 Ethical Consideration

The researcher acknowledged all the materials referred to in this research. The researcher represented the data as collected. Respondent's information was kept confidential and consent will be sought before revealing any information. The identity of the respondents was kept confidential. The study population was furnished with appropriate information about the research before accepting to participate in the research. This was done through cover letter that explained the purpose of the study, the benefit, and likely risk to the participant. The participants were informed that accepting to participate in this study was voluntary.

CHAPTER 4: RESEARCH FINDINGS AND DISCUSSION

The heads of Finance and ICT in the sampled MDAs in the government of Kenya were the main respondents of this survey, however, on occasions where the heads of these departments were not available, their email addresses were difficult to be acquired by the researcher, a manager, or staff in the department was sent the questionnaire.

As illustrated in the table below, the target population for the survey was 240 respondents. However, the researcher could only find the contacts of 183 possible respondents. The questionnaire was sent to these respondents. This represents 78% of the target sample population. A 68% response rate was achieved. A response rate above 50% is acceptable in descriptive research (Mugenda and Mugenda).

Table 4.1: Response Rate

Population size	Target Sample size	Accessed Sample Size	Number of Responses	Response Rate
331	240	183	123	68%

Data gathered from this survey showed that 76 % of government MDA's received payments for the services rendered. 73% of these organizations received cash payments as well as other automated forms of payments as indicated in figure 5 below.
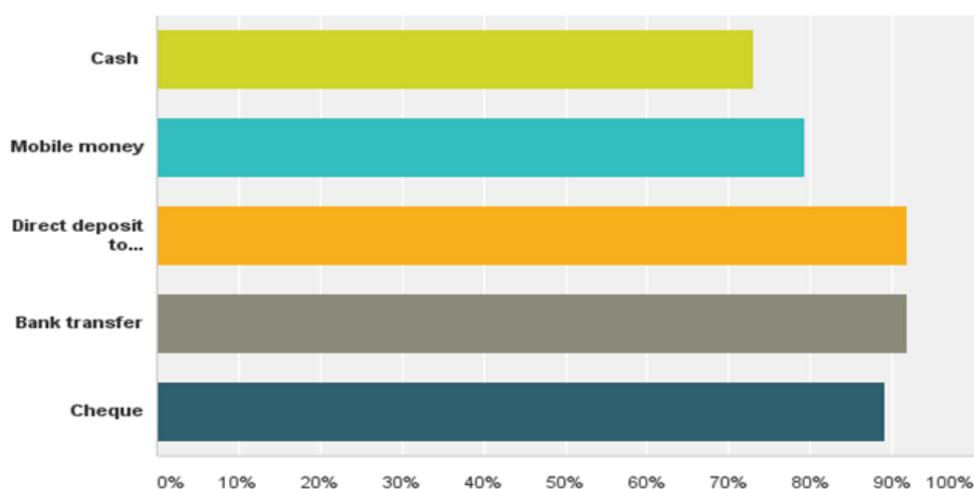
Figure 4: Payment Methods in Kenya

Generally, data obtained from questionnaires revealed the following findings.

4.1 ICT Infrastructure

This survey revealed that 73% of MDA's in Kenya process payments both manually and using computerized systems. Only 21% had fully automated their payments processes. 50% of the staff working in the payments offices had full access to internet throughout the day. However, 43% of the respondents indicated that internet connectivity was not reliable. Even though there was some form of access to network infrastructure, 52% of payments processing staff did not have the necessary software tools to process payments. 48% of the respondents found it difficult to reconcile their payments accounts and generate adequate reliable financial reports. Most of the respondent believed that implementation of government e-payment system was complex and difficult to implement. It was also found that 60% of government organizations lacked the necessary skills to implement and support e-payment systems.
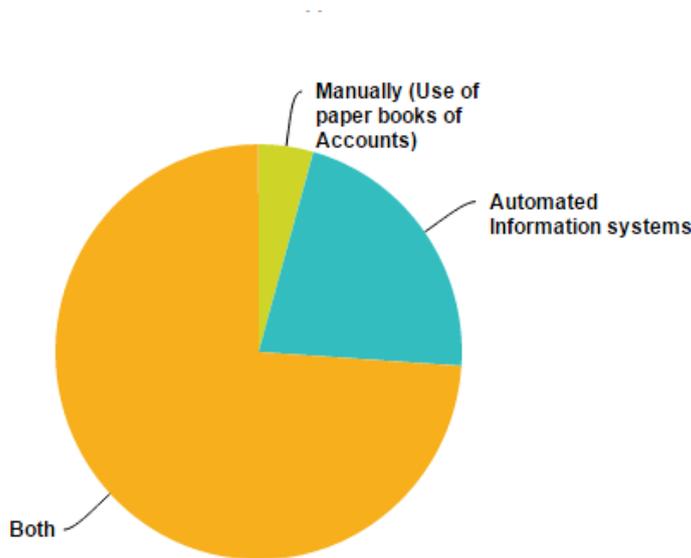
Figure 5: Methods of Payment processing systems

