

Cloud Computing Adoption in Insurance Companies in Kenya

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Abstract Cloud Computing allows companies to access ICT-based services i.e. computer infrastructure, applications, platforms and business processes, via the internet. Cloud Computing is still at the infancy stage in Africa. Studies have indicated a lack of cloud based awareness, even among big organizations in Africa. Kenya just like any other African market is yet to fully adopt cloud based systems due to trust and security concerns. This study aimed at identifying the extent and characteristics of Cloud Computing adoption in insurance companies in Kenya. The study assessed Cloud Computing uses in terms of productivity applications, business applications (CRM, SaaS), infrastructure on-demand (storage, network, and server), finance applications, core business application, databases and desktop. The adoption of the Cloud Computing services in insurance companies was relatively low. The results obtained would assist in providing a roadmap for the best practices to improve Cloud Computing services in the insurance industry in Kenya.

Keywords: *Cloud Computing services, ICT in insurance, insurance in Kenya, TOE model*

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1. Introduction

Cloud Computing (CC) or cloud refers to the delivery of on-demand computing resources over the internet on a pay-for-use basis. Cloud Computing relies on sharing computing resources rather than have personal devices or local servers handle applications. As a platform it supplies, configures and reconfigures servers. The servers can be physical machines or virtual machines. On the other hand, Cloud Computing describes applications that are extended to be accessible through the internet and for this purpose large data centers and powerful servers are used to host the web applications and web services. The phrase 'Cloud Computing' refers to a type of internet based computing where different services – such as storage, servers, and applications- are delivered to an organization's devices and computers through the internet [3]. The benefits of Cloud Computing as stated by different researchers make it more preferable to be adopted by enterprises i.e. Insurance companies. CC infrastructure allows enterprises to accomplish more efficient use of their IT hardware and software investments. Enterprises need to reflect on the benefits, drawbacks and the effects of Cloud Computing on their businesses and usage practices, to make decision about the adoption and use. In the enterprise, the adoption of Cloud Computing owes much on the maturity of organizational and cultural, including legislative, processes in the organization.

2. Literature Review

2.1. Key Issues in Cloud Computing

Cloud Computing acceptance is faced with a number of issues. These issues are in the areas of infrastructure, security, trust, legal and compliance and organizational challenges [2]. Linked to all these is the issue of trust between clients and vendors, because Cloud Computing calls for enterprises to trust vendors with the administration of their IT resources including data and availability. Most sources of information or data are vulnerable to misuse or use by unauthorized parties which normally calls for control measures in terms of permission of use by the relevant authorities [10]. The impeding situation is that these measures are normally not protective enough and therefore do not offer quite substantive security to the data and information on the cloud [9].

2.2. Obstacles Facing Cloud Computing Adoption

There a number of obstacles for Cloud Computing adoption that include business continuity and service availability, data lock-in, data confidentiality, data transfer bottlenecks, performance unpredictability, scalable storage, reputation fate sharing, and software licensing [1]. These obstacles can however, be transformed into opportunities

for growth of Cloud Computing. [7]. identified the following: security, privacy, connectivity and open access, reliability, interoperability, independence from CSPs, economic value, IT governance, changes in the IT organization, and political issues due to global boundaries.

2.3. Cloud Computing in Financial Systems in Kenya

Kenya just like any other African market is yet to fully adopt cloud based systems [8]. However, financial systems are now embracing the cloud approach in Kenya and outsource some of the non core services. There are opportunities in Kenya provided by cloud computing just like other developing economies as reported by [6]. The Mpesa system is termed as a great innovation and a lot of countries are now trying to adopt the same.

2.4. Development of Cloud Computing in Africa

Cloud Computing is in the infant stage in Africa. Studies have indicated a lack of cloud based awareness, even among big organizations in Africa. According to a Gartner survey conducted among large enterprises in 2011, half the respondents in emerging markets either had not heard of Cloud Computing or did not know what it meant [5]. The market for the cloud in developing countries is currently small, but is expanding rapidly. In Kenya, cloud demands are high in the offshoring industry and technology hubs. In South Africa, the call center industry has been a fastest growing area for cloud based technology.

