Cloud Computing Adoption and Utilization amongst Zimbabwean NGOs: A Case of Gweru NGOs

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Abstract: *This paper seeks to determine the cloud computing services utilized by NGOs in Gweru as well as identify reasons (which might be management related, worker related, company related or economic related) that influence the utilization or non-utilization of cloud computing services. To elicit data, the researchers used questionnaires and interviews. Results from the survey indicate that the most widely used cloud computing services are social networks (97%), Google docs (94%) and Gmail (86%). Major concerns raised by the respondents include the absence of a budget supporting ICT initiatives, indecisiveness towards adopting cloud computing due to security related concerns, to lack of technical and management oriented support, use of outdated hardware and software and lack of information on compliance requirements. The study winds off by proffering recommendations to tackle the raised concerns.*

Keywords: NGOs, cloud computing, ICTs, Gweru

1. Introduction

Cloud computing is an emerging new computing paradigm for delivering computing services that aims to provide scalable and inexpensive on-demand computing infrastructures with good quality of service levels [1]. It offers a new economic model for Information Communication Technologies (ICTs)- a model which heralds new modes of investment in and operation of Information Technology (IT) resources [2]. The new model resulting from the changes in ICTs is founded on the internet which offers significant benefits for NGOs such as improved productivity or decreased costs among other things. Built upon decades of research in virtualization, distributed computing, utility computing and more recently networking, web and software services [3], cloud computing represents a shift away from computing as a product that is purchased, to computing as a service that is delivered to consumers over the internet from large scale data centres or clouds [4].

There is no universally acceptable definition of what this phenomenon is but the definition by the National Institute of Standards and Technology (NIST) summarizes what cloud computing is all about. The term is defined as *"a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or cloud provider interaction"* [5].

According to [5] and [6], a cloud can be classified as private, public or hybrid. Public clouds provide access to computing resources for the general public over the Internet but the resources themselves are owned by the organization selling the cloud services. The cloud infrastructure is made available to the general public or a large industry group and is owned by an organization selling cloud services. Private clouds give users immediate access to computing resources hosted within an organization's infrastructure and the resources are dedicated solely for that organization's use. The cloud infrastructure is operated solely for an organization and it may be managed by the organization or a third party and may exist on premise or off premise. Hybrid clouds combine one or more public clouds and one or more private clouds by technology that enables data and application migration between them. Hybrid clouds typically use a shared API to enable hybrid operation.

The delivery models that exist in cloud computing include but not limited to Infrastructure as a Service (IaaS), Database as a Service (DaaS), Software as a Service (SaaS) and Platform as a service (PaaS) [1]. With Infrastructure as a service (IaaS), hardware resources and computing power are offered as services to customers. 'This enables businesses to rent these resources rather than spending money to buy dedicated servers and networking equipments [1]. Database as a service (DaaS) are a more specialized type of storage offering database capability as a service. Examples of service providers are Amazon Simple Database and Google. DaaS on the cloud often adopts a multi-tenant architecture, where the data of many users is kept in the same physical table. In the Software as a service (SaaS) model, software applications are offered as services on the Internet rather than as software packages to be purchased by individual customers. One of the examples of SaaS includes Google web-based office applications (word processors, spreadsheets, etc.). Platform as a service (PaaS) refers to providing facilities to support the entire application development lifecycle including design, implementation, debugging, testing, deployment, operation and support of rich Web applications and services on the Internet.

The main thrust of the research is on deducing user perspectives (in this case the perspectives of the employees in the NGOs) concerning cloud computing utilization, to determine the cloud computing services utilized by NGOs in Gweru and identify reasons (which might be management related, worker related, company related or economic related) that influence the utilization or non-utilization of cloud computing services. Findings were corroborated

against research done in other countries to establish which computing services were preferred by NGOs in general and identify factors that affect the utilization of cloud computing services by organizations specifically NGOs.

2. Methodology

The philosophical assumption of the research was based on positivism whilst the inductive approach was used to establish the NGO's conceptualization of cloud computing with deductive and abductive approaches used to validate findings. The descripto-explanatory research design was used to carry out the research. The descriptive part sought to provide an accurate profile of the NGOs under the study by determining the cloud computing services available to them, their use patterns and build a profile of factors that influence the utilization and non-utilization of cloud services by the NGOs. Based on the research objectives, the explanatory part of the research tested the following variables (a) cloud computing services accessed and utilized (independent) against the NGOs (dependent) and (b) factors influencing utilization and non-utilization of cloud services (independent) against cloud computing services accessed and utilized (dependent) in a bid to understand the utilization process.

