YASIR BASHIR KANKIA

A TECHNOLOGY ADOPTION FRAMEWORK AND A DIGITAL LITERACY MODEL OF CLOUD COMPUTING SERVICES IN HIGHER EDUCATION IN NIGERIA

A TECHNOLOGY ADOPTION FRAMEWORK AND A DIGITAL LITERACY MODEL OF CLOUD COMPUTING SERVICES IN HIGHER EDUCATION IN NIGERIA

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Yasir Bashir Kankia: A Technology Adoption Framework and a Digital Literacy Model of Cloud Computing Services n Higher Education in Nigeria, Doctor of Philosophy (PhD) © 2024

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To my wife
and my parent:
Thank you.

ABSTRACT

Background: One of several cutting-edge innovations that can help higher education institutions increase the effectiveness and efficiency of their processes for delivering learning outcomes, notably in terms of lowering costs and opening access to larger student pools, is cloud computing. Although it has been widely embraced in developed countries, it has a relatively low adoption rate in underdeveloped nations, and there is limited empirical research looking at the factors that affect its adoption in higher education institutions.

Objectives*:* This study proposed a technology adoption framework and digital literacy model of cloud computing services in higher education in Nigeria that aggregate models such as the Diffusion of Innovation (DOI), Unified Theory of Acceptance and use of Technology (UTAUT), Technology Acceptance Model (TAM), Desire Framework (DF) and Technology Readiness (TR) with three aspects:(a) technological, (b) organizational and (c) environmental aspects to identify the variables influencing cloud computing adoption in higher education institutions in Nigeria.

Methods*:* A survey research design was adopted for this study. Data were collected from both primary and secondary sources. A simple systematic random sampling technique was adopted in administering a set of questionnaires to 384staff and students of selected Nigeria Higher Institutions out of which only 260 (67.7%) pieces of the questionnaire were returned in an analysable manner. Secondary data were sourced from published and unpublished sources. Data collected were analysed using both descriptive and inferential statistics regression and correlation test at $p > 0.05$.

Results*:* The logistic regression indicates that computer efficiency, subjective norms, perceived innovation, perceived usefulness, attitude towards technology and external pressure are the factors that are enhancing the adoption of cloud computing by Nigerian public and private universities. The linear regression and correlation analysis showed that higher institutions in Nigeria have a positive perception of cloud computing as well as high levels of readiness for adoption. In order to test for the potency of the three factors/components of the model, the study confirmed that the External factor (Beta = .369; $t = 9.235$; $p < .05$) was the most potent determinant, followed by Technological factor (Beta = .248; $t = 7.538$; $p < .05$) and individual factor (Beta = .122; $t = 3.701$; $p < 0.05$) is the third determining factors of cloud adoption among students and staff in Nigeria higher institution as This finding leads to the recommendation that higher institutions in Nigeria should intensify efforts in making wider adoptions of cloud computing for all staff and students in educational settings.

Conclusion*:* The proposed CTRAM Model enables us to assess the level of cloud computing acceptance as well as provision of guidance on factors that determine CTRAM adoption among staff and students of Nigerian universities. The Model received expert validation, as the domain experts had agreed that the proposed Model was well applicable as a veritable tool in supporting and delivering successful and thriving digital education. The extent of the Model's generalizability and acceptability were done through the model iterations.

Keywords: Comprehensive, Technology, Readiness, Adoption, Framework, For Assessing, Cloud Technology. In Higher Education, Nigeria.

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Yasir Bashir Kankia
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ACRONYMS AND MEANING

Acronyms	Meaning
AMCOM	United States Army Aviation and Missile Command
API	Application Programming Interface
ATT	Attitude toward Technology
BI	Behavioral to Use
CC	Cloud Computing
CHAID	Chi-square Automatic Interaction Detector
CSE	Computer Self-Efficiency
CTRAM	Comprehensive Technology Readiness Adoption Model
DF	Desire Framework
DoI	Diffusion of Innovation
ES	External Support
GDP	Gross Domestic Product
HEIs	Higher education institutions
IaaS	Infrastructure-as-a-service
ICT	Information Communication Technology
MDX	Multidimensional Expressions
MTN	Mobile Telephone Network
NNPC	Nigerian National Petroleum Corporation
OMR	Optical Mark Recognition
PaaS	Platform-as-a-service
PE	Perceived Easiness
PEU	Perceived Ease of Use
PI	Perceived Innovation
PLS	Partial Least Square
PR	Perceived Reliability
PU	Perceived Usefulness
SaaS	Software-as-a-service
SN	Subjective Norms
STAM	Senior Technology Acceptance Model
SWOT	Strength, Weakness, Opportunity and Strength
TAM	Technology Acceptance Model
TR	Technology Readiness
TRB	Theory of Planned Behavior
TTF	TaskTechnology Fit
UTAUT	Unified Theory of Acceptance and Use of Technology

