Spring 5-22-2023

AN EVALUATION OF THE BENEFITS AND DIFFICULTIES FACING GHANAIAN SMES IN IMPLEMENTING CLOUD COMPUTING

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TOPIC: AN EVALUATION OF THE BENEFITS AND DIFFICULTIES FACING GHANAIAN SMES IN IMPLEMENTING CLOUD COMPUTING

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ABSTRACT

The advantages and challenges of cloud computing services adoption by Small and Medium Size Enterprises (SMEs) in the Kumasi Metropolis are examined in this paper. SMEs in Ghana lack adequate information technology skills for record keeping and information management, marketing and processing. It will be beneficial for SMEs in Ghana to use cloud conjugating for enable productivity, dependability, cost savings, and corporate cooperation. Although, the benefits of cloud computing are enormous, due to a number of obstacles, the widespread implementation of cloud computing among SMEs is slow and discouraging. The impact of the use of cloud computing on the performance of the organization has also been thoroughly explored in this study.

Using a combination of methods. the study gathered quantitative data using questionnaires. whereas interview guides were used to gather qualitative data. In assessing the effects of the use of cloud computing on the firm's performance, a simple linear regression was used to ascertain the correlation between them. The findings establish that cloud computing has a major influence on business performance. Data were gathered in the Kumasi Metropolitan Area.

Key words: Cloud Computing, SMEs, Kumasi Metropolis; Information Technology Skills.

INTRODUCTION

In the past years, SMEs are seeing the effect of cloud computing and are gradually

incorporating it into the creation and execution of their corporate strategy. In many nations, SMEs remain the main driver of economic expansion. Despite the worries raised by industry experts, SMEs are not afraid to integrate cloud technology into their company strategy (Gupta et al, 2013).

Regardless of location or device, cloud computing is on information technology (IT) service model that offers computation on demand to customers across a network in a self-service manner (Marston et al., 2011). Cloud computing has a number of advantages compared to traditional IT, such as pay-per-use, elasticity, data concentration, ubiquity. cheap cost, and resource sharing (Armbrust et al., 2010). Cloud computing has started transforming business in other industries as well as the manner in which IT software and hardware are created and acquired (Son et al, 2014). SMEs have yet to completely accept the consumption of information and communication technology (ICT), despite the fact that technology has recently had a substantial impact on many aspects of life and revolutionized the business environment (Houghton & Winklhofer, 2004).

Cloud computing is the practice of storing and using software over the Internet as an alternative to a person's hard disk. Simply said, the cloud is a symbol for the Internet. The internet is used by cloud computing as a channel to offer resources that are typically only accessible locally to anyone who needs them and is connected to the internet. It is the basic requirement for accessing cloud services. This implies that before you can access a particular document you've stored in the cloud, you must first connect to the internet either wirelessly, via a connected connection, or using a mobile broadband connection. The functionality of cloud services is hampered when there is poor access, unreliability, or a high cost of internet.

The emerging technology trend known as cloud computing aims to provide simple, scalable and available technological solutions to SMEs, to grant them the opportunity to utilize comparable technologies used by big firms without having to pay high costs or take unnecessary risks. It is a cost-effective choice that increases productivity and effectiveness, lowers expenses for electricity, bandwidth, operations, and hardware, and eliminates the need for operational employees, in-house expertise, space, power, and infrastructure (Salwani et al., 2009).

Resources in cloud computing are geographically dispersed in simulated and distributed contexts and therefore accessible on demand by integrating internet connectivity, pay-per-use systems and web-based technologies (Winans & Brown, 2009). Businesses and governments have benefited greatly from this new technological development, particularly in developed nations where it is already being used to enhance service delivery and performance. Despite the many advantages of cloud computing, most developing countries like Ghana, still have challenges in its adoption and as such, its full ability has not yet been realized in many developing nations (Senyo et al., 2016).

The implementation of cloud computing comes up with many advantages for SMEs and businesses in general. The cost savings that SMEs stand to experience farm using cloud computing services are significant. According to Yeboah-Boateng and Essandoh

(2014), using cloud computing services minimizes costs for system upgrades, data storage, hardware purchases, upkeep, software and licensing.

As a result. funds and resources can be employed to innovate for the core business rather for unneeded systems. Also, cloud computing makes it simpler for businesses to adjust their services quickly and instantly to different peak loads with little service supplier involvement. Certain IT services can even be deployed| within hours attributable to cloud computing. Scalability also results in savings in costs that can be utilised in securing end-user systems and training. Other benefits include unlimited storage capacity, business process efficiency. agility of business, up-to-date services. Flexibility and scalability.

Although cloud computing has benefits for SMEs, it still suffers from certain challenges hindering its adoption among SMEs. The impediments of adopting cloud computing can be categorized into at two, that is technological, and organizational barriers. The main technological hurdle to the efficient adoption and delivery of cloud computing services for people and businesses is security. Because users of cloud services have limited control over the infrastructure that are using. there may be some issues, such as security lapses and prohibitions or hacker assaults. In cloud deployments, user and provider trust is also crucial. Sensitive data and information saved in the cloud may be misused, stolen, or used illegally because the supplier bears complete liability. Other technological barriers include compatibility issues, internet connectivity, lack of standardization and delay incurred in transferring data. The organizational barriers include the backing from top management and organizational competency.