4.2   E-Payments Awareness

In Kenya, most of the MDA's had limited knowledge on the e-payment system. However, there were no standard guidelines and procedures on implementing and adopting government e-payments. From the survey, over 80% of the respondents indicated that there were no procedures and guidelines on adoption of e-payments. Furthermore, 68 % of MDA's did not know which government organization(s) were mandated with implementing e-payments. Even those who indicated that they know the government entity charged with implementing and managing the government e-payment system, over 50% could not point out to a specific organization. This lack of adequate information on e-payments within government MDA's had resulted in a lot of misconception about e-payments. For instance, it was found that 54% of the respondents believed that government e-payment was insecure, over 30% holds it that e-payments will deny them control of the revenue collected and will lead to loss of jobs. There was also another misconception that deployment and adoption of e-payments in government is a very complex undertaking.

4.3   Change Management and Stake Holder Engagement.

The survey study revealed that change management on adoption of e-payments in the Kenyan government was a major factor. 61% of the respondents were in agreement of the assertion that lack of a change management strategy was a hindrance to the adoption of e-payments in government. Furthermore, 88% of the respondents did not understand the procedure to follow in adopting government e-payments and the stakeholders to engage. As illustrated in figure 6 below, respondents were asked whether lack of change management strategy impaired the adoption of e-payments in the government of Kenya.
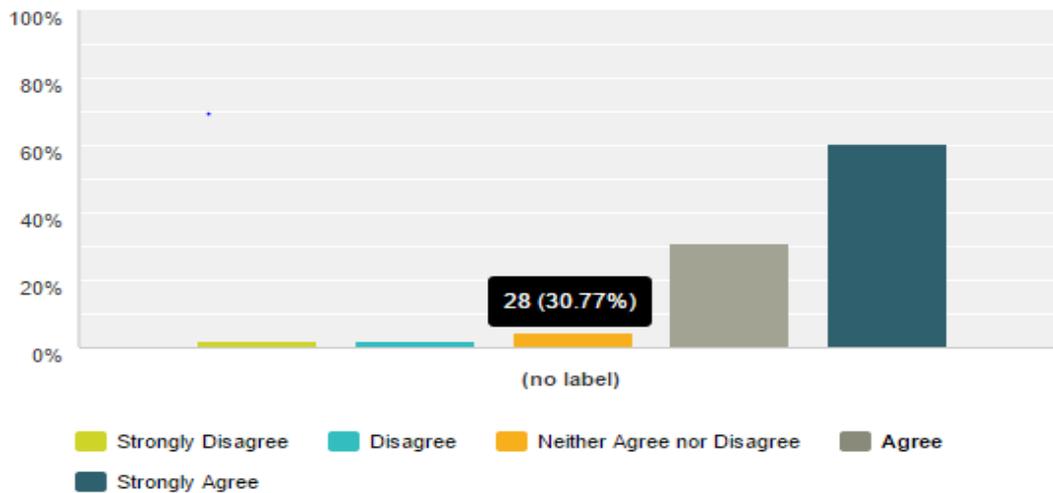
Figure 6: Change Management Strategy as a hindrance to adoption of Government e-payments

4.4   Information Security and Compliance

Analysis of the response for security concerns revealed that clients were not as such concerned with security on adoption of e-payments in government. Though some MDA's having not implemented e-payments , 87% of the respondents were concerned about inadequate security controls ,while 82 % had reservations about data lose with system failures.

Table 4.2: Specific Concerns on information security with adoption of E-payments

Lack of information control	52.33%	45
Insufficient security controls	87.21%	75
Data lose with system failures	82.56%	71
Legal compliance issue	48.84%	42
Legal data ownership issues	45.35%	39

The concerns with data lose on system failures can be corroborated with the fact that the survey revealed that 72% of MDA's do not have a business continuity plan.

Table 4.3: Response to Presence or Absence of Business Continuity Plan

Answer Choices	Responses	
yes	27.91%	24
NO	72.09%	62

In general, security perception at organization level was found to be varying. In most organizations, 41% had medium rating of security concern on adoption of e-payments.

Table 4.4: Organizational level security concern for government e-payments adoption

Answer Choices	Responses
High: Very concerned	11.63%
Medium : Somewhat concerned	41.86%
Low: Aware, but not concerned	29.07%
Very low: Not even aware at this point	17.44%

In addition to this, Majority of organizations showed no commitment in addressing information security with the adoption of government e-payments. From the survey, 40% had no policy and neither is the policy being developed. 37% were putting in place information security policies. A Paltry 7% have this policies in place.

