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## CLOUD COMPUTING AND THE PERFORMANCE OF THE COUNTY GOVERNMENT OF NYANDARUA, KENYA

Wangui Aurelia Wanjiru<sup>a</sup>, Dr. Muchelule Yusuf<sup>b</sup>

<sup>a</sup> Masters Degree, ICT Management at Jomo Kenyatta University of Agriculture and Technology

<sup>b</sup> Lecturers, Jomo Kenyatta University of Agriculture and Technology

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### ABSTRACT

The general objective of the study was to investigate effect of cloud computing on the performance of the county government of Nyandarua, Kenya. The study's specific objectives were to establish the influence of cloud technical skills on performance of the county government of Nyandarua, to assess the influence of cloud infrastructure on performance of the county government of Nyandarua. The study was informed by Innovation Diffusion Theory, Resource-Based View Theory, Institutional Theory, and System Theory. A correlational research design was employed in this study. The target population was 119 employees in ICT and public administration department from 5 sub counties in Nyandarua County Government namely; Ndaragwa, Ol Jororok, Ol Kalou, Kipipiri and Kinangop. Stratified and simple random sampling was used to select a sample size of 91 respondents. The study found that cloud computing significantly influenced the performance of the county government of Nyandarua. Specifically, cloud technical skills; cloud infrastructure; were found to have significant association with performance of the county government of Nyandarua. Further, all the independent variables (cloud technical skills, cloud infrastructure) were found to significantly influence performance of the county government of Nyandarua. The independent variables explained 80.3% of change in performance of the county government of Nyandarua. The study recommended training of employees on cloud computing and fully adoption of cloud computing to ensure improvement of service delivery by the county government. The study also suggested further studies on other factors related to cloud computing to ascertain 100% performance. The findings will be useful to county governments, scholars, and practitioners..

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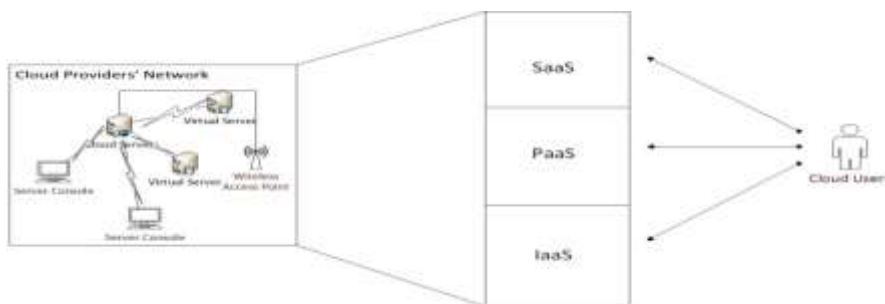
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## Background of the Study

Cloud Computing (CLOUD) is derived from grid computing and distributed computing which is on-demand access to resources via information communication technologies application, storage, and other IT services (Che, Duan, Zhang & Fan, 2019). In cloud computing, the stakeholder owns the hardware and soft resources while creating a network of other persons. Recently, the cloud has evolved into two broad perspectives: renting the framework in the cloud and renting any specific capacity in the cloud. The former necessitates the use of software and hardware, whilst the latter is limited to 'soft' commodities or services from cloud service and facility providers (Singh et al., 2018).

With the advancement of computing, in describing cloud computing principles, new words such as Platform as a Service (PaaS), Infrastructure as a

Service (IaaS) and Software as a Service (SaaS) have emerged (Anselmi et al., 2017). Cloud computing is essentially a broad variety of distributed and grid computing that differs in terms of services, architecture, deployment, and geographic dispersion and requires a team with high technical skills in cloud to effectively improve organization performance (Araujo et al., 2018). According to Singh and Jangwal (2016), infrastructure in a computer network setup can be defined as the hardware, including their sync, where the system software serves as the software platform. As a result, the concept of cloud-based services is established in a logical order from bottom to top: IaaS, PaaS, and SaaS. From the perspective of any cloud end-user, Figure 1.1 depicts the tiered structure based on which a cloud is perceived in the form of IaaS, SaaS, and PaaS.



**Figure 1.1: Cloud Service Hierarchy**

Figure 1.1 above describes cloud computing service model which shows that cloud users are explicit in the administration, structure, and technical information of cloud service providers' networking. From the perspective of the cloud user, the provider's service is delivered in the form of SaaS, IaaS, or PaaS, with the cloud user having no reason to be involved with the internal structure of the cloud service provider's network. Any type of interference, perceived by cloud users as service inadequacy or quality deterioration - its impact and techniques to dealing with it are critical aspects of cloud architecture. Security issues could play a crucial role as a guiding factor for any of the previously mentioned disturbances.