The uptake of cloud computing has also been researched in relation to developed and developing nations. From the viewpoint of developed nations, some research (Alshamaila et al., 2013; Sultan, 2014) have significantly influenced the utilization of cloud computing. For instance, Alshamaila et al. (2013) used the Technological Organization Environment (TOE) concept to examine the implementation of cloud computing among SMEs in North-East England.

The study's conclusions indicate that perceived benefits, uncertainties, geo-restriction, adaptability, company size and support from top management are the elements that affect the use of cloud computing. Others included prior knowledge, innovation, sector, market scope, provider efforts, as well as outside computing support. In addition, the study concluded that competition was a negligible factor in cloud computing. But nonetheless, SMEs make different technology acceptance based on large and particular enterprises. Furthermore, the acceptance of cloud computing may differ from that of developing countries from the perspective of affluent countries. Therefore, it is essential to inquire into the variables that affect the embrace of cloud computing across various enterprises, particularly from the viewpoint of developed nations.

The usage of cloud computing by Ghanaian SMEs and developing nations is mostly unknown. On the other hand, the literature on information systems has extensively studied the elements that influence the use of cloud computing in the industrialized countries. Furthermore, there are considerable differences in the technical,

organizational, and ecological elements of cloud computing between the industrialized and underdeveloped countries. For instance, a developed country like the United Kingdom has much more advanced technology infrastructure than a developing nation like Ghana (Senyo et al., 2016). This study aims to examine both the benefits and drawbacks of cloud computing usage by SMEs in a developing country context, with a focus on the Kumasi Metropolis of Ghana. This is because the adoption of cloud computing is well established in developed countries but not in developing ones. This study also seeks to find answers to the question of how affordable and reliable Internet service is in Ghana as well as how beneficial it is for SMEs to adopt cloud computing for their business as it remains a challenge to cloud computing adoption.

Objectives of the study

The study's objective is to examine the advantages and obstacles faced by Ghanaian SMEs when embracing cloud computing.

The study's specific objectives are listed below:

i. To examine the level of awareness of SMEs in Kumasi Metropolitan.
ii. To evaluate the advantages and difficulties when embracing cloud computing by SMEs in Kumasi Metropolitan.
iii. To assess the connection between a company's performance and the usage of cloud computing.
iv. To make recommendations for effective implementation of cloud computing among Ghanaian SMEs.

Research Questions

To accomplish the goals of this study, the following questions must be answered.

i. Is cloud computing a concept that SMEs in Ghana are aware of?
ii. Do SMEs who utilize cloud computing reap any benefits?
iii. What challenges do SMEs face while utilizing cloud computing?
iv. Is there any correlation between the firm's performance and cloud computing adoption?

LITERATURE REVIEW

Definition of Cloud Computing

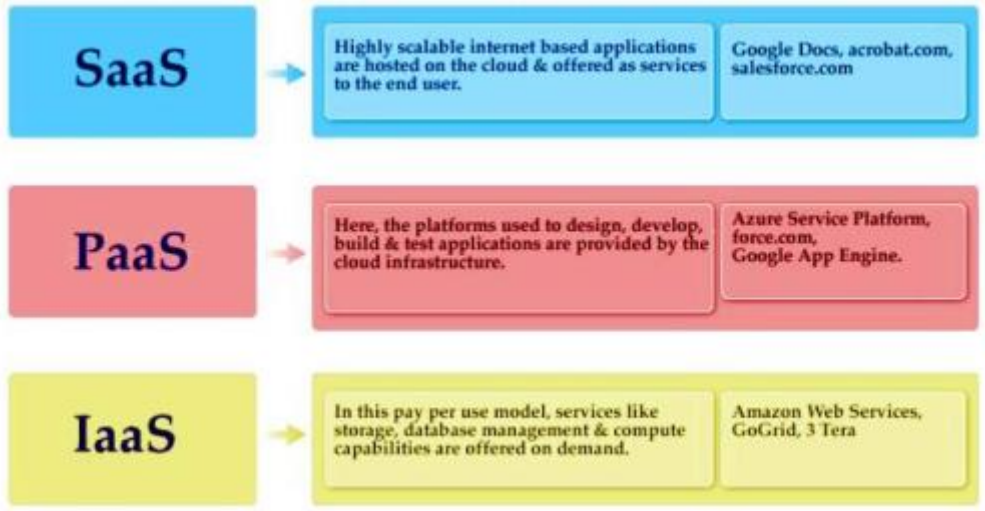
Cloud computing is referred to as the distribution of software and technology as services through the internet by service providers. The National Institute of Standards and Technology describes it as a universal framework, practical, upon request to have connection to a shared set of reprogrammable computing resources (such as storage, networks, applications, servers and services) that are swiftly supplied and issued with little or no managerial or service provider involvement (Mell & Grance, 2010). It is anticipated that its extensive network access, quick elasticity, pay-per-use, upon

demand self-service and resource pooling computing model will change how many businesses approach IT-related services.

