ICT Infrastructure and Adoption of E-government for Improved Service Delivery in Kajiado County, Kenya

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Abstract

Through advancement of ICT, many governments around the world embarked on projects that introduced E-government initiatives for efficient and effective government operations geared towards making a government accountable and transparent as well as providing timely services which are more convenient and cost-effective. The purpose of this study was to establish the influence of ICT Infrastructure on adoption of E-government in the County government of Kajiado in Kenya. The study was based on pragmatic paradigm. Descriptive survey was used in this study. A sample of 335 respondents was drawn from the target population of 2660 employees from the devolved 10 ministries in Kajiado County using Cochran (2007) formulae. Quantitative data was collected through open and closed-ended questionnaires while qualitative data was collected through an interview guide. Regression models and correlation were used to analyze inferential data and test hypotheses. Qualitative data was analyzed using content analysis. The study found that ICT infrastructure had a strong positive influence on adoption of E-government (r = 0.821, p-value=0.000). Thus, the study concludes that ICT infrastructure has a significant influence on the adoption of E-government in the County Government of Kajiado. The study recommends that the government of Kenya should develop ICT policy specifically for County governments so as to ensure that challenges such as slow network, lack of infrastructure and power interruptions are addressed. In addition, the National government should develop a policy aimed at addressing IFMIS and other systems related challenges so as to ensure efficiency and effectiveness in the supply of products and services in the County governments. Further, the County government of Kajiado should make sure that there are enough computers for use in different ministries. In addition, the County should start using a more reliable network and internet services. Network and internet service providers should be selected on the basis of their infrastructure and ability to provide reliable services.

Key words: ICT infrastructure, E-Government, ICT Adoption

Introduction

One of the preconditions of E-government implementation and adoption of any technology is availability of ICT infrastructure. ICT infrastructure include tangible hardware and the intangible software (Heeks 2001), which enable creation, acquisition, storage, dissemination, retrieval, manipulation and transmission of information (Zulu, 1994). Based on the IBM report on ICT Infrastructure (2001), ICT infrastructure for an E-government involves technologies - with network readiness at the beginning - including application servers, hardware resources, software, operating systems, and Internet, websites and data centers. From the definition of E-government, ICT infrastructure lies behind the effectiveness and success of E-government adoption. Availability and accessibility of information and services 24/7 from anywhere are determined by high speed servers, high speed internet, power and power backups as well as well-designed web applications. ICT infrastructure enables government agencies to collaborate, interact and share information as well as facilitating the daily tasks that save employee's time and effort. Adoption of E-government depends on modern infrastructure. Internetworking is required to enable sharing of information and open up new channels of communication as well as delivering of new services (Ndou, 2004). Technological resources have been consistently identified as an important factor for successful information systems adoption. Parasuraman and Colby (2015) pointed that technology readiness (TR) is a critical factor in the implementation and adoption of innovative products and services. It determines organizational readiness to adopt and embrace technology. According to Mose, Njihia and Magutu (2013),

private and public-sector organizations have been utilizing information technology (IT) systems to streamline and automate their purchasing and other processes over the past years. Most government are adopting ERP. ERPs are large scale computer software and hardware systems that attempt to integrate all data and processes of an organization into a unified system housed in a centralized database which is accessed through a secure network. ERPs have capabilities for handling enterprise wide business processes ranging from functions such as manufacturing, logistics, distribution, inventory, shipping, invoicing and accounting.

Digital transformation is a paradigm shift throughout the world caused by rapid growth of ICT and many governments just like the private sector have realized the importance of E-government as a tool for responsive governance. Implemented and adopted ICT has potential to transform delivery of services in public institutions. Benefits of E-government adoption are undisputed. It's evident that E-government is an effective driver for economic growth and saves time as well as bringing accountability, effectiveness, and openness in government, but there are many challenges that hinder the exploration and realization of its opportunities such as ICT infrastructure (Al-Sebie and Irani 2005; Ndou, 2004). Research on E-government has identified challenges such as lack of awareness, access to e-services, usability of E-government websites, lack of trust and security concerns, data protection laws, digital divide; lack of citizens' interest; lack of government support and lack of strategy and frameworks (Reffat, 2003; Damo daran et al., 2005) are hindering the adoption of E-government in many countries.

There is a high rate of failure of E-government projects, particularly in developing countries, despite the advantages and benefits that E-government technology provides. A report on E-government implementation projects in developing countries indicated that 35% failed, 50% partly failed, and only 15% were successful (Heeks, 2003). Raguseo & Ferro (2011) noted that public administration is lagging behind the private sector in the usage of ICTs for conducting their back-office activities. Most of them have not fully incorporated ICT in automating their activities. According to Raguseo and Ferro (2011), operational features, new managerial skills, new abilities of defining adequate policies, new capabilities of planning activities to conduct, new aptitudes to increase the citizens' involvement in public activities as well as the availabilities of new ICTs, combined with the organizational changes and the new competences creation is necessary for public administration to overcome organizational internal barriers in order to realize the value of E-government adoption.

Nograšek (2011) noted that although there is awareness that E-government is more than using ICT and putting public services on the web, the impressive growth of E-government exists in the making of information and services available to people. According to Apostolou, et al., (2011), E-government services pose unique challenges to change management because they require the co-evolution of the front office service and related back office IT infrastructure. Kifle and Low Kim Cheng (2009) analyzed the core factors of leadership in E-government implementation in twelve ministries in Brunei and identified that poor change management strategy is an area that had been overlooked in Brunei E-government. The Government had no strategy on how to handle changes brought by technology, like changes in policy, culture, mindset, organizational structure and process; pen and paper was still treated as the official tool. Therefore, there is a need to address the change of management as a critical factor in adoption of technology.

As many countries commit to IT investment, research on change management suggests that potential benefits of IT systems within organization remain unrealized (Hitt and Brynjolfsson, 1996). While Neufeld et al. (2007), noted that most IT projects, do not get close to achieving anticipated results. According to Aiman-Smith and Green (2002), the cost of projects in most cases exceeds initial budget due to time overruns leading to project failures. Wood-Harper et al. (2004), declared that studying factors that lead to successful E-government implementation and adoption is crucial. There a need to identify key success conditions, indicators and factors in order to develop an understanding on why and how E-government initiatives should be successfully implemented and adopted. This study therefore sought to examine the effect of ICT infrastructure on adoption of e-government.

The study was guided by the following research hypothesis:

H1$_1$ ICT infrastructure has no significant influence on the adoption of E-government in the county government of Kajiado.

Related Work

Adoption of E-government for service delivery
E-government or digital government refers to the use of ICT, IT and other web-based technologies to improve efficiency and effectiveness of service delivery in the public sector. It's the use of internet and other technological devices by governments to deliver services to the public (Young-Jin and SeangTae, 2007, Bhatnagar, 2004). Digital government or E-government entails computerizing the back and front office using ICT tools as well as modifying organization internal operation processes of the public sector (Liikanen, 2003). It also involves office automation through online services and transactions to improve government services (Huang, 2010). The government is able to become more responsive, transparent and accountable to the public through open government data initiatives as well as reduce bureaucracy. Government is able to increase its efficiency and offer better quality services. Successful implementation and adoption of E-government benefits all stakeholders such as employees, citizens, NGO, communities as well as businesses.

