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Cloud Computing and Performance of County Governments in Kenya; A Case of the County Government of Nyandarua

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Abstract

The general objective of the study was to investigate the effect of cloud computing on the performance of county governments in Kenya; a case of the county government of Nyandarua. The study?s specific objectives were to establish the influence of staff skills on performance of the County Government. The study was informed by Resource Based View Theory. The study adopted a correlational research design. The target population was 130 employees in ICT, communication, finance and administration department in the county government of Nyandarua. Simple random sampling was used to select a sample size of 97 respondents.

Index terms— cloud computing, performance, staff skills.

1 Introduction

he term cloud computing is a concept stemmed from distributed and grid computing. Cloud computing is explained as the derivative of distributed and grid computing by certain scholars (Che, Duan, Zhang & Fan, 2018). It entails the aspects and conditions where total computing could be conducted by use of another individual's network where proprietorship of hardware and soft resources are of outside stakeholders. Recently, the cloud has advanced into two wide outlooks-to rent the framework in cloud, or to rent any particular facility in the cloud. Where the former involves the hardware and software operation, the latter is limited to the 'soft' commodities or services from the cloud service and facility providers.

The world of computing has been advanced with various phrasings for instance PaaS (Platform as a Service), IaaS (Infrastructure as a Service) and SaaS (Software as a Service) with its advancement. As previously explored, the name 'cloud computing' is notably a conception, so are the terms to explain several blends of cloud computing. Fundamentally, cloud computing is not but a comprehensive form of distributed and grid computing which deviates with respect to services, infrastructure, deployment and geographic dispersion (Hashizume et al. 2017; Westphall et al., 2018; Hamlen, Kantarcioglu, **??**han, & Thuraisingham, 2018).

Cloud computing allows organizations to use their hardware and software investments in more efficient ways. This is achieved by overcoming the physical barriers of the isolated systems and automated managing a group of systems as a single unit. This technology is seen as a virtualized system which constitutes a natural evolution of data centres, hence increase performance of organization/institutions (Boss at al., 2017). Cloud computing also leads to lower software costs. Organizations no longer have to buy separate software packages for each computer **??**Miller, 2019). Instead, a particular application is accessed only by the employees using that application. Moreover, this also means saved cost of installing and maintaining that software on each computer. Another software-related cost benefit is that organizations do not have to pay for a software upgrade in order to have the latest versions of the applications **??**Miller, 2019). As all applications are in the cloud, they are upgraded automatically by the provider. Organizations can also greatly reduce their maintenance costs **??**Miller, 2019), this might eventual lead to improved organization performance, however, there is limited literature that links cloud computing and performance of County governments.

2 a) Statement of the Problem

There is a growing concern regarding performance of county governments in Kenya. According to Transparency International Survey conducted in 2017 on County Governments Performance in Kenya clearly indicated that

41% of the Kenya populations from the 47 were unsatisfied with the performance of their Counties. According to Auditor General Report (2018) over Kshs. 10 billion cannot be accounted for by the county governments. This has slowly led to the deterioration of the county performance affecting even the country's GDP growth index from 7% in 2009 to 5.8% in 2016 **??**Kihara, 2016).

Information Communication Technology (ICT) is viewed as a key enabler for the achievement of government policies for economic growth and development. Thus, globally, most governments are adopting various state-of-the art Information Technologies (IT) such as Cloud computing to advance their business operations (Pan and Jang, 2008; **??**ultan, 2010). However, The ICT policy environment in Kenya remains fragmented and unconducive to creating affordable and good quality high speed broadband access -a necessary, though not sufficient condition for cloud services to be optimized (access Kenya, 2017). The adoption of cloud computing in Kenya is still emerging. A cloud computing in Kenya report indicates that adoption of cloud computing is fairly recent with first adopters appearing in 2010 and showing no benefits or improved on performance (Omwansa, Waema, & Omwenga, 2014). County governments have lagged behind the private sector in strategic deployment of ICT. While the private sector has cautiously adopted the cloud to optimize business, the response from the public sector as a whole has been sluggish and uneven.

Despite the great advantage of cloud computing many research discoveries are in the developed countries (Osterman, 2012;Sharif, 2009; **??**artner, 2009;Chan and Chen, 2010) and very few in the developing countries. Kituku (2012) observed that cloud computing is still new to both academia and private sector in Kenya. in addition, Despite the effort of Nyandarua county to integrate services through cloud computing there still facing challenges such as lack of relevant skills, lack of the right support on ICT infrastructure, poor or unenforced ICT policies and failure to understand the utility of cloud computing, Nyandarua County report **??**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.

3 b) Objective

To establish the influence of staff skills on performance of the County Governments in Kenya.

