

**UNIVERSITY OF MINES AND TECHNOLOGY**

**TARKWA**

**FACULTY OF INTEGRATED MANAGEMENT SCIENCE**

**DEPARTMENT OF MANAGEMENT STUDIES**

**A THESIS REPORT ENTITLED**

**IMPACT OF CLOUD COMPUTING ON THE BUSINESS OPERATION OF SMALL  
AND MEDIUM ENTERPRISES (SMEs) IN GHANA**

**SUBMITTED IN FULFILMENT OF THE REQUIREMENT FOR THE AWARD OF THE  
DEGREE OF MASTER OF BUSINESS TECHNOLOGY AND MANAGEMENT  
STUDIES (MANAGEMENT INFORMATION SYSTEM)**

**BY**

**EMMANUEL AMUAH**

**FEBRUARY 2022**

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**THESIS SUPERVISORS**



.....  
**DR JOSEPH DERY NYEADI**  
**(PRINCIPAL SUPERVISOR)**

A blue ink signature, likely belonging to Dr. Emmanuel Eli Fianu, is shown below the signature of the principal supervisor.

.....  
**DR EMMANUEL ELI FIANU**  
**(CO-SUPERVISOR)**

## DECLARATION

I declare that this thesis is my work. It is being submitted for the degree of Master of Business and Technology Management (Management Information System) degree at the University of Mines and Technology (UMaT), Tarkwa. It has not been submitted for any degree or examination in any other University.

.....

(Signature of Candidate)

..... day of ..... (Year).....



## ABSTRACT

The aim of this study is to assess the impact of cloud computing on SMEs Business Operations in Ghana using data collected from SMEs in the Western Region of Ghana. The study adopted a descriptive research design and simple random sampling method to gather 153 responses received through a self-administered questionnaire as the data collection instrument. The data captured and cleaned in Microsoft Excel was analysed using IBM Statistical Package for Social Sciences (SPSS) version 25. An Ordinary Least Square Estimation Model was used in testing the relationships between Cloud computing and SMEs Business operations. The findings show that, the adoption cloud computing and ICT in general by SMEs in Ghana is relatively high. Most workers in these SMEs have a fair knowledge about cloud computing, and their organizations have separate units and dedicated staff for the ICT units. The study also showed that SMEs in Ghana have the compatibility to adopt cloud services. Again, the study revealed that even though data security is of concern for the SMEs, cloud services has improved the security of their data since most of the SMEs have local central based data storage for their businesses. The study concludes that the use of cloud computing among SMEs in Ghana is relatively high, even though previous studies have shown otherwise. Finally, this study concludes that there is a strong positive relationship between cloud computing and SMEs Business Operations. The study recommends that the government should create a compliance office, responsible for ensuring that businesses embrace cloud computing, which proved to be very effective for ensuring the security of data for organizations. In addition, cloud-service providers in Ghana should be licensed and regulated by law to build businesses confidence in cloud services.

## **DEDICATION**

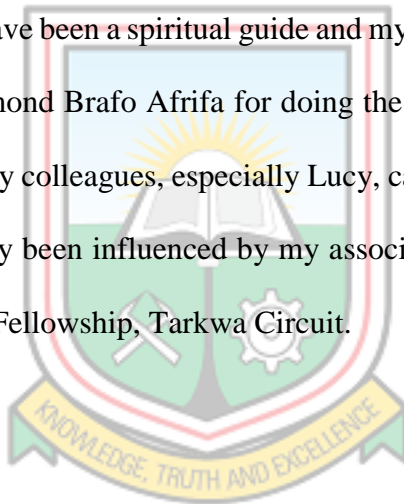
I dedicate this work to the Amuah and Afful families for their immeasurable support emotionally, spiritually, and financially during my postgraduate studies. I further dedicate this work to my wife, Mrs. Anita Amuah for being a strong pillar behind my success. Finally, to my son, Abeiku Amuah Afful, this is a special dedication to you because God bestowed you upon me in such a time as this.



## ACKNOWLEDGEMENTS

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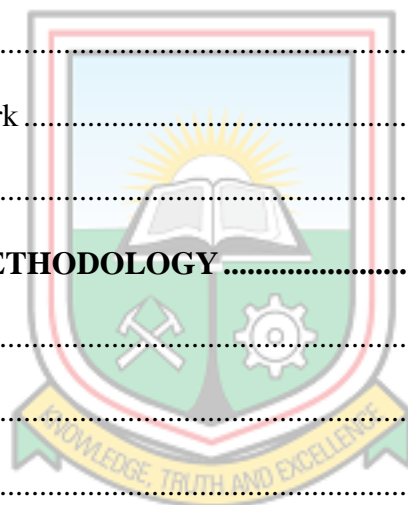
My sincerest appreciation goes to my family for taking responsibility for my financial needs in my education from the basic level through to this far. My father in the Lord, Very Rev. Alex Abeiku Afful, you have been a spiritual guide and my mentor in climbing the academic ladder. I thank Dr. Blestmond Brafo Afrifa for doing the proofreading for this thesis. The massive contribution of my colleagues, especially Lucy, cannot be overlooked. The success in this research has greatly been influenced by my association with the Methodist Church Ghana, Methodist Youth Fellowship, Tarkwa Circuit.



# TABLE OF CONTENTS

Contents	Page
<b>DECLARATION.....</b>	<b>i</b>
<b>ABSTRACT.....</b>	<b>ii</b>
<b>DEDICATION.....</b>	<b>iii</b>
<b>ACKNOWLEDGEMENTS.....</b>	<b>iv</b>
<b>TABLE OF CONTENTS.....</b>	<b>v</b>
<b>LIST OF FIGURES .....</b>	<b>viii</b>
<b>LIST OF TABLES .....</b>	<b>ix</b>
<b>LIST OF ABBREVIATIONS .....</b>	<b>x</b>
<b>CHAPTER ONE INTRODUCTION .....</b>	<b>1</b>
1.1 Background of the Study.....	1
1.2 Statement of the Problem.....	4
1.3 Objectives of the Study.....	5
1.3.1 General Objective.....	5
1.3.2 Specific Objectives.....	5
1.4 Research Questions .....	5
1.5 Justification of the Study.....	5
1.6 Scope of the Study .....	6
1.7 Limitations of the Study.....	6
1.8 Organisation of the Study .....	6
<b>CHAPTER TWO LITERATURE REVIEW .....</b>	<b>8</b>
2.0 Introduction.....	8

2.1 Conceptual Review .....	8
2.1.1 The Concept of Cloud Computing .....	8
2.1.2 Concept of Cloud-based System .....	9
2.1.3 Concept of Small and medium-sized enterprises (SMEs).....	11
2.1.4 Cloud Deployment and Service Models Theories .....	14
2.2 Theoretical Review .....	18
2.2.1 Transaction Cost Theory .....	18
2.2.2 Resource-Based Theory .....	20
2.2.3 Dynamic Capabilities Theory .....	22
2.3 Empirical Review .....	24
2.4 Conceptual Framework .....	26
2.5 Chapter Summary.....	27
<b>CHAPTER THREE METHODOLOGY .....</b>	<b>28</b>
3.0 Introduction .....	28
3.1 Research Design.....	28
3.2 Population .....	29
3.3 Sampling and Sampling Techniques .....	29
3.4 Data Collection Technique.....	30
3.5 Validity and Reliability .....	31
3.6 Data Analysis Technique .....	31
3.6.1 Model Specification .....	31
3.7 Chapter Summary.....	32
<b>CHAPTER FOUR RESULTS AND DISCUSSIONS .....</b>	<b>33</b>





4.0 Introduction .....	33
4.1 Demographic Characteristics .....	34
4.2 General Usage of Cloud Computing by SMEs in Ghana.....	38
4.3 Evidence of cloud Computing Usage and Quality of Service.....	42
4.4 Inferential Statistics.....	46
4.3.1 Regression Analysis – Cloud Computing on Business Operation .....	47
4.4 Discussion of Findings .....	49
4.4.1 Demographics of respondents .....	49
4.4.2 Evidence of cloud Computing Usage and Quality of Service .....	50
4.4.3 Impact of Cloud Computing on SMEs Business Operation.....	51
4.5 Chapter Summary.....	52
<b>CHAPTER 5 SUMMARY OF FINDINGS, RECOMMENDATIONS AND</b>	
<b>CONCLUSION.....</b>	<b>54</b>
5.0 Introduction .....	54
5.1 Review of Research Objectives .....	54
5.2 Summary of Findings .....	55
5.3 Recommendations/Policy Implications.....	56
5.4 Future Research Direction.....	56
5.5 Conclusion .....	57
<b>REFERENCES .....</b>	<b>58</b>
<b>APPENDIX 1: QUESTIONNAIRE.....</b>	<b>68</b>
<b>INDEX.....</b>	<b>77</b>

## LIST OF FIGURES

Figure	Page
2.2 Cloud Services of the service models. ....	16
2.3 TOE framework .....	17
2.4 Conceptual framework .....	27



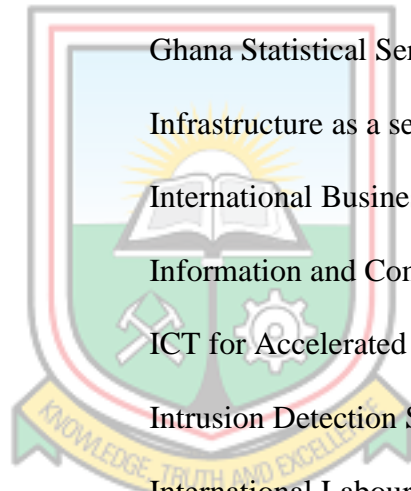
## LIST OF TABLES

Table	Page
4.1 Reliability Statistics .....	33
4.2 Demographic information of respondents.....	35
4.3 General Usage of Cloud Computing adoption in Ghana .....	38
4.4 Evidence of cloud computing usage and quality of services by SMEs.....	42
4.5 Inferential statistics .....	47
4.6 Descriptive Statistics of main variables .....	47
4.7 Regression Analysis – Cloud Computing on SMEs Business Operation .....	48



## LIST OF ABBREVIATIONS

ACRONYMS	MEANING
ACP	Ability of Cloud Provider
AES	Advanced Encryption Standard
Covid-19	Coronavirus Disease 2019
CPT	Compatibility
CPX	Complexity
CSPs	Cloud Service Providers
GDP	Gross Domestic Product
GSS	Ghana Statistical Service
IaaS	Infrastructure as a service
IBM	International Business Machines
ICT	Information and Communication Technology
ICT4AD	ICT for Accelerated Development
IDS	Intrusion Detection System
ILOSTAT	International Labour Organization Statistics
IT	Information Technology
MSME	Micro, Small and Medium Enterprises
OVF	Open Virtualization Format
PaaS	Platform as a Service
RA	Relative Advantage
SaaS	Software as a Service
SBO	SME's Business Operations



SLA	Service Level Agreement
SMEs	Small and Medium Enterprises
SPSS	Statistical Package for the Social Sciences
TAM	Technology Acceptance Model
TOE	Theory of Technology Organization and Environment
TTP	Trusted Third Party
UN	United Nations
VHD	Virtual Honey



# CHAPTER ONE

## INTRODUCTION

### 1.1 Background of the Study

According to Nkuah et al., (2013), small SMEs are defined by the Ghana Statistical Service (GSS) as organisations with less than ten employees, whereas medium and large businesses have more than ten employees. Small and medium-sized companies (SMEs) have been highlighted as the major instrument for developing nations to achieve fast industrialisation and other developmental objectives (Kayanula and Quartey, 2000). SMEs are expected to employ 85 per cent of the manufacturing workers in Ghana, contribute 70% of the country's GDP, and account for 92 per cent of the country's enterprises (Abor and Quartey, 2010). Despite the importance of SMEs in Ghana's economic growth, the nation confronts several challenges, including the installation of information technology systems (Wambugu, 2018).

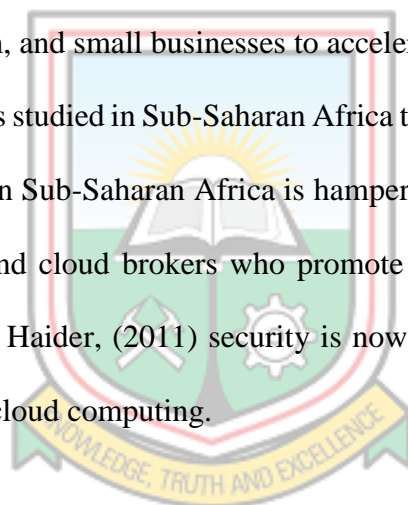
Cloud computing is frequently defined as a method for delivering IT-enabled services via internet-based software, platforms, and infrastructure (Gangwar et al., 2015). "Cloud computing may be a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with little management effort or interaction from service providers" (Mell and Grance, 2011). The popularity of cloud computing started in 2007 and was seen as a resource optimizer that provided services to clients separated by geographical differences (Etro, 2011; Ruan et al., 2011; Siegle, 2010; Wang et al., 2010).