Adoption of technology has two aspects, adoption at organization level and adoption at individual level (Fichman, 1992). Organization adoption deals with analyzing adoption decisions by large aggregates such as companies, business units, agencies or departments, whereas individual adoption deals with an individual behavioral intention to adopt an innovation or actual adoption behavior (Fichman, 1992). According to Hall and Khan (2003), contributions of new technology innovations in organizational performance can be realized if and when the new technology is widely accepted and adopted. The understanding of organization and individual decisions to adopt technology is essential for technological change management. To successfully implement and adopt E-government for service delivery, the government must have a vision and the system must be accepted and adopted by the intended users (Graafland-Essers & Ettedgui, 2003). Kyobe (2011) found that capacity to "adopt and use ICT" and "exposure" are remarkable determinants of adoption of ICT in South Africa. ICT adoption in the developing nations is influenced by income, availability of computer and internet skills. E-government adoption brings fundamental change in the public-sector structure, its culture and values and ways of conduction business. The radical change is surrounded by human, cultural, organizational, political and technological issues that must be dealt with for successful adoption. It brings about transformation changes to process, structure, culture and individual behavior in the public sector (Abdullah, Rogerson, Fairweather, & Prior, 2006).

E-government adoption has no universal model applicable to all countries and regions. According to Moon (2002), Ronaghan (2002) and Layne and Lee (2001) many government around the world adopted E-government solutions ranging from simple website, one-way communication, two-way communication and integrated websites with online transactions. Many scholars such as Lyne and Lee (2001) and Moon (2002) came up with stages of E-government development stages, with a general agreement on essential stages such as publishing, transactional and integration, however the approaches in terms of technological and organizational perspectives seems to differ in the E-government life cycle.

County ICT infrastructure and Adoption of E-government
ICT infrastructure is considered to be pivotal in E-government implementation and adoption. Appropriate infrastructure must be available before starting any E-government projects, (Graafland-Essers, & Ettedgui, 2003). According to Altameem, Zairi, & Alshawi (2006, November), an E-government infrastructure, in general, is comprised of an infrastructure application server environment and its security, data and content management tools; application development tools; hardware and operating systems; and a systems management platform. IT infrastructure is considered to be the heart of the E-government concept. McKay and Brockway (1989) defined ICT infrastructure as a foundation that enable sharing of information technology capabilities upon which business depends. ICT infrastructure is the shared portion of ICT architecture. Earl (1989) defines ICT infrastructure as the technological foundation of computer, communications, data and basic systems. He views ICT infrastructure as the technology framework that guides the organization in satisfying business and management needs. Duncan (1995) refers to ICT infrastructure as the set of IT resources that make feasible both innovations and the continuous improvement of IT systems. ICT infrastructure is an important aspect in implementation and adoption of E-government and has been emphasized across all literature. According to Zulu (1994), it's the main challenge in any ICT project. Tapscott (1995) observed that failure of ICT projects is primarily caused by a lack of sufficient computers and networks. A study done by Bwalya (2009) on Zambia Health Management Information System (ZHMIS), found that many remote hospitals could not benefit from the initiative due to lack of infrastructure.

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According to Davison et al (2000), telecommunication infrastructure and internetworking to enable information sharing by opening new channels of communication was inadequate. Nurdin *et al.* (2010) emphasizes the importance of electricity to ICT implementation and adoption of technology and observed that, low quality of electricity networks in Africa causes power fluctuation that affect ICT facilities. Availability and constant supply of electricity is crucial for technology adoption.

According to Laudon and Laudon (2001), Developments in ICT Technological Infrastructure have drastically influenced the competitive business environment as proved by the emergence and strengthening of the global economy, and the transformation of industrial economies to knowledge-and-information-based service economies. Inadequate ICT infrastructure has hampered provision of efficient and affordable ICT services in the country thus there is a need to put more emphasis on provision of supportive infrastructure such as high-speed local networks and fast connections, software, ICT equipment and accessories as well and provision for incentives of ICT infrastructure. E-government is dependent of highly available network to support online services.

Security is paramount for E-government adoption. According to Altameem, Zairi, & Alshawi (2006, November), securing information from authorized access is an important factor. Underestimating the importance of security can lead to authorized access to sensitive data, loss of trust which can lead to E-government failure. On the other hand, high level of confidence and trust can be the foundation of a successful E-government project and initiatives. IT standards are crucial for E-government adoption. IT standards are specifications for hardware and software that are widely used and accepted or sanctioned by a standard organization (Freeman, 2001). Based on Wakid and Radack (1997), Information Technology Standards refers to the technical rules and the foundation for interconnected systems that work across organizations and geographic locations. Single integrated gateway (one-stop shop) model for adoption of E-government is expected to provide access to its information and services, that requires the public sectors must share information, knowledge, participate positively, and collaborate to provide E-government services. Standards for IT play important role in helping people to manage and use the technology. Rapid change of technology, makes it difficult to develop timely and long-lived standards. IT Standards are known to influence cost reduction of organizations, facilitate enterprise-wide integration, and promote greater levels of IT responsiveness (Kayworth and Sambamurthy, 1997). Basing on Hossan (2015), a standard can influence in connecting organizational processes and systems, and it also allows a flexible approach in organizational cooperation.

Muraya (2015) in a study on the factors affecting successful adoption of E-government in Kenya's Public Sector found that ICT infrastructure was the main factor affecting the adoption of E-government. The study found that network in the offices was not reliable and was not providing a substantial up-time. The study also found that the government was not providing adequate hardware components necessary of E-government tasks. In addition, necessary software components necessary in the implementation of E-government initiates did not exist.

Dahiya and Mathew (2014) indicate that ICT infrastructure including physical IT assets consisting of the computer and communication technologies and the shareable technical platforms and databases had a significant effect on E-government adoption and performance. The main elements of ICT infrastructure capability included inter-operability, reliability, and flexibility. In addition, effective E-government readiness is characterized by efficient deployment of ICT infrastructure capability.

Og'ang'a (2012) examined the relationship between ICT infrastructure and E-government adoption among local authorities in Kisumu County. The results indicated that high speed broad band networks enhance communication initiatives, internet networking harmonizes operations in the local authority and effective ICT equipment enhances the implementation of the initiatives. However, lack of electronic facilities E-government adoption among local authorities in Kisumu County. In addition, unequal access to computer technology leads to ICT based conflicts in the local authority.

Theoretical framework
To understand the uptake and adoption of E-government systems and the effect of ICT infrastructure, the study adopted Unified Theory of Acceptance and Use of Technology (UTAUT) and Technology-Organization-Environment.

Unified Theory of Acceptance and Use of Technology (UTAUT)

UTAUT was introduced through extending TAM by (Venkatesh, Thong and Xu, 2012; Venkatesh, et al., 2003). The UTAUT can help the managers in understanding the drivers to accept technology as well as intention to use in order to assess the likelihood success of new innovation in an organization.