4.5   Statistical Analysis

4.5.1 Correlation Analysis

The findings of this study were subjected to a correlation analysis to determine whether any relationship exited between the dependent variable (adoption of e-payment system) and the independent variables (adequacy of ICT infrastructures, awareness of e-payment system, e-payment security, and compliance, change management, and Stake holder engagement). Correlation findings are indicated in Table 4.5.

Table 4.5: Correlation Matrix

Statements		1	2	3	4	5	6
Adoption of e-payment system	Pearson's Correlation	1					
	Sig (2 tailed)	0.001					
Adequacy of ICT infrastructure	Pearson's Correlation	$.636^{**}$	.391	1			
	Sig (2 tailed)	.001	.056				
Awareness of e-payment system	Pearson's Correlation	$.575^{*}$	$.432^{**}$	$.338^{*}$	1		
	Sig (2 tailed)	.002	.020	.040			
E-payment security and compliance	Pearson's Correlation	$.702^{**}$	$.462^{**}$	.330	.314	1	
	Sig (2 tailed)	.020	.028	0.030	0.050		
Change Management	Pearson's Correlation	$.482^{**}$	$.406^{*}$	.396	.347	.133	1
	Sig (2 tailed)	.000	.040	.050	.102	.122	
Stakeholder Engagement	Pearson's Correlation	623**	605*	558	552	550	640
	Sig (2 tailed0	.000	.000	.000	.020	.030	.000

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

According to the study findings, the relationship between adoption of e-payment system and the adequacy of ICT infrastructure was strong, positive and significant; r (0.636); $p \leq 0.05$. This was followed by a strong positive relationship between adoption of e-payment system and the awareness of e-payment system; r (0.575); $p \leq 0.05$. This was followed by a strong

positive relationship between implementation of e-payment system and E-payment security and compliance; r (0.702); p ≤ 0.05. The relationship between adoption of e-payment system and change management was equally positive; r (0.482); p ≤ 0.05, therefore significant. The relationship between adoption of e-payment system and stakeholder engagement was positive; r (0.623); p ≤ 0.05, therefore significant. Adequacy of ICT infrastructure had a significant relationship with other independent variables as follows: Awareness of e-payment system; r (0.433); p ≤ 0.05, E-payment security and compliance; E-payment security and compliance; r (0.462); p ≤ 0.05, Change Management; r (0.402); p ≤ 0.050; stakeholder engagement; r (0.605); p ≤ 0.05.

4.5.2 Multiple Regression Analysis

The study variables were subjected to regression analysis to determine the level of significance. The findings are presented in Table 4.6, 4.7, and 4.8 below. The regression model used was $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 \, e$; Where X_1 = Adequacy of ICT infrastructure; X_2 = Awareness of e-payment system; X_3 = E-payment security and Compliance; X_4 = Change Management; X_5 = Stakeholder engagement.

Table 4. 6: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.929[a]	.864	.824	.301

a. Predictors: (Constant), Adequacy of ICT infrastructure, Awareness of e-payment system, E-payment security and Compliance, Change Management, Stakeholder engagement

According to the findings in Table 4.6, multiple regressions indicated an adjusted R squared of 0.764 implying that 82.4% of variation in adoption of e-payment system was attributed to adequacy of ICT infrastructure, Awareness of e-payment system, E-payment security and Compliance, Change Management. 18.6% of variation in adoption of e-payment system was covered with other factors not considered in this study.

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Table 4.5.3: ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
	Regression	14.798	5	1.533	16.873	.000[b]
1	Residual	3.544	119	.091		
	Total	14.342	124			

a. Dependent Variable: adoption of e-payment system

b. adequacy of ICT infrastructure, Awareness of e-payment system, E-payment security and Compliance, Change Management, Stakeholder engagement

According to Table 4.7, the variation between the groups sum of squares was 14.798; with degree of freedom df (4); $F (5, 119) = 16.873$; $P<0.00 <0.05$; therefore there was significant relationship between adoption of e-payment system and adequacy of ICT infrastructure, awareness of e-payment system, E-payment security and compliance, change management.

