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# Assessing Cloud Readiness: A Case of Nairobi County Government

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*Abstract:*
*Cloud computing is an emerging technology that is being embraced by more and more organizations. It has been viewed as a way to increase the capacity or add capabilities dynamically without investing in new infrastructure, training new personnel, or licensing new software. A qualitative approach was adopted for this study. In order to gather information on the subject matter, questionnaires were used. The responses were fed into a cloud readiness assessment tool and score generated based on the questions. The score ranked the cloud readiness status as average at 65.4%. This is ranked as average based on the BSA Global Cloud Computing Scorecard. Improving hardware readiness was identified as an area needing improvement. This can be achieved by obtaining a higher degree of virtualization and by willing to upgrade the current hardware and software infrastructure. Connectivity readiness was also identified as needing improvement. Faster broadband connection with redundant capabilities can improve the score. The assessment also computed a potential value (70.4%) that Nairobi County government could gain from the functionalities and flexibility of the cloud.*

*General Terms: Cloud Computing*
*Keywords: Cloud computing, Cloud readiness, Assessment*

## 1. Introduction

Whereas Verdegem (2009) suggests that ICT offers government new possibilities of achieving their mandate, there is no attempt to explicitly point at a specific ICT that will help in attaining these new possibilities. Carter (2005) and Weerakkody & Reddick (2012) concur that ICT offers a better and faster mechanism of delivering services. They do not however narrow down to a specific ICT application to facilitate this. Wyld (2009) points out that cloud computing as an application of ICT improves service delivery in government. Though he does not provide a way to assess the level of cloud readiness he states the benefits of cloud computing with a focus on government. The UNCTAD (2013) report agrees that Cloud computing is crucial in government with the BSA Global Cloud Computing Scorecard (2013) providing a methodology to access cloud readiness. We embarked to assess the cloud readiness status of the County government of Nairobi informed by this methodology.

## 2. Conceptual Framework

Based on the methodology brought forward by the BSA Global Cloud Computing Scorecard (2013), we developed the conceptual framework below
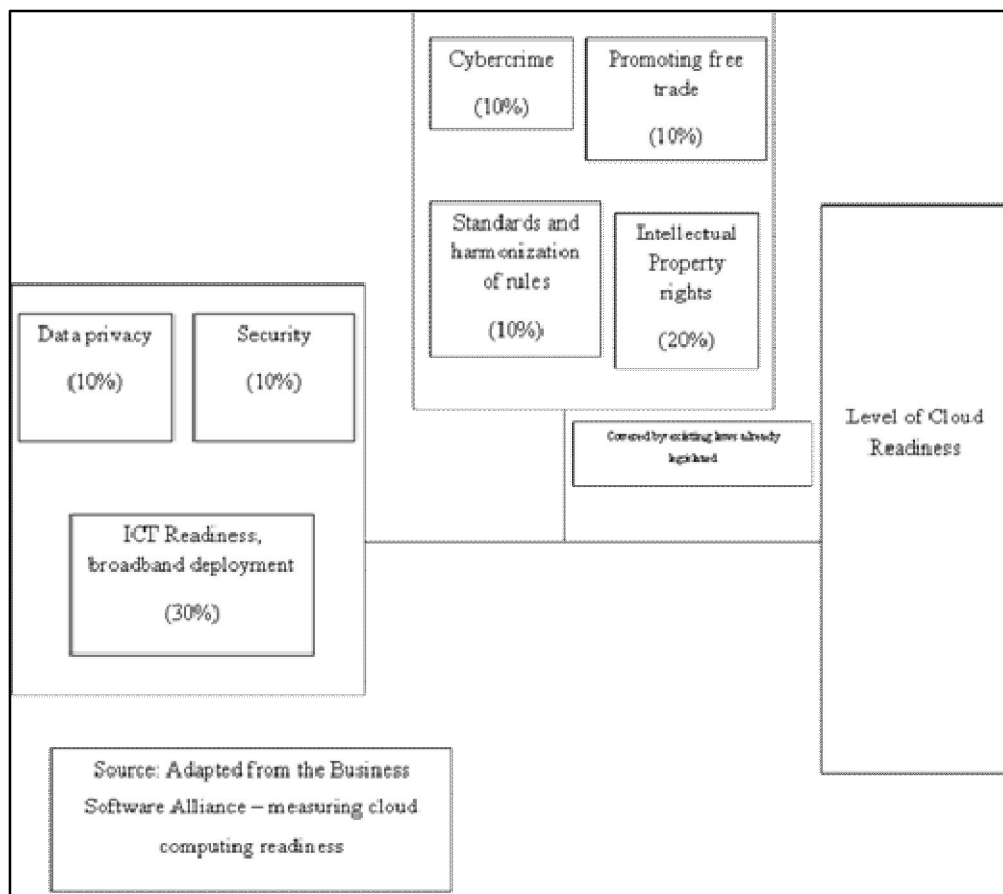
*Figure 1: The Conceptual model*