Cloud computing is being used by national and local governments around the world as a new manner of reasoning and execution for government IT departments, resulting in more competent public services with fewer public resources (Abd Al Ghaffar, 2020). International evidence from government agencies that use cloud computing services backs up the claimed benefits of increased efficiency and cost savings, as well as mobile solutions, real-time analytics, and sensor-based data collecting (Backe and

Lindén, 2015). Similarly, Makhoul (2020) indicated there is global evidence from public sectors on the use of cloud computing services that has supported the expected benefits of increased efficiency and cost reductions, as well as mobile device solutions, sensor-based data collection, and real-time analytics. For example, some countries in Europe and Asia have benefited from cloud computing, and its use is increasing in improving the performance of service delivery to citizens. According to Che et al., (2019) cloud computing has helped some countries in Europe and Asia, and its use is increasing.

Numerous researches have verified that cloud computing enables businesses to make better use of their software and hardware investments while improving their performance (Chang, et al., 2019; Kaplançalı and Akyol, 2021). This is accomplished through virtualizing systems, which is a natural progression of data centers, hence improving the performance of businesses and institutions (Boss et al., 2017). Cloud computing also lowers software costs, resulting in improved organizational efficiency. Businesses no longer need to purchase separate software programs for each computer (Miller, 2019). Instead, a program is merely a cloud that is only

accessible by the employees that utilize it. In addition, the cost of upgrading and installing the software on each system is less. Another advantage of cloud computing is that businesses don't have to pay for system upgrades to receive the latest versions of their apps (Miller, 2019). Since all of the programs are hosted in the cloud, the provider automatically updates them. Businesses can also save a substantial amount of money on servicing (Miller, 2019), which could lead to improved long-term performance. As a result, as businesses embark on digital transformations to improve performance, cloud computing is seen as the vehicle for the future of IT. However, there is a paucity of research linking cloud computing to county government performance.

Globally, Cloud computing plays a vital role in correcting inefficiencies and contributes dynamically to a company's competitiveness and success (Luftman & Zadeh, 2016). For instance, in Turkey, Kaplanal and Akyol (2021) showed cloud computing improves firm performance by creating new channels of creating, developing, operating, and maintaining information systems. In Romania, Neicu et al., (2021) found that cloud computing improves the performance of small and medium enterprises by structuring data, accessing information, and high-quality data in real-time. At the University of California at Berkeley, Armbrust et al., (2014) viewed cloud computing as a useful resources service that improves firm performance in deriving relative applications for hundreds of thousands to extend as a service as an alternative than to run on their personal computer systems.

In today's increasingly competitive business environment, various enterprises in Africa's development countries are embracing cloud computing. Nigerian, Kenyan, and South African businesses have enhanced their use of cloud-based services to help them attain a continuous and reliable flow of information (Lal & Bharadwaj, 2020). In Ghana, Adjei (2021) stated that cloud computing was useful during the Covid-19 pandemic, as it boosted working remotely methods and so increased potential growth.

A study by Laverty (2011) into the cloud readiness of countries in Sub-Saharan Africa revealed that at least one type of cloud solution has the ability to expand in the future. According to a report published by the United Nations Conference on Trade and Development (UNCTAD) in 2013, certain nations in Sub-Saharan Africa meet the minimum standards for basic cloud services. Sub-Saharan Africa, Ghana, South Africa, Nigeria, and Kenya can be considered early users of cloud services.

In Kenya, Chemjor (2013) found that cloud computing improves the performance of firms through cloud computing infrastructure, managing business operations efficiently, raising productivity levels, completing administrative tasks more quickly, increasing the quality of daily operations, and promoting competitive advantage when perceived useful to the organization. According to Oredo et al., (2019), cloud computing efficiency in increasing firm profitability has been unsuccessful in most Kenyan enterprises due to a lack of cloud computing technology and cloud computing policy conformance with statutory regulation.

### Statement of the Problem

County governments' performance is deemed the vehicle for the execution of the country's economic growth (Waikenda, 2019). However, despite the progress in devolution, a few challenges in county projects are emerging and slowing the transition process. There has been a decline in county performance affecting even their growth rate from 5.8% in 2017 to 4.6% in 2019 (Auditor General, 2020). A study conducted by Infortrak (2020) showed that 47% of the citizen's felt counties were less performing than expected. Further, the report showed that counties have been facing serious challenges in e-services, especially during the Covid-19 pandemic where most services were offered through electronic-service delivery solely depending on cloud computing. In addition, due to lack of efficient clouding-service, county governments continue to experience major challenges in e-service delivery and overall performance. County government of Nyandarua has spent millions in implementation of cloud computing, yet there is still challenge in performance of the county.

Government plans for economic growth and development are seen as requiring the use of information and communication technology (ICT). As a result, most governments across the world are embracing cutting-edge Information Technologies (IT) to better their business operations, such as Cloud computing (Bildosola et al., 2015). Cloud computing has been identified as a new advance technology with both the capability and ability to provide users with a variety of crucial strategies and operational advantages. Furthermore, cloud computing usage is not growing at the same rate as expected (Hentschel, Leyh and Petznick, 2018).