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1 Chapter One - Introduction

1.1 Problem Domain

Higher education institutions are private or public institutions that provide undergraduate and postgraduate courses and training courses for skill development to people who have completed high school or secondary school in developing countries (Makoza, 2015). Higher education institutions place a premium on teaching, learning, and research and because of their contributions to cultural and socioeconomic development, they have earned relevance on government development agendas (Sarkar, 2012 cited in Makoza, 2015).

Despite the prominence of higher education institutions in supporting culture and socio-economic development, Higher education institutions operate under resource-constrained environments that hinder effective delivery of their services in developing countries (Makoza, 2015). Some of the challenges include; failure to meet the high demand for higher education, high administrative costs and difficulties in managing a large population of learners against a small number of high-calibre teachers (Gital & Zambuk, 2011). Additionally, there is growing interest in investing in Information Communication Technology (ICTs) in Higher education institutions (HEIs) and improving the delivery of services (Makoza, 2015). Cloud computing has emerged as a technology that can remedy some of the challenges in HEIs in developing countries. Hence, it is important to understand how prepared are the HEIs in developing countries to adopt cloud computing.

Consequently, lack of information technology has been debarring the development of educational processes at different paces of higher education structure, which hitherto are carried out manually in most of the developing countries. The level of cloud computing awareness is higher in developed countries with robust industrial fundamentals, making studies of technology adoption framework and digital literacy models for cloud computing services commonplace in those countries. However, there remains a limited use and adoption of cloud computing in developing countries like Nigeria due to underdeveloped IT infrastructure, weak institutions, and limited literacy (Nnadozie, 2013).

Researchstudies have shown that Higher institutions of education in the developing countries of the world are trying to employ various means of improving their educational Programme to measure up with the educational standard of the developed nations through technological advancement in line with the current dictate (Jibril, 2014; Hakan, 2021; Charles, Emily & Catherine, 2021).In doing this, their ways of learning also must go together with the way the

world currently works. There has always been a huge gap in terms of technology between developing and advanced countries, many will argue that the gap is increasing during the last few decades (Nnadozie, 2013).

In the process of technology development, educational institutions play a crucial role as an absorption capacity for new technologies in developing countries. When a technology is accepted, it is always a good idea to test the users of that technology to determine how literate they might be with the newly introduced technology. When it comes to assessing and analyzing learning and user characteristics instructional designers depend on tools which have useful measurements for a front-end computing technology setting like cloud computing. We often find in the digital environment, that users of a certain technology tend to have a range of skills, interests, behaviours and attitudes, as well as their ability to comprehend the usage of digital tools, information systems, and their content. Ranging from the instructional designers to the institutions themselves, some may require that potential users of technology should be tested first on certain criteria to suggest their level of digital literacy before they are engaged with instructions.

Working in a funding organization for artisan, undergraduate and graduate studies in Nigeria has allowed me to discover lacunas in record management, ranging from information loss due to improper record facilities and backup facilities. To investigate the technology adoption framework and digital literacy model of cloud computing services in higher education institutions in Nigeria is at the heart of this research.

From a macroscopical lens, the financial crisis and global uncertainties have been one of the reasons higher education institutions across the world are facing increased pressure to deliver increased quality service from the limited resources available to them. This has forced higher education institutions to sort for alternative yet very flexible ways of delivering services leading to gradual expansion, wherein, the teachers' centred system has transformed into a learner-centred environment. This is part of the focus of this research, endorsing this sort of transformation demands innovating learning practices, as well as teaching methods and tools, resulting in rapid evolvement of the delivery system.

The adoption of cloud computing in the higher education sector in Nigeria can significantly improve the quality of education delivery, increase education efficiency, and curtail overall IT costs (Sanaei et al., 2014). To produce a novel and scalable approach that is aimed towards

solving difficulties encountered during a technology adoption process, reviewing the existing models to propose a new and better model is necessary.

