



RESEARCH ARTICLE

CLOUD COMPUTING FOR SMEs IN GHANA; BENEFITS AND CONTRIBUTION TO ORGANIZATIONAL PERFORMANCE, FIAGYA RURAL BANK AND ASPET 'A' COMPANY LIMITED IN THE TECHIMAN MUNICIPALITY

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ABSTRACT

The research was conducted to evaluate cloud computing in Ghana; Benefits and contribution to organisational performance in the Techiman Municipality. In all, sixty (60) questionnaire was distributed to Fiagya Rural Bank and Aspet 'A' Company limited. The study used the systematic random sampling and probability sampling techniques to ensure that participants were accessible throughout the period of study. Within this research work, the descriptive research type was used. Descriptive analysis factors like frequency tables, mean scores and percentages were generated, and their interpretations thoroughly explained and interpreted. The study found out that, the major benefits of cloud computing were improved collaboration between employers and customers, cost savings, extensive technical support from cloud providers, business continuity through disaster recovery, unlimited storage and safety in data storage. The lack of capital and inadequate technical expertise was among the factors that prevented SMEs for reaching their potential. The study also revealed that the awareness level of SMEs on the availability and accessibility of cloud services is low. Security in the cloud is among the greatest challenges that confront service providers and users. It is therefore evidently clear that the issue of security within the cloud cannot be over emphasised due to threats from within and outside of cloud environments. Additionally, the study showed a significant positive relationship between adoption of cloud computing and organisational performance. This is an indication that, as SMEs tend to adopt Cloud computing, the organisational performance of that organisation tend to increase and vice versa. Based on the findings of the study, the study recommended that Cloud computing should be incorporated into a holistic national ICT policy or framework for development. This will shape the development of viable strategies by policy makers and agencies in technology that can increase the adoption and use of cloud services amongst SMEs.

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INTRODUCTION

There is a growing adoption of cloud computing among SMEs in Ghana which is changing the way their business information systems are developed, and maintained. Particularly, cloud computing improves the reliability and scalability of IT systems, allowing SMEs to focus their limited resources on their core business. Cloud computing has become one of the affordable solutions for these SMEs due to the benefits that it offers (Kayanula and Quartey, 2000). There have been numerous efforts by various governments and the private sector in Africa to help meet the IT needs of these SMEs.

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Ghana Statistical service (GSS) defined Small and Medium Enterprises (SMEs) as firms with less than ten (10) employees as small-scale enterprise (Sarpong, 2012). One of the currently very interesting topics of strategic ICT application especially among SMEs in Ghana is Cloud Computing, which is defined by (Mell and Grance, 2009) as a model that appropriately ensures that access to shared set of computer resources that can be configured and promptly protected. Among the features of cloud computing includes: autonomous use of services at request, broad access to the network, joining resources and flexibility; it can be used as private, public, hybrid and joined; and the different types: software as service, platform as service, data as a service and infrastructure as service (Mell and Grance, 2009). SMEs in Ghana are faced with a turning-point as to either to adopt or not to adopt cloud computing concept mostly due to lack of information on this paradigm