However, Kenya's ICT policy environment remains fragmented and inhospitable to the creation of inexpensive and high-quality high-speed internet cloud which is a necessary but insufficient prerequisite for cloud services to be optimized (Access Kenya, 2017). Cloud computing use in Kenya is still in its infancy. According to a paper on cloud computing in Kenya,

cloud computing is still in its infancy in Kenya, with the first adopters arriving in 2010 and demonstrating no benefits or improved performance (Omwansa, Waema, & Omwenga, 2014). Omwansa et al. (2014) survey affirm this, noting that 90 percent of respondents believe Kenya's cloud services market is not ready.

Furthermore, despite Nyandarua County's efforts to integrate services such as revenue automation, mailing, website management, e-parliament management, financial management and payroll management through cloud computing, there are still hurdles such as a lack of essential skills, inadequate or non-enforced ICT rules, and an inability to comprehend the utility of cloud computing (Report on Nyandarua County, 2017). Hence this study sought to address the research gaps discussed by analyzing the effect of cloud computing on the performance of the County Government of Nyandarua.

### Specific objectives

- (i) To establish the influence of cloud technical skills on the performance of the County Government of Nyandarua.
- (ii) To assess the influence of cloud infrastructure on the performance of the County Government of Nyandarua.

## LITERATURE REVIEW

### Theoretical Review

#### Innovation Diffusion Theory (IDT)

Everitt Rogers (2003) created the Diffusion of Innovation (DOI) model to aid in the acceptance and diffusion of new technical ideas by removing confusion about the innovation through communication over time. Diffusion is the approach with the aid of which development is embraced through the use of human beings from a special group. Diffusion of innovation research has been broadly related in a variety of fields, including education, advertising, communication, sociology, agriculture, and fact innovation (Rogers, 1995; Khayer, Bao, and Nguyen, 2020).

According to Rogers (1995), innovation is a perceptual practice or aspect that is thought of as a new way of portraying a character or every unique element of adoption. Rogers (2010) also points out that diffusion is not a single, regular speculation, but rather a collection of hypothetical points of view that are associated with the overall concept of diffusion, i.e., a meta-speculation. Diffusion is the process through which an innovation is disseminated over time among individuals in a social context through the use of certain channels (Rogers, 2010).

Rogers (2013) contends in DOI that cloud computing complexity reflects an institution's staff's ability to understand, implement, and gain value from innovation while mitigating risk (Rogers, 2003). Oliveira et al. (2014) used the theory of diffusion of innovation and the TOE model and confirmed that technology readiness and staff technical skills have a favorable effect on acceptance, whereas complexity has a detrimental impact, on this.

According to Rogers, four key variables impact the spread of a new concept: the innovation itself, channels of communication, social and time a structure (Choi, Kim, & Lee, 2010). This process is strongly reliant on human capital, and the importance of this factor is emphasized in this study by the variables used for the model.

The DOI theory was chosen in the model study since it was an organizationally oriented theory that tried to determine what technical skills of cloud computing are effective in cloud computing adoption that improves firm performance. Thus, the theory is relevant in the study in determining the effect of the influence of cloud technical skills on the performance of the County Government of Nyandarua, Kenya.

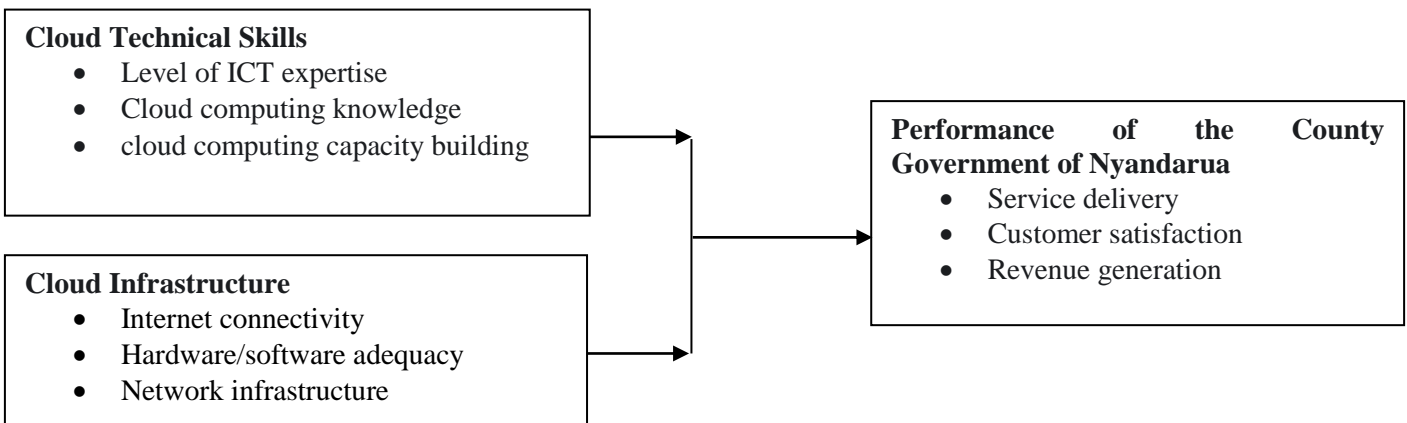
### Resource-Based View Theory (RBV)