## 3. Methodology
The study employed descriptive design and used purposeful random sampling.

### 3.1. Sampling and Sample Size
A sample size was determined based the population size – Nairobi county government has 10 departments (Education, ICT, Health, Public Service, Lands, Public works, Trade, Water, Finance and Agriculture). There are 45 permanent employees in the ICT department of Nairobi County. Mugenda and Mugenda (2003) indicated a sample size of 10% or 20% will be sufficient for a study. 35 employees in the ICT department were used as respondents which are 77.78%, in addition to the 10 heads of departments to make 45 returned questionnaires.

### 3.2. Data Collection
The research combines data collection techniques such as questionnaires and document and text analysis as suggested by Darke et al, (1998). The questionnaires closed ended questions with multiple choice responses.

### 3.3. Procedure of Data Collection
The sample population was drawn from the ICT department of Nairobi County government and heads of the 10 departments within Nairobi County. The questionnaires were picked two weeks after they were distributed to the respondents.
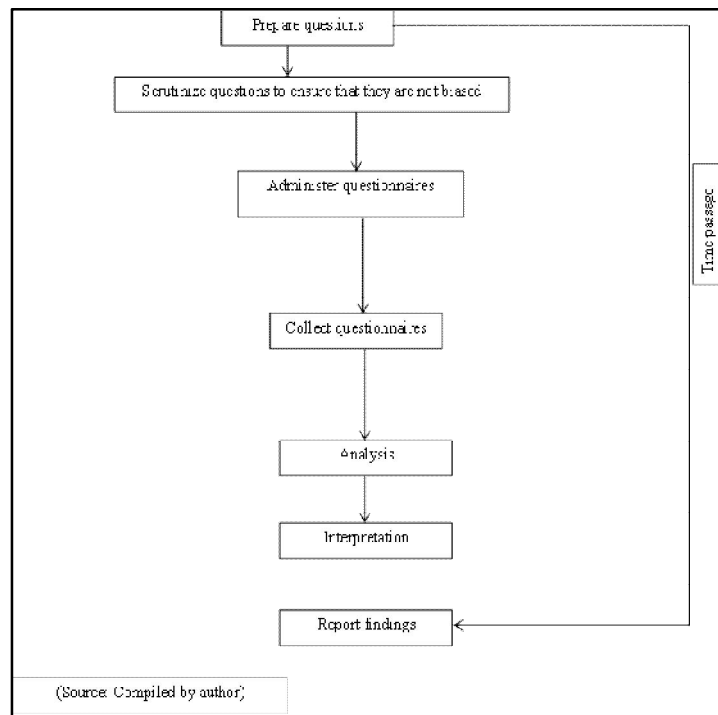
*Figure 2: Procedure of data collection*

Questions were prepared and then scrutinized to ensure that they are not biased. The questionnaires were then administered to the respondents. After the questionnaires were collected the responses were analyzed. The responses were fed into an online cloud readiness assessment tool. Scores based on the various questions were calculated by the cloud readiness assessment tool. The results are discussed in Chapter four.