Table 4. 5.4: Regression Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	1.600	3.271		-.389	.000
Adequacy of ICT infrastructure	.966	.337	.669	3.570	.016
Awareness of e-payment system	.052	.227	.341	-.357	.000
E-payment security and compliance	.768	.399	.456	1.651	.025
Change management	.149	.110	.278	-1.790	.070
Stakeholder engagement	.312	.226	.215	1.602	.000

The findings in Table 4.8 indicates a regression coefficient ß (0.669); $P<0.05$, between adoption of e-payment system and adequacy of ICT infrastructure. The relationship between adoption of e-payment system and awareness of e-payment system had a regression coefficient ß (0. 341); $P\leq0.05$, therefore significant. The relationship between adoption of e-payment system and e-payment security and compliance had a regression coefficient ß (0.456); $P\leq0.05$, therefore significant. The relationship between adoption of e-payment

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system and change management had regression coefficient ß (0. 278); P≥0.05, therefore the relationship was not significant. The relationship between adoption of e-payment system and stakeholder engagement had a regression coefficient ß (0. 215); P≤0.05, therefore significant. The formula used to compute the relationship was;

Adoption of e-payment =1.600 + 0.966X_1 + 0.052 X_2+0.768 X_3 +0.149 X_4 +0.315 X_5

Where X_1 = Adequacy of ICT infrastructure

X_2 = Awareness of e-payment system

X_3 = E-payment security and Compliance

X_4 = Change Management

X_5 = Stakeholder engagement

4.6 Discussion of the Research Findings

In the study, the first objective was to establish the reasons for slow adoption of e-payments in the government of Kenya. It was found that the absence of a clear guideline on adoption of e-payments had led to its slow adoption. This guideline should have addressed issues affecting the adoption of e-payments in the government of Kenya. Key issues affecting the adoption of e-payments in the government of Kenya were identified as change management, Stakeholder engagement, ICT infrastructure, e-payments awareness and information security and compliance.

The second objective of the study was to evaluate the existing frameworks on e-payments in Kenya. The study found that the frameworks that exist are either for e-citizen in general or e-government frameworks. Even though government e-payments fall within e-government or e-citizen realm, the study found that there was insufficient information on e-payments adoption models in the government of Kenya. On the Framework for quality assessment of E-government Service Delivery in Kenya, Christine Muthama (2014) contents that there has to be strong political support, coherent Information infrastructure and change management. The frameworks reviewed in the literature of this study were either for assessment of e-government services or general roadmaps and master plans for government ICT. Most of the existing models and frameworks were found either to be for evaluation of the impact of e-citizen or assessment of the success of e-citizen in Kenya. An example of this is the framework for Evaluating the Impact of e-Government from citizen's perspective (Otieno & Omwenga, 2014)

The third objective of this study, which forms the core of this research, was to develop a road map for adoption of e-payments for the government of Kenya. This road map was to address issues identified to be impairing the adoption of e-payments in the government of Kenya. From the analysis of the results of the study, it is evident that Stakeholder engagement, Change Management, ICT infrastructure, e-payments awareness and Information security and compliance were the key issues affecting the adoption of e-payments in the government of Kenya. From this study, the following model is proposed as a Road map for the adoption of e-payments in the government of Kenya.

STAKEHOLDER ENGAGEMENT

- Seek Top leadership Support –i.e. The 3 Arms of government
- Determine entities that will be affected by the system and engage.
- Gather Consensus From cross section Experts (Public policy, economics and Social Science)
- Identify Key technical and Institutional Barriers.
- Create reviews and consultation cycles.
- Establish a communication strategy

ICT INFRASTRUCTURE

- Determine Infrastructure requirements for government e-payments in Kenya
- Establish or determine the organization to Manage government e-payments gateway
- Analyze MDA's ICT infrastructure to establish readiness for e-payments.
- Design the architecture of Kenya government e-payments system
- Implement government e-payments system.
- Update system with the dynamics of business environment
- Develop and adopt a business sustainability model for the system

ADOPTION OF E-PAYMENTS IN THE GOVERNMENT OF KENYA

CHANGE MANAGEMENT

- Establish Steering Committee
- Develop Change Management Strategy
- Determine the level of change
- Determine advocates and early adopters of the system
- Determine MDA's that might present the most resistance and why)
- Select change management champions.
- Communicate the change and benefits
- Manage transition and realization of benefits.

INFORMATION SECURITY AND COMPLIANCE

- Establish regulatory frameworks for government e-payments
- Develop government E-payments information security policy.
- Determine and communicate Risks.
- Define alternative technology pathways to overcome barriers
- Develop government e-payments standards.

E-PAYMENTS AWARENESS

- Develop an awareness program
- Conduct expert workshops
- Communicate the Benefits of Government e-payments
- Determine knowledge gaps.
- Customize different messages for different groups
- Sustained awareness and training activities.