and its relationship to organisational performance. Coupled with the highly competitive business environment in Ghana, SMES are currently finding various ways to operate efficiently so as to cut cost and maximise profit and the researchers think cloud computing is the best option. Thus, in this new paradigm of computing, cloud computing has emerged to change the old ways of computing so as to bring about an increase in organisational performance. Cloud computing has emerged as one of the enabling technologies that allow the Information Technology world to use computer resource effectively and more efficiently. What this means is that users of the cloud have the luxury of unlimited computing power at the right time within the organisation to maximise profit. The authors Lebars and Euske (2006) defined organisational performance as indicators which provide information on the degree of achievement of organisational set objectives. This adoption of ICT concepts has influenced strategic management, (Nolan and McFarlan, 2005) increasing competitive advantage of the SMEs if applied by business aspects. Idea of strategic implementation of ICT principles including the adoption of cloud computing is based on the assumption that organizational performance is directly associated with the management's competence to create strategic feedback between the market position of the organization and the design of the adequate support for achieving goals (Čudanov, Krivokapić and Krunić, 2011). The real benefit from the strategic implementation of any ICT concept, in this case, cloud computing paradigm, is achieved by the organisation's ability to make a long-term use of the ICT-based functionalities (Čudanov, 2011). In addition to major cloud infrastructure providers, (for example Amazon, Google, and Microsoft) more third-party cloud data service providers are coming into the system which is dedicated to offering more accessible as well as user-friendly storage services to cloud customers (Schubert *et al.*, 2010). Examples include Dropbox which already has millions of users. This move to the Cloud is a crucial step for SMES in Ghana, but these SMEs need to clearly understand the concepts surrounding cloud computing. To address these concerns and thus motivate the wide adoption of data outsourcing in the cloud, this thesis will explore the benefits and the challenges of cloud computing for SMEs in Ghana as well as the find the relationship between the adoption of cloud computing and organisational performance. Despite the increasing interest in cloud computing adoption across the globe, various factors continue to slow down its migration, and in Ghana, the situation is not different. The study, therefore, seeks to provide the discussions on the key challenges that potentially create a barrier to the adoption of cloud computing among SMEs in Ghana.

Literature review

Concept of Cloud Computing

To conceptually review the work, the researchers decided to delve into the history of cloud computing in order to get an idea of what triggered this area of computing. Also, it is the bases of which the research depends on. In the past, software suppliers were providing services to their customers from remote servers connected through computers over the internet. This was termed as Application Service Provision (ASP), and this was the original platform of IT service delivery emergence from the convergence of computing and communications in the mid-1990s (Shagin, 2012). However, the ASP model ultimately failed, firstly because, it required more complicated

installation and configuration at the customer end. Secondly, it was meant to provide software on a one-to-one basis rather than on a multi-tenant basis, where one supplier has many customers. However, ASP lacked the huge advantage that cloud computing provides by being very scalable (Singh and Sirohi, 2013). The rise of software as a service (SaaS) in around 2001 indicated the beginning of software delivery based on multi-tenant architecture involving network-based access to software managed from a central location. Cloud computing as a utility is the concept where cloud customers can store their data remotely so as to enjoy the high-quality networks, servers, applications and services from a shared pool of configurable computing resources (Rizzo, 2012). The advantages of the cloud include on-demand self-service, ubiquitous and reliable network access, location independent for resource pooling, usage-based pricing, as well as transference of risk (Armbrust *et al.*, 2009). It has greater flexibility and reduces a company's cost which is the motivating factors to SMEs to outsource their data into the cloud. Looking at the numerous advantages of cloud computing, the researchers seek to explore more into this sector of development and examine how firms in Ghana can embrace this concept in outsourcing their IT infrastructure as a means of reducing company's cost. One of the major cost in Ghana is through the initial and subsequent acquisition as well as maintenance of IT infrastructure, and this study seeks to play an important role of enlightening firms concerning this interested area.

Benefits of it outsourcing through the cloud

Flexibility and Innovation

Notwithstanding the location, Ghanaian firms which adopt cloud computing can access their IT services anywhere in the world. The system provides flexibility in implementing changes and new technologies without high risk and cost. Further creating and configuring new virtual server instances is fast and easy in the cloud. This means that firms in Ghana stand the advantage of benefiting from the current and fast changing technology which is fast taken over the world.

Cost Reduction and Increased Efficiency

There would not be the need for initial and subsequent acquisition of IT infrastructure as well as maintenance meaning there will be a reduction in cost. There will be no down time which implies firms can operate effectively and efficiently to increase production. A company now needs to pay only for the cloud space that its data requires and does not need to pay for storage overhead in advance. There is no need for file storage equipment, server setup and maintenance, staff time, power usage, and backup (Kumar, 2013). A cloud provider can offer an infinite resource to many users allowing a firm to reduce the overall direct and overhead costs of developing or managing the IT solutions. Since there will be a reduction of cost, the firm can now have excess funds to develop infrastructure for future growths. Because of reduced cost and time, institutes can focus efforts elsewhere and be more efficient. Cloud computing offers price savings due to economies of scale and the fact that you are only paying for the resources you use.