Gweru District has a total of 55 Non-Governmental Organizations. All the users within the 55 registered NGOs constituted the study population. For the purpose of this research participants were randomly selected. An exhaustive alphabetical list of all IT users within each organization was generated. Within each stratum (organization) simple random sampling using the random number tables was used to select study participants. The sample size power calculation statistical package for descriptive studies was used to calculate the sample size for this research. Using a 5% significance level and assuming a prevalence of 30% for utilization of cloud computing services by NGOs, a sample size of 61 study participants was calculated. After having adjusted for 5% attrition, a sample size of 64 study participants was reached. A proportional sample size by service delivery area was then calculated so as to get a representative sample.

3.3. Results

3.1 Demographic Information

All the fifty five registered NGOs in Gweru participated in the study. 37% of the respondents were managers. 59% of the study participants were male, while 41% were female. The majority (41%) of the study participants had attained a diploma. Information Communication Technology (ICT) officers constituted the greater percentage of study participants of 50%, followed by Programme officers who were 31%. Only 3% of the population included Finance Officers. The majority (53%) of the study participants were aged between thirty to forty years.

3.2 Cloud Computing applications being utilized

The most common cloud computing application(s) being used by NGOs in Gweru are the social networking which include Facebook, Twitter and MySpace as cited by 97% of the respondents, followed by Google docs and Gmail where 94% and 86% of the respondents are using the applications respectively.
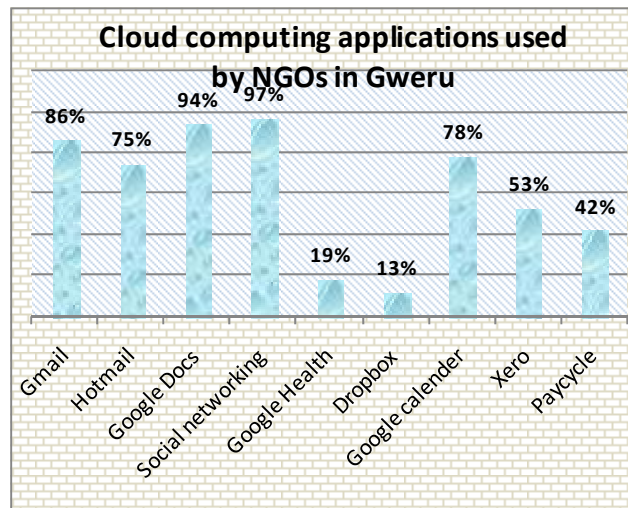

Figure 1: Cloud Computing Applications Utilized by the NGOs

3.3 Factors influencing utilization of cloud services by the NGOs

When asked on their concerns with regard to utilization of cloud services, 55% of the respondents indicated that they were not utilizing cloud computing services for varied reasons which include lack of ICT staff, lack of budgets to implement cloud computing, difficulty in measuring return on investment, security concerns, lack of management support and use of outdated software and hardware. The major issues raised by the respondents were the absence of a budget supporting ICT initiatives in this case cloud computing, indecisiveness towards adopting the technology because of security related concerns, use of outdated hardware and software to implement cloud computing, lack of information on compliance requirements, difficulty in measuring return on investment (ROI) and lack of both technical and management oriented support.
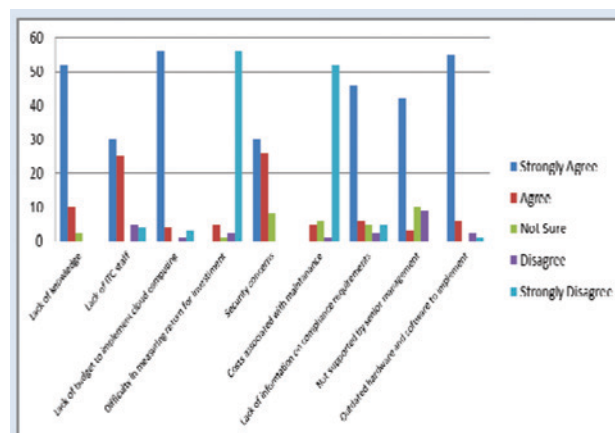

Figure 2: Factors influencing Cloud Computing Utilization by the NGOs

4. Discussions

The findings support the report by the TechSoup Global (2012) survey which concluded that specific cloud based applications that were often being used by NGOs were Facebook (70%), Gmail (63%) and Skype (50%). A case study report on the use of NGOs in Brazil reveals that the most used cloud services include Google Docs, Gmail, Google Groups and Google maps [7]. In fact NGOs are adopting communications applications such as Gmail and Facebook at a rate approaching 100% in much of the world [8].