*3.4. Data Analysis*
Miles & Huberman, (1984); Cavaye, (1996) stated that data analysis can be difficult given that qualitative data analysis methods are not as well established as quantitative methods, and the volume and variety of data collected may make analysis time-consuming. In light of this, on collection of the qualitative data derived from the questionnaires, careful analysis was done (both manually and utilizing a cloud readiness assessment tool).
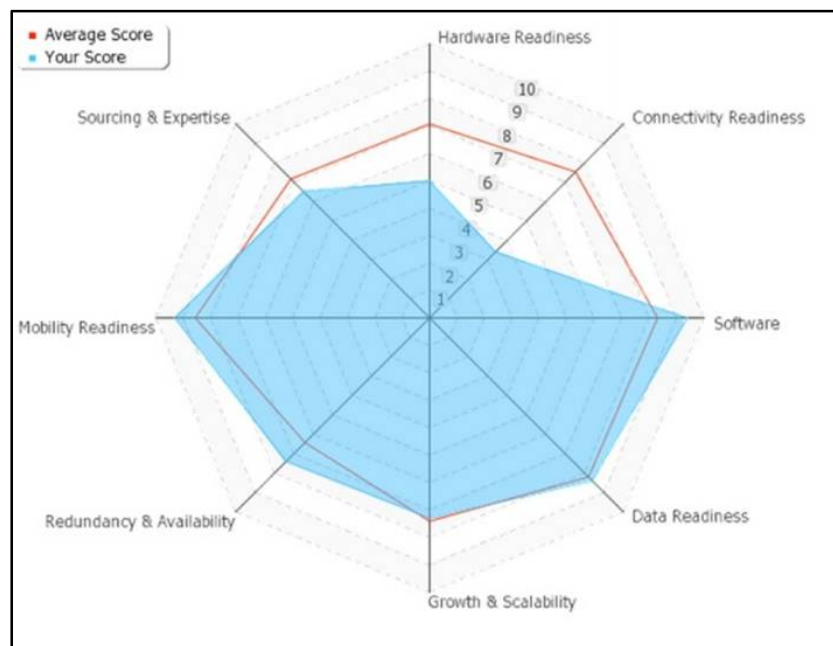The tool calculated the score based on the responses provided.

**4. Results**



*Figure 3: Cloud Readiness Radar Chart*

The radar chart shows the score for Nairobi County across all areas that were tested in the questionnaire. Mobility Readiness, Redundancy and availability, growth and scalability, Data readiness and Software were areas that the score was high. Meaning that on these areas Nairobi County government is ready for cloud computing. Sourcing and Expertise, hardware Readiness and connectivity readiness had a low score. These areas require improvement. To improve on the area of Sourcing and Expertise, Nairobi County government can train the employees to be ready for new software and new technological possibilities in order to efficiently accomplish tasks and acquire the necessary internal knowledge of cloud technologies. The total score on Hardware Readiness can be improved by optimizing by obtaining a higher degree of virtualization and by being willing to upgrade current hardware and software. Finally on Connectivity readiness if requirements towards access speed are lowered or purchase of a faster broadband connection with redundant capabilities is made, this area can be improved.
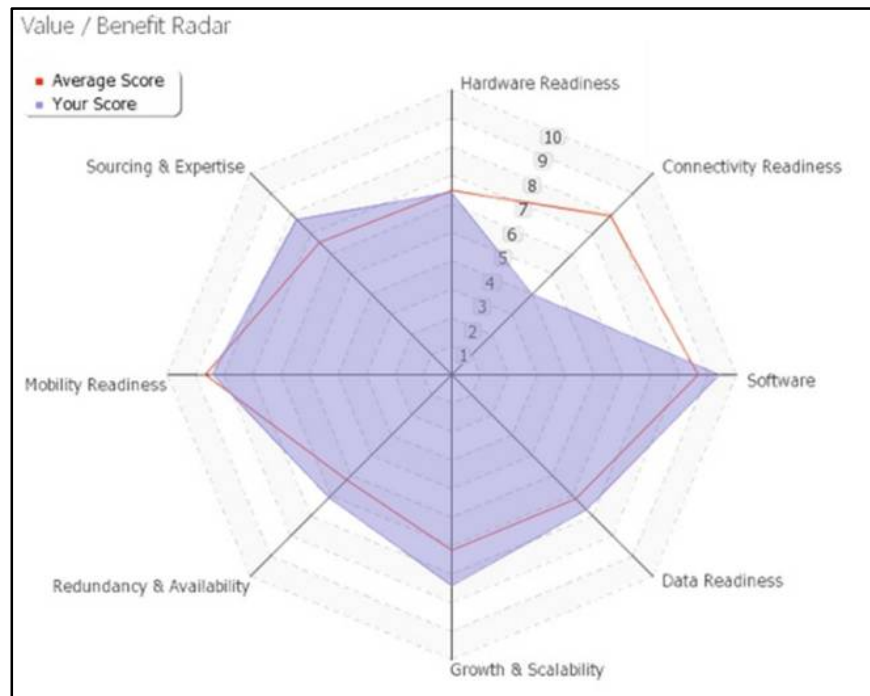


*Figure 4: Value Gained*

The assessment also computes a potential value (70.4%) that Nairobi County government could gain from the functionalities and flexibility of the cloud.