Reliability

SME's in Ghana now need to break operations and hire technicians when equipment breaks down. With the adoption

of cloud computing, there is a 24/7 technical support offered from highly trained and experienced staff to support the infrastructure at its best condition, and the benefits will reach all their clients. This is advantageous as against each organisation having a team of on-site IT people with the varied skill set (Deshpande *et al.*, 2013). The company can then operate constantly and smoothly, satisfying its customers and increasing its profit margin.

Security Gain

There are instances where companies in Ghana need to auction their equipment and acquire new ones since they are obsolete and are now not delivering up to task. This is a cost to the company as the company in addition to buying this new equipment, need to train/retrain staff. But with the adoption of cloud computing, companies in Ghana are provided with hardware and knowledge with the current security measures. Even though implementing a new data system comes with serious risks to consider, but it is also clear that these benefits of cloud computing can be factors that help companies grow especially well.

Fast Service (Always Up Time)

Cloud computing service providers have cloud infrastructure, so the server is always in up-time. This results in your having no distractions in the resource centre. Depending upon libraries needs, they have to choose plans for fast access service.

More Storage Capacity

There is no need to worry about a lot of data and files to store; this provides more data to save the files on the server. Everything is online stored in the cloud and can be accessed at any time in the browser (Chakraborty and Abhik, 2013).

Easy to use

Basic cloud services work 'out of the box'. For complex software and solutions, the cloud allows SMEs to skip the hardware procurement as well as capital expenditure phase.

Up to date

Companies are bound to enjoy up-to-date services since providers constantly update their software offering, adding new features as they become available. This implies that companies benefit from software updates freely without necessarily having to buy them.

Scalability

Depending on business growth, SMEs in Ghana can grow as cloud systems are developed to suite the sharp increases and reductions in workload. The various pricing models are also developed to support software reductions should these SMEs need to scale down, which reduces the business pressures.

Challenges of Cloud Computing among SMEs in Ghana

In as much as the researcher is advocating for the adoption of this new technology, the main aim of the study is to present the challenges and present possible means of mitigating them when the need arises. Security is the main obstacle militating

against the effective deployment and provision of cloud computing services for individuals and organisations. An IDC study reported 75% of respondents agreed security is their main concern. Users of cloud services do not fully control the infrastructure provided which may raise some concerns, such as security breaches and violations or attacks from hackers. Trust between a consumer and provider is also very important in cloud deployments. Sensitive information and data stored in the clouds can be subject to misuse, theft or illegal uses since the provider assumes full responsibility. These problems can be lessened during the drafting of Service Level Agreements (SLAs) – a means where a user is given the privilege to access only certain portions of a system - to assuage confusion and ensure that the right Quality of Service (QoS) is delivered. The cloud market has little standards and compliance requirements globally since the paradigm is still emerging. The regulatory regimes for cloud computing are uncertain as well as the enforcement in many developing economies (Kumar, 2013). The Lack clear and functioning legal framework in Ghana makes it difficult to integrate with other applications or switch between vendors leading to vendor lock-in. Vendor lock-in renders a client dependent on a particular vendor for products and service gave the high switching costs and lack of interoperability. Another concern is the issue of migrating data when a decision is reached to switch to a new cloud provider. Cloud computing is dependent on constant electricity and a running network or reliable Internet connection (Kumar, 2013). Unfortunately, in Ghana, this is not characteristic due to its unstable and slow network bandwidths and frequent power outages.