According to reviewed literature, cloud computing appears very interesting, however, the following are barriers to its adoption: resources deployment patterns and size of IT resources (Misra & Mondal, 2011). Additionally, institutional variables like presumed connectivity, presumed scalability, presumed security and presumed cost-efficiency deter the use of cloud computing (Saya et al., 2010).

Cloud Service Delivery Models

There are three primary categories of cloud service delivery models. The first type is software as a service (SaaS), platform as a service (PaaS) is another type and final one is infrastructure as a service (laaS). The above-mentioned categories are displayed in the diagram below indicating the various layers of cloud computing architecture in accordance with the computing requirements of the clients.



Cloud Service Delivery Models

Software as a Service (SaaS)

SaaS is the provider of cloud - based market which expands swiftly. SaaS makes use of the internet to supply apps that are controlled by a third-party vendor and whose user interface is viewed by clients. Majority of SaaS programs may be used straight from a web browser without the need for downloads or installations, however some call for plugins.

Platform as a Service (PaaS)

In addition to offering operating systems and server applications like web servers, the provider also provides infrastructure as a service. PaaS allows users to deploy web apps as well as other software created by them using vendor-supported programming languages on the vendor's cloud infrastructure. (Cyber Security Operations Center, 2012).

Infrastructure as a Service (laaS)

It includes the supplier of actual computer hardware, such as memory, network connectivity, and CPU processing. With the aid of virtualization software, this paradigm enables the seller to share their hardware with "many tenants" of customers. Customers can use laaS to run any operating system and software program of their choice (Cyber Security Operations Center, 2012).

Benefits of Cloud Computing

All stakeholders who use cloud computing will gain greatly from this technology's application.

Some of the benefits it offers to stakeholders are listed below:

1. **Business Process Efficiency:** In general, cloud computing is a system that helps execute multiple processes at once (Kuo, 2011). As a result, specific business procedures take less time to execute, increasing efficiency. For instance, Platform as a Service (PaaS) provides a solution that usually increases process effectiveness. Organizations automated this process to handle many tasks at once, which reduced processing duration and potentially waiting times for users of the system. Another research project that also concentrates on healthcare services makes the case that operations strategy not only promotes improved business efficiency but also gets rid of boring manual labour and the potential for human mistake. System deployment is accelerated by cloud computing by avoiding the need for significant, time-consuming upgrades to IT infrastructures. This bolsters the adaptability of processes and shifting business requirements that define several modern corporate structures (Kuo, 2011).

2. **Business Development through Innovation:** Using Amazon as an example, Kambil (2009) asserts that cloud computing permits businesses to discover novel avenues for generating income. He explains how Amazon's existing online retail sales skills were enhanced in order to provide new products like Amazon Web Services (AWS) to fresh clients and emerging marketplace. He also contends that by exploiting already-existing business skills, the proliferation of gadgets connected to the internet and the Internet of Things will open up fresh markets and enable the development of new goods for hither to untapped customer categories. The multinational consortium 3M, for instance, employed cloud computing to do away with the requirement for locally installed and specific software on clients' computers and now provides a computing

online service with no requiring any software installation, boosting 3M's income due to it being capable of reaching fresh clients in emerging markets (Berman et al., 2012).

Subramanian (2012) also stresses on how cloud computing opens up new economic prospects and gives a case study of how pharmaceutical companies and Hewlett Packard (HP) have collaborated to use the technology for tracking fake goods around the world. The cloud's data-sharing capabilities, which were previously inaccessible, enable the creative concept of such real-time product evaluation. Small firms and new ventures can use cloud computing to implement whole novel business models to stand out in the market, for example, by taking advantage of the decreased requirement for IT expenses (Creeger, 2009). They take advantage of shared, streamlined infrastructures to liberate themselves from routine duties and concentrate on building key competencies (Subramanian, 2012).

The new avenues are made possible largely by the cross-agency accessibility and integration provided by cloud computing as well as by general IT improvements, which have led to a new need for quicker and more comprehensive governmental services. Hence, cloud computing could contribute to improving, changing, and developing new value chain models, as well as enhancing, extending, and developing new customer value propositions (Berman et al., 2012).

3. **Cost Reduction and Variabilization:** Cost reductions are another significant factor for many companies to utilize cloud computing (Zhang et al., 2010; Benlian & Hess 2011; Sultan, 2010). According to Sultan (2010), the adoption of cloud computing was sparked by the economic collapse that began in the late 2000 and continued into the 2010s. Sultan contends that this phenomenon probably the result of the current economic crisis. Switching to cloud computing is a well-liked way to reduce capital investment in costly infrastructure and hardware due to its pay-per-use nature, which enables businesses simply pay for the quantity of computer services and resources that they use (Armbrust et al., 2010; Zhang et al., 2010).

   Due to the change in the structure of IT with the possibility of averting huge CAPEX investments and insufficient capital, companies can now adopt a zero-to-a-million-miles-an-hour company approach reasonably fast (Creeger, 2009). Additionally, the advantage of cost savings swiftly encourages corporate flexibility at the maturation stage. SMEs and new ventures that would otherwise not have access to innovative services and technology because of scarce funds may find it particularly intriguing as the cloud computing model minimizes the requirement for capital inputs (Marston et al., 2011; Sultan, 2011; Kim, 2009; Sultan, 2010; Zhang et al., 2010).