The RBV theory of the firm, proposed by Wernerfelt (1984), asserts that a firm's resources encompass all assets, competencies, organizational financials, firm attributes, knowledge (innovation capabilities), information, and so on and that it allows it to devise and integrate strategy to enhance its effectiveness and efficiency in terms of performance. The value of the RBV theory as a framework for explaining and predicting competitiveness and performance results has expanded rapidly in the last decade. (Barney *et al.*, 2011).

In RBV, Valuable, scarce, inimitable, and non-substitutable resources enable the company to take better-planned activities. If these activities are made to exploit resources, competitiveness is created, which improves performance (Ketchen Jr. *et al.*, 2007).

As a result, the resource (infrastructure in cloud computing) is virtually tradable, making it impossible to think that such resources do not always give higher advantages (Kraaijenbrink, *et al.*, 2010). Wade and Hulland (2004) argue that the firm's cloud computing resources can be explained by a few characteristics, including IT infrastructure competence. These IS resources have an inherent disadvantage in that they are easily imitated by competitors, making them fragile in sustaining competitiveness (Leonard-Barton 1992).

The deployment of IT resources, by definition, drives the development of IT infrastructure. As a result of new deployments, emergent applied embedded IT infrastructure capacity is typically unique to certain enterprises, making it inimitable (Ravichandran and Conceptual Framework



### Cloud Technical Skills

IT human resources gives knowledge and abilities to execute cloud computing related IT applications (Wang *et al.*, 2010). Ghobakhloo, Arias-Aranda and Benitez-Amado (2011) have pointed out a group of investigations that highlight the help of IT skills, consultants and vendors, and their individual qualities is key in the adoption of IT process. In this case, their expert capacities can have a positive effect on the process of adoption of IT while majority of firms experience the ill effects of an absence of both IT specialists and the hiring of external advisors (Li, Tan, Teo and Tan, 2006; Ghobakhloo, Zulkifli and Aziz, 2010).

If companies have the necessary infrastructure and technological expertise, cloud computing services can become a performance driver. As a result, technologically competent firms are more prepared to utilize cloud computing. Cloud computing allows businesses to increase their potential or add capabilities on the fly without having to invest in new infrastructure, hire new staff, or purchase new software. In the end, it may be able to save huge sums of money for businesses. As a result, there is little interest in the advantages of cloud computing among small enterprises, as well as a loss of expertise and technological competence (Shahamiri, 2011).

### Cloud Infrastructure

Technological infrastructure is the mounted network technologies and organizational frameworks that provide a foundation on which cloud computing abilities can be developed. These decide how far the available computational resources can be stretched (Wang *et al.*, 2010). The technological infrastructure availability and the capability of personnel have been

Lertwongsatien, 2005). Thus, this study was relevant in discussing the influence of cloud infrastructure on the performance of the County Government of Nyandarua, Kenya.

connected to organizations' ability to absorb new technology (Pan & Jang, 2008; Oliveira & Martin, 2010).

Cloud computing offers a dependable infrastructure, allowing for a little downtime and quick responses to customer needs (Chen *et al.*, 2010). Cloud computing is a breakthrough that allows businesses to run more efficiently without having to worry about finding and managing the underlying software and hardware. Cloud services are a novel method of increasing the efficiency of company activities without having to purchase and sustain the underlying software and infrastructure. Firms that use cloud services save money on system setup, operations, management, and maintenance, as well as employee training.

### Performance

For decades, performance of county governments has been drawing bigger attention from specialists because of poor performance arising from lack of adherence to procedures and processes. The purchasing operation has not been given the acknowledgment it deserves in emerging countries, in most public organizations, irrespective of the energy by the associates like the international World Bank. This could be planned or due to a complete lack of understanding of the value that a supply chain operation can provide to a company (Vernimmen *et al.*, 2008). While other activities, such as human resources (HR) and finance, can be reviewed, the procurement function cannot. The failure to identify the effectiveness of the supply chain process at the County Government has resulted in a series of unequal and prejudiced decisions that have cost every organization money (Musa 2011).

According to Axsater (2013), county government performance begins with procurement efficiency in procurement activities changing from reactive to

proactive in order to achieve expected performance heights in an organization. According to Cheng and Wu (2015), procurement success is well-thought-out to be the result of two fundamentals: purchasing efficiency and effectiveness. Performance is the fundamental motivator to improve quality facilities for a company to shift its focus and become more competitive (Datta *et al.*, 2007).