The theory was developed through a review and consolidation of the constructs of eight models that earlier research had employed to explain IS usage behavior (theory of reasoned action (TRA), technology acceptance model (TAM), motivational model (MM), theory of planned behavior (TPB), a combined theory of planned behavior/technology acceptance model, model of PC utilization, innovation diffusion theory (IDT), and social cognitive theory (SCT)). Subsequent validation of UTAUT in a longitudinal study found it to account for 70% of the variance in usage intention (Venkatesh et. al., 2003). UTAUT has four determinants of user acceptance and usage behaviour, namely; performance expectancy, effort expectancy, social influence and facilitating conditions. Performance expectancy defined as the degree to which an individual believes that using a particular technology will help him or her to attain gains in job performance. Venkatesh et al. (2003) proposed that performance expectancy captures the constructs of perceived usefulness, extrinsic motivation, job fit, relative advantage and outcome expectations. Perceived usefulness has been strongly related to usage intentions and its defined as 'a person's expectation that using the technology will result in improved job performance. Effort expectancy is defined as the degree of ease associated with the use of the system. Effort expectancy has three constructs; degree of ease associated with the use of the system. Ease of use is defined as the degree to which an individual believes that using a particular system would be free of physical and mental effort. Complexity relates to the degree to which a technology is perceived as relatively difficult to understand and use. The organizational and technical infrastructure are the facilitating conditions that individual believes they exist to support the use of the system. Usually measured by perceived behavioral control, facilitating conditions, perceived behavioral control and compatibility. West (2004) examined information technologies and found that training users and assisting them when they encounter difficulties is an example of a facilitating condition that can influence technology utilization. Social influence is the degree to which an individual perceives that important others believe he or she should use the new system. Despite the model being tested, Gallivan (2000) argued that generic application of this model may not applicable if its mandatory for users to adopt, if adoption is dependent on multiple factors and of adoption requires extensive training to upgrade user skills. A generic model can only be used in a voluntary adoption decision but not suitable in explaining complex adoption decision were other factors like senior management influence the decision to adopt.
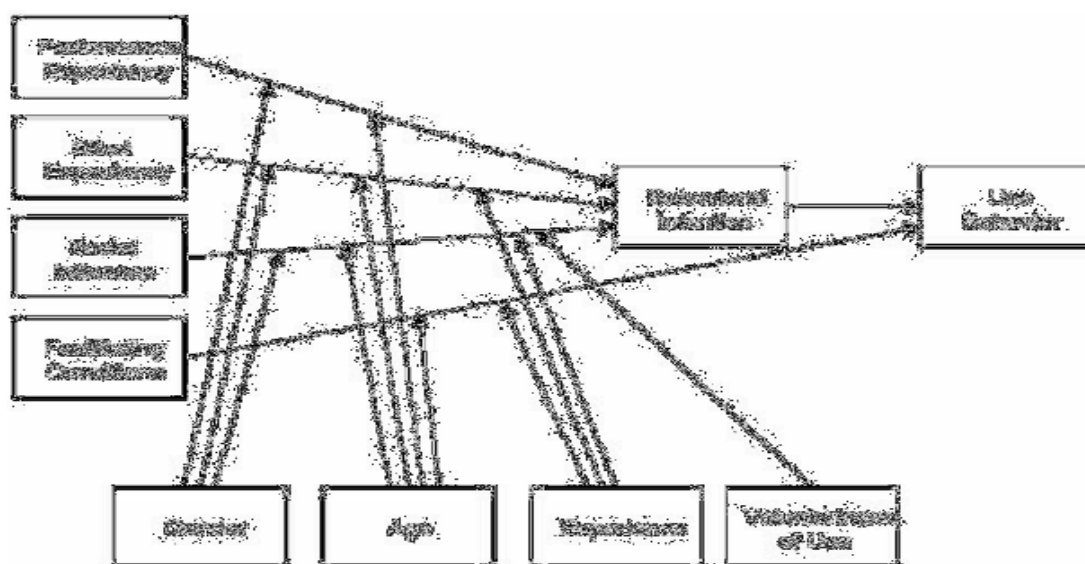

Figure 1: Unified theory of acceptance and use of technology

Source: Venkatesh, V., & Zhang, X. (2010)

Technology-Organization-Environment (TOE)

For conceptualizing individual end-user acceptance many researchers have used TAM and UTAUT while for adoption of technology by organization is limited, Oliveira and Martins, 2011). TOE framework has been extensively used to study e-business. It has three components impacting the process of organization's adoption, implementation and use of innovations, namely; technological, organizational and external environmental factors. According to Tornatzky and Fleischer (1990), technology, organization and the external environment are predictors of decision making for technology adoption in organizations. According to TOE framework, organization advancement through availability of relevant new technologies (e.g. Internet, technological tools and development processes), organizational structures and resources (organization culture, human recourse capacity, financial capacity, top management support, organization size, compatibility and collaboration) and the social environment around the organization (such as regulations and economic structures) are fundamental in technological innovation decision-making (Tornatzky and Fleischer, 1990). TOE framework has been validated by Information system researchers in different settings as a technology acceptance model at the organizational level.
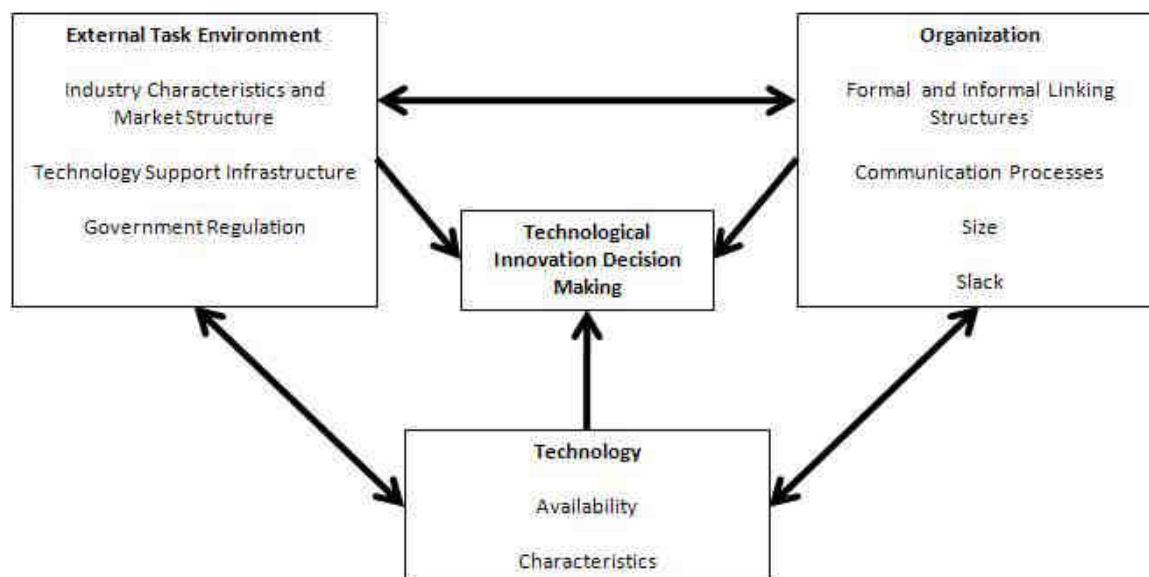

Figure 2: Technology-Organization-Environment Framework (TOE).