Start-ups also take advantage of not needing to spend money on IT infrastructure because these systems can quickly become expensive systems (Sultan, 2011; Buttell, 2016; Misra & Mondal, 2011). Many researchers contend that because there are fewer investments required, developing nations can also benefit from this opportunity and obtain access to technologies that would not otherwise be available to them (Marston et al., 2011; Cleverley, 2009).

4. **More Storage Space:** Cloud computing offers additional data storage space, addressing the concern that there would be a lot of data and files to keep. Everything is online and kept in the cloud so that it is always accessible through a browser (Chakraborty and Abhik, 2013).

5. **Scalability:** Cloud-based platforms are built to handle unforeseen increases and drops in workload as such Ghanaian SMEs using cloud computing may be able to expand at a very high speed. The various price models are also developed to support software reductions should these SMEs need to scale back, which lessens the load on the enterprises.

6. **Higher mobility:** Higher mobility is referred to as a high possibility to move resources and alter them dependent on the needs of the client in cloud computing by Cilleruello et al. (2012:642). Mobility is thought to be a benefit and a crucial characteristic in cloud computing, according to Cilleruello et al. (2012:643) and Joshua & Ogwelela (2013:43).

Difficulties of Cloud Computing

This segment mentions the difficulties or challenges that adoption of cloud computing normally encounters. These challenges can be categorized as technological and organizational challenges. Technological challenges are those that are posed by the application of current technological trends on users and investors such as security, privacy and compatibility among other related technological drawbacks, whiles the organizational challenges are those posed by organizational hierarchy such as institutional competency and management support.

1. **Lack of security and privacy:** The biggest obstacle to cloud adoption is security and privacy worries because enterprises need to trust external CSPs with their vital information (; Nyberg, 2011; Iyer. & Henderson, 2010; Luoma & Armbrust et al., 2010). Data confidentiality, methods for gaining access to data and resources on computers, application safety for technologies offered as a service via the cloud, and physical and manpower security are some of these challenges. According to Kazan (2010), authenticity, authority, and accountability are less important in terms of cloud computing security than data protection, continuous operations, and recovery from disasters.

Many businesses are hesitant to store their internal data on devices outside of their walls that might also house applications from other businesses. Secrecy and privacy issues are also an element of security because companies providing services gain access to all data provided and could inadvertently or intentionally use it for undesirable purposes. (Date et al., 2015). Basic privacy problems include confidentiality, the necessity for users to upload and keep sensitive material in data centers that are open to the public as well as copyright, the laws governing data protection and audits (Yang & Tate, 2009).

2. **Non availability of Internet:** For cloud computing to be successful depends on a consistent quality and source of internet connection (Kynetix, 2009). Due to internet outages, unreliable connections, or CSP disruptions, this raises a lot of questions about how businesses will continue to operate (Armbrust et al., 2010). Cloud-based applications like Google Reader and several office productivity tools provide an offline alternative that lets users continue with their activity even when they have erratic connection to the internet in order to help reduce this issue. Nevertheless, not all cloud-based programs can be used offline (Sakshat, 2010).

3. **Delay incurred in transferring data:** Another issue is delay, or the latency in data packet transfers, especially when employing time-sensitive applications like those utilized in international trading and financial markets (Kynetix, 2009). The internet's unexpected latency and the resulting data transfer constraints have an influence on cloud computing's ability to fully realize its potential (Yang & Tate, 2009; Armbrust et al., 2010). Customers find it difficult to migrate their data among sites because vendors employ proprietary and distinctive user interfaces, APIs, and databases. This makes them more vulnerable to changes in CP prices, issues with reliability, and possibly company closure (Yang & Tate, 2009; Armbrust et al., 2010).

4. **Reliability**: The availability of cloud services at a specific time and under specific circumstances as well as their perfect and uninterrupted delivery, are other terms for reliability in cloud computing (Garg et al., 2013). The majority of people believe that cloud computing is more dependable than traditional computing because cloud services are always available and have built-in redundancy (Gupta et al., 2013). However, numerous associations and groups such as Federal Trade Commission, the Open Web Application Security Project, and the Cloud Security Alliance, are trying to improve the reliability of cloud service providers (Subashini, & Kavitha, 2011; Armbrust et al., 2010; Dillon et al., 2010).

5. **Organizational Competency:** Organizational readiness refers to a manager's opinion and assessment of the degree that they think and feel that their

organization has the expertise, resources, dedication, and governance for embracing an IT. Technical readiness (infrastructure and human resources for cloud computing usage and administration) and financial readiness (monetary resource for implementing cloud computing and for operational costs daring usage) are two dimensions that have been broadly used to define the term (Oliveira & Martins, 2010; Musawa & Wahab, 2012). Also, it calls for specialist human resources, i.e., individuals employed by the company who possess the knowledge and abilities necessary to execute cloud computing services (Wang. 2007). The firms who have strong infrastructure, knowledgeable staff, and funding help make the technology more useful.