### Empirical Review

According to an AMD survey (2014) conducted in the United States and Europe to evaluate employees' skills, 14 percent and 21 percent of employees in the United States and Europe, respectively, Companies from over 500 employees had weaker comprehension of cloud services than smaller companies (AMD, 2014). In the United States, Eells and Jaguszewski (2015) found that ICT skills had been lacking since Minnesota libraries began before the library invested extensively in training for both professional and non-professional personnel, greatly reducing transition impulse. Sudhier and Seena (2018) observed that library professionals in Kerala university had low-level capabilities in the use of cloud technology, with the majority of workers citing a shortage of training and top-management commitment as the key impediment to increasing interest in cloud computing.

A study on staff skills and cloud computing deployment was undertaken by Sari and Kurniawan (2015). Staff skills are necessary traits for cloud computing, according to their research. Moreover, the key crucial application of cloud computing is dependent on their talents, if staff skills are to be effective in using cloud computing. Many scholars agree that employee knowledge is important in influencing the adoption of innovative practices inside businesses, and that IT skill are important in determining organizational outcomes (Al Shaar, *et al.*, 2015). IT abilities in IT workers provide the expertise and knowledge required to implement cloud computing (Wang *et al.*, 2010).

Oliveira & Martins (2010) found that the capability and capacity of companies in adopting new technology is linked to their technical infrastructure in a research on the impact of ICT infrastructure on cloud computing adoption among manufacturing enterprises in Finland (Oliveira & Martins, 2010; Pan & Jang, 2008). Cloud computing ensures that computing resources are available immediately (Mahmood, 2011). Cloud computing offers a dependable infrastructure, allowing for a little downtime and quick responses to customer needs (Chen *et al.*, 2010).

According to Chang *et al.* (2010), integrating cloud services with current legacy structures is difficult. When customers purchase cloud computing, they are purchasing functions that are designed to be of high quality for customers (Mahmood, 2011).

Wang *et al.* (2010) conducted research on IT adoption in the banking sector. The research revealed that a company's current trusted preparedness, which includes its technological infrastructure, is determined by its adoption of recent IT advances. With the right hardware, software, or IT infrastructure, cloud computing was a success.

### RESEARCH METHODOLOGY

This study employed a correlational research design. The study target population was 119 employees drawn from across the main department namely ICT and public administration in 5 sub counties in Nyandarua County Government namely; Ndaragwa, Ol Jororok, Ol Kalou, Kipipiri and Kinangop. The study adopted a random sampling technique in selecting the employees that participated in the study. The sample size of the study was calculated using the formula below as recommended by Fisher *et al.* (2003). The desired sample size thus comprises 91 respondents. In this study closed-ended questionnaires were used to collect data. After the researcher has collected the questionnaires, they were coded and entered into the SPSS computer software. The descriptive statistical techniques of mean, frequency and standard deviation were used to assess the quantitative data acquired. The results were displayed using frequency distribution tables. Inferential statistical analysis was also used. The collected data was analyzed using multiple regression and correlation analysis, and the significance of each independent variable was tested at a confidence level of 95%.

### RESEARCH FINDINGS

#### Descriptive Statistics

#### Performance of the County Government of Nyandarua

The main objective of the study was to investigate the effect of Cloud computing on the performance of County Government of Nyandarua. The descriptive statistics from the study are shown in Table 4.2 below.



**Table 1. County Performance**

County Performance Indicators	Mean	Stdev
There is an improvement of service delivery by the county government.	3.62	1.038
Revenue collection and accounting functions is more efficient in the county government.	3.66	1.102
There is a high level of customer/citizen satisfaction with county government services.	3.84	1.127
Trading services and licensing has significantly improved	3.71	1.083
Delivery of health services has improved	4.04	1.036
There is improved county governance in terms of accountability and accessibility of services.	3.67	1.101
<b>Composite mean for County Performance</b>	<b>3.76</b>	<b>1.081</b>

Results from Table 1 above indicate that, cloud computing has helped the county government of Nyandarua improve on the service delivery as supported by the mean of 3.62 (stdev = 1.038). The study also found that there was efficiency in revenue allocation and accounting functions as indicated by a mean of 3.66 (stdev = 1.102). In addition to that, there was evidence of high level of customer satisfaction with the county government services as supported by the mean of 3.84 (stdev = 1.127). According to Chen et al (2010) cloud computing offers a dependable infrastructure allowing for a little downtime and quick responses to customer needs.

Cloud computing has helped improve county governance in terms accessibility of government services and accountability as indicated by a mean of 3.67 (stdev = 1.101). The study also found significant improvement on trading and licensing services as shown by the mean of 3.71 (stdev = 1.083). Finally, the study found that cloud computing has helped improve the health services delivery by the county government of Nyandarua as indicated by the mean of 4.04 (stdev = 1.036).