Source: **(DePietro, Wiarda, & Fleischer, 1990)**

Conceptual framework

The aim of this study was to investigate the influence of ICT infrastructure on the adoption of E-government in county government. The relationship between the study variables is shown in Figure 1.
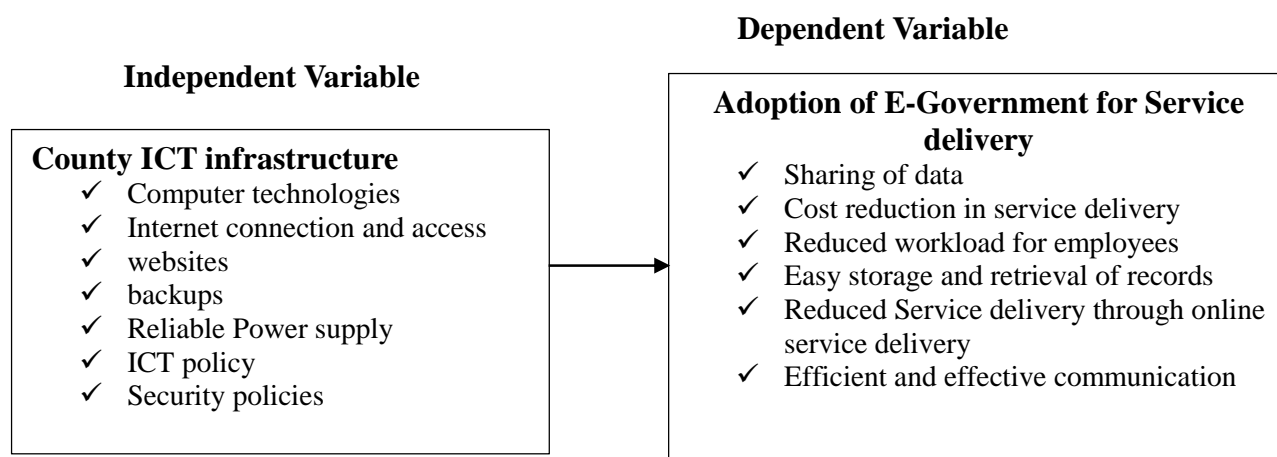
Dependent Variable

Independent Variable

County ICT infrastructure
- ✓ Computer technologies
- ✓ Internet connection and access
- ✓ websites
- ✓ backups
- ✓ Reliable Power supply
- ✓ ICT policy
- ✓ Security policies

Adoption of E-Government for Service delivery
- ✓ Sharing of data
- ✓ Cost reduction in service delivery
- ✓ Reduced workload for employees
- ✓ Easy storage and retrieval of records
- ✓ Reduced Service delivery through online service delivery
- ✓ Efficient and effective communication

Figure 1: Conceptual Framework

Research Methodology

The study adopted mixed method approach which used pragmatic system of philosophy. According to Johnson and Onwuegbuzie (2004), in a single study the researcher can combine quantitative and qualitative methods, approaches and techniques to make logic inquiry of induction, deduction and abduction. The study also combined a correlational and cross-sectional descriptive survey research design. This enabled the study to use inferential and descriptive analysis of data for better results. The Target population for this study was employees of Kajiado County government. The total population for this study was in forty-three departments and 2660 employees working in said departments within the devolved ministries.

The sample size for the employees working under the county government of Kajiado in various department under the ten ministries was based on Cochran (2007) formulae. The same is verified in the formula below:

$$n = \frac{Z^2 * p * q}{e^2}$$

Where;

n =refer to the desired sample size when the entire survey population is greater than 10,000.

Z =the standard normal deviate usually set at 1.96 which corresponds to the 95% confidence level.

p=Target population estimated to have a particular characteristic, 50% is normally used because it is the recommended measure if there is lack of reasonable estimate.

q =1.0 – p

e =degree of accuracy desired in this context set at 0.05.

The sample size of 335 employees was obtained by substituting in the formula above as indicated below:

$$n = \frac{Z^2 * p * q}{e^2} = \frac{(1.96)^2 (0.5)(0.5)}{(0.05)^2} = 384$$

where the above sample size was be adjusted using equation 2:

$$nf = \frac{n}{1 + \frac{(n-1)}{N}}$$

Where:

nf= the sample size,

n= the sample size in equation 1; and

N= is the population size

Given that the population of interest is 2660 (population size N=2660), the corrected sample size was obtained as illustrated mathematically using Krejcie and Morgan model as:

$$nf = \frac{n}{1+\frac{(n-1)}{N}}$$

n= 384/ [1+ (384/2660)]

n= 335

This study adopted mixed method of sampling, that is, proportional sampling technique, simple random sampling technique, and purposive sampling technique. For this study, a proportional sampling was used to sample of the respondents in each department. From a sample of 335 respondents, one (1) respondent was purposively selected in each department who particularly deals with ICT to provide unique information on how E-government services are carried out in their department. This contributed to 43 respondents who provided information through responding to questions designed in the interview guide. On the other hand, random sampling technique was used to select 292 respondents from the departments; these respondents formed the part of respondent that answered the questions captured through the questionnaire concerning how E-government services are handled.

Table 1: Selected Samples

Ministry of Government	No. of Department	No. of employees per department	Samples
Ministry of Agriculture, Livestock, Fisheries and Cooperative	4	273	34
Ministry of Health services, Medical Services and Public Health	2	1045	132
Ministry ICT Gender and Social Services	5	20	3
Ministry of Education, Youths, Sports and Social Services	4	733	93
Ministry of Public Works, Roads and Transport, Housing and Energy	5	76	9
Ministry of Environment, Water and Irrigation	2	77	10
Ministry of Trade, Tourism, Culture & Wildlife	4	48	6
Ministry of Public Services Administration and Citizen Participation and E-government.	3	162	20
Ministry of County Treasury	5	196	24
Ministry of Land, Physical Planning and Natural Resources	7	30	4
Total	**43**	**2660**	**335**

This study used primary data, where data was collected using a structured questionnaire and an interview guide. A pilot testing was conducted using the questionnaire to 35 employees of various departments in a nearby County-Kiambu to test the reliability and validity of the questionnaire. The pilot study was conducted through random sampling. According to Creswell (2013), the pilot test should constitute 10% of the sample, therefore, the pilot test is within the recommendation. The study used both content and constructs validity to ascertain the validity of the instrument. To ensure content validity, the questionnaire was given to experts in the area of project planning and management to give their views and suggestions for improvement of the questionnaire. Construct validity was ensured by reviewing empirical and theoretical literature in order to understand the relevant concept by constructing instruments items based on previous studies. The research instruments in this study were examined by the supervisors and other experts in research methodology. Reliability analysis was also

carried out using the Alpha coefficient (Cronbach, 1951). Higher scores generate more reliable scale. According to Nunnaly (1978), a score of 0.7 is an acceptable reliability coefficient.