6. **High Cost of Internet:** A recent analysis found that monthly broadband prices are drastically different all throughout the world. The Internet is today seen as a fundamental human right, since it allows us access to everything from financial services to education and health. In Ghana, internet providers package costs vary per network providers offered, ranging from about €1.5 to £89, an equivalent of C10- C450, which gives subscribers about I gigabyte of data to 100 gigabytes of data per month. Internet accessibility in Ghana is mostly from the use of mobile of which about 30 % of Ghanaian netizens subscribe to and mobile telephone usage has about 34% users of internet. Furthermore, home accessibility to internet has also about 45% of Ghanaians opting for this offer and 35% of Ghanaians having access to internet at their respective workplaces and place of education.

Methodology

In this study, we aim to evaluate the advantages and difficulties in implementing cloud computing services among Ghanaian SMEs, specifically Kumasi Metropolis. To ensure that all SMEs were covered, the researchers employed stratified and simplified random sampling approaches to gather data. It was done using a mixture of methods. Data were gathered at the quantitative and qualitative levels. The qualitative data was gathered through interviews, whereas the quantitative data was gathered using a questionnaire. All five of the Kumasi Metropolitan's sub-metros, Manhyia North, Manhyia South, Tafo, Bantama, Nhyineso, and Subin, were subjected to questionnaire administration and interviewing.

To evaluate and contextualize the quantitative data gathered through the questionnaire, as well as to thoroughly understand the problems surrounding the advantages and difficulties of SMEs adopting cloud computing, interviews were performed. The quantitative data analysis used frequency distribution and percentages. A single linear regression was also employed to determine the correlation between implementation of cloud computing and the firm’s performance.

Discussion and Analysis

The study sought to evaluate the benefits and difficulties in executing cloud computing services among SMEs in Kumasi Metropolis in the Ashanti Region of Ghana. Data was gathered from one hundred (100) SME managers and owners, IT personnel or officers and other crucial decision makers in the Kumasi metropolis. Tables, percentages and charts were used in the analysis. This analysis was done with the help of SPSS (v.17). A simple linear regression was used to ascertain the correlation between firm's performance and cloud computing adoption.

- **Demographics**

The demographic characteristics considered include the following: Gender, Education, Age of respondents, Nature of business and Age of business.

Table 1: Demographics

Demographics	Responses	Frequency	Percentage (%)
Gender	Male	66	66
	Female	34	34
	Total	***100***	***100%***
Education	Illiterate	2	2
	Basic	12	12
	Second Cycle	34	34
	Tertiary	52	52
	Total	***100***	***100%***
Age of respondents	21-30 years	8	8
	31-40 years	30	30
	41-50 years	46	46
	51 years and above	16	16
	Total	***100***	***100%***
Nature of business	Service	75	75

	Manufacturing	20	20
	Agriculture	5	5
	Total	***100***	***100%***
Age of Business	1 – 5 years	20	20
	6 – 10 years	48	48
	11 -15 years	17	17
	16 – 20 years	10	10
	Above 20 years	5	5
	Total	***100***	***100%***

Source: Field survey, 2022.

The gender analysis from the above showed that 66% were male whiles 34% were female. It could therefore be said that the male SME owners/managers in Kumasi were more than the female counterparts.

From the table above, data assembled showed that 2 respondents representing 2% had no formal education (illiterates), 12 respondents representing 12% had basic education, 34 respondents representing 34% had Secondary education whilst 52 tertiary graduates representing 52%. Per the educational attainment from the analysis, most of the SME owners/Managers (52%) had higher educational status and is a notable sign of their level of knowledge as far as managerial and IT skills are concerned.

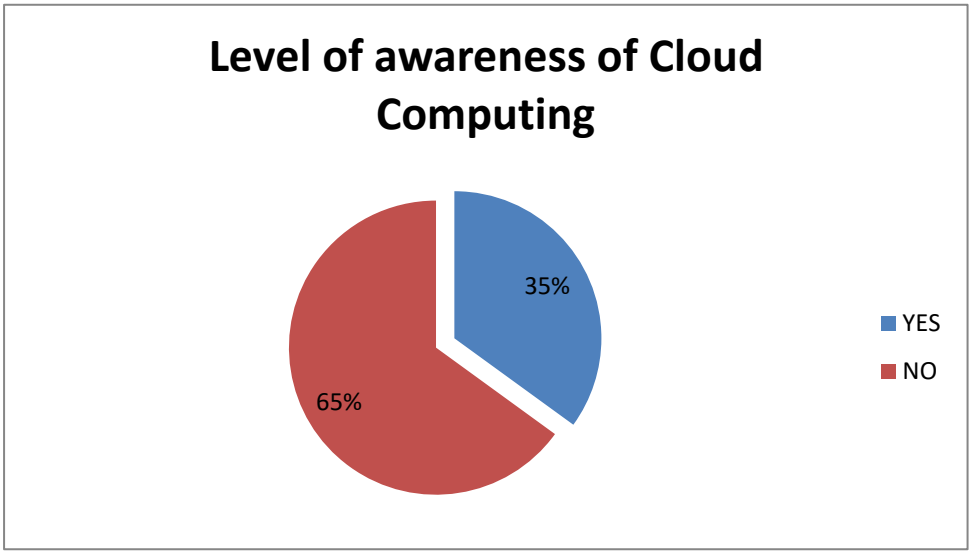
Table I also showed that 8% of the participants were between the ages of 21and 30, 30% of the participants were between 31-40, 46% were between 41 50 years of age while 16% were 51 years and above. It can be deduced from the table that only 16% of the respondents are youth above 50 years, so when giving the necessary support the sector can reduce unemployment among the youth.