4 II.

5 Literature Review a) Theoretical Literature Review i. Resource Based View Theory (RBV)

The use of the RBV theory in innovation research has grown exponentially in the past decade, which suggests its importance as a framework for explaining and predicting competitive advantage and performance outcomes (Barney et al., 2011;Slotegraaf et al., 2003;Vorhies and Morgan 2005). RBV theory of the firm was introduced by Werner felt (1984) and was expounded by **??**arney (1991) who expresses that firm resources include all assets, capabilities, organizational financials, firm attributes, information, knowledge (innovation capabilities), etc. controlled by a firm and it enables it to conceive and implement strategies that improve its efficiency and effectiveness in terms of performance. Innovation dimensions as a capability has in recent times been acknowledged by innovation researchers. Consequently, they have adopted RBV as the most appropriate theoretical framework to evaluate firm performance (Keramati et al., 2010; **??**app et al., 2010).

RBV theory which shoots from the principle of the source of firms' competitive advantage (enhanced performance), lies in their internal resources as opposed to their positioning in the external environment. That is, competitive advantage of a firm depends on the unique resources and capabilities it poses rather than merely evaluating environmental opportunities and threats in conducting business. The RBV of the firm predicts that certain resources possessed and organized by the firm for such innovations have the prospective to generate competitive advantage and eventually superior firm performance (Ainuddin et al., 2007). Resources that are valuable, rare, inimitable and non-substitutable allow the firm to do a better job of taking planned actions. If these actions that are taken capitalize resources, it creates a competitive advantage, which in turn enhances performance (Ketchen Jr. et al., 2007).

According to RBV, not only must firms be able to create knowledge within their boundaries, but they must also expose themselves to a bombardment of new ideas from their external environment in order to prevent rigidity, to encourage innovative behavior, and to check their technological developments against those of competitors (Leonard-Barton, 1995). In relevance with this study, from the resource-based view perspective, innovation does not come simply from scanning the external environment for market opportunities, but from looking inside and building on the resource endowment and core competencies of the organization. The RBV literature suggests that a firm should strive to innovate not only better than competitors but also one step ahead of the competition. By developing dynamic capabilities, for example, a firm is able to adapt to changing industry conditions, learn and exploit new knowledge and articulate an innovative response to previously nonexistent market demand (Kim & Kim, 2009).

The resource-based research is important to this study based on the fundamental premise that organizational resources and capabilities are those that underlie and determine a firm's capacity for innovation. Within this perspective, organizational resources (tangible and intangible) are taken to provide the input that in turn is

combined and transformed by staff skills and infrastructure to produce management innovative forms of improved firm performance.

6 b) Conceptual Framework

7 i. Staff Skills and Organisation Performance

A study conducted by Cragg and Zinatelli (2009) indicated that called attention to that absence of employee capability has truly prevented IT advancement and development inside firms, in this manner, they should beat this issue through either looking for assistance from external sources or building up their own employee ability to utilize new technology (Nieto and Fernández, 2005). External consultants and sellers are the primary sources of external IT skill in regards to IT usage inside small firms (Thong, 2009). Inferable from the significance of external help, these organizations are confronting challenges since IT vendors tend to favor their marketing to bigger firms and fail to comprehend exceptional necessities (Ahuja, Yang and Shankar, 2009).

Sari and Kurniawan (2015) conducted a study on staff skill and implementation of cloud computing. their findings showed that staff skills are important and essential properties to use cloud computing. Further, the maximum crucial utilization of cloud computing dependent on staff skills if they have to be successful in using cloud computing. Staff skills in IT play a vital feature in organizational results, and lots of researchers agree that staff skill is key position in influencing the adoption of innovational things to do inside the businesses (Al shaar, et al., 2015). It staff IT skills provide the understanding and abilities to place into effect cloud-computing-associated it features (Wang et al., 2010).

8 III. R esearch M ethodology

The study adopted a correlational research design. The target population were ICT officers within the county government of Nyandarua which included one hundred and thirty (130) employees in ICT, communication, finance and administration department. The sample size of the study was calculated using the formula below as recommended by fisher et al ??2003). A sample size of ninety-seven (97) respondents were chosen for the study. The study employed purposive sampling to select respondents while simple random sampling was used to select section heads and middle level employees based at the departmental level. Simple random sampling was used to avoid biasness and every individual had an equal chance to participate in the study.

Primary data for the study was collected with questionnaires. Data obtained from the field was coded, cleaned, and entered into the computer for analysis using the Statistical Package for Social Sciences (SPSS version 24). Descriptive statistical procedures including cross-tabulations and frequency distributions were used to provide comparisons and contrasts between cloud computing and performance of county governments. 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%.

IV .