Qualitative data was analyzed based on the content matter of the responses. Responses with common themes or patterns were grouped together into coherent categories. Quantitative data was presented in tables and explanation in prose. Data collected was coded and entered into Statistical Packages for Social Scientists (SPSS Version 17.0) and analyzed using descriptive and inferential statistics. Descriptive statistics involved use of absolute and relative (percentages) frequencies, measures of central tendency and dispersion (mean and standard deviation respectively). Inferential statistics such as correlation and regression analysis were used to establish the nature and magnitude of the relationships between the variables and to test the hypothesized relationships. The research hypotheses were tested at 95% level of confidence. Pearson's product moment correlation (r) was derived to show the nature and strength of the relationship. Coefficient of determination (R^2) was used to measure the amount of variation in the dependent variable explained by the independent variable.

To obtain the effect of the independent variables on the dependent variable, simple regression analysis was used. To obtain the effect of County ICT infrastructure on adoption of E-government in county governments' model 1 was used. The model was specified as follows:

E-gov= β_{0+} β_1ICTi+μ……………………………………………………………………. (1)

Where;

E-gov= is a composite score for adoption of E-government.

B_0 =Constant

B_0 = Beta Coefficients (slope)

ICTi = is a composite score for ICT infrastructure

u= error term

Research Findings and Discussions

The study sample size was 335 employees working in various departments in the County Government Kajiado. Out of 335 questionnaires which were distributed, 282 were duly filled and returned. Therefore, the response rate was 83.92%. According to Nulty (2011), a response rate of 75 per cent is adequate for analysis, for making conclusions and making inferences about a population. In addition, Fincham (2010) indicates that a response rate of 60% and above is acceptable for analysis. This implies that the response rate (83.92%) was adequate for analysis, drawing conclusions and reporting.

Adoption of E-government for Service Delivery

The study sought to obtain the extent of implementation of E-government in the provision of services in various ministries. As such, the respondents were requested to indicate the extent to which the implementation of E-government affected provision of services in their respective ministries. The data driven was as presented in Table 2.

Table 2: Adoption of E-government for Service Delivery

	Frequency	Percent
Very little extent	57	20.2
little extent	18	6.4
Moderate	63	22.3
Great extent	96	34.0
Very great extent	48	17.0
Total	**282**	**100.0**

Table 2 shows that a good number of the respondents 96 (34%) indicated that implementation of E-government affected provision of services in their ministries to great extent, followed 57 (20.2%) with very little extent, 48 (17%) with very great extent and 18 (6.4%) with little extent. The findings show that the implementation of E-government affected provision of services in various ministries to great extent and very great extent.

Influence of Adoption of E-government for Service Delivery

The study sought to determine influence of Adoption of E-government on Service Delivery in the County government of Kajiado. As such, the respondents were requested to indicate the influence of E-government adoption on service delivery in the County. Table 3 presents the results.

Table 3: Influence of Adoption of E-government for Service Delivery

	Mean	Std. Deviation
E-government has reduced cost of delivering services	3.776	1.104
Major function we do in our ministry are done electronically	3.712	1.079
This ministry I work in has an electronic payroll system that's pays salaries and keeps records for tax information	4.074	1.134
The county government has established an e-learning platform that enable staff access information in regards to training and learning opportunities	2.914	1.262
Management of records and sharing of information has improved immensely since implementation of E-government systems	3.648	1.100
Time taken to process any transaction has been reduced as the government has implemented E-government in service delivery	3.585	1.116
Am able to store and retrieve records when delivering services	3.819	1.011
Through E-government suppliers can bid for various government tenders electronically	3.744	1.140
There is a website developed that publishes information and gives the public access to different services	3.329	1.334
Since introduction of E-government, the nature of my work has gradually moved from handling a lot of paper to being paperless	3.606	1.152
Electronic communication has improved service delivery	3.946	0.951
Composite	**3.650**	**1.125**

Table 3 shows that the staffs agreed with a mean of 4.074 and a standard deviation of 1.134 that their ministries have electronic payroll system that pays salaries and keeps records for tax information. This implies that the County government of Kajiado had adopted electronic payroll system in payment of salaries and record keeping. They also agreed with a mean of 3.946 and a standard deviation of 0.951 that electronic communication has improved service delivery. This implies that the County government of Kajiado had adopted electronic communication, which is an important component of e-government. These findings agree with Liikanen (2003) argument that E-government entails computerizing the back and front office using ICT tools as well as modifying organization internal operation processes of the public sector. Moreover, the respondents that they were able to store and retrieve records when delivering services as shown by a mean of 3.819 and a standard deviation of 1.011. The adoption of electronic record keeping enabled easier storage and retrieval of records thus improving service delivery in the County government of Kajiado.

With a mean of 3.776 and a standard deviation of 1.104 the respondents agreed that E-government has reduced cost of delivering services. The respondents further agreed with a mean of 3.744 and a standard deviation of 1.140 that through E-government suppliers can bid for various government tenders electronically. This implies that the adoption of e-government had led to an improvement in the tendering process and in the reduction of cost in service delivery. Further, the respondents agreed that major function in their ministries were done electronically as shown by a mean of 3.712 and a standard deviation of 1.079. With a mean of 3.648 and a standard deviation of 1.100 the respondents agreed that management of records and sharing of information has improved immensely since implementation of E-government systems. Besides enabling easier storage and retrieval of information, electronic record keeping enabled easier sharing of information in the County government of Kajiado.

They also agreed that since the introduction of E-government, the nature of their work has gradually moved from handling a lot of paper to being paperless as shown by a mean of 3.606 and a standard deviation of 1.152. This implies that the adoption of E-government led to a reduction in the utilization of paper. These findings are in line with Huang (2010) argument that E-government involves office automation through online services and transactions to improve government services.

Further, they agreed that time taken to process any transaction has been reduced as the government has implemented E-government in service delivery as shown by a mean of 3.585 and a standard deviation of 1.116. This implies that the adoption of e-government in the County government of Kajiado led to timely delivery of services. These findings concur with Huang (2010) argument that by use of E-government, the government is able to increase its efficiency and offer better quality services.

However, they moderately agreed that there was a website developed that published information and gave the public access to different services as shown by a mean of 3.329 and a standard deviation of 1.334. These findings agree with Layne and Lee (2001) argument that many governments around the world adopted E-government solutions ranging from simple website, one-way communication, two-way communication and integrated websites with online transactions. Finally, the moderately agreed that the County government has established an e-learning platform that enable staff access information with regards to training and learning opportunities as shown by a mean of 2.914 and a standard deviation of 1.262. This implies that the establishment of e-learning platform that enable staff access information with regards to training and learning opportunities was not as effective as it should be.

ICT Infrastructure and Adoption of E-government

The objective of this study was to determine the influence of ICT Infrastructure on the adoption of E-government in the County Government of Kajiado.

Adequacy of ICT infrastructure Resources to Facilitate Adoption of E-government

The study sought to determine the adequacy of ICT infrastructure resources to facilitate adoption of E-government. As a result, the respondents were asked to indicate whether the County provided enough ICT infr**a**structure resources to facilitate adoption of E-government. The data driven was as presented in Table 4.

Table 4: Adequacy of ICT infrastructure Resources to Facilitate Adoption of E-government

	Frequency	Percent
Yes	111	39.4
No	171	60.6
Total	282	100.0

Table 4 shows that majority of the respondents 171 (60.6%) indicated that the County did not provide enough infrastructure resources to facilitate adoption of E-government while 111 (39.6%) indicated that the County provided adequate infrastructural resources. This implies Kajiado County Government provided inadequate ICT infrastructural resources to facilitate adoption of E-government. These findings are contrary to Graafland-Essers and Ettedgui (2003) findings that ICT infrastructure is considered to be pivotal in E-government implementation and adoption.