A study by Boison et al., (2016) on barriers to cloud computing adoption in Ghana's tertiary institutions. They state in their report that "tertiary institutions in Ghana have either yet to formally adopt cloud computing as an emerging technology or have done so on their initiative through faculty, students, and administrators. Cloud computing enables the delivery of SaaS (software as a service), PaaS (platform as a service), and IaaS (infrastructure as a service) services (IaaS). Each service has its own set of security concerns; consequently, the Service Level Agreement (SLA) must describe the various levels of security and their complexity to support the services they provide, and thus enable customers to understand the safety policies that are being implemented uniformly regardless of the service provider (Kandukuri et al., 2009).

Businesses are rapidly gaining insight into how easily they can leverage cloud services to gain rapid access to best-of-breed business applications or augment their infrastructure resources, all at a negligible cost. According to Hocenski and Popović, (2010) concern about data security is growing, as more data on individuals and businesses is stored in the cloud. The developing world must take advantage of cloud computing opportunities while mitigating associated risks to facilitate access to advanced IT infrastructure, data centres, and applications and to safeguard sensitive information (Kshetri, 2010). Hocenski and Popović, (2010) argued that: a) security concerns indicate potential problems; b) security standards provide some relatively straightforward security templates that cloud service providers (CSPs) can follow, and c) the most promising standard in the longer term is Open The Open Virtualization Format (OVF format) claims to empower organisations to innovate

by allowing them to create new business models. d) Security management models provide suggestions based on industry-accepted security standards and best practices. Consumer adoption of cloud computing services continues to be hampered by concerns about cloud computing security, especially data security and privacy protection (Chen and Zhao, 2012).

Over the years, information technology (computation) has evolved from centralized (client-server) to more virtualized centralization (Cloud Computing) (Gangwar et al., 2015). This has aided in the resolution of the IT gap problem by readily available and low-cost IT solutions (Wambugu, 2018). Abubakar, (2016) explained that cloud computing has been adopted by large, medium, and small businesses to accelerate their growth for years. Cloud computing adoption is less studied in Sub-Saharan Africa than in the rest of the world. Cloud computing development in Sub-Saharan Africa is hampered by several factors, including a lack of local providers and cloud brokers who promote foreign cloud service providers. According to Shaikh and Haider, (2011) security is now the most vital threat to both the users and the vendors of cloud computing.



In Ghana, the vision for development in this information age is through the ICT for Accelerated Development (ICT4AD) agenda based on the policy framework document titled “An Integrated ICT-led Socio-economic Development Policy and Plan Development Framework for Ghana” (Anon., 2003). There has not been enough literature evidence to show the level of adoption of cloud computing by SMEs in Ghana. However, Yaw et al. (2015) researched a Cloud computing framework for e-health adoption difficulties and solutions in Ghana: a case study of the Ghana health service. In their study, they assessed



the degree of ICT knowledge among healthcare stakeholders, establishing the feasibility of cloud computing deployment and establishing a framework for cloud-based E-Health acceptance. Udunwa et al., (2019) developed a migration framework for microfinance banks in Accra - Ghana.

## **1.2 Statement of the Problem**

In recent times, cloud computing has attracted attention from researchers in Ghana and globally. This is due to the tremendous rise in the availability of information as a result of technological improvements and discoveries which has arisen and elevating the effective use of contemporary information technology to the status of a crucial competitive business tool (Beheshti, 2004). Due to intense market competition and a rapidly changing business climate, businesses are being recommended to use a variety of cutting-edge information technologies (IT) to increase the efficiency of their operations (Sultan, 2010).

Even though cloud computing has a huge potential in Ghana and Africa as a whole, there exist numerous challenges that need to be addressed. A lot has been said and done on the use of cloud computing, potential risk of cloud computing and benefits for businesses which include reduced cost and increased productivity but much attention has not been placed on the impact of the subject on small and medium enterprises (SMEs) business operations. The aforementioned has left a research gap in academia that provide scientifically proven information on the impact of cloud computing on small and medium enterprises (SMEs) business operation in Ghana hence this study focus on filling this research gap.

### **1.3 Objectives of the Study**

#### **1.3.1 General Objective**

The purpose of this study is to examine the impact of cloud computing on the business operation of Small Medium Enterprises (SMEs) in Ghana.

#### **1.3.2 Specific Objectives**

1. To establish evidence of the general cloud computing usage by SMEs in Ghana.
2. To assess the impact of cloud computing on SMEs business operations.

### **1.4 Research Questions**

1. What is the extent of the use of cloud computing in SMEs business operations in Ghana?
2. What is the impact of cloud computing on the business operation of SMEs in Ghana?

### **1.5 Justification of the Study**

SMEs in developing economies including Ghana have a very low level of awareness of cloud computing (Yeboah-Boateng and Essandoh, 2014) but are not left out in cloud computing research in the Sub-Saharan African region. Even though there has been some recent research on cloud computing in Ghana, not much has been done on the impact of cloud computing on business operations of Small and Medium Enterprises (SMEs) in Ghana. This has therefore created a research gap that researchers should investigate, hence, the need for this work. This work will contribute to knowledge in cloud computing in Ghana and will also contribute to effective management and policy makers' decisions in the impact of cloud computing small and medium enterprises (SMEs) business operation.

## **1.6 Scope of the Study**

The targeted population for the research was SMEs in the Western Regions of Ghana by using stratification. The primary data were analyzed using Statistical Package for the Social Sciences (SPSS) version 25 and the results were presented using tables, figures, and write-ups. This research will contribute to knowledge, close the research gap in cloud computing its influence on SMEs business operations.

## **1.7 Limitations of the Study**

Despite the flexibility of the research instrument, several limiting factors were identified as below:

1. Internet connectivity was required to access the questionnaire hence SMEs with no connectivity could not take part in the survey.
2. Some social media users were reluctant to respond due to the fear of data theft.
3. Due to the outbreak of the coronavirus (Covid-19) as a global pandemic, physical contact with people was avoided hence, SMEs that were not linked to the social networks could not access the research tool.

## **1.8 Organisation of the Study**

The study has five main chapters: The first chapter covers the introduction that will contain brief background information of the study, the definition of the problem statement, outlines the research objectives and research questions. Chapter two; literature review: to highlight the empirical conceptual and theoretical framework on the level of adoption of cloud computing and its impact on data security, the perceptions, benefits, and challenges. Chapter

three; methodology and methods used in data collection, analysis, and interpretation of the study. Chapter four deals with data presentation, analysis, and discussion of findings. Chapter five contains a summary of key findings, conclusions and recommendations, future research, and the limitations of the study.



## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.0 Introduction**

This chapter is a combination of theoretical and empirical review literature reviewed from previous works related to this work. It embodies the description of cloud computing, theories encircling it as well as SMEs and how cloud computing impacts SMEs.

#### **2.1 Conceptual Review**

Below are some of the underlining concepts related to the topic:

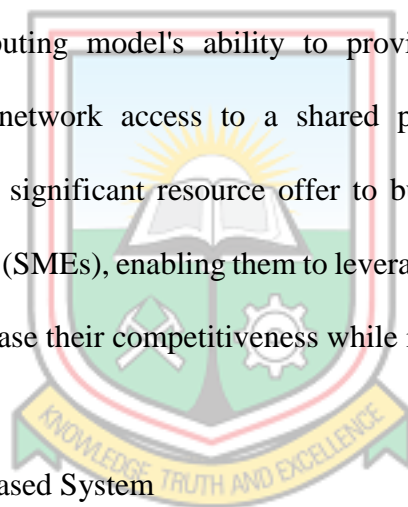
##### **2.1.1 The Concept of Cloud Computing**

Some researchers argue that cloud computing is difficult to define because it lacks a clear definition (Yeboah-Boateng and Essandoh, 2013; Wireko and Azumah, 2017). One of the simplest ways to define cloud computing is that it involves service providers utilizing the internet to deliver software and technology as services to their customers (Abubakar, 2016). On October 25, 2011, the National Institute of Standards and Technology defined cloud computing as "a model for providing ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (such as networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction" (Mell and Grance, 2011; Abubakar, 2016).

Furthermore, according to Gangwar et al., (2015), cloud computing is defined as a method of delivering IT-enabled services in the form of software, platforms, and infrastructure

through the use of internet-based technologies. "Cloud computing is a consumer/delivery model in which information technology capabilities are offered as services that are billed on a usage basis," explained Boison et al., (2016) in their discussion of Seke (2015). Computer resources and technologies that are accessible via the internet, in which users request the necessary space and pay for it without having to worry about maintenance or security, are characterized. In all of the definitions provided, the fact that cloud computing provides users with storage space, and that their data is accessible from anywhere there is internet connectivity, is clearly stated (Rao and Selvamani, 2015).

Due to the cloud computing model's ability to provide businesses with ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources, it represents a significant resource offer to businesses, particularly small and medium-sized enterprises (SMEs), enabling them to leverage accessible IT facilities to grow their businesses and increase their competitiveness while incurring fewer costs.



#### 2.1.2 Concept of Cloud-based System

Chen and Zhao, (2012) indicated that even though there are numerous perceived advantages of Cloud computing compared to traditional IT models data security and privacy protection remain one of the greatest concerns of enterprises in the adoption of the cloud service (Rao and Selvamani, 2015; Subashini and Kavitha, 2011). Cloud-based Data security refers to policies, regulations, technologies, and controls deployed to protect user data, information, applications, and associated infrastructure of the cloud as a sub-domain of information security (Chen and Zhao, 2012). The major security concerns are group as external attack

and breach of owner privacy by the cloud service provider (Sood, 2012). Chen and Zhao (2012) advocated that every cloud user should be well informed with privileged user access, regulatory compliance, data location, data segregation, recovery, investigative support, and long-term viability before deploying data to the cloud. Zissis and Lekkas, (2012) outlined trust, security identification of threats which include confidentiality and privacy, integrity, and availability as the essential tools in securing information systems thereby proposing using a Trusted Third Party (TTP) within a cloud system by enabling trust and using cryptography to ensure the confidentiality, integrity, and authenticity of data and communications.

Sohal et al., (2018) proposed a cybersecurity framework based on three technologies that are Markov model, the Intrusion Detection System (IDS), and Virtual Honeypot Device (VHD) to identify malicious edge devices in a cloud-computing environment. Osei (2013) in dealing with the Trusted-Security problems in both the cloud and traditional in-house architecture proposed a two-step authentication concept using the logical "AND" gate mathematical model for interlocking the user computer to a mobile phone by using system development life cycle.

In addition, Rewagad and Pawar, (2013) in their paper titled "Use of Digital Signature with Diffie Hellman Key Exchange and AES Encryption Algorithm to Enhance Data Security in Cloud Computing" proposed a combination of digital signature and Diffie Hellman key exchange blended with Advanced Encryption Standard (AES) encryption algorithm to protect the confidentiality of data stored on the cloud. They argued that if a hacker gets

access to the secret key through a transmission medium, the Diffie Hellman key exchange makes it useless because the key that is transmitted is of no use without the user's private key, which is confined only to the legitimate user. They, therefore, proposed a three-way architecture mechanism that makes it difficult for hackers to break the security system, hence, protect data stored in the cloud.

### 2.1.3 Concept of Small and medium-sized enterprises (SMEs)

The term Small and Medium-Sized Enterprises (SMEs) is defined differently in different countries. Many academics from around the world have attempted to come up with a suitable definition, based on various factors such as the number of employees, total net assets, sales and/or investment level to arrive at a consensus. The number of employees has traditionally been the most commonly used criteria for defining SMEs. Companies with fixed assets (excluding land) of less than US\$ 250,000, according to the World Bank's definition of SMEs since 1976, are emphasized by Kayanula and Quartey (2000). Grindle and Thomas (1989) defined small-scale enterprises as those with fewer than or equal to 25 permanent members and fixed assets (excluding land) valued at less than or equal to US\$ 50,000. According to the United Nations Industrial Development Organization's definition, medium enterprises are firms with 20 to 99 employees and small enterprises are those with 5 to 19 employees in developing countries, whereas, in industrialized countries, medium enterprises are firms with 100 to 499 employees and small enterprises are those with less than 99 employees.

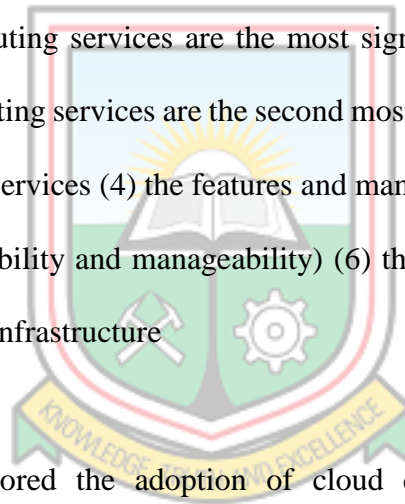


This study is focused on the definition of SMEs by Ghana Statistical Service (GSS) and has adopted the same as the operational definition: small enterprises are those that employ less than ten people, while those that employ more than ten people are classified as Medium and Large-Sized Enterprises (Nkuah et al., 2013).