With a composite mean of 3.76 (stdev = 1.081), the study provided significant statistical evidence to

suggest cloud computing to some extent significantly influences performance of the county government of Nyandarua. Axsater (2013) opine that county government performance begins with procurement efficiency in procurement activities changing from reactive to proactive in order to achieve expected performance heights in an organization. Cheng and Wu (2015) further explains that procurement success is well-thought-out to be the result of purchasing efficiency and effectiveness. Datta *et al.* (2007) further suggests that performance is the fundamental motivator to improve quality facilities for a company to shift its focus and become more competitive.

### Cloud technical skills and performance of the County Government of Nyandarua

The first specific objective of the study was to establish the influence of cloud technical skills on the performance of the County Government of Nyandarua. The respondents were requested to indicate their level of agreement on various statements relating to cloud technical skills on the performance of the County Government of Nyandarua. The results are as presented in Table 2.

**Table 2: Cloud Technical Skills**

Cloud technical skills Performance Indicators	Mean	Stdev
The county involves IT experts regularly in upgrading and updating cloud systems.	3.82	1.124
The county priorities hiring/employing employees with cloud computing technologies skills.	3.82	1.135
The county outsources cloud computing experts regularly rain employees in utilizing cloud computing for day-to-day operations.	3.98	1.042
Most employees have adequate knowledge in use of cloud computing in the county operations.	3.73	1.100
The county provides time and resources for training cloud computing for those directly involved in projects.	3.96	1.059
After new employees hiring, emphasis is laid on training in cloud computing.	3.67	1.176
<b>Composite mean for Cloud technical skills</b>	<b>3.82</b>	<b>1.106</b>

Table 2 above shows that IT experts are involved regularly by the county government of Nyandarua in upgrading and updating of the cloud systems as supported by the mean of 3.82 (stdv = 1.124). In addition to that, Cloud computing experts are outsourced by the county government of Nyandarua to ensure smooth operations of the day-to-day cloud computing utilization as shown by the mean of 3.98

(stdev = 1.042). The issue is common in many organizations as addressed by Cragg and Zinatelli (2009), the lack of employee capability has stifled IT development and advancement within companies; as a result, they should address this issue by either seeking external help or improving their own employees' potential to use modern technology (Nieto and Fernández, 2005).However, Ghobakhloo et al (2011)

explain that expert capacities can have a positive effect on the process of adoption of IT while majority of firms experience the ill effects of an absence of both IT specialists and the hiring of external advisors.

Employees with cloud computing technology skills are given priorities when the county is hiring. This is supported by a mean of 3.82 (stdev= 1.135). Thus, most employees have adequate knowledge in use of cloud computing in the county operations as shown in the study by the mean of 3.73 (stdev = 1.100). Sari and Kurniawan (2015) in their study of cloud computing deployment opine that staff skills are necessary traits for cloud computing. The key crucial application of cloud computing is dependent on staff talents, if staff skills are to be effective in using cloud computing. Further, Wang et al (2010) affirms that IT abilities in IT workers provide the expertise and knowledge required to implement cloud computing.

The study also found that the county provides the time and resources for training on cloud computing for team members that are directly involved in cloud computing projects as shown by the mean of 3.96 (stdev = 1.059). Furthermore, a lot of emphasis is given on cloud computing training for new employees who are hired as indicated by the mean of 3.67 (stdev = 1.176). The findings are also in line with Sudhier and Seena (2018) who observed that library professionals in Kerala University lacked interest in cloud computing due to

**Table 3: Cloud Infrastructure**

Cloud infrastructure Performance Indicators	Mean	Stdev
The county has fast, reliable efficient internet connectivity for cloud computing usage.	3.91	1.080
The county has adequate hardware to ease utilization of cloud computing technologies.	3.96	1.059
There is enough software that facilitates usage of cloud computing technologies in the county.	3.87	1.075
County infrastructure is the responsibility of the cloud service provider.	3.88	1.047
The county has specific budget set aside for purchasing new computer devices.	3.51	1.045
I like the technology applied by the county government in adoption of cloud computing.	3.46	1.056
<b>Composite mean for Cloud infrastructure</b>	<b>3.77</b>	<b>1.060</b>

From Table 3 above the study found statistical evidence to suggest that the county has fast, reliable efficient internet connectivity for cloud computing usage as supported by a mean of 3.91 (stdev =1.080). In relation to hardware, the study provided statistical evidence as shown by the mean of 3.96 (stdev =1.059) that the county government of Nyandarua has adequate hardware for ease utilization of cloud computing technologies. Further, the mean of 3.87 (stdev =1.075) showed the adequacy of software that facilitate cloud computing technologies in the country. According to Wang et al (2010) technological infrastructure is the mounted network technologies and organizational frameworks that provide a foundation on which cloud computing abilities can be developed and they are the major deciders of the stretch for the available computational resources. Oliveira and Martin (2010) posit that the technological infrastructure availability and the capability of personnel have been connected to organizations' ability to absorb new technology.

low level capabilities in the use of cloud technology, shortage of trainings, and lack of top management commitment. Thus, lack of training and lack of top management commitment are the key impediment to increase interest in cloud computing.