MATERIALS AND METHODS

The target population consisted of business owners and managers, IT staff or officers and other key decision makers of ICT at Fiagya Rural Bank and Aspet 'A' Company Limited in the Techiman Municipality of Ghana. The study had a population size of seventy people. However, a sample size of sixty was used for this study. The study utilised the probability technique because it gives an equal chance for all members to be selected. It is also the appropriate method for survey-based strategy (Saunders *et al.*, 2007). To achieve the aim of this research, both primary and secondary data was used during the research process. The questionnaire was the instrument for this study. Both quantitative and qualitative data were used for the study. The qualitative data from secondary sources was analysed using content analysis and logical analysis techniques. Frequency distribution and percentages were used for the quantitative data analysis to determine the proportion of respondents choosing the various responses. Data obtained from the field was coded into Statistical Package for Social Sciences (SPSS) version 20. Descriptive analysis factors like frequency tables, mean scores and percentages were generated, and their interpretations thoroughly explained. The statistical tool appropriate for the analysis of data is the simple linear regression. This helps to identify the relationship between adoption of cloud computing and organisational performance.

Empirical Discussion and Analysis

Distribution of Sample Respondents by Gender

Table 4.1.1 shows that the percentage of male respondents was 60% while that of female respondents was 40%. This finding is

in agreement with Sager (2009) and Hamidifar (2009) where a majority of the study respondents were males (58.8%).

Table 1 provides the visual representation of the gender distribution of the study sample within the municipality.

Table 1. Respondents by Gender

Gender	Frequency	Percentage
Female	24	40.0
Male	36	60.0
Total	60	100

Source: Field survey (2016)

Educational level of Respondents

Two respondents (3.3%) did not answer the questionnaire on educational level. The researcher attributed it to an oversight on the part of the respondents. In all, it could be shown that majority of the respondents had basic education. Thus, 40% of the respondents representing 24 have had basic education. 31.7% of the respondents representing 19 in number had attended secondary school with 11.7% having no formal education at all. 8.3% of the respondents had Bachelor degree while 5.0% had post-graduate degree. Table 2 depicts the results.

Table 2. Educational Level of Parents

Category	Frequency	Percentage (%)
No formal Education	7	11.7
Basic Education	24	40.0
Secondary Education	19	31.7
Bachelor Degree	5	8.3
Post Graduate	3	5.0
Other	-	-
Total	58	96.7

Source: Field survey (2016)

Years of working

From Table 3, it can be seen that respondents who have served for 10-15 years representing 33.3% form the majority while 31.7% of the respondents have served for between 5-10 years. Respondents who have served within the range of 1-5 years make up 18.3%, 10% had less than 1-year experience and while those with more than 15 years of experience forms 6.7%.

Table 3. Working Experience

Years	Frequency	Percentage (%)
>15 years	4	6.7
10 – 15 years	20	33.3
5 – 10 years	18	31.7
1 – 5 years	11	18.3
Less than 1 year	6	10.0
Total	60	100

Source: Field survey (2016)

Respondents by Age

Table 4 reveals that only 6.7% of the staff are below the age of 26. This reduced number could be due to the decreasing number of staff intake for the past five years. The majority of the working staff are between the ages of 26 and 40. It means the SMEs in the Techiman Municipality have a sizeable proportion of "experienced" staff.

Table 4. Respondents by Age

Age Category	Frequency	Percent
Below 26 years	4	6.7
26 – 40 years	30	50
41 – 60 years	24	40
61 years and above	2	3.3
Total	60	100.0

Source: Field survey (2016)

From the analysis, it could be concluded that:

The study sample is a reflection of the study population regarding gender. It is confined that majority of the workers at SMEs in the Techiman Municipality are 'matured'.

Respondents view on the factors influencing the adoption of Cloud Computing

To answer the first Research question "What are the factors that influence the adoption of cloud computing?" various factors were assessed based on their various constructs to determine their mean values. The study discovered seven factors that influence the adoption of cloud computing amongst SMEs in the Techiman Municipality which was categorised under technological, organisational and environmental.