Numerous studies have been conducted on the use and nature of general cloud computing technologies and their adoption in developed countries (see, for example, Dishaw & Strong, 1999; Pardeshi, 2014; Appiahene & Bombie, 2016; & Khan, 2018). Despite this body of work, there remains a relative scarcity of documented research on the technology adoption framework and digital literacy model of cloud computing services in higher education institutions in developing nations (Kenndy et al, 2019), especially those with a GDP of under 1 trillion US dollars. Thus, in the specific context of developing nations and those with particularly 'low' levels of economic output, there is a distinct and important research gap that needs to be filled in how cloud computing technologies and platforms may serve to bolster not only the economic enhancement of such countries but also the wider social effects such as in the case of education. While such studies may be commonplace for developed nations, there is a vital need to gain a deeper understanding and evaluation of a technology adoption framework for developing nations such as Nigeria. Thus, this study is motivated by the paucity of studies about Nigeria; of special interest including the few studies that have focused on the case of developing countries such as Kenndy et al (2019) and Akinwunmi et al (2020) that recognize the role of cloud computing in the nation and comparable countries. Akinwunmi et al (2020) documented the role of a cloud computing model for youth empowerment, while Kenndy et al (2019) evaluated the factors hindering the adoption of cloud computing in Kenya.

From this setting, this research sought to introduce innovations and extensions to the strand of cloud computing literature on developing nations. The first aim was to contribute to the work of Akinwunmi et al (2020) by recognising and applying the Comprehensive Technology Readiness Adoption Model to assess the adoption of cloud computing services in a Nigerian educational context and evaluating how literacy can be gained by users in such a setting. Second, Kenndy et al's (2019) study will be built upon as it provided insight on hindering factors of cloud computing in Kenya, and hence these factors will be incorporated during the assessment of the technology's influence in higher educational institutions in Nigeria.

Higher educational institutions are vital for the growth of any economy. They play a significant role in being the vehicle for change, providing knowledge, technical know-how, research, employment opportunities and value delivery. Cloud computing has become an integral aspect

of teaching and learning in higher education institutions leading to a positive learning and teaching outcome.

Broadly defined, cloud computing involves the use of virtual resources that are increasingly scalable and may be shared by varied users, and it provides IT resources on demand via the internet and is identified to be the fastest growing area in a digital economy (Yokoyama et al, 2012). It was further illustrated that cloud computing adoption has gained increasing momentum over recent years. The authors found that cloud computing now operates as a secure and cost-effective data storage system. Among the various available cloud activities, the banking sector recorded the highest usage with 64 per cent, followed by social media at 58 per cent, online games at 45 per cent, photography services at 29 per cent, and file sharing at 19 per cent. Thus, going beyond the use of cloud computing adoption in industrial sectors, this research will add to the body of knowledge by considering cloud computing adoption in higher education institutions in Nigeria.

From an educational perspective, cloud computing enables stakeholders to gain easier access to information from anywhere across the world (Alsufyani et al, 2015). Therefore, higher institutions in both private and public institutions can adopt cloud computing to improve service delivery by possessing only relatively few resources. Research by Wyld (2009) showed that institutes in many Commonwealth nations have initiated a collaborative framework termed as 'Virginia Virtual Computing Lab' to bring about reductions in IT costs by eradicating the necessities of licensing and frequent software upgrades. Similarly, Hugos and Hulitzky (2010) found that 72 per cent of IT leaders in higher institutes preferred cloud computing as compared to conventional computing technologies, citing the importance of improvement in IT services as a crucial decision for their uptake of cloud facilities. Supporting these views, Pardeshi (2014) argues that the use of cloud computing in higher institutions is likely to reduce the total cost of operations by approximately 25 to 30 per cent. Despite the merit of cloud computing in higher education, it remains in a relatively early stage of uptake in developing countries (see, Karim & Rampersad, 2017). Thus, this study is motivated by the paucity of studies about developing countries such as Nigeria.

This research becomes imperative for the fact that greater levels of cloud computing adoption across higher education institutes in Nigeria can significantly improve the quality of education delivery, increase education efficiency, and curtail overall IT costs (as has been demonstrated by Sanaei et al., 2014). To achieve this, this research aims to evaluate the readiness for the

adoption of cloud computing in higher institutions in Nigeria and in so doing, highlight critical factors necessary for successful uptake to promote higher rates of cloud computing adoption.

Their research seeks to contribute to existing technology adoption theories, which focus mainly on the features that lead to and encourage potential users to adopt a technology. Since the deployment of cloud computing in the education sector in Nigeria, previous studies that investigated the readiness of adoption for cloud computing typically employed models such as the diffusion of innovation (DOI), Unified Theory of Acceptance and use of Technology (UTAUT), Technology Acceptance Model (TAM), Desire Framework (DF) and Technology Readiness (TR). Despite their relevance and prevalence in the general subject domain, there has been relatively little work in the aggregation of these various approaches, and hence one principal aim of this research was to consider whether these methods may be collectively employed in the case of Nigeria, and if so, how their collective application may lead to a refinement or combination of these techniques into a single tool for measuring cloud adoption. Thus, this research sought to bridge this gap in the literature and extend existing models by developing a combined model, especially since cloud computing has become a fundamental and vital piece of technology in the general world of IT as well as across different industry sectors.