It was evidence that majority of those who participated had been worked in their various enterprises for a long time, as 80% have spent six years and above in the businesses which are made up of Service, Manufacturing and Agriculture sectors. It is a sign of good management style to control staff turnover.

- **Cloud Computing awareness level**

When asked whether the respondent have any knowledge about cloud computing, the following responses were obtained:

Figure 1: Level of awareness of Cloud Computing



Source: Field survey, 2022.

According to the study's findings above, thirty-five (35) respondents representing (35%), said they had heard of cloud computing, while sixty-five (65) of them, or 65%, said they had no idea what cloud computing was. This asserts to Yeboah-Boateng and Essandoh (2016) claims that SMEs in developing economies have a low degree of information and understanding regarding cloud computing.

As a follow up question to those who have heard of cloud computing (35) to indicate whether their firms have been using clouding computing,

Table 2: Usage of cloud computing

Usage	Frequency	Percentage (%)
Yes	11	31
No	24	69
Total	**35**	**100**

Source: Field Survey, 2022.

Only 11 out of 35 respondents, or 31% of those who were aware of cloud computing, stated that they used it for their businesses, while 24 respondents, or 69%, said they did not (Table 2). In the Kumasi Metropolitan, very few SMEs are embracing cloud computing, according to the findings. The majority of people who are acquainted with cloud computing do not apply it to their businesses.

When those respondents who answered 'NO' were asked to give reasons why they are not using cloud computing in their enterprises, the following reasons were given:

- ✓ High cost of internet.
- ✓ Lack data security and privacy.
- ✓ Non availability of internet
- ✓ Reliability
- ✓ Lack of organizational competency
- ✓ Delays incurred in transferring data.

- **Benefits of cloud computing**

When those respondents (11) who have been using clouding computing were asked to rank the benefits to their firms, the following is the summary of the results:

Table 3: The Benefits of cloud computing

Benefits	RII	Level of importance	Rank
Business process efficiency	0.89	High	1st
Business growth through innovation	0.86	High	2nd
Cost reduction and Variabilization	0.85	High	3rd
Scalability	0.78	High	4th
More storage space	0.71	High	5th
Higher mobility	0.66	Medium	6th
Access and connectivity to various devices	.063	Medium	7th

Source: Field Survey, 2022.

According to Table 3, business process efficiency had the greatest relative index score, at 0.89, followed by business growth through innovation, at 0.86, and cost reduction and variabilization at 0.85. The next two advantages listed by respondents were scalability and more storage space, with index values of 0.78 and 0.71. respectively. Higher mobility was the next indexed value er mobility was the next indexed value, with a Relative Index of 0.66, followed by Access and connectivity to various devices, with a Relative Index of 0.63.

- **Impact of cloud computing usage on organizational performance**

A simple linear regression was utilized to determine the link between the effects of cloud computing utilization and the firm's performance. Table 4 below displays the summary in full.

Table 4: Overview of cloud computing usage and simple linear regression for the relationship between firm performance

Variables	R-square	β-value	Model Fit	p-value
Use of cloud computing	.134	.258	.000	.000
On the performance of firms	.			

Source: Field Survey, 2022.

According to the R-square value in the table, the independent variable (firm performance) predicts 13.4% of the variation in the dependent variable (use of cloud computing). Nevertheless, the independent variable it contained tended to anticipate the dependent variable, making the model fit value of.000 significant. The direction of the link between cloud computing utilization and the firm's success is shown by the regression model's 0.258 coefficient. The study's conclusions reveal a strong correlation between employing cloud computing and raising organizational performance (p-value = 0.000, β-value = 0.258). This confirms that, as SMEs embrace cloud computing, organizational performance also begins to improve, and vice versa.

Findings

The study's findings showed that SMEs in the Kumasi Metropolitan had little idea on cloud computing. Only a small percentage of participants made use of cloud computing in their businesses and confirmed to the fact that doing so has various advantages. Concerning difficulties in the implementation of cloud computing, majority of respondents cited high internet cost, not accessibility and reliability of internet, lack of internal expertise and knowledge, a lack of a clear and functional legal framework, delays in data transfer and migration and lack of internal expertise and knowledge as major obstacles. However, it should be noted that the main obstacle to SMEs adopting cloud computing is their awareness of its presence. Accosting to the findings of this research, up to 65% of respondents were unaware of the existence and advantages of cloud computing. The findings also demonstrate that cloud computing has a major effect on business' performance.

Conclusion

In developing economies, the work of SMEs is shown enormous promise, but there are still problems with technology use. The industry would become more effective when the awareness level of cloud computing is raised. This study evaluated the benefits and barriers to cloud computing adoption among SMEs. The analysis and highlighting of the advantages and implementation challenges associated with cloud computing contribute to the body of knowledge. Given the many advantages SMEs that have adopted cloud computing have experienced, it is projected that more SMEs will use cloud-based services in the future to help their business operations. In this study, the effect of cloud computing on organizational performance has been carefully examined. The study's conclusions can help SME decision-makers take full responsibility for educating their businesses on new technologies, their advantages, and their limitations in order to apply them successfully.