9 Research Findings a) Descriptive Statistics i. Descriptive Statistics for Staff Skills

Staff skills can be defined as the technical understanding and subject knowledge that enable employees to carry out their role to the best of their ability. Thus, the study sought to establish the perspective of the employees regarding the effect of staff skills on performance of the County Government of Nyandarua. Their views were measured on a 5-point Likert scale to determine their degree of agreement or disagreement with the various statements regarding staff skills. The findings were presented in Table 1.

From the findings, 46 (58.2%) and 10 (12.7%) of the employees of Nyandarua County government agree and strongly agree respectively that the county engages IT experts in conducting regular system upgrades and updates while 12 (15.2%) and 11 (13.9%) disagree or are not sure of this. The mean response is 3.68 (SD = 0.885). Furthermore, the findings show that 54 (68.4%) The findings further show that 48 (60.8%) and 10 (12.7%) of the employees agree and strongly agree respectively that the county regularly trains on how they can better incorporate cloud computing in their day to day work while 5 (6.3%) and 16 (20.3%) disagree and are not sure of this respectively. The mean response was 3.46 (SD = 1.01) indicating overall neutrality with the aspect of regular training on how to incorporate cloud computing in their daily work.

In addition, the findings show that 48 (60.8%) and 10 (12.7%) of the employees agree and strongly agree respectively that knowledge of cloud computing is a key factor in the selection of employees or volunteers for the organization while 5 (6.3%) and 16 (20.3%) disagree and are not sure of this respectively. The mean response was 3.80 (SD = 0.740) meaning knowledge of cloud computing is a key factor in the selection of employees or volunteers. Further, the findings show that 37 (46.8%) and 13 (16.5%) of the employees agree and strongly agree respectively that the county provides time and resources for training cloud computing for those directly involved in projects while 9 (11.4%) and 20 (25.3%) disagree and hold a neutral view on this respectively. The mean response was 3.68 (SD = 0.885).

Finally, 10 (12.7%) and 46 (58.2%) of the employees agreed and strongly agreed respectively that emphasis is laid on training in cloud computing after new employee hiring while 11 (13.9%) were neutral and 12 (15.2%)

disagreed. The overall mean for the item is 4.13 (SD = 0.648). The overall mean response for staff skills was 3.79 (SD= 0.384) indicating overall agreement by majority of the employees regarding aspects of staff skills. Assessment of the standard deviations show that all of them are within the +/-1.96 range which is the approximate value of the 95-percentile point of the normal distribution.

10 ii. Descriptive Statistics for Performance of County Governments

The study sought to establish the views of the employees on the performance of Nyandarua county government especially given the perceived level of staff skills, ICT infrastructure, ICT policy and Perceived value. Their views were measured using a 5-point Likert scale to indicate their degree of agreement or disagreement with various aspects that define Performance of County Governments and the findings were presented in Table 2.

The findings in Table 2 show that 30 (38%) and 4 (5.1%) agree and strongly agree respectively that there is a general improvement of services in county governments whereas 15 (19%), 13 (16.5%) and 17 (21.5%) strongly disagreed, disagreed and held a neutral view respectively. The mean response was 2.94 (SD = 1.234) that showed neutrality in terms of general improvement of services in county governments.

Furthermore, 39 (49.4%) and 14 (17.7%) of the employees agree and strongly agree respectively that revenue collection and accounting functions is more efficient in county government whereas 8 (10.1%), 14 (17.7%) and 4 (5.1%) of the employees strongly disagree, disagree and hold a neutral view regarding service levels of the suppliers and giving a mean response of 3.47 (SD = 1.259). The findings also show that 28 (35.4%) and 14 (7.7%) of the employees agree and strongly agree respectively that there is high level of customer/citizen satisfaction with county services while 10 (12.7%), 17 (21.5%) and 10 (12.7%) indicated otherwise giving a mean response of 3.24 (SD = 1.323).

Furthermore, 33 (41.8%) and 13 (16.5%) of the employees agree and strongly agree respectively that trading services and licensing has significantly improved while 15 (19%), 13 (16.5%) and 5 (6.3%) of the employees indicated otherwise with a mean response of 3.20 (SD = 1.409). In addition, 22 (27.8%) and 20 (25.3%) of the employees agree and strongly agree respectively that the health services have improved in services delivery while 6 (7.6%), 17 (21.5%) and 14 (17.7%) indicated otherwise respectively resulting a mean response of 3.42 (SD = 1.287).

Finally, the findings show that 39 (49.4%) and 9 (11.4%) of the employees agree and strongly agree respectively that improved county governance terms of accountability, transparency and accessibility of services while 5 (6.3%), 8 (10.1%) and 18 (22.8%) of the employees indicated otherwise respectively giving a mean response of 3.49 (SD = 1.036). Generally, the mean response regarding Performance of County Governments was 3.29 (SD = 0.780) indicating that the county government of Nyandarua is yet to realize improved performance from the use of cloud computing.