To this end, this research will contribute to the field by proposing a new comprehensive technology readiness adoption model (CTRAM) for the assessment of cloud computing adoption. The novelty of CTRAM over other models (such as TAM, TOE, and DOI amongst others) resides in its comprehensive and combined attributes of existing models. Moreover, the research would help to deepen the understanding of core factors affecting the adoption of cloud computing in Nigeria. In addition to the use of the CTRAM model, the research employs Chi-square Automatic Interaction Detector (CHAID), Logistic Regression (LR), Linear Regression and Correlation analysis technique to analyze the collected data. These techniques were applied to reach objective conclusions regarding the readiness of educational institutions to adopt cloud computing in Nigeria. Therefore, this thesis sought to examine the technology adoption framework and digital literacy model of cloud computing services in higher education institutions in Nigeria.

1.2 Research Aim, Objectives and Questions

This research aims to investigate the adoption of cloud computing services and understand how people can gain literacy in cloud computing in higher educational institutions in Nigeria. To achieve the aim, the following research objectives are formulated:

i. To assess the influence of individual characteristics on cloud computing adoption in Nigeria University
ii. To ascertain the influence of technological factors on cloud computing adoption in Nigeria University
iii. To examine the influence of external factors on cloud computing adoption in Nigeria University

The research was guided by the following research questions derived from the research objectives.

RQ_1: What are the influences of individual characteristics on cloud computing adoption in Nigerian universities?

RQ_2: What are the influences of technological factors on cloud computing adoption in Nigerian universities?

RQ_3: What are the influences of external factors on cloud computing adoption in Nigerian universities?

RQ_4: What is the impact of cloud computing adoption on Nigerianuniversity performance?

1.3 Research Hypotheses

In reference to the research questions and objectives, the research is underpinned by the following testable null hypotheses.

Hypothesis One

H_0: University management support had no significant effect on Cloud computing adoption among Students and Staff of Nigeria University

H_1: University management support had a significant effect on Cloud computing adoption among Students and Staff of Nigeria University

Hypothesis Two

H_0: Staff/Student cooperation with peers and cloud providers on cloud computing adoption had no significant effect on Cloud computing adoption among Students and Staff of Nigeria University

H_1: Staff/Student cooperation with peers and cloud providers on cloud computing adoption had a significant effect on Cloud computing adoption among Students and Staff of Nigeria University

Hypothesis Three

H_0: Student/Staff creativity/know-how had no significant effect on Cloud computing adoption among Students and Staff of Nigeria University

H_1: Student/Staff creativity/know-how had a significant effect on cloud computing adoption among Students and Staff of Nigeria University

Hypothesis Four

H_0: Student/Staff accessibility to current and updated information had no significant effect on Cloud computing adoption among Students and Staff of Nigeria University

H_1: Student/Staff accessibility to current and updated information had a significant effect on Cloud computing adoption among Students and Staff of Nigeria University

Hypothesis Five

H_0: Student/Staff experience/expertise with cloud computing had no significant effect on Cloud computing adoption among Students and Staff of Nigeria University

H_1: Student/Staff experience/expertise with cloud computing had a significant effect on Cloud computing adoption among Students and Staff of Nigeria University

Hypothesis Six

H_0: Perceived University benefit had no significant effect on Cloud computing adoption among Students and Staff of Nigeria University

H_1: Perceived University benefit had a significant effect on Cloud computing adoption among Students and Staff of Nigeria University

Hypothesis Seven

H_0: Operation cost reduction had no significant effect on Cloud computing adoption among Students and Staff of Nigeria University

H_1: Operation cost reduction had a significant effect on Cloud computing adoption among Students and Staff of Nigeria University

Hypothesis Eighth

H_0: Perceived privacy and security of information had no significant effect on Cloud computing adoption among Students and Staff of Nigeria University

H_1: Perceived privacy and security of information had a significant effect on Cloud computing adoption among Students and Staff of Nigeria University

Hypothesis Nine

H_0: Triability/experiment by students and staff of cloud computing had no significant effect on Cloud computing adoption among Students and Staff of Nigeria University

H_1: Triability/experiment by students and staff of cloud computing had a significant effect on Cloud computing adoption among Students and Staff of Nigeria University

Ho1: There is no significant joint and relative effect of Computer Self-Efficiency (CSE) and Subjective Norms (SN) on user background of cloud technology in higher education in Nigeria.