Figure 7: Model Roadmap for the adoption of Government e-payments in Kenya

The forth objective of this study to gain an understanding of the impact of Change management, stakeholder engagement, ICT infrastructure, Awareness and Information security and compliance was realized by the study as follows :-

Information Security and Compliance - The study found that Information security and compliance had a high relationship with adoption of e-payment systems in the government of Kenya. From the study, it was concluded that some of the misconceptions about government e-payments are as result of the perceived insecurity of the existing e-payments platforms. In as much as security was not usually an issue for customers who intend to use government e-payment but it was found to be an issue of concern for government respondents who took part in this study. Most government officials lack understanding of information security on electronic transactions. There was little regard for information security and compliance within government to the extent that no security and business continuity strategies and plans had been put in place. A legal framework for payments encompassing electronic payments existed though compliance to the National payment systems act (2011) was still a major issue to most MDA's. From the study, it was established that the following information security and compliance issues should be addressed by the guideline for adoption of government e-payments in Kenya.

- Establish regulatory frameworks for government e-payments
- Develop government E-payments information security policy.
- Determine and communicate Risks.
- Define alternative technology pathways to overcome barriers to adoption of e-payments.
- Develop government e-payments standards.

ICT Infrastructure - This study concluded that adequacy of ICT infrastructure was a major issue on adoption of government e-payments in Kenya. To this regard, adequate ICT infrastructure contributed significantly to adoption of e-payment systems. In as much as internet penetration in Kenya was among the highest in Africa, Some Kenyan government offices still faced unreliable internet connectivity challenges. The government e-payments platforms that existed, had most of activities conducted online hence too much dependence on the internet. The study also found that there was inadequate skill to implement and support e-payments in MDA's in the Government of Kenya. Customer side infrastructure for access to the government e-payment services was found not to be an issue of great concern.

This was attributed to the fact that Kenya had the basic infrastructure to support e-payments through the mobile telecommunication infrastructure and Banks' retail POS devices at shops and village Kiosks. There were also challenges with integration of the various financial systems in government agencies to the envisaged government e-payment system that was to facilitate government e-payments. The study concluded that infrastructure issues hampering adoption of e-payments should be enshrined in the road map for adoption of e-payments in the government of Kenya as follows.

- Determine Infrastructure requirements for government e-payments in Kenya

- Establish or determine the organization to Manage government e-payments gateway

- Design the architecture of Kenya government e-payments system

- Implement government e-payments system.

- Continuous Update of the system in relation to the dynamics of business environment

However USAID (2013) in their Better than Cash publication emphasize the importance of Analyzing the existing infrastructure to establish readiness for adoption of any technology that there is .They also indicate that for sustainability of government e-payments infrastructure , a business sustainability model should be developed .

Change Management - This study concluded that indeed change management was a major issue in adoption of government e-payments. Although cashless payments have picked up in Kenyan society, it was found that Government Agencies were yet to exploit these platforms, which included Mobile money, Banks POS terminals in shops and Village Kiosks, credit cards, and debit cards. Government MDA's were still receiving payment made by cash. Even where automation has been done, mixtures of modes of payments were still being used which made it difficult to reconcile various government accounts and provide accurate financial reporting to the exchequer. This was attributed to unwillingness to change as revealed by the study. Some government employees preferred cash payments over electronic payments partly because transition benefits to cashless payments have never been communicated. To compound this problem, the study found that structures in finance departments in government offices supported cash payments as most of them had cash offices manned by cashiers. There was no guideline by the government to provide a standard procedure for adopting e-payments by integrating existing payment processing systems to the government payment gateway. Majority of the MDA's did not know the stakeholders to engage in their quest to adopt e-payments. The study also found that there was confusion

about which government Agency is mandated to manage the e-payment system and which one regulated government e-payments. In this study, it was revealed that social cultural issue of the population was also an issue to deal with due to literacy levels and a large part of the population that is still unbanked despite government efforts to open up the financial services sector and allowed mobile telecommunication companies to operate mobile bank accounts. In its publication on technology Road Mapping, IEA (2014) Suggests that change management issues can be addressed in an integrated guideline like a Roadmap. The Road Map should seek to address the issues of change management by performing the following tasks.

- Establish Steering Committee
- Develop Change Management Strategy
- Determine the level of change (What is going to be done differently)
- Determine advocates and early adopters of the system
- Determine MDA's that might present the most resistance and why)
- Select change management champions.
- Communicate the change and benefits
- Manage transition and realization of benefits

Awareness of e-payment systems was found to be one of the contributing factors to its slow adoption in the government of Kenya. This study indicated that most government employees in ICT and Finance department do not understand what an e-payment is. There is a negative perception towards adoption of e-payments. Government employees do not view e-payments as a tool to simplify their work. The misconception is that e-payments will render some of them jobless. The thinking within MDA's is that by adopting e-payments, they will lose control of revenues they collect. The study found that Government e-payments in Kenya are perceived to be complex and difficult to implement. To address these issues of e –payments awareness, IEA (2014) suggested for the following should be addressed in the formulation of adoption Roadmap.