11 b) Inferential statistics i. Correlation Results

Thus, the study sought to establish the nature of the relationships existing between the independent variables and the dependent variable by examining the correlation coefficients. Consequently, a correlation analysis of the independent factors and the dependent factor (performance of county government) was conducted and the findings were summarized and presented in Table **??**.

The findings in Table **??** show that staff skills has a positive and significant relationship with Performance of County Governments, ? = 0.712, p< 0.001. This means that there is a probability of 0.712 that Performance of Nyandarua county government would increase given an increase in staff skills.

12 ii. Regression model

The regression analysis in this case is used in assess the effect of the independent factors on the dependent factor (Performance of Nyandarua County Government) and answer the underlying research questions. First the model summary and the analysis of variance which is used in assessing model fit were assessed and findings were presented in Table 4 and Table 5. The regression analysis findings are used in answering the research questions for the study.

The findings in Table 4 on the model summary show that all the predictors explain 68.2% of the variation in Performance of Nyandarua county governments (R = 0.826, R-squared = 0.682, Adjusted R-squared = 0.664). The coefficient of determination explains the extent to which changes in the response variable can be explained by the change in the explanatory variables or the percentage of variation in the dependent variable that is explained by all the independent variable.

ANOVA results in Table 5 show that the model fit was good as illustrated by overall test of significance with F (4, 74) value of 39.607 with p< 0.001. Thus, the model was fit to predict the performance of Nyandarua county governments based on effect of cloud computing.

The specific objective of this study was to investigate the influence of staff skills on performance of the County Government of Nyandarua. As such, the study sought to answer the following research question: What is the influence of staff skills on the performance of the County Government of Nyandarua? The findings in Table 6

show that staff skills do not influence the performance of Nyandarua county government, ? 1 = 0.147, p = 0.188. This shows that staff skill were not important is using cloud computing for county performance. The findings are contrary to Sari and Kurniawan (2015) argument that that staff skills are important and essential properties to use cloud computing. Similarly, the findings disagrees with Al shaar, et al., (2015) that the maximum crucial utilization of cloud computing dependent on staff skills if they have to be successful in using cloud computing. It staff IT skills provide the understanding and abilities to place into effect cloud-computing-associated it features (Wang et al., 2010).

V .

13 Conclusions

In conclusion, the study found that staff skills had no influence on the performance of Nyandarua county government. The findings imply that despite the county government's focus on computer skills acquisition among the employees and engaging IT experts in conducting regular system upgrades and updates, it was not enough to elicit an improvement in the county's performance. It could be that the staff are not better equipped to utilize cloud computing in enhancing the county's performance. As such, there is need for further studies on the same to ascertain if indeed staff skills have no influence on county's performance in the context of cloud computing.

14 Recommendations

Owing to the findings of the study, ICT infrastructure is instrumental in improving the performance of the county government. As such, it is recommended for county governments to have adequate software and hardware for easy utilization of cloud computing technologies. Besides that, it is important for the county to have fast, reliable and efficient internet connectivity for cloud computing usage. In addition, the country government should set aside a budget for purchasing new computer devices. Consequently. adequate and appropriate ICT infrastructure is likely to bring about an in improvement in the performance of the county government.

15 a) Areas for Further Studies

On a geographical dimension, this study was primarily limited to Nyandarua county government. Therefore, it may not be appropriate to generalize to the whole population of counties in this country or any other country. For this reason, further empirical investigations in different regions and countries are needed.

Furthermore, the methodology that has been chosen to achieve the research objectives was limited to questionnaires. As such, future research could build on this study by examining effect of cloud computing in different sectors and industries in both a qualitative and quantitative way. Future studies could use the same basic hypotheses, but implement the study in terms of a longitudinal rather than a cross-sectional design. Finally, only a single research methodological approach was employed and future research through interviews could be undertaken to triangulate. [1] [2] [3]

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[Note: Appendices]

Figure 1: Table 1 :

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SD	D	N	A	SA	Mean	SD

Figure 2: Table 2 :

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[3] © 2020 Journals

4

R	R Square	Adjusted R Square	Std. Error of the Estimate
0.826a	0.682	0.664	0.458

a Predictors: (Constant), Perceived value, ICT infrastructure, Staff skills, ICT policy

Figure 3: Table 4 :

5

	Sum of Squares	Df	Mean Square	F	Sig.
Regression	33.2	4	8.3	39.607	0.000b
Residual	15.507	74	0.21		
Total	48.707	78			

a Dependent Variable:

Figure 4: Table 5 :

6

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	0.639	0.263		2.430	0.018
Staff skills	0.126	0.095	0.147	1.328	0.188

[Note: a Dependent Variable: Performance of Nyandarua county government]

Figure 5: Table 6 :

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