Influence of Aspects of ICT Infrastructure on Adoption of E-government

The study sought to determine the influence of ICT infrastructure on the Adoption of E-government in the County government of Kajiado. As such, the study participants were requested to indicate their level of agreement of various statements related to aspects of ICT infrastructure on performance of E-governance. The results were as presented in Table 5.

Table 5: Influence of Aspects of ICT Infrastructure on Adoption of E-government

	Mean	Std. Deviation
ICT infrastructure is considered to be the crucial in E-government implementation and adoption	4.106	1.038
ICT infrastructure is a modern infrastructure that enable sharing of information technology capabilities upon which county government depends	3.989	1.007
ICT Technological Infrastructure have drastically influenced the competitiveness of the County governments	3.648	1.129
Inadequate ICT infrastructure has hampered provision of efficient and affordable ICT services in the county government.	3.957	1.149
There is adequate infrastructure to support E-government initiatives in my area of work e.g. computer, software, network, internet, power to enable service delivery	3.127	1.364
Underestimating the importance of information security in the county can lead to unauthorized access to sensitive data, loss of trust which can lead to E-government utilization failure	4.042	1.121
ICT infrastructure is an important aspect in implementation and adoption of E-government and guides the organization in satisfying operations and management needs	3.978	1.001
There exists a contingency plan for data backup and recovery in case of any loss	3.244	1.228
IT standards are crucial for E-government adoption. IT standards are specifications for hardware and software that are widely used and accepted or sanctioned by a standard organization	3.766	1.116
In my ministry, the software that exist is regularly updated to cater for the E-government emerging requirements	3.170	1.219
Telecommunication infrastructure and internetworking required to enable sharing of information and open up new channels for communication and delivery of new services is inadequate	3.914	1.119
Composite	**3.721**	**1.135**

Table 5 shows that the respondents agreed on most of the Likert items on ICT infrastructure and adoption of e-government with a mean of 3.721 and a standard deviation of 1.135. This implies that ICT infrastructure influences adoption of e-government in the County Government of Kajiado. These findings agree with Dahiya and Mathew (2014) argument that ICT infrastructure capability affects effective E-government readiness. In addition, the respondents agreed with a mean of 4.106 and a standard deviation of 1.038 that ICT infrastructure was considered to be the crucial in E-government implementation and adoption. They also agreed that underestimating the importance of information security in the County could lead to unauthorized access to sensitive data, loss of trust which could eventual result to E-government utilization failure as shown by a mean of 4.042 and a standard deviation of 1.121. With a mean and a standard deviation of 3.989 and 1.007 they agreed that ICT infrastructure was a modern infrastructure that enabled sharing of information technology capabilities upon which County government depended on. These findings are in line with McKay and Brockway (1989) argument that ICT infrastructure as a foundation that enable sharing of information technology capabilities upon which business depends.

Moreover, the respondents agreed that ICT infrastructure was an important aspect in implementation and adoption of E-government and guided the organization in satisfying operations and management needs as shown by a mean of 3.978 and a standard deviation of 1.001. These findings are in line with Earl (1989) argument that ICT infrastructure is the technology framework that guides the organization in satisfying business and management needs. Further, with a mean of 3.957 and a standard deviation of 1.149 they agreed that inadequate ICT infrastructure hampered provision of efficient and affordable ICT services in the County government. The findings concur with GoK policy (2005) indication that there is a need to put more emphasis on provision of supportive infrastructure such as high-speed local networks and fast connections, software, ICT equipment and accessories as well and provision for incentives of ICT infrastructure. The also agreed that telecommunication infrastructure and internetworking was required to enable sharing of information and open up new channels for communication and delivery of new services as shown by a mean of 3.914 and a standard deviation of 1.119. The findings agree with Davison et al (2000) observation that telecommunication infrastructure and internetworking to enable information sharing by opening new channels of communication inadequate.

Further, with a mean of 3.766 and a standard deviation of 1.116 they agreed that IT standards were crucial for E-government adoption. These findings are in line with Freeman (2001) argument that IT standards are crucial for E-government adoption. The participants also agreed that ICT Technological Infrastructure drastically influenced the competitiveness of the County governments as shown by a mean of 3.648 and a standard deviation of 1.129. The findings agree with Laudon and Laudon (2001) argument that developments in ICT technological infrastructure have drastically influenced the competitive business environment.

However, they moderately agreed that there was contingency plan for backing up data and recovery in case of any loss as shown by mean of 3.244 and a standard deviation of 1.228. According to Altameem, Zairi and Alshawi (2006), underestimating the importance of security can lead to authorized access to sensitive data, loss of trust which can lead to E-government failure. Further, with a mean of 3.170 and a standard deviation of 1.219 they moderately agreed that in their ministries, the available software were regularly updated to cater for the E-government emerging requirements. Finally, with a mean of 3.127 and a standard deviation of 1.364 they moderately agreed that there was adequate infrastructure to support E-government initiatives in their areas of work (computer, software, network, internet and power) to enable service delivery.

The key informants were asked to indicate how the ICT infrastructure holds up the performance, data transformation, and storage process that are necessary in the E-government services. From the findings, they indicated that the internet is not reliable and it was extremely slow.

> *Internet connection in the offices is not reliable but the county has ensured that is sorted by providing modems and airtime. However, power failure affects the operation; they are times we go without power for 3 days.* K06

Other ICT infrastructure related challenges highlighted included power fluctuations/power blackouts, frequent break down of systems and slow connections. These findings agree with Nulens (2000) emphasis on the importance of electricity to ICT implementation and adoption of technology and observed that, low quality of electricity networks in Africa causes power fluctuation that affect ICT facilities. Availability and constant supply of electricity is crucial for technology adoption. In addition, the county was using old machines that do not serve the purpose well. Where computers were available, they were not enough and hence staff were using official phones to receive and send emails. These findings agree with Tapscott (1995) observation that failure of ICT projects is primarily caused by a lack of sufficient computers and networks.

In regard to ICT policy available, the key informants indicated that the government policies states that all the county government should adopt E-government. In addition, the county has its ICT policy in line with what the government. A policy in place from National treasury regulates the usage of ICT. IFMIS system is in place but a lot of challenges. The use of the system causes a lot of delays, that is, in terms of payments and e-procurement system, but staff are still learning the process.

Testing Hypotheses

The study sought to establish the influence of ICT infrastructure on adoption of E-government in the county government of Kajiado. The hypothesis was as follows;

H1$_1$ ICT infrastructure has no significant influence on the adoption of E-government in the county government of Kajiado.

The hypothesis was tested by use of correlation analysis and regression analysis. Using 95 per cent confidence interval, the significance level was 0.05. Therefore, the alternative hypothesis was accepted when the p-value was less than the significance level (0.05).

Correlation Analysis for ICT Infrastructure and adoption of E-government

The study sought to determine the existence of an association between ICT Infrastructure and adoption of E-government in the County government of Kajiado. A Pearson correlation analysis was used. The results were as presented in Table 6.