H_1: There is a significant joint and relative effect of Computer Self-Efficiency (CSE) and Subjective Norms (SN) on user background of cloud technology in higher education in Nigeria

Hypothesis Eleven

Ho: There is no significant joint and relative effect of Perceived Innovation (PI), Perceived Usefulness (PU), Perceived Easiness (PE), Attitude toward Technology (ATT), and Perceived Reliability (PR) on the perception of cloud technology in higher education in Nigeria.

H_1: There is a significant joint and relative effect of Perceived Innovation (PI), Perceived Usefulness (PU), Perceived Easiness (PE), Attitude toward Technology (ATT), and Perceived Reliability (PR) on the perception of cloud technology in higher education in Nigeria.

Hypothesis Twelve

Ho: There is no significant joint and relative effect of Organization Characteristics (OC), External Pressure (EP), External Support (ES) and Social Influence (SI) on External Factors in assessing cloud technology in higher education in Nigeria.

H_1: There is a significant joint and relative effect of Organization Characteristics (OC), External Pressure (EP), External Support (ES) and Social Influence (SI) on External Factors in assessing cloud technology in higher education in Nigeria.

Hypothesis Thirteen

Ho: There is no significant difference in the influence exerted by males and females on user background of cloud technology in higher education in Nigeria.

H_1: There is a significant difference in the influence exerted by males and females on the user background of cloud technology in higher education in Nigeria.

Hypothesis Fourteen

Ho: There is no significant influence of education level on external factors of cloud technology in higher education in Nigeria

H_1: There is a significant influence of education level on external factors of cloud technology in higher education in Nigeria.

Hypothesis Fifteen

Ho: There is no significant influence of age groups on user background of cloud technology in higher education in Nigeria

Hi: There is a significant influence of age groups on user background of cloud technology in higher education in Nigeria.

1.4 Significance of the Study

This research provides both practical and theoretical contributions. In the aspect of practical contributions, the results of this research can help computer/data scientists improve the technology adoption models. This can be done by understanding the process adopted in this

research in the development of the technology model and providing modification for a better model. In the aspect of theoretical contributions, this research provides an understanding of CTRAM in the context of higher education institutions in Nigeria, which is not well covered in the existing literature. This study will also be of significant positive change via improving of government service delivery to people and businesses; government services like passport registration, National Identity number registration, driving license, vehicle registration, and tax payment among others. Many people and businesses may assess the e-government platform as cloud-based via the single-window portal. The knowledge gained from this study would assist the government in integrating data and services that are hosted on a Cloud platform would help the government in the reduction of cost of infrastructure of information system as well as increasing performance, productivity and efficiency. The outcome of this study would alert the government and its organizations in adopting clouding technology not to worry about the information systems but to have a more focused plan on efficiencies and performance of their services.

This study would generate findings that may contribute to the IT practice by filling the knowledge gap in the literature on cloud computing adoption in both government and private higher education in Nigeria. The knowledge addition in the existing literature will increase cloud computing adoption understanding in higher education in Nigeria. This study will also lead to positive social change in the improvement of government service delivery to businesses and citizens not only in the education sector but also in other sectors of the economy. The adoption of cloud computing technology by higher education in Nigeria will go a long way in reducing government cost of IS infrastructure as well as increasing efficiency, productivity, and performance.