Recommendations

The research makes the following recommendations in light of its findings:

- The National Board for Small Scale Industry (NBSSI) and its Business Advisory Centers must be strengthened and well-resourced in order to offer Ghanaian SMEs the essential training and workshops on cloud computing.
- Businesses are urged to engage in cloud services and integrate them into their daily operations in order to improve customer relation, gain access to new markets and prompt and timely delivery.
- Cloud computing ought to be included in an all-encompassing national IT policy or development framework. It will influence how effective cloud adoption and usage strategies are developed by government organizations and policy makers.
- For their staff to get more expertise, Firms must prioritize offering IT training facilities. To enable SMEs to comprehend and value the services and applications supplied, providers must provide sufficient training and integrate free training into the adoption process.

Future Research

There is a gap in the literature regarding how SMEs migrate to the cloud, how this affects current operations, and how this affects the viability of the company. Investigations should be conducted into the entire migration process and w SMEs adapt to the changes. Also, more research must be done on the deficiency of studies on the policies, the law, and the clarity of security issues relating to adopting of cloud computing by Ghanaian SMEs.

References

Alshamaila, Y., Papagiannidis, S. & Li, F. (2013). ―Cloud computing adoption by SMEs in the north east of England: a multi-perspective framework‖,. *Journal of Enterprise Information Management*, Vol. 26 No. 3, pp. 250-275.

Armbrust, M., Fox, A., Griffith, R., Joseph, A.D., Katz, R., Konwinski, A., Lee, G., Patterson, D., Rabkin, A., Stoica, I. & Zaharia, M. (2010). ―A view of cloud computing, *Communications of the ACM,*, Vol. 53 No. 4, pp. 50-58.

Benlian, A., & Hess, T. (2011). Opportunities and risks of software-as-a-service: Findings from a survey of IT executives. *Decision Support Systems*, 52(1), 232-246.

Berman, S., Kesterson-Townes, L., Marshall, A., & Srivathsa, R. (2012). How cloud computing enables process and business model innovation. *Strategy & Leadership, 40*(4), 27-35.

Buttell, A., (2016). 6 reasons to switch to cloud computing. *Journal of Financial Planning.*, 6-7.

Buyya, R., Broberg, J. & Goscinski, A. (Eds),. (2011). *Cloud Computing: Principles & Paradigms.* New York, NY: Wiley Press.

Cleverley, M. (2009). Emerging markets: How ICT advances might help developing nations. *Communications of the ACM*, 52(9), 30-32.

Creeger, M. (2009). CTO roundtable: Cloud computing. *Communications of the ACM,* 52(8), 50-56.

Date, H., Gangwar, H & Ramaswamy, R. (2015). "Understanding determinants of cloud computing adoption using an integrated TAM-TOE model". *Journal of Enterprise Information Management,, Vol. 28*(1), 107-130,. doi:https://doi.org/10.1108/JEIM-08-2013-00

Dillon, T., Wu, C. & Chang, E. (April 20-23, 2010). ―Cloud computing: issues and challenges‖,.
Proceedings of 24th International Conference on Information Networking and Applications (pp. 27-33.). Perth: IEEE.

Garg, S.K., Versteeg, S. & Buyya, R. (2013). ―A framework for ranking of cloud computing
services‖. *Future Generation Computer Systems,* Vol. 29 No. 4, pp. 1012-1023.

Gupta, P., Seetharaman, A. & Raj, J.R. (2013). ―The usage and adoption of cloud computing by
small land medium businesses. *International Journal of Information Management*, Vol.

33 No. 5, pp. 861-874.

Houghton, A. K. & Winklhofer, H. (2004). The Effect of Website and E-commerce Adoption on the Relationship between SMEs and their Export Intermediaries. *International Small Business Journal, 22*(4), 369-388.

Ifinedo, P. (2011). ―Internet/e-business technologies acceptance in Canada‘s SMEs: an explorative investigation‖. *Internet Research, Vol. 21 No. 3,, 21*(3), 255-281.

Iyer, B. & Henderson, J.C. (2010). ―Preparing for the future: understanding the seven capabilities of cloud computing‖. *MIS Quarterly Executive, 9*(2), 117-131.

Jang, S. (2010). ― An empirical study on the factors influencing RFID adoption and implementation‖. *Management Review: An International Journal, 5* (2), 55-73.

Katzan, H. (2010). ―On the privacy of cloud computing‖. *International Journal of Management and Information Systems, 14*(2), 1-12.

Kuo, A. (2011). Opportunities and challenges of cloud computing to improve health care services. (67, Ed.) *Journal of Medical Internet Research, 13*(3).

Kim, W. (2009). Cloud Computing: Today and Tomorrow. *The Journal of Object Technology*, *8*(1), 65. doi:10.5381/jot.2009.8.1.c4

Kynetix. (2009). *Group,* Retrieved from Cloud Computing-Strategy guide for board level
executives:

www.google.ie/search?q=Kynetix+Technology+Group+(2009)%2C+%E2%80%9CCloud+computing+%E2%80%93+a+strategy+guide+for

Luoma, E. & Nyberg, T. (2011). Four scenarios for adoption of cloud computing in China.
Proceedings of the European Conference on Information Systems (pp. 1-3). Helsinki: Association of Information Systems. doi: http://aisel.aisnet.org/ecis2011/123

Makena, J. (2013). Factors that affect cloud computing adoption by small and medium enterprises in Kenya. *nternational Journal of Computer Applications Technology and Research, 2*(5), 517-521.