- Develop an awareness program and sustain awareness and training activities
- Conduct expert workshops
- Communicate the Benefits of Government e-payments
- Determine knowledge gaps.
- Customize different messages for different groups

Stakeholder Engagement - From the study, it was concluded that Stakeholder engagement affects the adoption of e-payments in the government of Kenya. This study indicated that the concept of stakeholder engagement is still confusing. Most government officials think that as long as they have invited few government agencies and departments to their meetings, that constitutes stakeholder engagement. However, for enhancing the development and adoption of e-payment systems, in its 2014 publication on e-government, COMESA agrees that it is essential that the private sector, the civil society, private citizens and ICT experts be all involved early enough in government technology road mapping to enable easy buy in. Equally, the stakeholder meetings need to be consultative, where the government does not just give information, but also actively seek information and input from these stakeholders. For stakeholders to be engaged in a structured and effective manner in technology Road mapping, IEA (2014) suggested that:-

- Top leadership Support –i.e. the Executive and the Legislative arms of government (In the case of Kenya)
- Determine entities that will be affected by the system and engage.
- Gather Consensus From cross section Experts (Public policy, economics and Social Science)
- Identify Key technical and Institutional Barriers.
- Create reviews and consultation cycles.
- Establish a communication strategy

The study indicated that Stakeholders should be engaged throughout the cycle of the project for the adoption to be successful.

CHAPTER 5: CONCLUSION RECOMMENDATIONS AND FURTHER WORK

This study analyzed e-payments in the government of Kenya by evaluating the existing frameworks and examined the identified issues and how they influenced its adoption. The absence of an adequate guideline through which Change management, Stakeholder engagement, ICT infrastructure, awareness and Information security and compliance was found to have a big impact on the adoption of e-payments in the government of Kenya.

5.1 Study Achievements

From the study, it was determined that there was no clearly defined roadmap to guide government Agencies on how to adopt e-payments. The study further revealed that there was lack of sufficient information on government e-payments that had led to misconceptions and wrong perceptions about government e-payments resulting to outright resistance and negative attitude towards e-payments adoption within government MDAs. The study concluded that Information Security and Compliance, ICT Infrastructure, Change Management, Awareness, and Stakeholder engagement were the main issues affecting e-payments adoption in the government of Kenya and that these issues should be addressed through a consolidated guideline as proposed by the roadmap of this study. The study established there were several frameworks on Kenya's e-citizen to which e-payments are a sub section but there is none that addresses e-payments in Kenya specifically.

5.2 Limitations and challenges encountered during the study

This study was limited to e-payments in government organizations in Kenya. It did not include adoption issues from the citizen Perspective and e-citizen in general. A more extensive research can be carried out Inco-operating issues that affect e-payments adoption from citizens' and private sector's perspective. Challenges experienced during the study included non-response from some targeted respondents, Time constrain and limited financial resources. These issues were mitigated by use of online questionnaire as a data collection tool and sending of frequent e-mail reminders to the respondents.

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5.3 Recommendations and Further Research

From the findings of this study, it is evident that the issues of stakeholder engagement, Change management, ICT Infrastructure, Awareness and Information security and compliance have a great impact on adoption of e-payments in the government of Kenya.

The government of Kenya should seek first to establish the adequacy of the current ICT infrastructure in government payment processing departments verses the required ICT infrastructure to implement e-payments.

E-payments awareness should be done within government MDA's by identifying all players in government e-payments and engaging them from the initial stages to actual implementation and post implementation. Efforts should be made through awareness, Adequate ICT infrastructure and regulatory frameworks to provide information security and compliance assurance thus building trust for e-payments within government. Elaborate well-coordinated management structure that is representative of government e-payments domain should be put in place through development of a change management strategy.

The proposed Roadmap from this study should act as a universal guide for adoption of e-payments in Kenya and form the basis for further research in development of comprehensive frameworks for implementation and adoption of government e-payments.

Further research may delve into adoption and use of government e-payments from the public perspective and evaluation of the effectiveness of government e-payments. Other future studies could be done as a comparative analysis of Kenya's government e-payment systems with other developed world.

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APPENDIX:

Questionnaire Introduction Cover letter

Thank you for showing interest in this research project. Please read this information below before deciding whether to participate in this study. Participation is voluntary.

Purpose: This survey is being conducted in partial fulfilment of the award of Master of Science degree in Information Technology Management of The University of Nairobi by Bonface Asiligwa under the supervision of Prof. Elijah Omwenga. The research aims at developing a roadmap for the adoption of E-payments in the government of Kenya, evaluation of the adequacy of existing models and establishing how change management, CT infrastructure, Information security, e-payments awareness and stakeholder engagement affect the adoption of e-payments in government.