1.5 The Study Area(s)

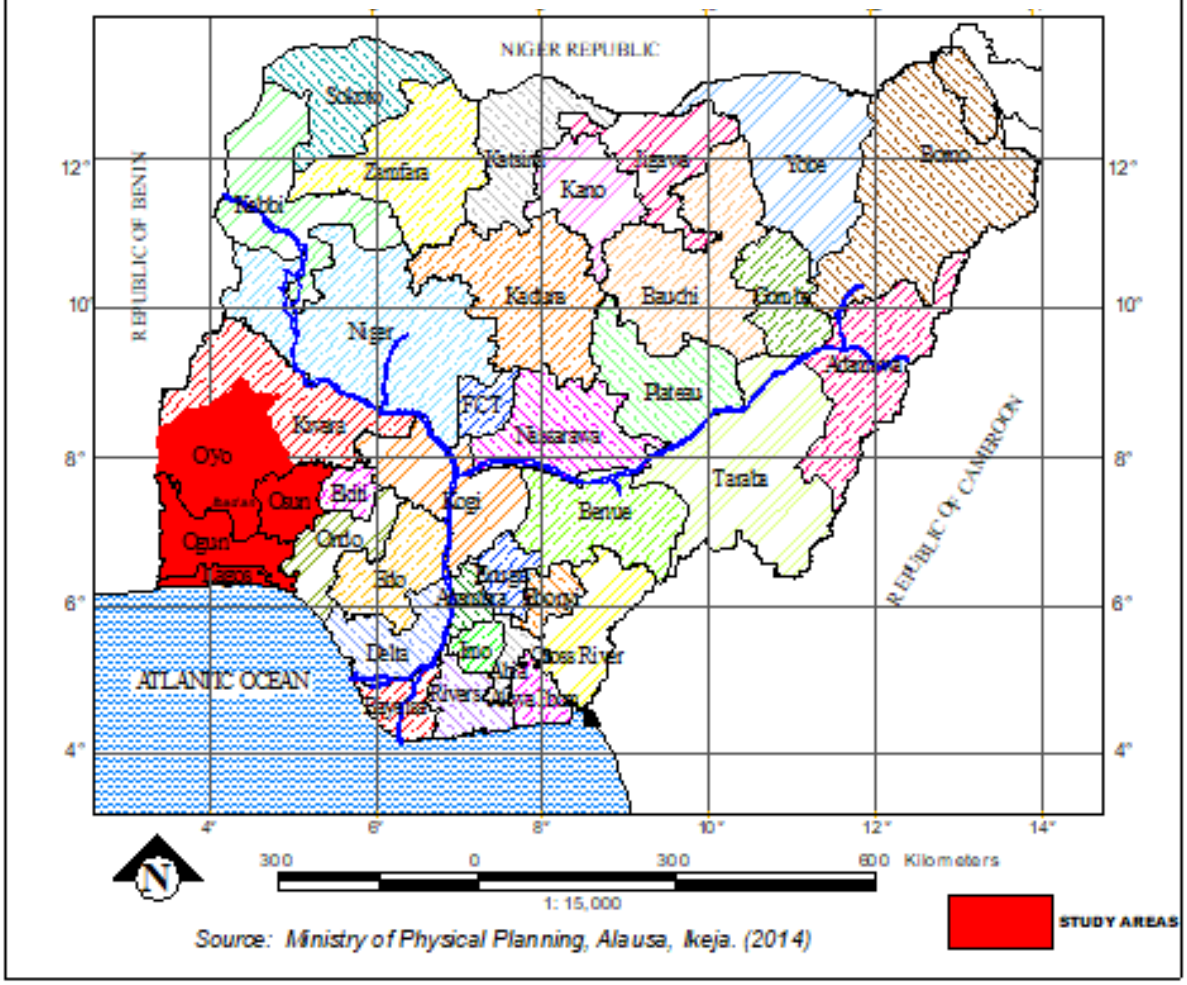
The study area is Nigeria which comprises thirty-six (36) states and Abuja the Federal Capital Territory. However, each of these states has different Universities both public and private universities, but not all of these universities offer information management systems.The application of cloud computing is being vigorously pursued at both undergraduate and postgraduate levels, however, only four states that had all universities both public and private universities studied information management systems with cloud computing as an option were considered for this study. The affected states are Lagos, Ogun, Oyo, and Osun, states. However, according to the information obtained from the study areas which shows zero or meagre

achievements were recorded in other states concerning information management systems with cloud computing options. Although some universities undertake information management systems in some of these other states but not at higher magnitudes than what is obtainable in the chosen four states. Therefore, the universities chosen in the four states are reflected in Figure 3.

Table 1.1: The Selected Universities for the study within the context of Nigeria.

S/N	NAME OF UNIVERSITY	OWNERSHIP	LOCATION
1	University of Lagos, Akoka (UNILAG)	Federal Government of Nigeria	Akoka, Lagos
2	Olabisi Onabanjo University (OOU)	Ogun State Government	Ojo Badagry Expressway
3	Obafemi Awolowo University	Federal Government of Nigeria	Ile-ife, Osun State
4	Adeleke University Ede (AUE)	Adeleke Family	Ede, Osunun State
5	University of Ibadan, (U.I)	Federal Government of Nigeria	Ibadan, Oyo State
6	Babcock University (BU)	Seventh Day Adventist Church	Ilishan Remo, Ogun State

Figure 1.1: LAGOS, OYO, OSUN AND OGUN STATES WITHIN THE CONTEXT OF NIGERIA



1.6 Structure of the Thesis

The thesis format follows the research approach taken during the research. The approach taken includes establishing the research question and objectives, developing the methodology, and gathering and analyzing data to support the conclusions. The thesis is organized into six chapters explained below:

Chapter 1: This chapter discusses the background of the research by stating the research motivations, problem statement, objectives, questions, hypotheses, significance, scope of the research and finally the organization of the study.