According to Al-Ismaili et al., (2016) despite the promising competitive advantage and technological advancement cloud computing brings to light for SMEs, the adoption of cloud computing is still progressing at a slower pace than other industries. Small and medium-sized enterprises (SMEs) in Sub-Saharan Africa have placed a high priority on issues such as security, privacy, and trust, rather than embracing cloud computing as a new paradigm to improve their information technology infrastructure (Abubakar, 2016). After discovering that 67% of their respondents were not familiar with a local cloud service provider, Opoku and Kwarteng (2015) proposed effective sensitization among small and medium-sized enterprises (SMEs) in Ghana. SMEs and government organizations in Ghana have faced additional challenges in adopting cloud computing due to the lack of a formal compliance regulatory body to guide them through the process of compliance (Boison et al., 2016; Wireku and Azumah, 2017).

SMEs in developing economies lack awareness of cloud computing, according to a study conducted by Yeboah-Boateng and Essandoh (2013). They concluded that education and sensitization on cloud computing will help SMEs better understand emerging technology and its implications. The rate of acceleration and growth of information and communications technology (ICT) and, in particular, cloud computing, continues to attract

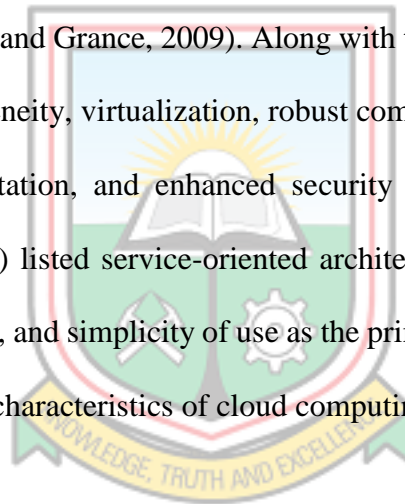
attacks on data security, as hackers and other "bad nuts" attempt to launch attacks on institutional and personal information. A qualitative research method was used to investigate Data Security Issues in the Corporate Environment by using Mining Companies in Ghana as a case study, in light of the aforementioned findings. They concluded that the privacy, reliability, and accessibility of corporate data have a significant impact on corporate data security. According to Al-Isma'ili et al., (2016), in their paper on Cloud computing implementation decision model for SMEs: a conjoint analysis, they ranked a hierarchy of the most important factors that small and medium-sized enterprises (SMEs) are concerned about when considering cloud computing adoption. They are as follows: (1) the advantages provided by cloud computing services are the most significant; (2) the economic values gained from cloud computing services are the second most significant. (3) the dependability and availability of cloud services (4) the features and management of cloud services (5) the ability to control (integrability and manageability) (6) the compatibility of cloud services with legacy systems and infrastructure



Obinkyereh (2017) explored the adoption of cloud computing in Ghana using the Technology Acceptance Model (TAM). Using Pearson correlation and simple linear regression analysis, he discovered a positive significant association between cloud computing adoption and perceived utility, value perception, perceived risks, and perceived ease of access of cloud computing services. Furthermore, the study discovered no statistically significant association between perceived ease of use and Cloud Computing uptake in Ghana. Wireko and Azumah (2017) conducted an investigation titled "Who Owns the Cloud, and how did this come to be?" Their paper presents an empirical investigation of

cloud governance in cloud computing in Ghana "It was discovered that the diversity of technology and service offerings, as well as a lack of coherent legislation and governance, hindered the implementation of Cloud services among organizations in Ghana, which has compelled many organizations in the developing world to rely on their data centres and private clouds to protect their information assets.

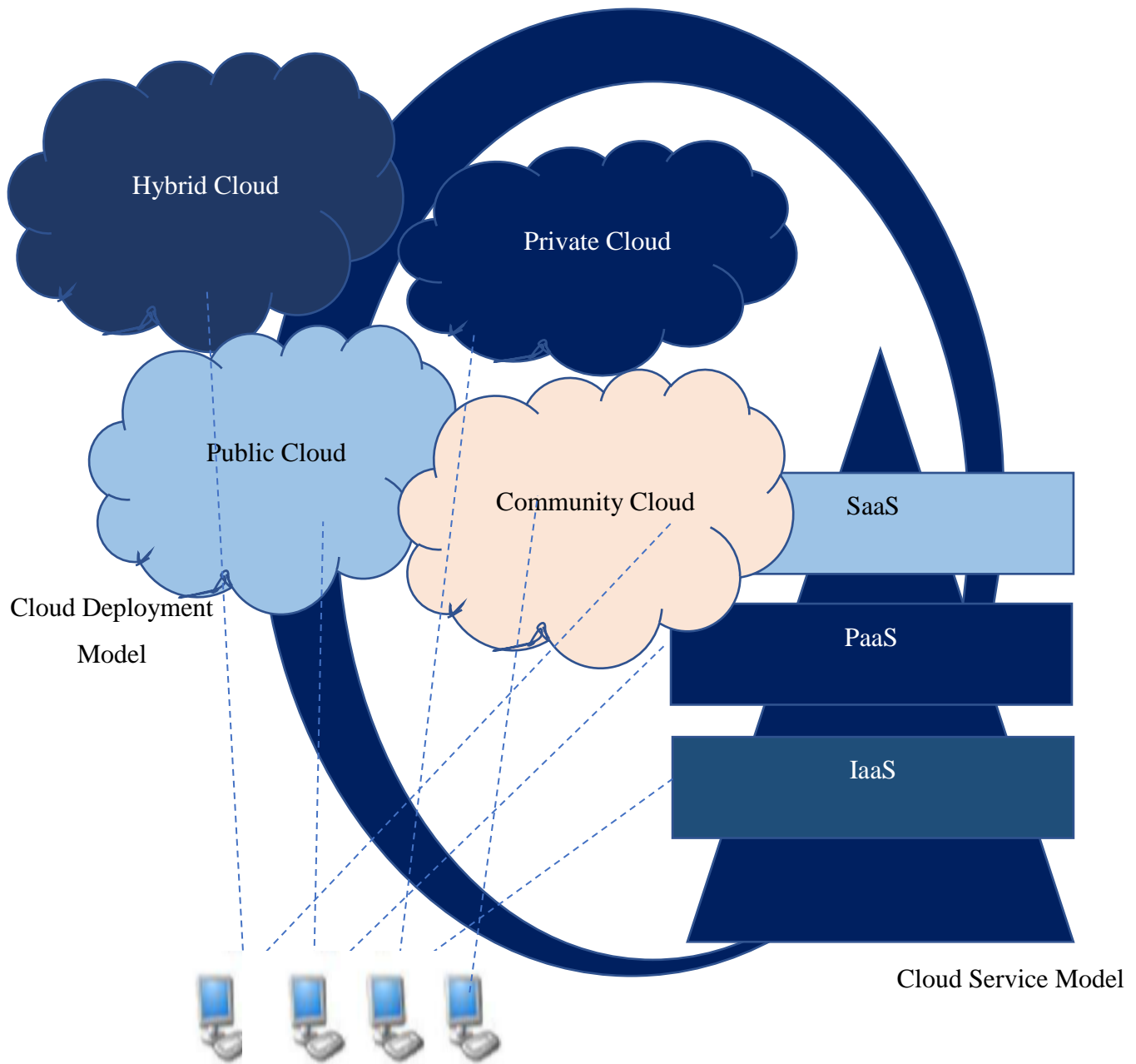
Five fundamental properties of cloud computing are determined from the paper's accepted concept of cloud computing. The fundamental qualities include self-service on-demand, extensive network access, resource pooling (location independence), quick flexibility, and measurable service (Mell and Grance, 2009). Along with the key ones, other common traits include vast size, homogeneity, virtualization, robust computing, low-cost software, global dispersion, service orientation, and enhanced security technologies (Mell and Grance, 2009). Gong et al. (2010) listed service-oriented architecture, loose coupling, good fault tolerance, business model, and simplicity of use as the primary features of cloud computing in their study titled "The characteristics of cloud computing."



#### 2.1.4 Cloud Deployment and Service Models Theories

The adapted definition highlighted four possible deployment models namely Private cloud, Community cloud, Public cloud, and Hybrid cloud. The cloud service model explains what kind of service cloud service provider renders to their customers. Cloud computing services are modelled on three fundamental bases namely Software-as-a-Service (SaaS), Platform-as-a-Service (PaaS), and Infrastructure-as-a-Service (IaaS) (Mell and Grance, 2011; Jadeja and Modi, 2012; Yeboah-Boateng and Essandoh, 2013; Pardeshi, 2014) all at pay-per-use

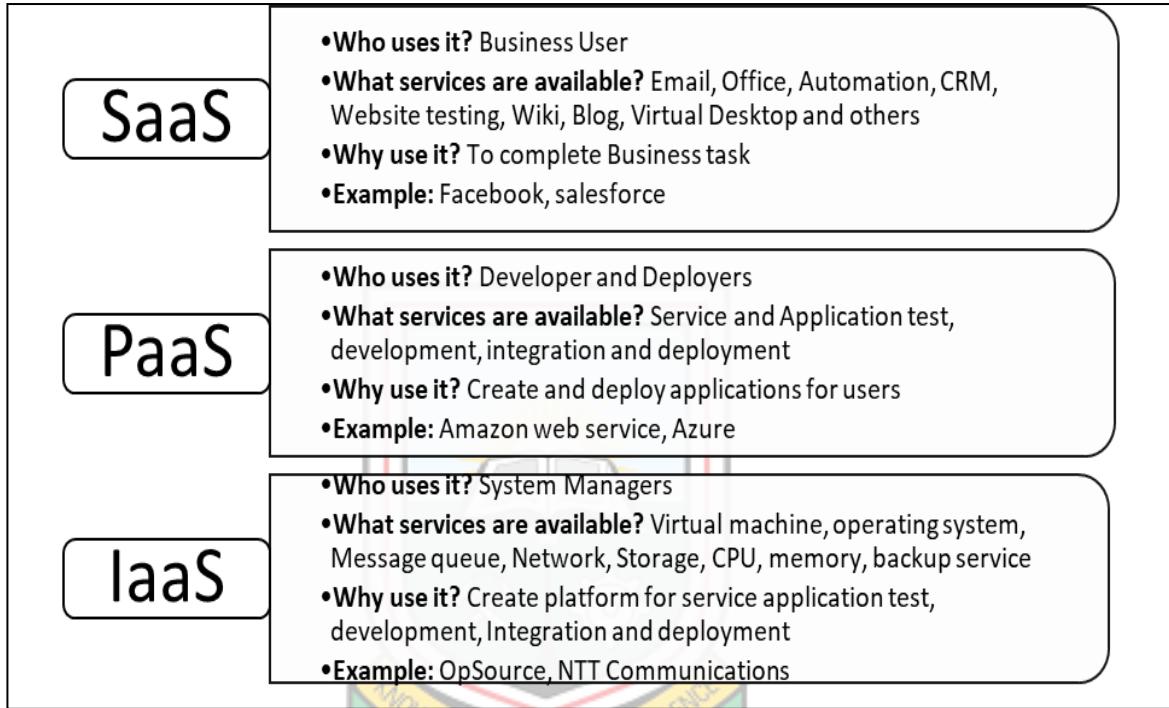
bases without initial capital (Osei, 2013) investment in infrastructure. Cloud deployment and service options are illustrated below;



*Figure 2.1: Cloud Deployment and Service Models.*

*Source: Achbarou and El Bouanani, (2017).*

Figure 2.2 adapted from Rani and Ranjan (2014) summarizes the services of the cloud service model and showed some reasons why the model is used by businesses.



*Figure 1.2: Cloud Services of the service models.*

*Source: Rani and Ranjan, (2014)*

Tweneboah-Koduah et al., (2014) used an unstructured interview methodology to interview selected government agencies in Ghana based on the theory of technology, organization, and environment (TOE) framework which history can be traced to Rogers in 1962 and with further worked on by Tornatzky and Fleischer in 1990. The TOE theory highlights three influential structures that affect the adoption and implementation of technology innovation

namely technology, organization, and environment. The variables in the model are summarized in Figure 2.3 below adopted from Tweneboah-Koduah et al., (2014).

For any organization to migrate its data to the cloud, there is a need for technological and innovation-decision to be taken by top management. Information Technology Manager must help the organization to analyse the available technology and its characteristics. The organizational structure, formal and informal communication links, and processes should be accessed thoroughly.