A cloud provider will mostly provide hardware as part of the service. These can be beneficial to Nairobi County government as it means the county does not need to invest in new hardware whose cost may be high. Redundancy and Availability and Growth and Scalability are benefits that emanate from cloud services, therefore Nairobi County will profit from the same.

## 5. Summary
The overall purpose of this study was to determine the cloud readiness status in Nairobi County government. To accomplish this goal, existing literature on this subject was reviewed and questionnaires were issued to employees of Nairobi County government. The responses were then fed into an online cloud readiness assessment tool. The scores were computed based on the varied weights of the questions as discussed in Chapter two.

The results show the level of cloud readiness in Nairobi County government answering the research questions raised at the beginning of this research process. The level of cloud readiness was 65.4%. This value is considered average based on the BSA global Cloud Computing scorecard.

The potential value that Nairobi County could gain from the functionalities and flexibility of the cloud shows that Nairobi County government could gain 70.4% by using cloud services. The areas that Nairobi County could gain in include Hardware, Redundancy and Availability and Growth and Scalability.

### 5.1. Conclusion
On successfully concluding the study, we found that there is a level of cloud readiness in Nairobi County government. The potential gain of using cloud services was also computed. Our conclusion can therefore be summarized as follows:

On the research question on the level of cloud readiness in Nairobi County government, the answer is 65.4%. Nairobi County government had a low score on Connectivity and Hardware Readiness. However, these are areas that it could gain greatly if it uses cloud services.

On the research question on factors contributing to current status of cloud readiness, Hardware Readiness, Connectivity Readiness and Sourcing and Expertise were areas in which Nairobi County performed poorly. Only some servers in Nairobi County are virtualized, given it is much simpler to move virtualized servers into the cloud than to start with physical servers, because all of the dependency clarifications and performance tests have already been completed. Often, problems are encountered with external hardware, such as Dongles for specific software, which is not compatible with virtualized drivers, etc. Much more time and effort is necessary to migrate to the cloud if your servers are not virtualized.

On Connectivity Readiness the faster ones broadband connection is, the better the cloud experience will be. If servers are incorporated into the cloud, their computing requirements will be fulfilled by the cloud provider's hardware infrastructure and will, therefore, not be affected by the speed of the client's broadband connection. The speed at which the client will be able to send and receive files/documents will still be dependent on their broadband connection speed. It can be an advantage to have internal resources that manage company IT, and who also have the skills necessary to migrate to a cloud provider. Having resources present that can both assist and work internally to prepare for the migration is a valuable asset. These resources would have to be contracted which would in turn drive up costs.

On the research objective on ways to improve the level of cloud readiness in Nairobi County: The Hardware score can be improved by obtaining a higher degree of virtualization and by being willing to upgrade current hardware and software. The Connectivity Readiness mark can be improved if requirements towards access speed are lowered or purchase of a faster broadband connection with redundant capabilities is made. Sourcing and Expertise can be improved by training the employees to be ready for new software and new technological possibilities in order to efficiently accomplish tasks and acquire the necessary internal knowledge of cloud technologies.

*5.2. Recommendations*
Nairobi County government can greatly benefit by improving hardware readiness by obtaining a higher degree of virtualization of its servers. Nairobi County government can also consider upgrading the current hardware and software as a way of refining its hardware readiness. This could improve its cloud readiness score as observed in Chapter four on the analysis on the Hardware readiness section. We also identified Connectivity readiness as an area needing improvement. To improve this area we recommend faster broadband connection with redundant capabilities. The faster ones broadband connection is, the better the cloud experience will be. If Nairobi County government incorporate servers into the cloud, their computing requirements will be fulfilled by the cloud provider's hardware infrastructure and will, therefore, not be affected by the speed of Nairobi County's broadband connection. The speed at which the County will be able to send and receive files/documents will still be dependent on its broadband connection speed.

*5.3. Further Work*
There are several areas for further development, for the work undertaken in this study. The respondents on this study were drawn from the IT department and from Heads of the various departments in Nairobi County government. It would be interesting to observe results from a wider pool of respondents. The respondents could even be drawn from stakeholders that receive services from Nairobi County government.

**6. Acknowledgment**

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