However what is common in these surveys is that though the respondents managed to identify the services that they were using, they were not aware that the applications they mentioned are in the cloud implying lack of knowledge of what cloud computing encompasses. In the research 55% of the respondents said they were not utilizing cloud computing whilst 45% were utilizing the services. Findings in Brazil reveal that nearly half of the respondents claim they are not using cloud computing services according to their knowledge and yet they are able to identify the different services available to them that they use on a day to day basis [7]. Survey findings of a research on Hong Kong NGOs released in May 2012 reveals that the NGOs generally lack knowledge of cloud solutions [9]. In fact the TechSoup Global 2012 survey results indicate that lack of knowledge is the biggest barrier to cloud adoption as cited by 86% of the respondents [10]. TechSoup results released in April 2012 on a survey done among NGOs on their global attitudes, beliefs and practices regarding cloud computing revealed that a few of the interviewees were surprised to learn that some of the more ubiquitous products like Skype, Gmail, Google apps and MS Office 365 were indeed cloud technologies.

In outlining factors that make ICT usage among NGOs, [11] highlighted that most NGOs have no budget for the development, improvement or maintenance of their ICT infrastructure. NGOs are under-budgeted when it comes to Information Technology (IT). In fact in a survey conducted by TechSoup in April 2012, it was revealed that the NGOs operate on budgets that are less than 1.5% of the NGOs' total operating budget [12]. It is important to see ICTs as a vital part of an organization's running costs and as it increasingly becomes dependent on ICT, a more planned system of allocating an appropriate amount for ICT each year is needed .

Cloud computing presents specific challenges to privacy and security as the clients are entrusting their data to a third-party for storage and security [13] . Therefore the users want to be confident that their cloud computing provider is following standard security practices which require disclosure and inspection [14]. The focus of lawmakers and regulators should be to ensure that the data is secure and subject to proper controls and the adoption of industry standards can play an important role in ensuring that appropriate security protocols are followed and in providing transparency into the security operations of cloud computing companies [15].

The way a technology is infused in an organization is influenced by top management support and attitudes towards change (Daylami *et al.*, 2005) cited in [16]. Top management support is essential to maintain the importance of possible change through an articulated vision for the organization and by sending signals of the significance of the new technology to other members of the firm [17]. It is important that management drives the adoption and utilization of any ICT initiatives in the organization.

When asked whether there were individuals who were responsible for initiating the adoption and ultimate utilization of cloud services, 55% of the respondents indicated that there was no one driving the use of cloud services at all in their organizations. This was an indication that management support was not evident towards the use of cloud computing services which is why the respondents said they were not utilizing cloud computing services. Without top management support, adoption of new technologies is less likely to occur [16]. On the other hand, 17% indicated that IT executives drive the use of the service while 9% responded that management drives use, 8% indicated that IT department were behind the utilization of the cloud services while 6% attributed the drive to individual employees and 5% responded that the finance department is the major driver of the use of cloud computing services in their organizations.

5. Conclusion and Recommendations

It is evident from the research that cloud computing yields more benefits than losses to NGOs in developing countries specifically Zimbabwe. To ensure successful implementation of cloud computing services the following recommendations should be implemented. Users need to have adequate knowledge about the service, its pros and cons as well as how utilizing cloud computing will benefit the organization and help achieve its mandate. Therefore there is need for adequate training to staff and management on the principles of cloud computing so that they appreciate its worthiness. When evaluating cloud vendors, NGOs should pay particular attention to security. Focus on questions such as where data will be stored, who at the service provider might have access to the data, what layers of security are in place, and how is the remote connection protected should be fully addressed and explained to the client. This can address fears of confidentiality also.

NGOs should have a clearly defined strategy on what implementation of cloud computing entails. It is important to understand the requirements of the NGOs and identify in detail the business reason(s) and purpose for moving to the cloud. There is need for formulation of budgets for cloud computing in order to cater for subscription fees, configuration fees, internet access, end-user support usage fees and training fees among other costs. In formulating the budget NGOs should consider some hidden costs such as incremental user fees, storage fees, termination and cancellation fees. Management buy in is crucial for the success of any programme in an organization. In light of this, it is very critical that top management appreciate the benefits of implementing cloud computing for their organizations. Maximum support is required from both staff and management. Future research must seek to expand on

the targeted respondents to include rural and small towns in Zimbabwe to improve representation.

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