Table 5. Respondents view of technological factors influencing adoption of cloud computing

	N	Mean	P-value
Existence of required IT infrastructure and resource	60	3.60	.030
Compatibility with existing system	60	3.60	.003
Strength of in-built security system	60	3.30	.001
Company adapts readily to cloud services	60	3.10	.009
Desire for optimum system performance	60	2.60	.003

Source: Field survey (2016)

Table 5 reveals that all the factors were statistically significant at level $\alpha = 0.05$. The mean value for the "Existence of required IT infrastructure and resource" and "Compatibility with existing system" are 3.60 respectively indicating that respondents saw these factors as the most crucial technological factors towards the successful adoption of cloud computing. This finding is consistent with Ghobakhloo *et al.* (2011) whose also identified compatibility as an important facilitator for cloud computing adoption since new solutions must work smoothly with already installed IT solutions on premise. The third most prominent technological factors involve strength of in-built security system which had a mean score of 3.20. With a mean score of 3.10, the fourth technological factor is the readily adaptability of the company to cloud services. Further, desire for optimum system performance was the fifth most prominent technological factor with a mean score of 1.43.

Table 6. Respondents view on Organizational factors

	N	Mean	P-value
Impact of organisational structure and size	60	3.10	.000
First adopters in the industry	60	2.80	.000
Company's acceptance of new technology	60	2.80	.001
Approval from top management	60	4.10	.015
Conformity with work culture	60	2.80	.003

Source: (Field Data, 2016).

Table 6 reveals Approval from top management registered the highest mean value of 4.10. This implies that SMEs in Ghana

are faced with a challenge where most decision-makers kick against the use of the cloud technology. Hence, there is the need for decision-makers to devise strategies to deploy and use cloud systems to ensure optimal use of IT resources in their organisation to reduce operational cost which can lead to increased profits and competitiveness. SMEs are also not noted for implementing complex enterprise IT solutions. Nonetheless, the next factor which scored highest was an impact of organisational structure and size with a mean value of 3.10 followed by Company's acceptance of new technology. First adopters in the industry and Conformity with work culture with a mean score of 2.80 respectively. Borgman *et al.* (2011) and Ifinedo (2013) justify this finding in their study where the role of top management, support and involvement in the adoption and use of innovative technologies is crucial. They highlight strong managerial influence leads to efficiency in the adoption of ICT by their enterprises.

Table 7. Respondents view on Environmental factors

	N	Mean	P-value
Adequate user and technical support from providers	60	4.00	.000
Reduction in operational cost	60	3.30	.000
Environmental efficiency	60	3.80	.001
Competitive pressure	60	3.20	.015
Trading partner pressure	60	2.80	.003
Total	300	3.42	.000

Source: (Field Data, 2016).

Table 6 reveals that all the environmental factors except 'Competitive pressure' were statistically significant at level $\alpha = 0.05$. The mean value for the "technical support from providers" is 4.00 with environmental efficiency scoring a mean value of 3.80. Reduction in operational cost followed a mean score of 3.30 while Competitive pressure had a mean value of 3.20. The last factor was trading partner pressure which had a mean value of 2.80.

Disadvantages of Cloud Computing

The data obtained was analysed and presented using a simple statistical tool called the Relative Importance Index (RII). Subsequently, the indices of the variables were ranked according to their relevance. The indices ranging from 0.71 – 1.00 were classified as high, 0.41 – 0.60 as medium and greater than 0.00 – 0.40 as being low. It must be noted that only the top ranked items rated 0.71 or above, indicating a high importance, are deemed to be of importance to the study and therefore analysed and discussed.