3. Methodology

A descriptive survey research design was used to investigate the adoption of Cloud Computing services in insurance companies. The area of study was Nairobi,

Kenya, where most of the insurance companies are situated. A total of 33 insurance companies were studied. The Chief Executive Officers and Chief Information Officers were the respondents. Structured questionnaire was used to collect data. The reliability of the questionnaire was carried out and the result shows alpha coefficient of 0.72. Data collection was by use of a questionnaires and observation

4. Results and Discussion

4.1. Introduction of Cloud Computing Services

Out of the 33 companies studied, one introduced Cloud Computing services in less than a year, eleven (11) introduced a year ago while twenty one (21) companies introduced the services more than a year. Since Cloud Computing is relatively new and expensive, most companies took slightly longer in adopting the services. Employees had not been fully trained to handle the Cloud technology.

Chi-square test results showed there was a relationship between Cloud Computing services applications (productivity applications, business applications (CRM, SaaS), application development/deployment platform, application development/deployment platform, finance applications, core business application, databases) and adoption rate of Cloud Computing since p- values were =.000 less than the alpha of 0.05

4.2. Adoption Rate of Cloud Computing Services

The findings showed 19 insurance companies were experimenting on Cloud Computing systems, while 9 were utilizing a combination of Cloud Computing services. The results are shown in Figure 1 below.

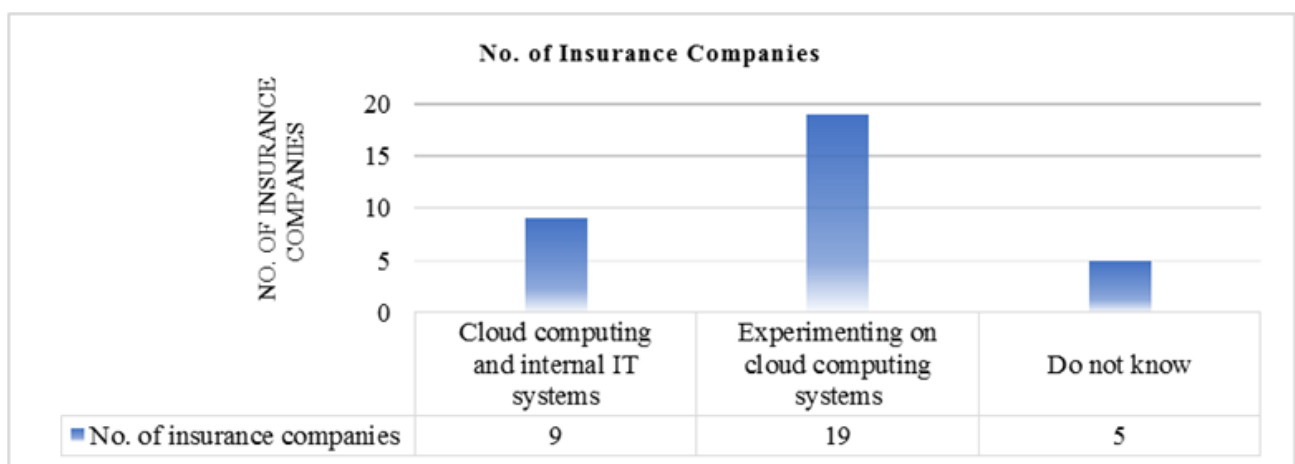


Figure 1. Level of Adoption of Cloud Service

4.3. Use of Cloud Computing Services

The findings show that 18 companies expected to use Cloud Computing services in productivity applications, business application development platform, infrastructure on-demand, databases and desktop. However, the

companies did not use finance applications and core business applications in Cloud Computing, may be due to levels of understanding and maintenance issues related to Cloud Computing systems. Figure 2 below shows the results of the findings.