Description: This survey questionnaire will take about 10 Minutes to complete .The survey will seek your opinion about the adoption of e-payments in the Kenyan government. The survey will collect data about the identity of your organisation, the services offered, type of payment received from Citizens or other businesses, ICT infrastructure, Level of business process automation, Staff Computing skills, and e-payments awareness. Should you wish to receive the results of this study kindly send your request to isiaho@gmail.com.

Confidentiality: It will be my pleasure and gratitude if you respond to this questionnaire. You are therefore assured that your identity and your responses will be highly confidential. Individual participation will not be quoted in the analysis. Only the final and aggregated results will be presented.

Complaints: For any complains, Clarification or questions about this study contact the undersigned.

BONFACE ASILIGWA
MSc. Information Technology Management
School of Computing and Informatics
University Of Nairobi
Email: isiaho@gmail.com Cell: 072531915

Sample Survey questionnaire

PART A: GENERAL INFORMATION

Please Mark with an (X) to indicate your response.

A1. Individual Name (Optional)   _____

A2. Which type of government organisation do you work for?

  Parastatal ☐

  County ☐

  Ministry ☐

A3. What department you work for in your organization?

  ☐ Finance

  ☐ ICT

  ☐ Other(Specify)_____

A4. Does your organization receive any form of payment for services or products rendered?

  ☐ Yes

  ☐ NO

  If **NO,** Exit the Questionnaire.

A5. Your organization has fully adopted e-payments system

Strongly disagree 1	Disagree 2	Neutral 3	Agree 5	Strongly Agree 5

A7. What method does your organization receive payments   ?
  ☐ Mobile Money

  ☐ Cheques

  ☐ Cash

☐   Electronic Bank transfers

☐   Direct Cash deposit to Organization's account

☐   Other(Specify)_____

A8. The adoption of e-payment in government will make payments faster

Strongly disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5

A9. The adoption of e-payments has made government payments efficient

Strongly disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5

A10. Please indicate with an X to indicate your response to below asserts

Statement	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly agree 5
Inadequate ICT infrastructure hinders the adoption of e-payments in the government of Kenya.					
Information security concerns affect the rate of adoption of e-payments in the government of Kenya.					
Lack of change management strategy impacts negatively on adoption of e-payments in the government of Kenya.					
Lack of stakeholder engagement on government e-payments has resulted in un-coordinated efforts towards adoption of e-payments in the government of Kenya					
Government staff have inadequate information on e-payments that has lead					

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to mistrust and misconceptions about e-payments which has resulted in slow adoption of e-payments in government.					

SECTION B: EVALUATION OF ADEQUECY OF ICT INFRASTRUCTURE FOR   E-PAYMENTS

This subsection evaluates the adequacy of ICT infrastructure in the government of Kenya to establish whether it is a major factor affecting the adoption of government e-payments. Please Mark with an (X) to indicate your response.

B2. How do your organization process payments made to it**.**

☐ Manually (Using paper book of accounts)

☐ Through automated information systems.

☐ Both

B2. The difficulty in accessing government provided computing   devices by employees working at the Finance department in my organization throughout their working hours affect the rate of adoption of e-payments?

☐   Yes

☐   No

B3. Please Mark with an (X) to indicate your response on below assertions.

Statement	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly agree 5
There is adequate reliable internet connectivity at my work place					
There is a reliable Local area network at My work place					
There is Network infrastructure at my work place that supports Voice, Video ,data and Wireless technologies					
Payment processing staff have access to a reliable up to date computer system					
Payment processing employees have					

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been provisioned with adequate software and tools for processing electronic payments.					
The payment system at our organization is/ can be integrated to other government systems .					
There is adequate Technical support for the payment processing system.					
It is easy and fast to generate accounts reconciliations reports with the system					
There are adequate skills to implement ,manage and support e-payments system in my organization					
Our clients have access to adequate ICT infrastructure to effect e-payments					

SECTION C: AWARENES OF GOVERNMENT E-PAYMENTS

This Section evaluates the level of awareness about e-payments in government Ministries/Departments/Agencies. Please Mark with an (X) to indicate your response.

C1.Do you know what an e-payment system is?
   ☐   Yes

   ☐   No

C2. Has any sensitization about e-payments in government been carried out in your organizations' finance department?

   ☐   YES

   ☐   NO

C3.Has the government provided your organization with clear guidelines on the use of electronic payments?
   ☐   Yes

   ☐   No

   C4. Is there an official procedure by the government on the process of adopting

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e-payments for government services?