Table 8. Barriers inhibiting the Adoption of Cloud Computing

Barrier	RII	Level of rating	Rank
Lack of internal expertise and knowledge	0.84	High	1 st
Poor internet access	0.81	High	2 nd
Lack of data security	0.75	High	3 rd
Lack of trust	0.71	High	4 th
Integration with existing system	0.71	High	5 th
Lack of loss of control	0.69	Medium	6 th
Differences in internal statutory laws and regulations	0.66	Medium	7 th
Delay in transfer and migration of data	0.63	Medium	8 th
Lack clear and functioning legal framework	0.59	Medium	9 th

From the Table 8 Lack of internal expertise and knowledge had the highest scored index of 0.84 followed by Poor internet access with Relative Index of 0.81 and Lack of data security with Relative Index value of 0.75. Lack of trust and Integration with existing system were the next Challenge enumerated by Respondents with an index value of 0.71 indexed value respectively. The least indexed value was Delay in transfer and migration of data and Lack clear and functioning legal framework which had a Relative Index value of 0.63 and 0.59 respectively.

Benefits of cloud computing

Table 9.

Benefit	RII	Level of importance	Rank
Improved collaboration between employers and customers	0.87	High	1 st
Cost effectiveness	0.84	High	2 nd
Extensive technical support from cloud providers	0.83	High	3 rd
Business continuity through disaster recovery	0.81	High	4 th
Unlimited storage	0.81	High	4 th
Safe data storage	0.79	High	6 th
Work from anywhere	0.73	High	7 th
Reduce capital cost	0.71	High	8 th
Access and connectivity to different devices	0.68	Medium	9 th
Environmental and ecological friendliness	0.55	Medium	10 th
Reduction in production time	0.53	Medium	11 th
Achieve economies of scale	0.51	Medium	12 th

From the Table 9 Improved collaboration between employers and customers had the highest scored index of 0.87 followed by Cost effectiveness with Relative Index of 0.84 and Extensive technical support from cloud providers with Relative Index value of 0.83. Business continuity through disaster recovery and Unlimited storage were the next Challenge enumerated by Respondents with an index value of 0.81 indexed value respectively. The next indexed value was Safe data storage which had a Relative Index value of 0.69.

The role of adoption of Cloud Computing on organisational performance

Table 10. Summary of simple linear regression for the relationship between adoption of cloud computing and organisational performance

Variables	R-square	β -value	Model Fit	p-value
Adoption of cloud computing	.129	.256	.000	.000
On Organizational performance				

(Source: Field survey: June 2016)

The R-square value displayed in the table shows that 12.9% of the variation in the dependent variable (adoption of cloud computing) is explained by the independent variable (organisational performance). However, the model fit value of .000 was significant in the sense that its independent variable has a tendency of predicting the dependent variable. The coefficient of the regression model which was 0.256 shows the direction of the relationship existing between the role of adoption of cloud computing and organisational performance. The finding of the study showed a significant positive relationship between adoption of cloud computing and

organisational performance (β -value=0.256, p-value=.000). This is an indication that, as SMEs tend to adopt Cloud computing, organisational performance also tend to increase and vice versa.

Conclusion and Recommendation

This study has delved into the influence of the adoption of cloud computing on organisational performance. Based on the findings, it is clear that cloud computing plays a significant role on organisational performance. This declares how imperative and germane organisations should involve themselves in the cloud to increase organisational performance. Therefore, cloud computing should be pursued any organisation to enhance or improve its performance.

Based on the findings, the study recommends the following:

- Cloud computing should be incorporated into a holistic national ICT policy or framework for development. It will shape the development of viable strategies by policy makers and agencies in technology that can increase the adoption and use of cloud services amongst SMEs. Efforts must also be doubled to increase broadband coverage and access to fast internet speeds at reasonable prices for small businesses.
- Additionally, SMEs are encouraged to invest and integrate cloud services into their business operations and activities to stay competitive, better customer service, ensure fast and efficient delivery and different access markets.
- SMEs must place emphasis on the provision of training facilities in ICT for their employees to increase knowledge. Providers must offer adequate training and embed free training as part of the adoption process to allow SMEs to understand and appreciate the services and applications offered.

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