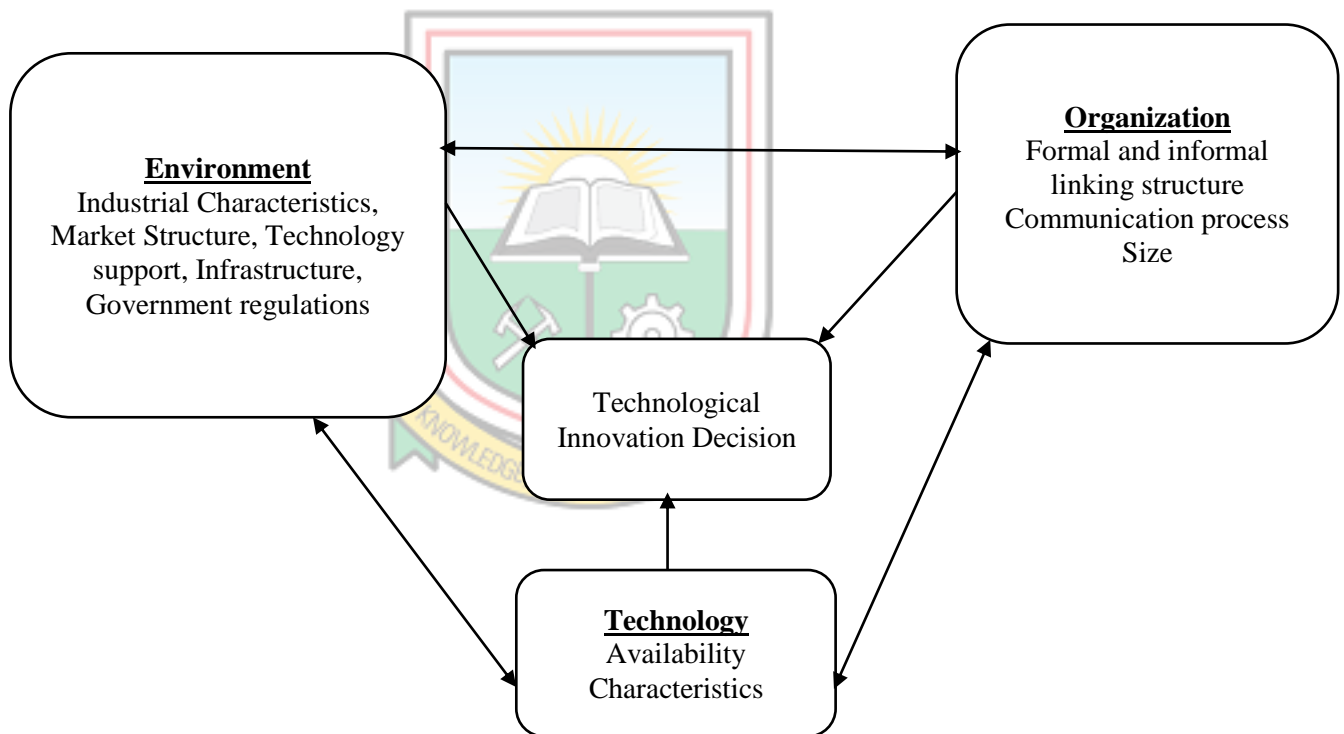


Figure 2.2: TOE framework

Source: Tornatzky and Fleischer (1990 cited in Tweneboah-Koduah et al., 2014)

Lastly, all the internal factors should be linked to the external environmental factor that affects or has the potential of affecting the adoption of cloud services. Factors such as industrial characteristics, market structure, infrastructures, governing, and regulatory bodies give the organization a competitive advantage if properly accessed. Tweneboah-Koduah et al., (2014) concluded that lack of basic infrastructure for cloud take-off, data security, unreliable internet connectivity, and general lack of institutional readiness were some factors that hinder the adoption of cloud service by the Ghanaian government. The physical platform(s) of a cloud data centre (s) housing the internal protection and security control remains the first layer of a security attack by hackers (Bartock et al., 2020).

## **2.2 Theoretical Review**

### **2.2.1 Transaction Cost Theory**

The Transaction Cost Theory is the first main theoretical approach that the research employed to investigate the influence of cloud computing adoption on the business operations of Small and Medium-Sized Enterprises (SMEs) in Ghana (TCT). According to TCT, a firm's fundamental purpose is to create governance arrangements in such a way that transaction costs are minimised (Coase, 1937). The term "transaction costs" refers to the direct or indirect costs associated with the negotiation, monitoring, and enforcement of explicit and tacit contracts between businesses (Mroczek, 2014). It is seen as a cost imposed during an economic transaction.

There are several forms of transaction fees. They include expenditures associated with search and information, negotiating, policing, and enforcement (Kumar et al., 2017). Costs

connected with locating and acquiring information are incurred while determining if a certain product or service is available in the market and who offers the best price, among other things. Bargaining expenses are those associated with the process of reaching an acceptable agreement with the other party, such as the preparation of an adequate contract. If the other party does not comply with the contract's terms, the expenses involved with ensuring that they do so and taking required action (often via the legal system) if this does not occur are included in the policing and enforcement costs (Kumar et al., 2017)

However, regardless of the sort of transaction cost involved, the most critical factor to examine is the transaction's relative cost advantage. In this sense, relative cost advantage refers to the anticipated overall cost reductions associated with transferring a programme to cloud computing rather than pursuing it internally (Mroczek, 2014). The amount to which managers see a significant relative cost-benefit from cloud computing increases the chance that they will employ it. Using the economies of scale argument, cloud computing might be considered more cost-efficient since it makes use of virtualized resources that are dynamically allocated, or "provisioned," only as needed.

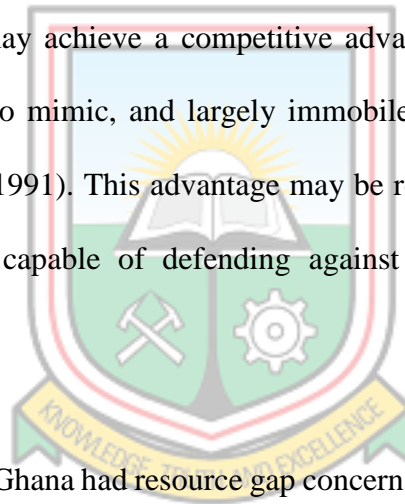
When external transaction costs are lower than internal transaction costs, sensible businesses would look for cost-cutting solutions, such as cloud computing migration, to reduce their overall expenses. It is increasingly probable that applications that cut transaction and production costs will be transferred to cloud computing in the future. In contrast, applications that increase net transaction costs when moving to cloud computing diminish managers' likelihood of deciding to use cloud computing in the first place. This leads to the



conclusion that the larger the predicted savings from SMEs' use of cloud computing in comparison to transaction costs, the more likely stakeholders will pick cloud computing.

### 2.2.2 Resource-Based Theory

The second main theoretical approach on cloud computing adoption that SME owners should consider is Resource-Based Theory (RBT). RBT's key tenet is that the organisation is seen as a collection of resources. The resource-based perspective of organisation and transaction cost economics are considered complimentary since the latter is a theory of company rents and the former is a theory of the firm's existence (Barney, 1991). According to RBT, a corporation may achieve a competitive advantage by collecting and utilising scarce, valued, difficult to mimic, and largely immobile and non-substitutable resources (Penrose, 1959; Barney, 1991). This advantage may be retained for an extended length of time if the business is capable of defending against resource imitation, transfer, or replacement.



The majority of SMEs in Ghana had resource gap concerns that needed to be addressed. The resource gap is defined as the lack of internal personnel with the technical expertise necessary to supply the application service (Alvarez and Busenitz, 2001). When compared to specialised or custom programmes, the skills and knowledge necessary to manage applications such as email or collaboration tools are more likely to be available via a cloud provider since they are more widely available. The migration of email, collaboration tools, and other applications, such as human resource management tools, to cloud computing, was initially undertaken by a large number of federal agencies because the skills and expertise

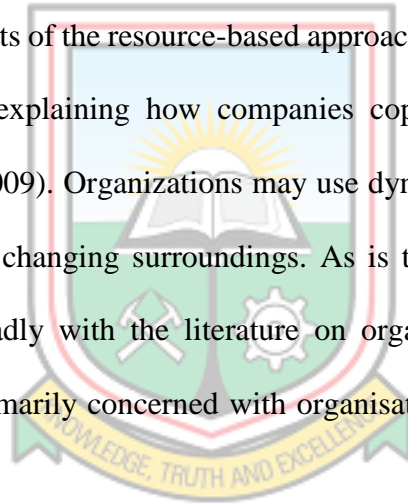
required to support them are widely available, and cloud computing vendors have gained experience with these types of application migrations. The use of cloud-based technology allows small and medium-sized enterprises (SMEs) to focus their attention and resources on acquiring and maintaining certain capabilities. This contributes to the mitigation of the risks associated with resource scarcity. As a result of adopting the RBT method, a company looks for sources of competitive advantage based on the resources and capabilities it has or has access to (Raduan *et al.*, 2009). This viewpoint is critical for analysing the uptake of cloud computing applications. Organizations must examine their present resources and compare them to future needs when designing a resource-based strategy. If the business determines that more or complementary resources are required, it may opt to buy them rather than devote the resources necessary to create them in-house (Alvarez and Busenitz, 2001). This is particularly true for businesses that are undergoing rapid and unexpected transformations.

Today, more than ever, SMEs face growing financial constraints and workforce reductions. They must continue to achieve mission objectives and make up for resource shortages. They must acquire or reallocate resources fast to maintain or strengthen their position in delivering their mission goals and addressing the demands of their customers. If a business does not have any obvious gaps in its IT skills, keeping applications with low strategic value may require the utilisation of internal resources that may be better deployed elsewhere (i.e., focusing on core competencies). When companies evaluate their IT resources and capabilities, they must consider both existing and future demands and the resources and skills offered in the cloud computing marketplace. When an organization's IT skills fall short of its requirements, it enters into agreements with external suppliers to rectify the problem.

This suggests that the greater the resource gap between stakeholders' internal resources and cloud computing resources, the more likely stakeholders will shift applications to cloud computing.

### 2.2.3 Dynamic Capabilities Theory

The dynamic capabilities theory is the third and final important theoretical approach that may be utilised to analyse SMEs' cloud computing adoption choices. The dynamic capability hypothesis denotes an organization's capacity to modify its assets and resources in response to quickly changing conditions. The notion of dynamic capabilities originated as a result of the constraints of the resource-based approach, which views resources as static and so is incapable of explaining how companies cope with changing circumstances (Klievink and Janssen, 2009). Organizations may use dynamic capabilities to change their resources in response to changing surroundings. As is the case with the resource-based paradigm and more broadly with the literature on organisational strategy, research on dynamic capacities is primarily concerned with organisational performance (Helfat et al., 2007).



Government organisations' use of information technology resources and capabilities is being shaped by the dynamic environment in which they operate today. Simply increasing the operational efficiency of IT-enabled business processes may not be enough to maintain the agility required to function in tumultuous settings. Rather than that, firms must significantly modify their IT-enabled business processes (Tuan and Takahashi, 2010).

The capacity to integrate, create, and reconfigure internal and external skills in response to rapidly changing surroundings is characterised as dynamic capabilities. This idea is based on studies in a variety of fields, including research and development management, technology transfer, manufacturing, and organisational learning. It builds on the resource-based approach, which asserts that "firms own valuable, scarce, unique, and non-substitutable resources and may create lasting competitive advantage by applying novel value-creating methods that are difficult for competitors to reproduce" (Eisenhardt and Martin, 2000).

Eisenhardt and Martin (2000) propose that dynamic skills be classified according to their kind to provide clarity to the research. While some concentrate on resource integration, others on resource reconfiguration inside enterprises. Others are concerned with the acquisition and release of resources. Organizations in the public sector are increasingly confronted with quickly changing surroundings (Pablo et al., 2007). However, although the development of dynamic skills in the commercial sector has gotten substantial emphasis in the literature, the development of analogous capabilities in the public sector has received less attention (Pablo et al., 2007). Numerous sectors, like outsourcing innovation (Eisenhardt and Martin, 2000) and e-business transformation (Eisenhardt and Martin, 2000), have recognised a spectrum of dynamic capabilities for adapting to changing situations (Daniel and Wilson, 2003).

Cloud computing apps differ from other kinds of applications in that they are characterised by their elasticity and agility. As a result, dynamic capabilities theory, which has been

applied to the study of technologies and processes that can adapt to changing environments, offers an appropriate theoretical lens through which to examine cloud computing acceptably. A fundamental difference between consumers is their readiness to share their "product," as well as their level of dedication to meeting their demands. As a result, the user is the one who makes the distinction (Muller, 2011). According to this study, the researcher's goal is to evaluate the impact of cloud computing adoption on the business operations of small and medium-sized firms (SMEs) in Ghana. In this respect, the greater the ability of cloud computing to aid corporate management in achieving their goals, the more probable it is that stakeholders will choose cloud computing for their organisations.