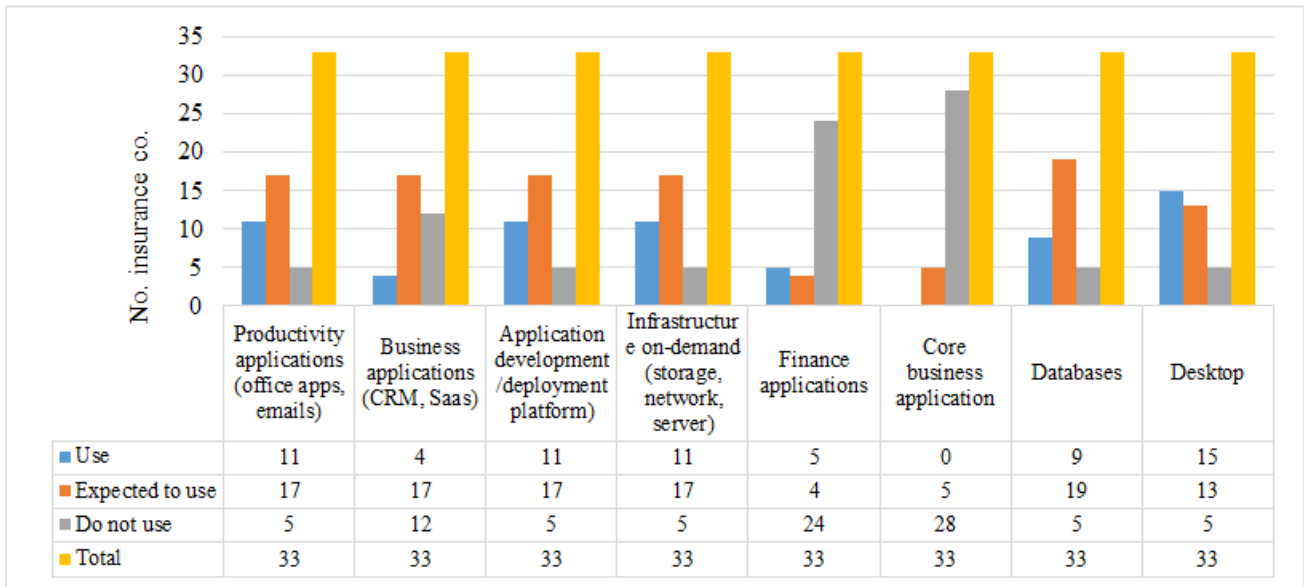


Figure 2. users and expectations to use Cloud Computing services

The study revealed that, most insurance companies used or expected to use Cloud Computing service applications, since these services offered the companies with unmatched flexibility in terms of usage policies and scalability. Data storage is one of the major resources that insurance companies moved to the cloud. With data storage on the cloud, the companies would pay for the volume of space consumed. Cloud Computing service were also used since they were cost effective and flexible in terms of resource utilization which leads to reduced operational costs as well as controlled financial spending on large scale upgrade.

Another reason for the use of cloud services was that, data was available when required. The insurance companies also used Cloud Computing services trust for its security and data integrity. It was noted that, using services led to the ability to work from anywhere and from multiple devices hence, resulting in innovative work cultures in insurance companies.

4.4. Factors Influencing Rate of Adoption of Cloud Computing Services

It was reported by (94%) of companies that security of data was very important and therefore, influencing rate of adoption in terms of keeping data safe and its integrity. Influence of infrastructure on rate of adoption was reported by (29%) of the companies studied, while (34%) indicated influence in the rate of adoption by hardware and software. 44% of the respondents noted that internet coverage influenced the rate of adoption since the Cloud Computing squarely depends on the internet coverage. Finally, (24%) respondents showed that standardization influenced rate of adoption, there was no clear standards set in the whole industry of insurance companies therefore, and the rate of adoption was low.

Significance level in our model is 0.000 which is less than 0.05 which indicates that our model is statistically significant in predicting adoption rate of Cloud Computing with our independent variables (Core business applications, infrastructure on-demand (storage, network, server), finance applications, productivity application, application development/deployment platform) business applications (CRM, SaaS) in the Insurance Company).

Table 1. Regression summary of adoption rate of Cloud Computing services

| Model | Unstandardized coefficients | | Standardized coefficients | t | Sig. | 95.0% confidence interval for b | |
|---|-----------------------------|------------|---------------------------|-------|------|---------------------------------|-------------|
| | B | Std. Error | Beta | | | Lower bound | Upper bound |
| 1 (constant) | 1.16 | .18 | | 5.86 | .000 | .701 | 1.42 |
| Productivity application | .17 | .09 | .26 | 1.97 | .053 | -.002 | .340 |
| Business applications (CRM, SaaS). | -1.77 | .18 | -2.06 | -9.98 | .000 | -2.12 | -1.41 |
| Infrastructure on-demand (storage, network, server) | 1.79 | .18 | 1.99 | 10.04 | .000 | 1.44 | 2.15 |
| Application development/deployment platform | .72 | .13 | .796 | 5.32 | .000 | .455 | 1.00 |
| Finance applications | -.15 | .10 | -.123 | -1.44 | .153 | -.355 | .057 |
| Core business Applications | .00 | .02 | .000 | -.012 | .990 | -.036 | .035 |

a. Dependent variable: rate of adoption of the Cloud Computing services.