Marston, S., Li, Z., Bandyopadhyay, S., Zhang, J., & Ghalsasi, A. (2011). Cloud computing the
business perspective. *Decision Support Systems, 1*, 176-189.

McCarthy, N. (2017, November 22). *The Most and Least Expensive Countries for Broadband*. Retrieved August 2018, from Forbes Magazine:

Mell, P. & Grance, T. (2010). The NIST definition of cloud computing.

Communications of the ACM, 53(4), 50-58.

Misra, S., & Mondal, A. (2011). Identification of a company's suitability for the adoption of cloud computing and modelling its corresponding return on investment. *Mathematical and Computer Modelling, 53*(3-4), 504-521.

Musawa, M.S. & Wahab, E. (2012). The adoption of electronic data interchange (EDI) technology by Nigerian SMEs: a conceptual framework. *Journal of Business Management and Economics, 3*(2), 55-68.

Oliveira, T. & Martins, M.F. (2010). Firms patterns of e-business adoption: evidence for the European Union-27. *The Electronic Journal Information Systems Evaluation, 13*(1), 47- 56.

Oliveira, T., Thomas, M. & Espadanal, M. (2014). Assessing the determinants of cloud computing adoption: an analysis of the manufacturing and services sectors. *Information and Management, 51*(5), 497-510.

Premkumar, G. & Roberts, M. (1998). Adoption of new information technologies in rural small
businesses. *Omega, 27*(4), 467-484.

Ramdani, B., Kawalek, P. and Lorenzo, O. (2009). Predicting SMEs' adoption of enterprise systems. *Journal of Enterprise Information Management, 22*(1/2), 10-24.

Romero, N. (2012). Cloud computing‖ in library automation: benefits and drawbacks. *The*
Bottom Line, 25(3), 110-114.

Sakshat. (2010). *National Mission on Education through Information & Communication*
Technology. Retrieved from www.sakshat.ac.in.

Salwani, M.I., Marthandan, G., Norzaidi, M.D. & Chong, S.C. (2009). E-commerce usage and business performance in the Malaysian tourism sector: empirical analysis. *Information Management & Computer Security, 17*(2), 166-185.

Saya, S., Pee, L., & Kankanhalli, A. (2010). The impact of institutional influences on perceived technological characteristics and real options in cloud computing adoption. *ICIS 2010 Proceedings.*

Senyo, P. K., Effah, J., Addae, E. (2016). Preliminary insight into cloud computing adoption in a
developing country. *Journal of Enterprise Information Management, 29*(4), 505-524. doi:https://doi.org/10.1108/JEIM-09-2014-0094.

Son, I., Lee, D., Lee, J.-N. & Chang, Y.B. (2014). Market perception on cloud

computing initiatives in organizations: an extended resource-based view. *Information & Management, 51*(6), 653-669.

Subashini, S. & Kavitha, V. (2011). A survey on security issues in service delivery models of cloud computing. *Journal of Network and Computer Applications, 34*(1), 1-11.

Subramanian, B. (2012). The disruptive influence of cloud computing and its implications for adoption in the pharmaceutical and life sciences industry. *Journal of Medical Marketing: Device, Diagnostic and Pharmaceutical Marketing, 12*(3), 192-203.

Sultan, N. (2010). Cloud computing for education: A new dawn? *International Journal of Information Management, 30*(2), 109-116.

Sultan, N. (2011). Reaching for the ―cloud‖: How SMEs can manage. *International Journal of Information Management, 31*(3), 272-278.

Wang, M. L.-K. (2007). Knowledge management systems diffusion in Chinese enterprises: a multi-stage approach with the technology-organization-environment framework. *PACIS 2007 Proceedings* (p. 70). Auckland: PACIS.

Wang, Y., Wang, Y. & Yang, Y. (2010). Understanding the determinants of RFID adoption in the manufacturing industry. *Technological Forecasting & Social Change, 77*(5), 803-815.

Winans, T.B. & Brown, J.S. (2009). Moving information technology platforms to the clouds:
insights into IT platform architecture transformation. *Journal of Service Science, 2*(2), 23-
33.

Yang, H. & Tate, M. (2009). Where are we at with cloud computing? A descriptive literature review. *20th.* Melbourne: Australasian Conference on Information System

Yang, H. & Tate, M. (2012). A descriptive literature review and classification of cloud computing research. *Communications of the Association for Information Systems, 31*(2), 35-60.

Yeboah-Boateng, O. E & Essandoh, K. A. (2014). Factors Influencing the Adoption of Cloud
Computing by Small and Medium Enterprises in Developing Economies. *International Journal of Emerging Science and Engineering, 2*(4).

Zhang, Q., Cheng, L., & Boutaba, R. (2010). Cloud computing: State-of-the-art and research challenges. *Journal of Internet Services and Applications, 1(1),* 7-18.