In conclusion, the composite mean of 3.82 (stdev = 1.106) provides significant statistical evidence to suggest cloud technical skills in cloud computing to some extent influence performance of the county government of Nyandarua. States, Eells and Jaguszewski (2015) opine that lack of ICT skills and training for both professional and non-professional personnel greatly reduces the transition impulse. Further, Sudhier and Seena (2018) observes that the key impediment to cloud computing interest is on lack of capabilities, training and management commitment.

### Cloud Infrastructure and performance of the County Government of Nyandarua

The second specific objective of the study was to assess the influence of cloud infrastructure on the performance of the County Government of Nyandarua. The respondents were requested to indicate their level of agreement on various statements relating to cloud infrastructure on the performance of the County Government of Nyandarua. The results are as shown on Table 3.

County infrastructure was also found to be the responsibility of the cloud service provider as evident by the mean of 3.88 (stdev = 1.047). Chen et al (2010) opine that cloud services are a novel method of increasing the efficiency of company activities without having to purchase and sustain the underlying software and infrastructure. The organizations that use cloud services save money on system setup, operations, management, and maintenance, as well as employee training.

In addition to that, the study provided some slight significant evidence (mean = 3.51, stdev =1.045) to suggest that a specific budget has been set aside for by the county government of Nyandarua for the purchase of computer devices to be used for cloud computing technologies. However, there was not significant evidence to support whether the respondents liked the technology applied by the county government in adoption of cloud computing as shown by the mean of



3.46 (stdev = 1.056). Shahamiri (2011) observes that the huge investment in new infrastructure, purchase of new software, hiring of new staff provides a competitive advantage to businesses with technological infrastructure and expertise in adoption of cloud computing over small enterprises.

The composite mean of 3.77 (stdev = 1.060) provided significant statistical evidence to suggest that cloud infrastructure in cloud computing to some extent influences performance of County government of Nyandarua. Shahamiri (2011) suggests that if organizations have the necessary infrastructure and technological expertise, cloud computing services can become a performance driver. Firms that are technological competent are more prepared to utilize cloud computing and thus they are able to increase their potential or add capabilities on the fly without having to invest in new infrastructure, hire new staff, or purchase new software and as a result save huge sums of money for businesses.

**Inferential Statistics**

**Correlation Analysis**

Correlation analysis is important in a research undertaking. It is a measure of the existing relationship between the independent factors or variables and the dependent factor or variable and also between the independent factors. Correlation analysis provides a means of understanding the magnitude and direction of the existing relationship and provides a way of establishing whether there exists a linear relationship among the variables being examined. Generally, for scale measures, the Pearson Correlation coefficient is used to measure the relationships between the variables. Concerning the correlation coefficient, it varies between -1 and +1 with values close to -1 or +1 indicating a strong relationship while values close to 0 in either case are indicative of a weak relationship.

**Table 4: Correlation Coefficients**

		County Performance	Cloud Technical skills	Cloud infrastructure
County Performance	Pearson Correlation	1		
	Sig. (2-tailed)			
	N	82		
Cloud technical skills	Pearson Correlation	.866**	1	
	Sig. (2-tailed)	.002		
	N	82	82	
Cloud infrastructure	Pearson Correlation	.838**	.231	1
	Sig. (2-tailed)	.003	.071	
	N	82	82	82

Results from Table 4 above reveal that there is a strong significant association between cloud technical skills and performance of county government of Nyandarua. The Pearson correction coefficient of 0.866 shows the strong magnitude of the association as it nears +1. Further, the positive relationship is an indication of direct relationship between cloud computing skills and performance of county government thus, an increase in cloud technical skills will lead to an increase in performance of county government of Nyandarua. In addition, the p-value of 0.002 which is less than the threshold of 0.05 is an indication of a significant relationship between cloud technical skills and performance of county government of Nyandarua. Thus, cloud technical skills has a significant association with performance of county government of Nyandarua.

The study also found significant positive association between cloud infrastructure and performance of county government of Nyandarua. The Pearson correlation coefficient of (r) 0.838 nears the maximum threshold of +1 and thus, shows the strong magnitude between the independent variable (cloud infrastructure) and the dependent variable (performance of the county government of Nyandarua). The p-value of 0.003 is less than 0.05 (significance level) an indication of significant relationship between the two variables. Further, the positive association is a good indication of the presence of a direct relationship between cloud infrastructure and performance of the county government of Nyandarua. This means a unit increase of cloud infrastructure in cloud computing leads to an increase in performance of county government of Nyandarua.