The coefficient for productivity application (0.169) is not statistically significantly influence the adoption rate of Cloud Computing services from 0 because its p-value of 0.053 slightly larger than 0.05. The coefficient for Business applications, (-1.769) is statistically significant

to adoption rate of Cloud Computing services, because its p-value of 0.000 is less than 0.05. The coefficient for Infrastructure on-demand (1.799) is statistically significant to adoption rate of Cloud Computing services, because its p-value of 0.00 is less than 0.05. The coefficient for

application development/deployment platform (0.73) is statistically significant to adoption rate of Cloud Computing services its p-value of 0.00 is less than 0.05.

The coefficient for Finance applications, is .103. The intercept is not statistically significantly different to adoption rate of Cloud Computing services, from 0 because its p-value (0.153) is larger than 0.05. Financial applications were not very popular among the insurance companies and were not widely used may due to its complexity involved. Finally the coefficient for core business applications is (0.018). The intercept is not statistically significantly different to adoption rate of Cloud Computing services from 0 because its p-value (0.990) is much larger than 0.05. This implies that core business applications didn't influence the adoption rate of Cloud Computing services in the insurance companies.

4.5. Platforms used in Insurance Companies in Kenya

58% indicated that platform used included; software services (email, database access, back-up, enterprise

application), Platform as a Service (PaaS) (use of operating systems, development environments, software's, packages). The platforms were user friendly and were being used for basic transactions on day to day terms. Lastly the Use of infrastructural (hardware, storage, network) resources (infrastructure-as-a -service) was reported by (52%) of the companies studied. The use of these platforms services enabled the insurance companies to turn ideas into innovations faster.

The model summary where the R value is .833 this indicated that 83 % of the variations observed in the dependent variables was caused by the independent variables. The other 17 % of variations observed may have been due to other factors not captured in the study.

The significance level in the model was 0.000 which was less than 0.05 which indicates that the model was statistically significant in predicting platform used with independent variables (testing on SaaS model, use of infrastructural resources, use of operating systems, development environments, software's, packages as a platform in the insurance company).

Table 2. Regression of the influence services on rate of adoption of Cloud Computing services

| Model | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|-----------------------------|------------|---------------------------|-------|------|
| | B | Std. Error | Beta | | |
| Constant | .563 | .762 | | .739 | .463 |
| use of operating systems, development environments, software, packages (platform-as a-service) as a platform in the insurance company | 1.438 | .322 | .842 | 4.462 | .000 |
| Use of infrastructural (hardware, storage, network) resources (infrastructure-as-a -service) | .563 | .189 | .333 | 2.976 | .004 |
| Testing on Saas Model | .438 | .260 | .258 | 1.684 | .097 |

a. Dependent variable: Rate of adoption of the Cloud Computing services.

The use of operating systems, development environments, software, packages (platform-as a-service) as a platform in the insurance company was statistically significantly different from 0, its p-value 0.000 was less than 0.05. The coefficient for Use of infrastructural (hardware, storage, network) resources (infrastructure-as-a -service), was also statistically significant to the rate of adoption of the Cloud Computing services as its p-value of 0.004 less than 0.05. The coefficient for Testing on SaaS Model (0.438). The intercept is not statistically significantly different from 0 because its p-value (.097) is

larger than 0.05. The testing on SaaS does not influence the rate of Cloud Computing services in the insurance companies.

4.6. Cloud Computing Concerns

According to the study, it was observed that significance level in the model was 0.000, indicating that the model was statistically significant in predicting adoption rate of Cloud Computing with independent variables.

Table 3. Regression of the influence of concerns on the rate of Cloud Computing services

| Model | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|-----------------------------|------------|---------------------------|--------|------|
| | B | Std. Error | Beta | | |
| Constant | 3.000 | .812 | | 3.696 | .000 |
| Immature technology as a concern in Cloud Computing services in company | 1.276 | .322 | .435 | 3.959 | .000 |
| compliance issues a concern in Cloud Computing services in company | -1.276 | .541 | -.259 | -2.360 | .021 |

Dependent Variable: Rate of adoption of the Cloud Computing services.