Chapter 2: This chapter looks at our current understanding of the concept of cloud computing, its types, benefits, and the state of cloud computing in Nigeria. The section also looks at the existing cloud computing models, their comparison, and limitations. This chapter also reviews the empirical studies and provides the basis for the proposition of CTRAM.

Chapter 3: This chapter presents the proposed framework, explains the derivation of variables, and examines the comprehensive technology readiness adoption model.

Chapter 4: This chapter presents the research methodology section of this research. Details on the philosophical view, research design, research approach, data collection, instrumentation, data analysis and validation of research are given and discussed.

Chapter 5: This chapter presents the findings, analysis and discussions of the survey results conducted in this research. From the findings, discussion and reflections were carried out under the auspices of the research objective.

Chapter 6: The final chapter presents conclusions of what has been found in the research, with a summary of the main results and an exploration of the theoretical and practical implications. Finally, the chapter also discusses the limitations of the research and contributions and reflects on possible areas for further investigation.

CONCEPT OF CLOUD COMPUTING AND THE EXISTING CLOUD COMPUTING MODELS

2 Chapter Two - Literature Review

2.1 Introduction

This chapter reviews the concept of cloud computing and the existing cloud computing models. The chapter further provides a comparison of the existing models, and empirical research efforts and thereby provides the comprehensive technology readiness adoption model.

2.2 Cloud Computing Technology

The concept of cloud computing is used to introduce services like data storage, servers, databases, networking, and software over the Internet. While the data is warehoused on somatic servers that are preserved through a cloud service provider, the demand for computer system resources, most specifically data storage and computing power are made available without direct control of the user of cloud computing (Prajakta &Chiradeep, 2022). Therefore, rather than packing and preserving collections and documents on a device or hard drive, they can be stored on the cloud thereby easing the accessibility of the stored documents from anywhere provided that, there is access to the web (Baburajan, 2018). Furtherance to the above, the services accommodated on cloud computing can be largely grouped under the three basic categories; infrastructure-as-a-service (IaaS), platform-as-a-service (PaaS) and software-as-a-service (SaaS).

In line with the deployment model, cloud computing can also be classified as private, public and hybrid cloud. In a private cloud, the computing services are provided over a reserved IT network mainly devoted to a single organization for use. A private cloud is regulated through the internal assets of an organisation and remains inaccessible to any outsider (Baburajan, 2018). It provides an advanced level of security via company firewalls and internal compering to safeguard an organization's sensitive data from gaining accessibility to any third-party providers. Conversely, the shortfall of private cloud lies in the heavy body of its maintenance costs through expensive management of data centres.

More so, the public cloud entails computing services provided by third-party agents over the Internet. In contrast to the private cloud, the services on the public cloud are open for use by anyone who wishes to utilise or acquire them (Baburajan, 2018). These services on the public cloud can be found accessible for free and/or sometimes attract charges for accessing them. The charges that are sometimes attracted to the public cloud services are usually on-demand, where users are required to pay according to the degree of usage for the CPU cycles, storage,

or bandwidth they consume. Public clouds can aid businesses in procuring, handling, and maintaining on-premises infrastructure as the cloud service provider is responsible for managing the system (Ray, 2018). The public cloud also offers scalable RAM and flexible bandwidth thereby making it the easier model for businesses to gauge their storage needs. The Hybrid cloud combines the features of both private and public clouds for utilization and this attribute makes it "the best of both worlds" cloud model that allows for the shift of capacities between private and public clouds when computing and required cost variations (Danielson, 2008). As regards the variations in demand for computing and processing, the hybrid cloud permits businesses to scale their on-premises infrastructure up to the public cloud to manage the excesses, while guaranteeing the inaccessibility of the third-party data centres to their data. The distinctive feature of a hybrid cloud model, it allows companies to only pay for the resources they use temporarily rather than purchasing and maintaining resources that may be of no use for a prolonged time. Concisely, a hybrid cloud guarantees the benefits of a public cloud without necessarily being affected by the security risks associated with the public cloud (Peter & Timothy, 2011).

Its division can be in the form of front-end and back–end strata (He, Guo, Guo, & Ghanem, 2012). While the front–end stratum gives the users easy interaction, the back–end stratum allows the users of the cloud to have easy accessibility to the stored data on the cloud through cloud computing software. It is worth noting that, the back-end stratum is made up of software and hardware, that is the computers, servers, central servers, and databases (Sun, Zhang, Xiong& Zhu, 2014). The back–end stratum is the principal constituent of cloud computing that exclusively accounts for securely saving information. Therefore, central servers that use software named middleware guarantee smooth connectivity between devices linked through cloud computing and also act as a link between the database and applications.