### **2.3 Empirical Review**

According to Ennajjar et al., (2015) study on the Cost and Security Impact of Cloud Computing on Organizations, despite its popularity, many organisations lack a broader understanding of implementing and utilising cloud computing for business and operational purposes due to the existing ambiguity regarding its cost and security implications. The qualitative study collected data on the critical benefits and hazards of cloud computing usage for enterprises in terms of cost and security, utilising an interview guide as the data collecting instrument. The findings indicate that the primary source of cost risk in the current cloud market is a lack of accurate and sophisticated cost models. Increased data protection, faster data recovery and transfer, centralization, and improved security software processes and maintenance are just a few of the highlighted security benefits. Further cost reductions in operational and administrative expenditures are viewed as the most critical cost-benefit by enterprises. The findings indicate that cloud computing is more advantageous for small

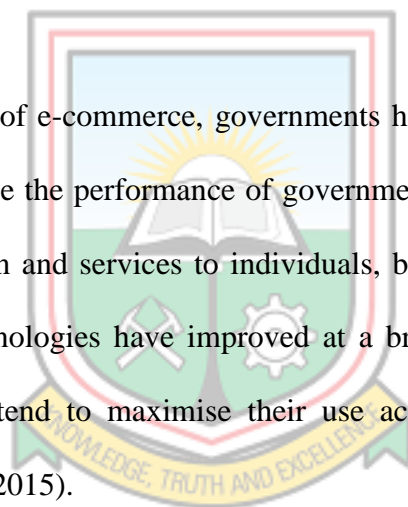
and medium-sized businesses and that the hybrid cloud model is the fittest for them. Additionally, cloud computing's cost and security issues cannot be avoided unless the issue of a lack of realistic pricing models, international regulatory frameworks, and interoperable security standards at supranational levels is resolved (Vasiljeva et al., 2017).

Attaran and Woods (2019) asserted in their study *Cloud Computing Technology: Leveraging the Power of the Internet to Improve Business Performance* that Cloud Computing Technology (CCT) has emerged as a significant technology capable of increasing an organization's operational efficiency by providing infrastructure and software solutions for all of an enterprise's needs over the Internet. Utilizing this cutting-edge technology facilitates collaboration between businesses and has the potential to generate financial and operational benefits. This finding was bolstered further by Gangwar, (2017) who examined the effect of cloud computing on corporate performance. In India, the study questioned 403 manufacturing enterprises. The data were evaluated using exploratory and confirmatory factor analysis, as well as structural equation modelling to validate the proposed model further. The findings indicate that business, human, and technology capital, change management, organisational culture, regulatory and supplier support, and company size all play critical roles in determining cloud computing utilisation and performance.

Hussein and Mohamed, (2015) collected and analysed data for their study on *Cloud Computing and Its Effect on Performance Excellence in Higher Education Institutions in Egypt* using a qualitative research technique. The study concluded that there is a significant relationship between cloud computing and performance excellence because cloud

computing is primarily concerned with completing tasks quickly and efficiently; and personnel, customers, innovation, and leadership are critical components of achieving excellence in higher education institutions and are major components of cloud computing. Mirrazavi and Khoorasgani, (2016) have discovered that cloud computing technology has a considerable favourable effect on organisational performance. Additionally, cloud computing has a favourable and significant impact on the financial, customer, and operational dimensions of organisational performance. Additionally, Donepudi, (2016) stated that cloud computing has emerged as the most promising technical advancement in recent years.

Recognizing the success of e-commerce, governments have chosen to integrate ICT into public services to improve the performance of government organisations in providing the best available information and services to individuals, businesses, and other government entities. Computing technologies have improved at a breakneck pace, and governments throughout the world intend to maximise their use across public sector organisations (Hussein and Mohamed, 2015).

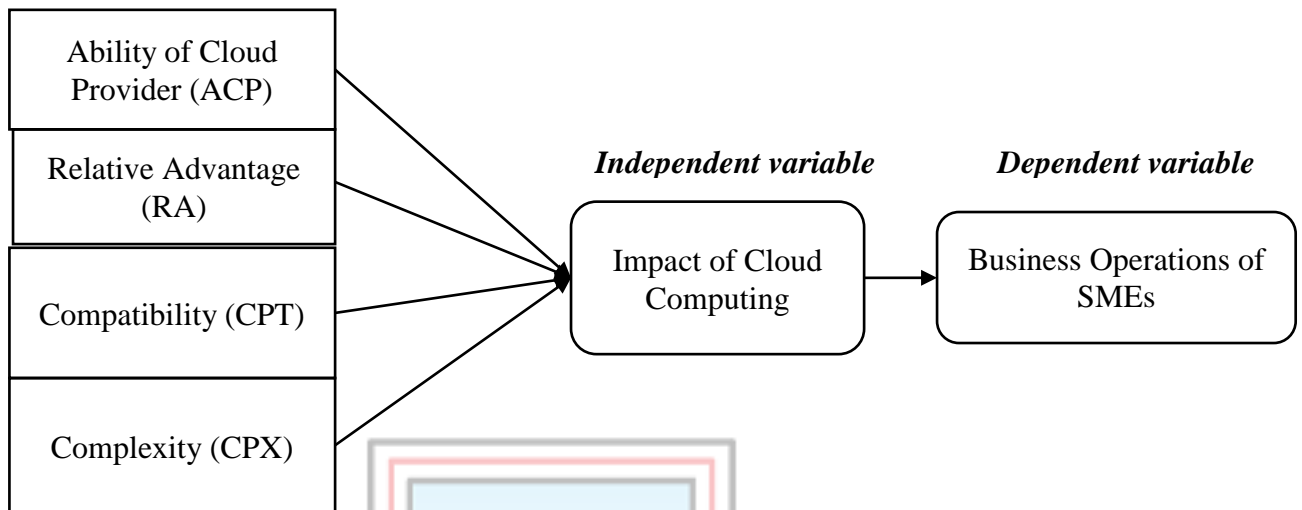


## **2.4 Conceptual Framework**

In order to reflect the reviewed literature in this work, the conceptual framework in figure 2.4 shows the variables that make up the adoption of cloud computing and the replica effect on SMEs business operations. The impact of cloud computing is the independent variable consisting of Ability of Cloud Provider (ACP), Relative Advantage (RA), Compatibility

(CPT), and Complexity (CPX) and Business Operations of SMEs is the dependent variable.

This is shown in the figure 2.4 below.



*Figure 2.3: Conceptual framework*

*Source: Author's Construct, 2021*

## 2.5 Chapter Summary

This chapter examined the existence of academic literature for the subject under research. It was evident that literature on the use of cloud computing and its impact on SMEs business operations in Ghana is scarce, hence the subject under research intends to fill the academic gap.



## **CHAPTER THREE**

### **METHODOLOGY**

#### **3.0 Introduction**

This chapter seeks to explain the techniques and approaches adopted to carry out the research, which investigates the impact of cloud computing on SMEs business operations in Ghana. The chapter further stipulates the research design and approach, population and sampling techniques, data collection technique, research instrument, data analysis, and limitations associated with conducting the research activities.

#### **3.1 Research Design**

Research design is a systematic plan for initiating and concluding a study - operationalizing variables to make them quantifiable, selecting an appropriate sample, collecting data, and analyzing the results (Kumar, 2011). A research design is a blueprint or a strategy devised expressly to address the research topic and to minimize variance. A research design is a framework or plan for conducting research that describes the procedures necessary to gather the data necessary to solve the research challenge (Malhotra and Dash, 2010). Similarly, it is an outline of the process that the study will follow; thus, it includes the study's purpose, significance, location, the type of data required and where it can be obtained, the period, sample design and technique or method for data collection, how data will be analyzed, and the style in which the report will be prepared. This study adopted a descriptive research design. This choice is based on its low cost and its capacity to collect data on a wide variety of topics, including attitudes, opinions, and personal facts, all of which are included in this study.

### 3.2 Population

Population refers to a comprehensive collection of elements (people or objects) that share some common characteristic as defined by the researcher's sampling criteria (Saunders et al., 2015). The National Micro, Small and Medium Enterprises (MSME) Policy prepared by the Ministry of Trade and Industry outlined that 90% of businesses in Ghana registered under the Registrar General are MSMEs (Anon, 2019) forming the study population. The population of the study refers to Small and Medium Enterprises in the Western Region of Ghana that has adopted ICT and Cloud Computing in their daily business activities.

### 3.3 Sampling and Sampling Techniques

SMEs as a sampled population has been noted to provide about 85% of the manufacturing employment of Ghana and contribute about 70% to Ghana's GDP and account for about 92% of businesses in Ghana (Abor and Quartey, 2010).

This study adopted the Yamane formula to determine the sample size, and it is shown below;

$$n = \frac{N}{1 + N(e)^2} \quad (3.1)$$

Where  $n$  = sample size,  $N$  = estimated population,  $\alpha$  = confidence level (95%) and  $e$  = Significant level of error (0.05) or 5%.

$$n = \frac{400}{1 + 400(0.05)^2} \Rightarrow n = 200$$

Therefore, the sample size adopted after inputting the estimated population into the Yamane formula is 200.

### 3.4 Data Collection Technique

Primary data was collected by using self-administered electronic questionnaires hosted on google form starting from 27<sup>th</sup> December 2020 and ending on the 27<sup>th</sup> of February 2021. The questionnaire was distributed to individual employees and owners of small and medium enterprises of duty categories such as Senior Managers, Managers, Senior Staff members, Junior Staff members, and General Hand workers through social media and emails across the western region of Ghana. The medium of administration of the questionnaire was fast (Doherty, 2012) and could reach the target group at any part of the country with internet connectivity and the respondents had the flexibility to respond at their own pleasant time without any interference from the researcher (Selm and Jankowski, 2006).

The questionnaire instrument used consists of five divisions. Part I: Demographics, Part II: Company classification, Part III: Cloud Computing usage in Ghana while Part IV: Impact of cloud computing on SMEs Business Operation based on the Likert scale. Five-point rating scale where responses ranged from Strongly Disagree (1) to Strongly Agree (5).

The research instrument was constructed such that a link between cloud computing and SMEs Business operation could be established. All the questions were itemized for respondents to select from the list by ticking in the allocated space. Each response was saved in the google spreadsheet database for analysis.

### **3.5 Validity and Reliability**

A questionnaire as an instrument for conducting social sciences research is one of the most widely accepted tools for obtaining accurate and relevant information, which is more reliable and valid. The concept of Validity and Reliability of research instrument help to provide sufficient consistent, sound, and relevant evidence that provide information that must be both valid and reliable. Ghauri et al., (2020) explain validity as the actual area under investigation is covered by the data collected and measures exactly what is intended to measure (Golafshani, 2003; Field, 2013). The measurement phenomenon must provide a stable and consistent result, which is the main reliability concern (Carmines and Zeller, 1979), and repeatability. A reliable scale or test is if a measurement repeated under constant conditions produces the same result (Moser and Kalton, 1989).

### **3.6 Data Analysis Technique**

The raw data from respondents was captured into a google spreadsheet and transformed into a Microsoft Excel spreadsheet. IBM Statistical Package for Social Sciences (SPSS) version 25. Techniques employed in the data analysis include descriptive statistics such as sum, mean, standard deviation, minimum, and maximum of the study. Correlation and regression analysis were used in testing the relationships that exist between the dependent variable and the independent variables and other control variables.

#### **3.6.1 Model Specification**

In striving to achieve the stated purpose of the research that is quantitative, descriptive statistics are used to explain the first objective. The other objectives were achieved by using

correlation and regression models respectively. The model to be estimated is deduced from the simple linear regression model presented as:

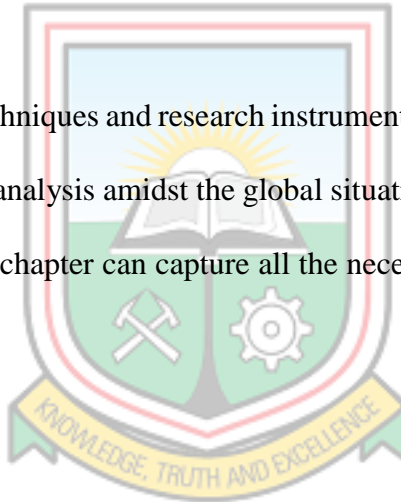
$$SBO_i = \alpha + \beta_1 ACP + \beta_2 RA_i + \beta_3 Cpt_i + \beta_4 Cpx_i + \varepsilon_i \quad (3.2)$$

Where  $SBO_i$  – SMEs Business Operation is the dependent variable.

On the other hand, ACP – Ability of Cloud Provider, RA – Relative Advantage, Cpt – Compatibility, and Cpx – Complexity are the independent variables.  $\alpha$  is the value of  $SBO_i$  when all of the independent variables are equal to zero,  $\beta_1, \dots, \beta_4$  are the estimated regression coefficients, and  $\varepsilon_i$  is the error components of the equation.

### 3.7 Chapter Summary

The chapter consists of techniques and research instruments designed to add some flexibility to the data collection and analysis amidst the global situation of the covid-19 pandemic. All the tools employed in the chapter can capture all the necessary data needed for the success of the study.