Table 6: Correlation Coefficients for ICT Infrastructure and Adoption of E-government

		Adoption of E-government for service delivery	County ICT Infrastructure
Adoption of E-government for service delivery	Pearson Correlation	1	.821[**]
	Sig. (2-tailed)		.000
	N	282	282
County ICT Infrastructure	Pearson Correlation	.821[**]	1
	Sig. (2-tailed)	.000	
	N	282	282

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

Table 6 shows that there was a strong positive association between ICT Infrastructure and adoption of E-government in the County government of Kajiado (r=0.821). The relationship was significant because the p-value (0.000) was less than the alpha value (0.05, at 95% confidence interval). In addition, the association between ICT Infrastructure and adoption of E-government was positive. The findings show that there exists a perfect positive and significant relationship between ICT Infrastructure and adoption of E-government in the County government of Kajiado. Therefore, we can accept the alternative hypothesis indicating that "ICT infrastructure has a significant influence on the adoption of E-government in the county government of Kajiado". These findings agree with Graafland-Essers and Ettedgui (2003) findings that ICT infrastructure is considered to be pivotal in E-government implementation and adoption.

Regression Analysis for ICT Infrastructure and Adoption of E-government

The study sought to establish the variation in the adoption of E-government that can be explained by ICT Infrastructure. The results were as presented in Table 7.

Table 7: Model Summary for ICT Infrastructure and Adoption of E-government

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.821[a]	.675	.674	.403

Table 7 shows that the r-squared for the relationship between ICT infrastructure and adoption of E-government was 0.674, implying that the ICT infrastructure can explain 67.5% of the adoption of E-government in the County Government of Kajiado. This implies that ICT infrastructure considerably affects adoption of E-government in the County Government of Kajiado. These findings concur with Og'ang'a (2012) argument that ICT infrastructure affects adoption of e-government among local authorities in Kisumu County.

Analysis of variance was used to determine whether the model the model was a good fit for the data in determining the influence of ICT Infrastructure on the adoption of E-government. The results were as presented in Table 8.

Table 8: Analysis of Variance for ICT Infrastructure and Adoption of E-government

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	94.693	1	94.693	580.825	.000[b]
	Residual	45.649	280	.163		
	Total	140.341	281			

Table 8 shows that the p-value (0.000) was less than the significance level (0.05) and the F-calculated (580.825) was greater than the F-critical (3.8415). This implies that the regression model can be used for predicting the influence of ICT infrastructure on the adoption of E-government in service delivery in Kajiado County Government.

Table 9 shows the regression coefficients for the influence of ICT Infrastructure on the adoption of E-government in the County government of Kajiado.

Table 9: Coefficients for ICT Infrastructure and Adoption of E-government

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.069	.151		.454	.650
	County ICT Infrastructure	.987	.041	.821	24.100	.000

Table 9 indicated that County ICT infrastructure has a significant influence on the adoption of E-government in service delivery as shown by regression coefficient (0.987) and a p-value (0.000). The findings indicate that an improvement in ICT infrastructure leads to an improvement in the adoption of E-government in the county government of Kajiado.

Conclusions and Recommendations

The study concludes that ICT infrastructure has a significant influence on the adoption of E-government in the County Government of Kajiado. The study found that information technology standards were crucial for E-government adoption. The study recommends that the government of Kenya should develop ICT policy specifically for County governments so as to ensure that challenges such as slow network, lack of infrastructure and power interruptions are addressed. This will help in ensuring that there is efficiency and effectiveness in service delivery in various ministries in the County government. The study also found that although IFMIS system had been adopted in County governments, it was facing numerous challenges. The study recommends that the National government should develop a policy aimed at addressing IFMIS relate challenges so as to ensure efficiency and effectiveness in the supply of products and services in the County governments.

The study found that inadequate ICT infrastructure hampered provision of efficient and affordable ICT services in the County government. This study therefore recommends that the County government of Kajiado should make sure that there are enough computers for use in different ministries. In addition, the County should start using a more reliable network and internet services. Network and internet service providers should be selected on the basis of their infrastructure and ability to provide reliable services.

Suggestions for Further Research

The study was delimited to Kajiado County, which is one of the counties in Kenya. All county governments in Kenya are expected to use E-government. Different counties in Kenya have different experiences in the adoption of E-government due to differences in resources, community cultures, and literacy levels among other factors. Therefore, similar studies should be conducted in other county governments of Kenya on the influence of ICT Infrastructure on the adoption of E-government.

The study was limited to ICT infrastructure that explains 67.5% of the adoption of E-government. Therefore, further studies should be conducted on other factors influencing adoption of E-government in County governments of Kenya. The government of Kenya has developed various policies regarding the adoption of E-government. These policies include ICT policy. Therefore, further studies should be conducted on the influence of government policies on the adoption of adoption of E-government in County governments of Kenya. The study was also carried out in one County. More counties can be included in a study for bench marking and comparison.

References

Abdullah, A., Rogerson, S., Fairweather, N. B., & Prior, M. (2006). The motivations for change towards E-government adoption: Case studies from Saudi Arabia. In E-government Workshop (Vol. 6, No. 1, pp. 1-21).

Aiman-Smith, H & Green, G. (2002). The use of interorganisational ICT in United States construction projects. *Automation in Construction, 19*(1), 73-83.

Al-Sebie, M. & Irani, Z. (2010). Technical and organisational challenges facing transactional E-government systems: an empirical study. *Electronic Government, an International Journal,* 2(3), 247–276.

Altameem, T., Zairi, M., & Alshawi, S. (2006). Critical success factors of e-government: A proposed model for e-government implementation. Innovations in Information Technology, 1, 1-5.

Apostolou, D., Mentzas, G., Stojanovic, L., Thoenssen, B., & Pariente Lobo, T. (2011). A collaborative decision framework for managing changes in e-Government services. *Government Information Quarterly, 28*, 101-116.

Bhatnagar, S. (2004). E-government: From vision to implementation-A practical guide with case studies (Vol. 21, No. 1). Sage.

Bwalya, K. J. (2009). Factors affecting adoption of E-government in Zambia. *The Electronic Journal of Information Systems in Developing Countries*, *38*.

Cochran, W.G. (2007). *Sampling Techniques*. 3rd Ed. New Delhi: Wiley India Pvt. Limited

Creswell, J. W. (2013). *Research design: Qualitative, quantitative, and mixed methods approaches*. Sage publications.

Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *psychometrika*, *16*(3), 297-334.

Dahiya, K. & Mathew, S.K. (2014). Impact of ICT Infrastructure Capability on E-Governance Performance: Proposing an Analytical Framework. *Emerging ICT for Bridging the Future, 112*, 603-610.

Damodaran, L., Nicholls, J., Henney, A., Land, F. & Farbey, B. (2005) The Contribution of Sociotechnical Systems Thinking to the Effective Adoption of e-Government and the Enhancement of Democracy. Electronic Journal of e-Government 3, 1-12.

Davison, R., Vogel, D., Harris, R., & Jones, N. (2000). Technology leapfrogging in developing countries–an inevitable luxury?. *The Electronic Journal of Information Systems in Developing Countries*, *1*(1), 1-10.