The p value for immature technology as a concern in Cloud Computing services in insurance company was 0.000. Therefore, immature technology as a concern was statistically significant to the rate of adoption of Cloud Computing services. On the other had compliance issues are not statistically significant to the adoption rate of the Cloud Computing services since the p value is 0.21 which is greater than 0.05.

4.7. Technology Adoption Factors

The most statistically significant factor according to the regression model was insufficient or lacking technology and implementation with a beta coefficient of -.337 and a p value of 0.002 less than alpha 0.05 and the least contributing factor was insufficient security with a beta coefficient of -.348 with a p value of 0.578 greater than alpha 0.05. Other observations included insufficient legal (-1.072, p-value .005 less than 0.05) and insufficient/lacking compliance (-1.420 and p value of .007 less than 0.05).

Table 4. Regression summary of the influence of insufficient services in adoption of Cloud Computing services

| Model | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|-----------------------------|------------|---------------------------|--------|------|
| | B | Std. Error | Beta | | |
| Constant) | 7.954 | .838 | | 9.490 | .000 |
| Insufficient security | -.348 | .622 | -.071 | -.559 | .578 |
| Insufficient legal | -1.072 | .371 | -.365 | -2.889 | .005 |
| Insufficient or lacking technology and implementation | -.695 | .218 | -.337 | -3.188 | .002 |
| Insufficient/lacking compliance | -1.420 | .511 | -.288 | -2.780 | .007 |

a. Dependent Variable: rate of adoption of the Cloud Computing services.

4.8. Discussion

These finding may guide and provide a roadmap for the process of successfully adopting or migrating to Cloud Computing services for insurance companies in Kenya. This will address key issues associated with cloud migration such as those identified by [4].

The Technology-Organization-Environment (TOE) adoption model is proposed for customization in the development and implementation of the roadmap. This roadmap will address the following factors: technology (characteristics of available CC technology), organizational (structures and processes), and environmental (client, competitor, and regulations).

The TOE components are external environment representing the outside of the insurance companies. From the findings the external environment is supporting the adoption, through making technology reachable. Technology such as fiber optic is now widely available in the country. For any technology to be adopted external environment must be conducive. From the findings areas that had bad environments had a rough time in the adoption process this fosters better communication within the organization. The organization represents the insurance internal organization. For successful adoption then structures must exist. Based on the research the insurance companies that had some forms of structures made the adoption much easy. The insurance companies that adopted seamless had a defined business process and a way of introducing new technologies. For adoption to be successful a project plan is further to be adopted to make sure it captures all the areas.

The proposed roadmap would have four phases in the adoption of cloud computing project: analysis, planning, adoption, monitoring and evaluation. Analysis would use the TOE model to in the assessment of success and Hindrance factors, usability in the insurance and financial environment, insurance readiness to adopt, and the impacts on the insurance industry.

Planning is key as it manages all the resources needed to effectively run a technology adoption process. Planning makes availability of all the ingredients available and also shall specify the standards to be used. Materials needed and resources are planned as well as the infrastructure to be used.

The implementation would include application modules, application migrations, rollout, and change management. Adoption will involve many aspects based on the TOE model. This phase is a preparation phase for the actual migration of systems and/or applications selected to the cloud platform and infrastructure of choice. In this phase systems/ application integration is done to ensure that the

candidate applications will be able to function with the internal applications that are not migrated.

At the monitoring and evaluation stage the Cloud Computing adoption project is now fully operational. However, contract and dealer management, training, testing and maintenance, user support and review should be ongoing for several months to years subsequent to launch. The system metrics or benchmarks developed and set based on the TOE model can be used as indicators of project success and should be monitored Security standards compliance, SLAs, regulatory requirements and compliance issues, IT governance best practices and cost management are desirable metrics that need to be monitored and evaluated. Documentation of lessons learnt and best practices during the project should be documented and communicated to all stakeholders.

5. Conclusion

Based on the study findings the following are the recommendation: Insurance Companies should invest more in the areas of Cloud Computing security, infrastructure, capacity building and personnel training. A roadmap based on discussion above to be fully developed and implemented in order to address all issue of concern that include but not limited to security, privacy, vendor lock, legal issues, technology maturity, compliance, integration with existing ICT and cost model. Further studies will be required to establish the Mobile Cloud Computing services that are suitable for service delivery in insurance and the financial sector. The impact of Cloud Computing services in insurance companies in Kenya requires more investigation.

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