In conclusion, all the independent variables indicated a strong positive significant association with the dependent variables. The associations also revealed a direct relationship meaning an increase in any of the independent variables by a unit leads to an increase on the performance of the county government of Nyandarua.

**Analysis of Variance**

ANOVA was used to determine if the model was good fit for the data. As depicted in Table 5 below, the F calculated was 91.039 which is higher than the F critical value 2.49. Besides, the P-value was 0.000 which is less than the significant level of 0.05. This implies that the model was a good fit for the data hence can be used to show the impact of independent variables (Cloud technical skills, Cloud infrastructure, Cloud policy, and Data Management) on the dependent variable (County Performance).

**Table 5: Analysis of Variance**

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	36.051	4	9.013	91.039	.000 <sup>b</sup>
Residual	7.623	77	0.099		
Total	43.674	81			

a. Dependent Variable: County Performance

b. Predictors: (Constant), Cloud technical skills, Cloud infrastructure,

**Regression Analysis****Table 6: Regression Coefficients**

Model	Unstandardized Coefficients		Standardized Coefficients		Sig.
	B	Std. Error	Beta	t	
(Constant)	0.531	0.095		5.589	0.000
Cloud technical skills	0.363	0.082	0.365	4.427	0.048
Cloud infrastructure	0.522	0.107	0.521	4.879	0.001

a. Dependent Variable: Performance of the County Government of Nyandarua

From Table 6 above, cloud technical skills ( $\beta = 0.363$ , p-value = 0.048); cloud infrastructure ( $\beta = 0.522$ , p-value = 0.001). The  $\beta_0$  or  $\alpha$  the constant is 0.531. All the  $\beta$  values are positive and p-values (0.000, 0.048, 0.001) are less than the significance value of 0.05. Thus, the equation can be show as below.

$$Y = 0.531 + 0.363X_1 + 0.522X_2$$

$$Performance = 0.531 + 0.363CTS + 0.522CI$$

**Model Summary**

The coefficient of determination ( $r$ ) was used to show how the variation of the dependent variable (County Performance) could be explained by the independent variables (Cloud technical skills, Cloud infrastructure, Cloud policy, & Data Management). The R squared was 0.803 and this implied that 80.3% of the dependent variable (County Performance) could be explained by independent variables (Cloud technical skills, Cloud infrastructure, Cloud policy, & Data Management).

**Table 7: Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.896 <sup>a</sup>	.803	.801	.14884

a. Predictors: (Constant), Cloud technical skills, Cloud infrastructure, Cloud policy, & Data Management

**Conclusions**

The first specific objective of the study was to establish the influence of cloud technical skills on the performance of the County Government of Nyandarua. Cloud technical skills has a significant and positive influence on the performance of county government of

Nyandarua. The variable also has direct relation with performance and thus, an increase in cloud technical skills will lead to an increase in performance. Outsourcing of IT experts and regular involvement of IT experts in upgrading and updating of the cloud systems by the county government to ensure smooth daily operations positively affect the performance of the county government of Nyandarua. Employees are trained to have adequate knowledge on cloud computing. County government gives priorities to employees with cloud computing skills.

The second objective of the study assess the influence of cloud infrastructure on the performance of the County Government of Nyandarua. The variable has a significant positive and string relationship with performance of the county government of Nyandarua. As for the descriptive statistics the study found some significant evidence to suggest the influence of cloud infrastructure on the performance of county government of Nyandarua. The county has fast, reliable efficient internet connectivity for cloud computing usage. There is adequate hardware for ease utilization of cloud computing technologies. Further there is adequacy of software that facilitate cloud computing technologies in the county.

**Recommendations**

The study found cloud computing significantly influences performance of the county government of Nyandarua County. Therefore, the study recommends the county government to continue embracing cloud computing to ensure improvement of service delivery in Nyandarua. A lot of emphasis should be given on training employees with adequate knowledge on cloud computing to ensure they are well equipped with the knowledge and skills need to ensure effective implementation of the cloud computing technology in the county government of Nyandarua.

In addition, the study found in cloud infrastructure that there is some slight agreement concerning the budget allocation for the purchase of new computer devices and thus, this study recommends a proper budget allocation for that. Further, the information regarding the purchase should be made known to the various stakeholders to ensure transparency and accountability. Still under cloud infrastructure, the study did not find significant evidence to whether the respondents liked the technology applied by the county government in adoption of cloud computing.

**Areas for Further Research**

This study focused on the influence of Cloud Computing on the performance of the County Government of Nyandarua. Having been limited to Nyandarua County government hence the study findings cannot be generalized to other counties, public and private institutions in Kenya. The study therefore

suggests further studies on the influence of cloud computing on the performance of other organizations in Kenya.

Further, the study found that the independent variables (Cloud Technical Skills, Cloud Infrastructure, Cloud

Policy and Data Management) could only explain 80.3% of the performance of the county government of Nyandarua. This study therefore suggests research on other factors relating to cloud computing that may influence performance.

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