Duncan, N.B. (1995). The Invisible Weapon: A Study of Information Technology Infrastructure as a Strategic Resource. *Dissertation, Texas A&M University.*

Earl, M. J. (1989). *Management strategies for information technology*. Prentice-Hall, Inc..

Fichman, R. G. (1992, December). Information technology diffusion: a review of empirical research. In *ICIS* (pp. 195-206).

Fincham, J.E. (2010). Response Rates and Responsiveness for Surveys, Standards, and the Journal. *Journal of Academic Research 72*(2), 23-38.

Freeman, C. (2001). A hard landing for the 'New Economy'? Information technology and the United States national system of innovation. *Structural Change and economic dynamics*, *12*(2), 115-139.

Gallivan, M. J. (2000). Examining Workgroup Influence on Technology Usage: A Community of Practice Perspective. *2000 ACM SIGCPR conference on Computer personnel research,* Chicago, Illinois, United States, ACM Press: 54-66.

Graafland-Essers, I., & Ettedgui, E. (2003). *Benchmarking E-government in Europe and the US* (No. 1733). Rand Corporation.

Hall, B. H., & Khan, B. (2003). *Adoption of new technology* (No. w9730). National bureau of economic research.

Heeks, R. (2001). *Understanding e-governance for development*. Manchester: Institute for Development Policy and Management.

Heeks, R. (2003). Most E-government-for-development projects fail: how can risks be reduced? (Vol. 14). Manchester: Institute for Development Policy and Management, University of Manchester.

Hitt, L.M. & Brynjolfsson, E. (1996). Productivity, Business Profitability, and Consumer Surplus: Three Different Measures of Information Technology Value. *MIS Quarterly 20*(2), 121-142.

Hossan, C. (2015). Applicability of Lewin's Change Management Theory in Australian Local Government. *International Journal of business and Management*, *10*(6), 53.

Huang, Z. (2010). A comprehensive analysis of U.S. counties' e-Government portals: development status and functionalities. *European Journal of Information Systems, 16*, 49-164.

Johnson, R. B., & Onwuegbuzie, A. J. (2004). Mixed methods research: A research paradigm whose time has come. *Educational researcher*, *33*(7), 14-26.

Kayworth, T. & Sambamurthy, V. (1997). The Impact of Corporate Information Technology Infrastructure Standards on Enterprise and Business Unit It Use. *Proceeding of the 18th international conference on information systems*, pp. 462-463.

Kifle, H., & Low Kim Cheng, P. (2009). e-Government Implementation and Leadership – the Brunei Case Study. *Electronic Journal of e-Government, 7*(3), 271 – 282

Kyobe, M. (2011). Investigating the key factors influencing ICT adoption in South Africa. *Journal of Systems and Information Technology, 13*(30, 255-267.

Laudon, D.P. & Laudon, J.P. (2001). *Management Information Systems: Organisation and Technology in the Network Enterprises*, 4th ed. New York: Prentice Hall International in. U.S

Layne, K., & Lee, J. (2001). Developing fully functional E-government: A four stage model. *Government information quarterly*, *18*(2), 122-136.

Liikanen, E. (2003). E-government and the European Union. *Rivista online UPGrade*, *4*(2), 21-28.

McKay, D. T., & Brockway, D. W. (1989). Building IT infrastructure for the 1990s. *Stage by stage*, *9*(3), 1-11.

Moon, M. J. (2002). The evolution of e-government among municipalities: rhetoric or reality?. *Public administration review*, *62*(4), 424-433.

Mose, J. M., Njihia, J. M., & Magutu, P. O. (2013). The critical success factors and challenges in e-procurement adoption among large scale manufacturing firms in Nairobi, Kenya. *European Scientific Journal, ESJ*, *9*(13).

Muraya, B.M. (2015). *Factors affecting successful adoption of e-government in Kenya's Public Sector.* Retrieved from http://erepo.usiu.ac.ke/bitstream/handle/11732/1512/

Ndou, V. (2004). E-government for developing countries: opportunities and challenges. *The Electronic Journal on Information Systems in Developing Countries*, *18*(1), 1-24.

Neufeld, D, Dong, L & Higgins, C. 2007, 'Charismatic leadership and user acceptance of information technology', *European Journal of Information Systems, 16*(4), 494-510

Nograšek, J. (2011). Change management as a critical success factor in E-government implementation. *Business Systems Research*, *2*(2), 13-24.

Nulty, D.D. (2011). The adequacy of response rates to online and paper surveys: what can be done? *Assessment & Evaluation in Higher Education, 33*(3), 301–314.

Nunnally, J. C. (1978). *Psychometric theory* (2nd ed.). New York, NY: McGraw-Hill.

Nurdin, N., Stockdale, R., & Scheepers, H. (2010). Examining the role of the culture of local government on adoption and use of E-government services. In *E-government, e-services and global processes* (pp. 79-93). Springer Berlin Heidelberg.

Ong'ang'a, A. (2010). *ICT infrastructure and e-government adoption among local authorities in Kisumu County, Kenya*. Retrieved from http://erepository.uonbi.ac.ke/bitstream/handle/11295/13357/index: TRI 2.0. *Journal of service research*, *18*(1), 59-74.

Raguseo, E., & Ferro, E. (2011). E-government and Organizational Changes: Towards an Extended Governance Model. In M. Janssen, H. J. Scholl, M.Wimmer, & Y. Tan, *Electronic Government - Lecture Notes in Computer Science 6846* (p. 418- 430). Berlin: Springer

Reffat, R. (2003) Developing A Successful E-Government. School of Architecture, Design Science and Planning. *University Of Sydney*, Australia.

Ronaghan, S. A. (2002). Benchmarking E-government: a global perspective. *Assessing the progress of the UN member states. United Nations Division for Public Economics and Public Administration & American Society for Public Administration*.

Tapscott, D., (1995). The digital Economy: Promise and peril in the Age of the Networked Intelligence. London: McGraw-Hill.

Venkatesh, V., & Zhang, X. (2010). Unified theory of acceptance and use of technology: US vs. China. *Journal of global information technology management*, *13*(1), 5-27.

Venkatesh, V., Morris, M.G., Davis, F.D., & Davis, G.B. (2003). User Acceptance of Information Technology: Toward a Unified View. *MIS Quarterly, 27*, 425-478.

Venkatesh, V., Thong, Y.L.; & Xu, X. (2012). Consumer Acceptance and Use of Information Technology: Extending the Unified Theory of Acceptance and Use of Technology. *MIS Quarterly*, 36(1), 157-178.

Wakid, S. & Radack, S. (1997). Measurement-Based Standards for future Information Technology Systems. *Standard View, 5*(1), 36-40.

West, D. M. (2004). E-government and the transformation of service delivery and citizen attitudes. Public administration review, 64(1), 15-27.

Young-Jin, S., & Seang-Tae, K. (2007). E-government Concepts, Measures, and Best Practices. In *Global E-government: Theory, Applications and Benchmarking* (pp. 340-369). IGI Global.

Zulu, S. F. (1994). Africa's survival plan for meeting the challenges of Information technology in the 1990s and beyond. *Libri*, *44*(1), 77-94.