## CHAPTER FOUR

### RESULTS AND DISCUSSIONS

#### 4.0 Introduction

Chapter four (4) presents the results of the study and makes discussions with existing literature. 200 questionnaires were distributed through email and social media and the researcher received 195 responses representing a response rate of 97.5% ( $195 \div 200 \times 100 = 97.5\%$ ). Out of the 195 responses, 42 were rejected after data cleaning. The valid responses therefore were 153. The study runs reliability to verify the strength of the data collection instrument. The findings show that the questionnaire has a reliability of 79.9% which shows that the set of questions meets the acceptable standard of reliability test. The results are shown in Table 4.1

**Table 4.1: Reliability Statistics**

A	Standardized Items	Mean	Std. Dev	Variance	N of Items
0.739	0.799	137.99	12.887	166.074	50

Source: Author's Construct, 2021

Table 4.1 above shows that the research instrument is in good shape to measure the various constructs ( $\alpha=0.739$ ). This means that the questionnaire used to collect the data is reliable.

The results in this chapter are divided into two main categories, demographics, and results of the study. The demographics are presented in frequency tables, making use of the counts

(frequencies of responses), also expressed in percentages. The results of the study are also presented in frequency tables, charts, and inferential statistics.

#### **4.1 Demographic Characteristics**

The demographic of respondents presents the features of respondents based on their gender, age, educational level, duty category, company classification, region of operation, organization size, the industry of the company, and the number of years that the respondents have worked in their current organizations. As stated earlier, the demographics of the respondents are presented in frequencies and displayed in charts where necessary. Table 4.2 shows the demographic information of respondents.

##### **4.1.1 Gender of respondents**

Out of the 153 respondents that were accepted for this study, almost seventy per cent (68.0%) of the respondents were Males, with the remaining thirty (32.0%) of them being Females. This implies that males were dominant in this study. Hence, males have more information on the study than females.

##### **4.1.2 Age of respondents**

Furthermore, the study found that most of the respondents for this study were between the ages of 26 and 33 years. Thus, a total of 98 respondents, represented by 64.0% were between the ages of 26 and 33 years, followed by the ages of 34 and 44 years, equivalent to 18.3%, and then the ages of 18 and 25, having a frequency of 25, equivalent to 16.3%. Finally, the ages of 45 to 52; and 53 to 60, both had frequencies of 1, representative of 0.7% respectively.

**Table 4.2: Demographic information of respondents**

Variable	Category	Frequency	%
Gender	Male	104	68.0%
	Female	49	32.0%
Age	18 and 25	25	16.3%
	Between 26 and 33	98	64.0%
	Between 34 and 44	28	18.3%
	Between 45 and 52	1	0.7%
	Between 53 and 60	1	0.7%
Education Level	Basic	2	1.3%
	Secondary	8	5.2%
	Tertiary	113	73.9%
	Postgraduate	28	18.3%
	Others	3	1.3%
Duty Category	Senior Manager	12	7.8%
	Manager	10	6.5%
	Senior Staff	42	27.5%
	Junior Staff	57	37.3%
	General Hand	10	6.5%
	Others	22	14.4%
Organizational Structure	Public Sector	51	33.3%
	Private Sector	92	60.1%



	Others	10	6.6%
Organizational Size	Small	25	16.3%
	Medium	128	83.7%
Working Duration (Years with the Organization)	Less than 1 year	34	22.2%
	Between 1 and 3 years	54	35.3%
	Between 3 and 6 years	33	21.6%
	Between 6 and 9 years	21	13.7%
	More than 10 years	11	7.2%

(Source: Author's Construct, 2021)

#### 4.1.3 The educational level of respondents

The educational level of the respondents shows that 73.9% of the respondents completed tertiary education, 18.3% of the respondents were post-graduates, 5.2% of the respondents were secondary school certificate holders, and 1.3% of the respondents were basic school certificate holders and “others” category respectively. The “others” included Vocational, Technical, and informal education. A graphical representation is shown below. The implication is that majority of the respondents have ample knowledge on the subject matter based on their qualification hence can give information that will help in making informed discussion and conclusions.

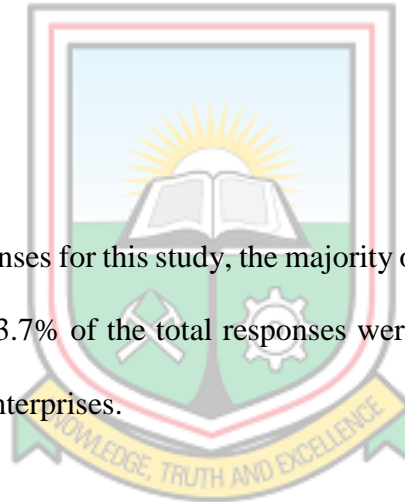
#### 4.1.4 Duty Category

The duty category of the respondents shows that 37.3% of the respondents are junior staff, 27.5% are senior staff, followed by 7.8% were senior managers and 6.5% were managers

and general hand workers respectively. There were also 14.4% respondents in the “others” category as shown in the figure below.

#### 4.1.5 Organizational Structure

The organizational structure of the respondents was meant to determine whether the organizations under study were either in the public or the private sectors. The majority of respondents were from the private sector represented by 60.1%. Conversely, the respondents from the public sector were represented by 33.3%. The remaining respondents were in the other category, which was made up of public-private partnerships as shown in the figure below.



#### 4.1.6 Organizational Size

Out of the 153 valid responses for this study, the majority of respondents were from medium enterprises. In essence, 83.7% of the total responses were from medium enterprises while the rest was from small enterprises.

#### 4.1.7 Working duration (in years) with the organization

This section sought to find the number of years that the respondents have been with their respective organizations. As shown in Table 4.2 above, 54 (35.3%) respondents who have worked for between 1 and 3 years, 34 (22.2%) of the respondents who have worked for less than a year, 33 (21.6%) of the respondents who have worked for between 3 and 6 years, 21 (13.7%) of the respondents who have worked for between 6 and 9 years, and 11 (7.2%) of the respondents who have worked for 10 years or more, in their respective organizations.

## 4.2 General Usage of Cloud Computing by SMEs in Ghana

This section of the chapter sought to find the general usage of cloud computing by SMEs in Ghana. To achieve this, respondents were asked a couple of questions and the results are presented in Table 4.4 below. Responses for this section were determined by the use of the mean, to find the average response of all the respondents for a given question or statement.

The majority 132 (86.3%) of the respondents agreed that they use computers in their organizations, making use of local central databases with 50 (32.7%) and 105 (68.6%) being knowledgeable about cloud computing. Also, respondents indicated that they got to know about cloud computing through learning institutions (42, 27.5%). 30.7% of respondents indicated their organizations have adopted cloud services while 59 (38.6%) have no idea whether their organizations have adopted cloud services. The majority of the respondents (88.9%) do not know how much their organization spend yearly on cloud services while 3.9% of respondents indicated their organization's averagely spending five hundred Ghana cedis (GH¢ 500) yearly. Further, most (47.6%) of the respondents have familiarity with cloud computing, and 48.4% work remotely.

**Table 4.3: General Usage of Cloud Computing by SMEs in Ghana**

Variable	Option	Freq	%
Qualification in ICT	No	67	43.8
	Yes	86	56.2
	No	28	18.3

ICT unit and dedicated personnel	Yes	112	73.2
	I do not know	13	8.5
Computer usage	No	21	13.7
	Yes	132	86.3
Type of data storage facility	Stand-alone computers	47	30.7
	Local central database	50	32.7
	External (outsourced) database	22	14.4
	Others	34	22.2
Cloud computing knowledge	No	48	31.4
	Yes	105	68.6
Source of Cloud Computing Knowledge	At workplace	16	10.5
	Friends/Family	10	6.4
	News item/advertisement	14	9.2
	Social media	31	20.3
	The school (learning institution)	42	27.5
	I have never heard of it	40	26.1
Adopted any cloud services	No	47	30.7
	Yes	47	30.7
	I do not know	59	38.6
Average Cost cloud services per year	Less than GH¢50.00	2	1.3
	Between GH¢50.00 and GH¢199.00	5	3.3

	Between GH¢200.00 and 499.00	4	2.6
	Above GH¢500.00	6	3.9
	I have no idea	136	88.9
Cloud service provider based in Ghana	No	23	15.0
	Yes	27	17.7
	I do not know	103	67.3
Familiarity with cloud computing	Very Low	44	28.8
	Low	37	24.2
	Average	54	35.3
	High	14	9.2
	Very High	4	2.5
Do you work remotely?	No	79	51.6
	Yes	74	48.4
Software-as-a-Service	No	87	56.9
	Yes	66	43.1
Platform-as-a-Service	No	138	90.2
	Yes	15	9.8
Infrastructure-as-a- Service	No	148	96.7
	Yes	5	3.3
None	No	78	51.0
	Yes	75	49.0

Cloud model is deployed	Private cloud (exclusive to the organization)	62	40.5
	Public cloud (opened to the general public)	14	9.2
	Community cloud (exclusive to a group of organizations with a common interest)	4	2.6
	Hybrid cloud (a combination of two or more of the above)	5	3.3
	None	68	44.4
File Sharing and Transfer	No	96	62.8
Cloud-based application	Yes	57	37.2
Data backup and Storage	No	95	62.1
cloud-based application	Yes	58	37.9
Data Analysis cloud-based application	No	119	77.8
	Yes	34	22.2
Email cloud-based application	No	67	43.8
	Yes	86	56.2
Web Conferencing cloud-based application	No	130	85.0
	Yes	23	15.0
Project Management	No	143	93.5
cloud-based application	Yes	10	6.5

eLearning cloud-based application	No	137	89.5
	Yes	16	10.5
Text Messaging cloud-based application	No	112	73.2
	Yes	41	26.8
Time Management cloud-based application	No	141	92.2
	Yes	12	7.8
None of the cloud-based application	No	153	100
	Yes	0	0.0

(Source: Author's Construct, 2021)

#### 4.3 Evidence of cloud Computing Usage by SMEs in Ghana

Using the mean to determine the average responses, the result of the study is as shown below. The respondents agreed that there is strong credibility of the cloud provider to protect user's data, and that cloud services providers have the skills and expertise to handle the required data security needs of their customers and agreed that their cloud service providers can deliver time (24 hours) services.

**Table 4.4: Evidence of cloud computing usage and quality of services by SMEs**

Statement	Min.	Max.	Mean	SD
Credibility	1	5	3.59	0.862
Required skills and expertise	1	5	3.65	0.790
Ability to deliver timely services (24 hours)	1	5	3.71	0.808
Increase data sharing and availability	1	5	3.63	0.887

Improves operational efficiency, productivity, and quality of work	1	5	3.72	0.807
Easier access to work remotely compared to traditional on-premises computing	1	5	3.78	0.794
Access to the latest version of software applications and technology compared to the traditional on-premises computing	1	5	3.65	0.756
Easy to backup data on cloud computing than traditional on-premises computing	1	5	3.79	0.783
Cost-efficient	1	5	3.56	0.785
Cloud Computing services is fit-for-purpose	1	5	3.63	0.809
Easily integrate Cloud-based services into our existing IT framework	1	5	3.58	0.749
Does not need to acquire additional infrastructure to use cloud-based services	1	5	3.23	0.862
Learning Time too long	1	5	2.63	0.841
Easy to Adopt Cloud Computing	1	5	3.47	0.953
Easier to set up cloud-based services	1	5	3.31	0.845
Internet connectivity allows easy use of cloud-based services	1	5	3.85	0.902
No legal regulation in Ghana to protect the interest of cloud computing customers and service providers	1	5	3.07	0.856
Data security concerns in cloud-based services are higher than in traditional on-premises ICT	1	5	3.46	0.873
Data protection from unauthorized users	1	5	3.41	0.831



Data loss as a result of damage of physical infrastructure is low in the cloud computing	1	5	3.67	0.889
Insider threat in the cloud-based services is lower than on-premises computing	1	5	3.48	0.770
Reduced Data theft and data leaks	1	5	3.52	0.836
Reduced malware and phishing attacks	1	5	3.55	0.835

(Source: Author's Construct, 2021)

Furthermore, the respondents also agreed that the use of cloud-based services increases data sharing and availability in their organizations, that the use of cloud-based services improves their operational efficiency, productivity, and quality of work in their organizations. They also agreed that cloud-based services give them easier access to doing their jobs remotely, compared to traditional on-premises computing, and also that cloud computing gives them easier access to the latest software applications and technology compared to traditional on-premises computing. To the respondents, it is easy to backup data on cloud computing than traditional on-premises computing, and that cloud computing is cost-efficient because of the “pay-as-you-go” model of payment for infrastructure and applications as compared to the acquisition of traditional computing infrastructure and applications. About credibility, the respondents agreed that cloud-computing services are fit-for-purpose in their organization because their organizations can easily integrate cloud-based services into their existing IT framework and that their organization does not need to acquire additional infrastructure to use cloud-based services.

With complexity, the respondents agreed that it is not too complicated to understand cloud-based services, but it is rather easy for them to study and adapt to cloud-based services. The respondents also agreed that it is easier setting up cloud-based services, compared to traditional ICT, and that internet connectivity allows easy use of cloud-based services.