☐   YES

☐   NO

C5. If YES above (D1), is the procedure adequate for adoption for e-payments in government? :

☐   Yes

☐   NO

C6.This subsection evaluates E-payments perception in government Ministries/Departments/Agencies. Please Mark with an (X) to indicate your response.

Statement	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly agree 5
E-payments are insecure					
Government e-payments will make government payments to be fast, efficient and effective					
E-payments will ensure accurate reconciliation of books of account.					
Government e-payments will ensure proper record keeping that is up to date and easy to retrieve.					
E-payments will deny government organizations the control of payments made to them					
Adopting e-payments will render some employees in Finance department redundant.					
Government E-payment					

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system is complex and difficult to implement and use					

C7. Are you aware of the organization(s) that is mandated to co-ordinate manage and maintain the government payment gateway that facilitates   government e-payments

☐   YES

☐   NO

C8. If yes above select the organization from the list below

☐ Kenya revenue Authority

☐ Central Bank of Kenya

☐ The National treasury

☐ Information communication technology Authority of Kenya

☐ Kenya Trade network Agency

☐ Other specify _____

PART D: CHANGE MANAGEMENT

This Section evaluates impact of change Management on adoption of e-payments in government Ministries/Departments/Agencies. Please Mark with an (X) to indicate your response.

D1. The absence of a change management strategy is a hindrance to the adoption of e-payments in the government of Kenya.

☐   Strongly Agree

☐   Agree

☐   Don't agree

☐   Neutral

D2.Changes that e-payments in government will bring have been communicated to the concerned government employees.

□ Yes

□ No

D3 There is adequate mechanism to handle criticism and negative information about the system

□ Yes

□ No

D4 Resistance to change from tradition manual and transaction based autofocus systems to e-payments is a major cause for its slow adoption in the government of Kenya

□ strongly disagree

□ Disagree

□ Don't Know

□ Agree

□ strongly agree

D5. Do you or your organization know of the changes to be done to your internal system to integrate with the government e-payments platform?

□ Yes

□ No

D6. There are well elaborate mechanisms on who to communicate to for any changes in government e-payments and how to go about it

□ strongly disagree

□ Disagree

□ Don't Know

□ Agree

□ strongly agree

D7. Are there other projects your organization is involved in that are affecting the adoption of e-payments in your organization?

□ Yes

□ No

SECTION E: STAKE HOLDR ENGAGEMENT

E1. Do you know all the stakeholders to engage before adopting e-payments in the Government of Kenya?

☐ Yes

☐ No

E2. Is there a formal process to identify, manage, and understand how the likely adoption of e-payments in government may affect stakeholders?

☐ Yes

☐ No

E3. Stakeholders in government e-payments are the once who will decide whether e-payments are of benefit to them thus affect its adoption.

☐ strongly disagree

☐ Disagree

☐ Don't Know

☐ Agree

☐ strongly agree

E4 .The slow adoption to government e-payments by government agencies is attributed to lack of stakeholder engagement.

☐ strongly disagree

☐ Disagree

☐ Don't Know

☐ Agree

☐ strongly agree

E5. The absence of a formal procedure for stakeholder engagement has led to lack of guided communication on adoption of e-payment in government.

☐ strongly disagree

☐ Disagree

☐ Don't Know

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☐ Agree

☐ strongly agree

SECTION F: INFORMATION SECURITY AND COMPLIANCE

This Section evaluates whether information security concerns hinders the adoption of e-payments in government of Kenya. Please Mark with an (X) to indicate your response.

F1. What is the perception of information security to your organization created by adoption of E-payments?

☐ High: Very concerned

☐ Medium: Somewhat concerned

☐ Low: Aware, but not concerned

☐ Very low: Not even aware at this point

F2. What are your organization's concerns about information security that hamper the adoption of government e-payments (Choose all that apply)

☐ Lack of information control

☐ Insufficient security controls

☐ Private Citizens data leaks

☐ Data lose with system failures

☐ Legal compliance issue

☐ Legal data ownership issues

☐ All of the above

F3. What is the commitment of your organization to address Information security with the adoption of E-payments?

☐ Critical: Managers are supportive and comprehensive policies are in place

☐ Extremely important: Managers are aware and policies are being implemented

☐ Important: Awareness and policies are growing

X

☐ Unimportant: No policies in place or being developed

☐ Unknown

☐ Other(Specify)_____

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F4. Does your organization have a business continuity plan and a disaster recovery plan?

☐ YES

☐ NO

☐ Don't Know_____

F6. Information security concerns are significant to our clients over the use of e-payments.

☐ Agree

☐ Strongly Agree

☐ Don't agree

☐ Strongly disagree

☐ Disagree

F7. Does your organization have any policy or framework on information security of e-payments data?

☐ YES

☐ NO