Concerning security and privacy, the respondents agreed that there is no legal regulation in Ghana that protects the interest of cloud computing customers and service providers and that data security concerns in cloud-based services are higher than traditional on-premises ICT. They also agreed that data protection from unauthorized users in cloud computing is higher as compared to traditional on-premises computing, that data loss as a result of damage to physical infrastructure is low in cloud computing as compared with traditional on-premises computing. According to the respondents, insider threat in the cloud-based services is lower than on-premises computing but also agreed that the adoption of cloud computing has reduced data theft and data leaks as compared to traditional on-premises ICT. Finally, the respondents agreed that the adoption of cloud computing has reduced malware and phishing attacks and that data security is one of the main reasons that cloud-based services are their preferred choice.

Owing to the above, and on recommending cloud-based services, the respondents agreed that they prefer to use cloud computing for easy accessibility to the latest version of the software, technology, and upgraded infrastructure need. In indicating their biggest barriers for cloud computing adoption in their organizations, Cost was the most cited barrier for cloud-based service adoption in organizations. Other barriers included data security,

complexity, connectivity and open access, and management support. It can also be seen from the above that based on the mean weights; the majority of the respondents believe the Internet connectivity allows easy use of cloud-based services (mean = 3.85) followed by Easy to backup data on cloud computing than traditional on-premises computing with a mean of 3.79.

#### **4.4 Inferential Analysis**

To ascertain the impact of cloud computing on SMEs business operations in Ghana, inferential statistics were run to draw scientific proof of whether indeed cloud computing has any effect on SMEs business operations. To determine this, correlation analysis was run between the SMEs business operations (SBO) and the variables of the Cloud Computing which are the Ability of Cloud Provider (ACP), relative advantage (RA); compatibility (Cpt); and Complexity (Cpx) for organizations.

As shown in Table 4.5, all four (4) independent variables, i.e., ACP, RA, Cpt, and Cpx, have positive and significant relations with the SBO. In essence, the correlation coefficient between SBO and RA is 0.696. This implies that SBO and RA are positively related, meaning that an improvement (increase) in relative advantage (RA) causes a corresponding increase in SMEs Business Operations. This also implies that when there is a decline in SBO, RA also declines. This association is also significant at the 0.05 significance level. The results of the study are shown in Table 4.5 below;

**Table 4.5: Inferential statistics**

Construct	SBO	RA	Cpt	Cpx	ACP
SME's Business Operations (SBO)	1				
Relative Advantage (RA)	0.696**	1			
Compatibility (Cpt)	0.612**	0.693**	1		
Complexity (Cpx)	0.338**	0.475**	0.573**	1	
Ability of Cloud Provider (ACP)	0.394**	0.444**	0.508**	0.360**	1
**. Correlation is significant at the 0.01 level (2-tailed).					

(Source: Author's Construct, 2021)

#### 4.4.1 Regression Analysis – Cloud Computing on Business Operation

To investigate the impact of cloud computing on business operations, the study runs a regression analysis among the variables. Before running the regression analysis, the researcher conducted a descriptive analysis of the dependent and the independent variables as well as other control variables to ensure that they all fall within the required standard. Table 4.6 shows the results of the summary of the descriptive statistics. The findings show that all the variables fall within the acceptable standard. For instance, ACP, RA, Cpt, Cpx and SBO all have Means above 3.00 indicating that all the variables have strong Mean values.

**Table 4.6: Descriptive Statistics of main variables**

Construct	N	Min	Max	Mean	Std. Dev
ACP	153	1.00	5.00	3.6632	0.681
RA	153	1.00	5.00	3.7256	0.659
Cpt	153	1.00	5.00	3.4923	0.631

Cpx	153	1.00	5.00	3.3679	0.528
SBO	153	1.50	5.00	3.4695	0.509
Gender	153	1.00	2.00	1.784	0.013
Education	153	1.00	5.00	3.6581	0.457

(Source: Author's Construct, 2021)

The researcher further runs the regression analysis on the main variables. The independent variable (Cloud Computing) is comprised of four (4) sub-variables which are Ability of the Cloud Provider (ACP); Relative Advantage (RA); Compatibility (Cpt); and Complexity (Cpt). The dependent variable on the other hand is SMEs Business Operations whiles Gender and Educational Level are the control variables of the study.

It can be observed in Table 4.7 that the study reveals a strong positive relationship between cloud computing and SMEs Business operations ( $r=0.722$ ). In addition, the coefficient of determination (r-square) of Cloud computing on SMEs business operations shows a value of 0.649. The implication is that 64.9% of SMEs Business operation is influenced by cloud computing. This means that a unit change in cloud computing can cause a 64.9% change in the SMEs Business Operational activities.

**Table 4.7: Regression Analysis – Cloud Computing on SMEs Business Operation**

Model	Coeff	S. E	R	R <sup>2</sup>	T-stats	P-values
(Constant)	0.722	1.924	0.722	0.649	0.375	0.017
Ability of Cloud Provider	0.521	0.673			0.774	0.081
Relative Advantage	0.696	0.341			2.0410	0.004
Complexity	0.338	0.457			0.739	0.093

Compatibility	0.612	0.633			0.966	0.024
Gender	0.016	0.087			0.184	0.852
Education Level	0.128	0.077			1.662	0.0002

(Source: Author's Construct, 2021)

## 4.5 Discussion of Findings

### 4.5.1 Demographics of respondents

This study found that males dominated the working class of Ghana, given the fact that almost 7 of 10 respondents for this study, were males. This may be a reflection of the fact that most communities in Ghana see women as the ones who should be home and do the house chores while the more dominating ones (males) should go about activities to make ends meet, as asserted by Ampofo and Boateng (2007). This also showed in the number of males to females, who are in executive positions since there were more than ten times of males in positions than females. It was also revealed in this study that the majority of the working class are in their youthful ages between the of 18 and 44, which is reminiscent of the 2010 population census, as indicated by Ampofo and Boateng (2007) who indicated that Ghana's population has a youthful structure with the majority of the citizens being less than 40 years. On educational levels, it has been shown that most of the respondents have completed tertiary, which may be because most of the respondents are in the services sector, which generally requires candidates with relatively high qualifications.

As also found in this study, most of the respondents are junior staff. This result is the case because generally, all organizations have fewer leadership/managers as compared to the number of workers or staff. Another category of workers included senior managers,

managers, senior staff, and general hand workers. Considering that, most companies in Ghana are privately owned. From there, it was also found that most organisations for this study were medium enterprises even though there were a few small and micro enterprises for this study. However, it was revealed that most of the respondents have worked for up to six years in their organizations. This could be because of job insecurity or job satisfaction in Ghanaian organizations, which causes staff to be laid off often or they quit themselves.

#### 4.4.2 Evidence of cloud Computing Usage and Quality of Service

This study revealed that most of the respondents (more than half) for the study had some knowledge in ICT and that almost all organizations for this study (about 7 in 10) had ICT units and dedicated IT personnel who handle their ICT related activities. It was also revealed that almost all organizations in Ghana use computers in their daily activities, but most of them make use of local central databases to store their data, and most of the respondents have heard about cloud computing, mainly through learning institutions. Some have also heard about cloud computing through other means such as through friends/family, at the workplace, and social media. The study also revealed that almost all the organizations have adopted cloud services and spend more than GH¢ 500.00 per annum to keep the cloud services active with their cloud service providers, most of which are based in Ghana. The study also showed that the workers in these organizations have at least, average familiarity with cloud computing, and close to half of the staff, work remotely from home, which may partly be as a result of the influx of Covid-19, which has necessitated the need for social distancing protocols.

Cloud services used in Ghana included SaaS, PaaS, and IaaS. However, SaaS is the most used cloud service in Ghana, even though a significant number of the staff were recorded to not use any of these cloud services. Furthermore, most organizations use the public cloud model. Other models, which are also minimally used in Ghana, include the private cloud, community cloud, and hybrid cloud. The cloud-based application also mostly used by the organizations was the email cloud-based applications, and other minor used cloud applications are file sharing and transfer, data backup and storage, data analysis, web conferencing, project management, eLearning, text messaging, and time management.

Even though the above points to the fact that most organizations in Ghana have adopted ICT/cloud-based computing, Opoku and Kwarteng, (2015) found otherwise. According to them, 67% of Ghanaian SMEs are not aware of the local cloud service providers, to which they recommended that there should be effective sensitization among SMEs in Ghana.

Also, Yeboah-Boateng and Essandoh, (2013) in the research titled "Cloud computing: the level of awareness amongst small & medium-sized enterprises (SMEs) in developing economies" concluded that the level of awareness amongst SMEs is low hence education and sensitization on cloud computing will help boost their knowledge on emerging technology and its prospects.

#### 4.4.3 Impact of Cloud Computing on SMEs Business Operation

This study showed that SMEs Business Operation was significant in every way for the Ability of the Cloud Provider (ACP), Relative Advantage (RA), Compatibility (Cpt) and Complexity (Cpt) of organizations that used them. However, the use of cloud computing



has some embedded challenges that come with the level of complexity, which the organizations must deal with. This study found that the cost of cloud computing was the main barrier/complexity. Other barriers included data security, connectivity, open access, and management support. This finding supports several studies which were conducted in Ghana. For example, Tweneboah-Koduah, et al (2014) concluded that lack of basic infrastructure for cloud take-off, data security, unreliable internet connectivity, and general lack of institutional readiness were factors that hinder the adoption of cloud service by the Ghanaian government. Another study found that the physical platform(s) of the cloud data centre (s) housing the internal protection and security control remains the first layer of a security attack by hackers (Bartock et al, 2020). Even though there are numerous perceived advantages of Cloud computing compared to traditional IT models (Chen and Zhao, 2012) data security and privacy protection remain one of the greatest concerns of enterprises in the adoption of the cloud service

#### **4.5 Chapter Summary**

This chapter presented the results of the study, by analyzing and presenting respondents responses as contained in the questionnaire. This involved presenting data in forms that can be easily understood in frequencies and percentages for easy comparisons and references. The main objective of the study was to investigate the impact of Cloud Computing on SMEs Business Operations. The chapter begins by analysing the demographics and then analysing the research objectives one after the other. The study adopted Ordinary Least Square to ascertain how the variables of Cloud Computing can influence SMEs Business operations.

The study thus found that cloud computing even though very significant and advantageous to organizations, comes along with complexities and barriers.



## **CHAPTER 5**

### **SUMMARY OF FINDINGS, RECOMMENDATIONS AND CONCLUSION**

#### **5.0 Introduction**

Chapter five, provides the summary of the entire work, draws a conclusion based on the results of the study, and makes interesting recommendations to policy, and to practice. This study sought to find the impact of cloud computing on the business operation of small and medium enterprises (SMEs) in Ghana.

#### **5.1 Review of Research Objectives**

This study sought to establish evidence of cloud computing and the quality of services provided by SMEs in Ghana. To achieve this, a total of 15 questions were posed to find respondents' knowledge on cloud computing, and to find out whether their organizations have adopted any of the cloud services. It was proven in this study, that cloud computing and ICT in general, is highly adopted in Ghana, with social media networking such as WhatsApp, Facebook, Instagram, etc. being mostly used by SMEs. It was also revealed that most workers in these SMEs have a fair knowledge about cloud computing, and their organizations have separate units and dedicated staff for the ICT units.

As shown in the study, the ability of cloud providers, greatly impacted SMEs Business activities. This means that SMEs have realized some degree of advantages with the use of cloud computing in their businesses. The study also showed that SMEs in Ghana are better positioned and have the compatibility to adopt cloud services. However, it was also revealed in this study that adopting cloud services comes with some complexity and barriers which

include costs, management support, and security concern. This was also the objective for Obinkyereh, (2017) who used both Pearson correlation and simple linear regression analysis to investigate cloud computing adoption in Ghana based on Technology Acceptance Model (TAM) and his result indicated that there was a significant relationship between perceived usefulness, perceived benefit, perceived security, and perceived accessibility and Cloud Computing adoption in Ghana. He added, there was no significant relationship between perceived ease of use and Cloud Computing adoption in Ghana

Finally, the objective sought to find how the use of Cloud Computing applications in Ghanaian SMEs influences data security. Again, the study revealed that even though data security is of concern for the SMEs, cloud security has improved the security of their data since most of the SMEs have local central based data storage for their businesses.

## **5.2 Summary of Findings**

This study concludes that the use of cloud computing among SMEs in Ghana is relatively high, even though previous studies have shown otherwise. This could be as a result of the influx of Covid-19, which has forced several businesses to use information technology in their activities. The study also concludes that the ability of cloud providers greatly impacted relative advantage for the SMEs. This means that SMEs have recorded some degree of advantages with the use of cloud computing in their businesses. The study also showed that SMEs in Ghana are better positioned and have the compatibility to adopt cloud services. However, it was also revealed in this study that adopting cloud services comes with some complexity and barriers which include costs, management support, and security concern.

Finally, this study concludes that even though data security is of concern for SMEs, cloud security has improved the security of their data since most of the SMEs have local central based data storage for their businesses.

### **5.3 Recommendations/Policy Implications**

This study recommends that the government should create a compliance office, responsible for ensuring that businesses embrace cloud computing, which proved to be very effective for ensuring the security of data for organizations. Also, since some of the respondents for this study were concerned about the security of their data, cloud-service providers in Ghana should be licensed so that businesses will have confidence in them to safeguard their data. Before being given licenses, there should be criteria that these cloud-service companies should meet before being given the license to operate, and these companies should also be capable of keeping the data of the clients confidential.

Finally, this study recommends that all businesses in Ghana should embrace cloud computing which allows remote activities and ease of accessibility no matter the location. This will not only allow the workers of the organization to work remotely, but also allow them to interact with their partners and customers conveniently.

### **5.4 Future Research Direction**

First of all, this study recommends that future research should consider expanding the number of respondents so that results can be easily generalized, since a larger number of respondents may give a more objective representation of the findings.

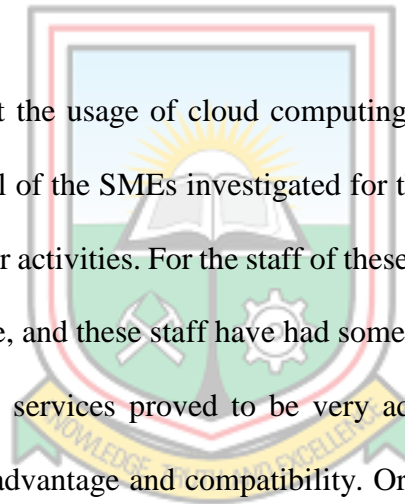
Furthermore, future research should consider involving the customers of these companies so that it would not appear that the SMSs gave a biased view of their companies which is not reflective of their true standings.

Finally, this study recommends that future research should be quantitatively based so that already data that cannot be affected by respondent bias will be used. This data is also independent of researcher bias.

## **5.5 Conclusion**

This study concludes that the usage of cloud computing by SMEs in Ghana is relatively high, given that almost all of the SMEs investigated for this study have some form of ICT and cloud adoption in their activities. For the staff of these companies, the study proved that ICT knowledge is average, and these staff have had some aspect of ICT education.

The importance of cloud services proved to be very advantageous for Ghanaian SMEs because of their relative advantage and compatibility. Organizations in Ghana are thereby recommended to adopt ICT and cloud-based services but to put in place, strategies to combat complexities and barriers to the adoption and use of ICT and cloud services.



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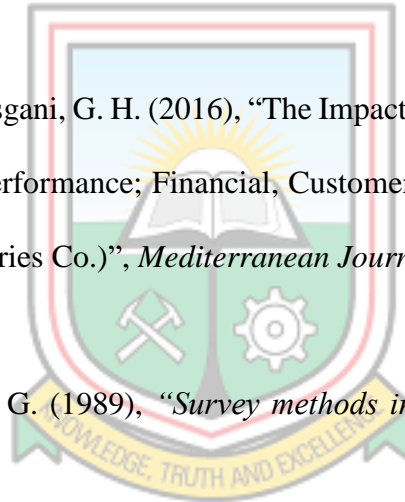
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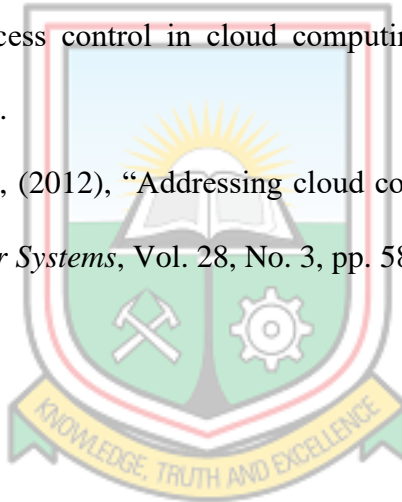
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## **APPENDIX 1: QUESTIONNAIRE**

### **IMPACT OF CLOUD COMPUTING ON THE BUSINESS OPERATION OF SMALL AND MEDIUM ENTERPRISES (SMEs) IN GHANA**

#### **Ethics and Confidentiality Disclosure Consent**

You are invited to take part in this survey as a key team player in small and medium enterprises in Ghana that contributes to the economic development of the country. By contributing to this survey, you agree that the researcher can base on your contributions to make solid contribution to knowledge on the adoption and impact of ICT and cloud computing on Small and Medium Enterprises (SMEs) in Ghana.

#### **Background of the information**

The researcher, Emmanuel Amuah (Mr), is a postgraduate student pursuing Master of Business Technology Management Option Management Information System (MBTM - MIS) at University of Mines and Technology (UMaT), Tarkwa. The survey is conducted as part of my long essay in partial fulfilment of the above-mentioned degree.

Your willingness to participate in the survey is greatly appreciated and I promise the information you provide will be treated with confidentiality and will only be used for this research.

For any information kindly contact me via [eamuah@st.umat.edu.gh](mailto:eamuah@st.umat.edu.gh). Thank you.

#### **Part I: Demographics**

**Kindly select the most appropriate**

1. Indicate your gender

Male ☐ Female ☐

2. What is your age bracket?

Between 18 and 25 ☐ Between 26 and 33 ☐

Between 34 and 44 ☐ Between 45 and 52 ☐

Between 53 and 60 ☐ Above 60 ☐

3. What is your education level?

Basic ☐ Secondary ☐ Tertiary ☐ Postgraduate ☐

Others ☐

4. What is your duty category in your company?

Senior Manager ☐ Manager ☐ Senior Staff ☐

Junior Staff ☐ General Hand ☐ Others ☐

**Part II: Company classification**

5. What is the structure of your organization?

Public sector ☐ Private sector ☐ other sectors ☐

6. How many employees does your organization have?

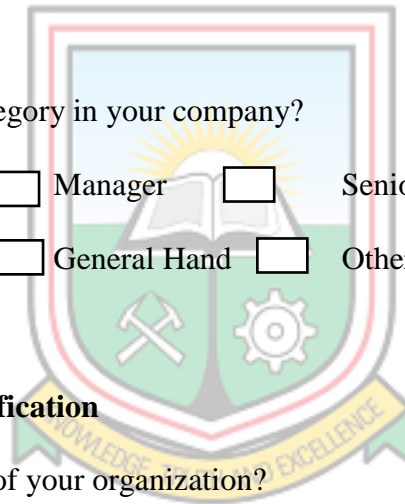
Between 1 and 9 (Small) ☐ 10 or more (medium) ☐

7. What type of industry is your organization?

Extractive industry ☐ Financial Sector ☐

Manufacturing ☐ Other Services Sector ☐

8. How long have you been working for your organization?



Less than 1 year ☐ Between 1 and 3 years ☐  
 Between 3 and 6 years ☐ Between 6 and 9 years ☐  
 More than 10 years ☐

### Part III: Information Technology, Cloud Computing level of adoption and use in Ghana

9. Do you have any qualification in ICT?

Yes ☐ No ☐

10. Is your organization having ICT unit and dedicated personnel?

Yes ☐ No ☐

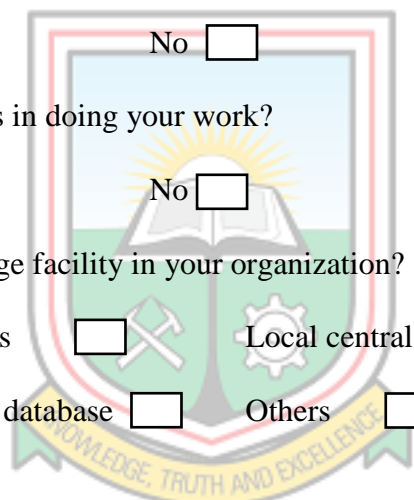
11. Do you use computers in doing your work?

Yes ☐ No ☐

12. What is the data storage facility in your organization?

Stand-alone computers ☐ Local central database ☐

External (outsourced) database ☐ Others ☐



13. Have you heard of Cloud computing before?

Yes ☐ No ☐

14. How did you get to know about cloud computing?

At workplace ☐ Friends/Family ☐

News item/advertisement ☐ social media ☐

School (learning institution) ☐ I have never heard of it ☐

15. Has your organization adopted any cloud services?

Yes ☐ No ☐

16. Averagely, how much does your organization pay yearly for the cloud services?

Less than GH¢50.00 ☐

Between GH¢50.00 and GH¢199.00 ☐

Between GH¢200.00 and 499.00 ☐

Above GH¢500.00 ☐

I have no idea ☐

17. Is the organization's cloud service provider based in Ghana?

Yes ☐ No ☐ I do not know ☐

18. Your familiarity with cloud computing

Very low ☐ Low ☐ Average ☐ High ☐ Very high ☐

19. Do you work remotely?

Yes ☐ No ☐

20. What type of cloud service have your organization adopted?

☐ Software-as-a-Service (SaaS). Eg. Google Apps, Dropbox, Salesforce, Cisco WebEx, Concur, GoToMeeting, etc

☐ Platform-as-a-Service (PaaS). Eg. Windows Azure, AWS Elastic Beanstalk, Google App Engine, Apache Stratos, OpenShift, etc

☐ Infrastructure-as-a-Service (IaaS). Eg. DigitalOcean, Linode, Cisco Metapod, Google Compute Engine (GCE), etc

☐ None

21. Which cloud model is deployed by your organization?

☐ Private cloud (exclusive to the organization)

- ☐ Public cloud (opened to the general public)
- ☐ Community cloud (exclusive to group of organizations with common interest)
- ☐ Hybrid cloud (a combination of two or more of the above)
- ☐ None

22. Which cloud-based applications do your organization use?

- File sharing and transfer ☐ Data backup and storage ☐
- Data analysis ☐ Email ☐ Web conferencing ☐
- Project management ☐ E-learning ☐ Text messaging ☐
- Time management ☐ None ☐

23. Which cloud Social Networking applications do you use at work?

24. WhatsApp ☐ Facebook ☐ Twitter ☐ LinkedIn ☐
25. Instagram ☐ Telegram ☐ Youtube ☐ None ☐

#### Part IV: Impact of cloud computing on Data Security

The following items ask for your views about the level of adoption of cloud computing and its impact on data security in Ghana. Indicate how much you agree or disagree with the following statements by selecting from the options below using the 5-point rating scale

Strongly Disagree=1, Disagree=2, Neutral=3, Agree=4, Strongly Agree=5

Item	Description	1	2	3	4	5
Ability: The extent to which a respondent believes that cloud service provider has the ability, skills, and expertise to perform efficiently in the specific domains						
26.	There is strong credibility of the cloud provider to protect user's data					

27.	Cloud services provider has the required skills and expertise to handle the required data security needs of their customers.					
28.	Cloud service provider has the ability to deliver timely services (24 hours)					
Relative Advantage: The extent to which the respondent is advantageous on the cloud-based computing services over the traditional on-premises computing.						
29.	The use of cloud-based services increases data sharing and availability in my organization					
30.	The use of cloud-based services improves operational efficiency, productivity, and quality of work in my organization					
31.	Cloud-based services give me easier access to doing my job remotely compared to traditional on-premises computing					
32.	Cloud computing gives me access to latest version of software applications and technology compared to the traditional on-premises computing					
33.	It is easy to backup data on cloud computing than traditional on-premises computing					

34.	Cloud computing is cost efficient because of 'pay as you go' model of payment for infrastructure and applications as compared to the acquisition of traditional computing infrastructure and applications					
Compatibility: The degree of which the respondent agrees or disagree to the level of compatibility of cloud computing with exiting ICT system in their organization						
35.	Cloud Computing services is fit-for-purpose in my organization					
36.	My organization can easily integrate Cloud-based services into our existing IT framework					
37.	My organization does not need to acquire additional infrastructure in order to use cloud-based services					
Complexity: The degree to which the individual agrees or disagree to the how complex cloud computing is						
38.	It is too difficult and complicated to understand Cloud-based services.					
39.	It is easy for me to study and adapt to cloud-based services					
40.	It is much easier to setting up cloud-based services as compared to traditional ICT					

41.	Internet connectivity allow easy use of cloud-based services					
Security and Privacy:						
42.	There is no legal regulation in Ghana to protect the interest of cloud computing customers and service providers					
43.	Data security concerns in cloud-based services is higher than traditional on premises ICT					
44.	Data protection from unauthorized users in Cloud computing is higher as compared to traditional on-premises computing.					
45.	Data loss as a result of damage of physical infrastructure is low in the cloud computing as compared with traditional on-premises computing.					
46.	Insider threat in the cloud-based services is lower than on-premises computing					
47.	The adoption of cloud computing has reduced Data theft and Data leaks as compared to traditional on-premises ICT					
48.	Adoption of cloud computing has reduced malware and phishing attacks					



49.	Data Security in the cloud is one of the main reasons cloud-based services is our preferred choice					
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50. Would you prefer to use cloud computing for easy accessibility to latest version of software, technology and upgraded infrastructure need?

Yes ☐

No ☐

51. If “No” please indicate your biggest barriers for Cloud Computing adoption in your organization

Data Security ☐

Compatibility ☐

Complexity ☐

Connectivity and open access ☐

Management support ☐

Cost ☐