2.3 Challenges for Cloud Computing Adoption in Developing Countries

The adoption of cloud computing is according to Abdullah, Nur, and Zahurin, (2020) confronted with many challenging factors, and this includes the following.

i. Lack of control capability: The services of cloud computing are wholly under the management and control of the technology of service providers. This has thus, led to a deficiency of institutions' inability to have control over the cloud server. Because the efficiency of institutions' adoption is at mercies of cloud services providers thereby hindering the adoption of cloud computing by most higher institutions in Nigeria.

ii. Inadequacy of ICT specialists: The smooth adoption of cloud computing in Nigeria is a direct function of the availability of sufficient ICT expertise. The limited number of ICT expertise available in the country has made the adoption of cloud computing difficult since building and deployment of all types of cloud services are grave tasks which are usually undertaken by the cloud service providers that are limited in number in the country. Subsequently, errors arising from the building and deployment of cloud computing services can be detrimental to higher institutions' operations through recurring loss of stored data to the institutions, and hamper continuous usage.

iii. Poor internet connection: The use of cloud services is dependent on the sound internet network facility because its utilization must have a guaranteed internet network to access it. Therefore, cloud computing services accessibility in developing countries like Nigeria is still a constraint, especially when institutions are situated in an area which far from a big city. This is owed to the poor quality internet network services connection thus; poor quality internet network service connection is considered as hindering factor to the adoption of cloud computing service in Nigeria.

iv. Risk: The huge financial outlay required for building and deploying the cloud computing service makes the adoption of cloud computing highly risky, should there be any event of mistakes in deploying wrong server infrastructure that could endanger security such as web or applications that can make the institutions' database prone to the impending danger of cyber-attacks of service hackers. This would consequently result in the loss of huge funds invested to build and deploy cloud computing on one hand, and leaked the accessibility right of institutions' sensitive data on the other hand thereby hinder the adoption of cloud computing in Nigeria. The risk of using cloud is also associated with hazard of thrown the profiles of individuals within institutions that are stored on the institutions' database to the undesired destination through the activities of hackers.

v. Poor Government regulations: Government takes in developing countries like Nigeria are considered to be enmeshed with poor regulation of institutions owing to the inactions and excesses of the government body charged with the responsibility of ensuring good and quality governance system as it relates to the adoption of cloud computing through building and deployment of cloud computing infrastructure in Nigeria. This is because it is the responsibility of the government to provide the basic legal framework for data placement by third parties and subsequent sanction of any deviant from existing legal terms and conditions governing cloud computing services.

It is also expected of the government to provide services and infrastructure that support quality internet connections for aiding the adoption of cloud services activities by institutions. However, less or poor attention the government pays to the regulation issues on cloud services hinders the adoption of cloud computing services in developing countries like Nigeria.

vi. Challenge of migration issue: The issue of migration for institutions comprises several issues like switching the use from prior technology to the new services. Another challenge that instilsfearin institutions is the issue of moving data from old technology to the new one especially when the data of institutions are very large because of the number of attendants, it fears the migration process that is capable of disrupting the institutions' operations.

vii. Continuing change: In the ICT industry, everything becomes rapidly changing over time including the condition of service upgrades to the glory of service providers. Management states, it is not impossible if a cloud service provider someday meets bankruptcy or tripped over legal issues. Institution management states continue to monitor the current state of the ICT industry in anticipation of probable changes to arise. The inability of the management to make the best planning for the institution to minimize the negative impact of continued changes on the institution is another factor affecting the adoption of cloud computing services.

Various researchers have advocated that there are different challenges affecting cloud computing adoption such as:

(i) Data security

Certain risks and challenges prevent organizations and users from adopting the technology of cloud platforms. Ismail, Ammar, Samer & Issa (2019) affirmed that the unmitigated risks do form a major challenge for the providers of cloud services, they advocated that the highly rated challenges of cloud computing are; application integration, data migration, privacy and security as Shynu and Sigh 2018 as well as Ebert, Weber and Koruna (2019) informed. However, Volkov & Sukhoroslov (2017) stated that data privacy and security are necessary and veritable issues in the integration process of cloud computing. Also, Sun (2019) stated that security and privacy are veritable issues which aided the cloud computing popularity. The organization and

users of the technology do perceive privacy and security as data protection privacy breach, data transmission, protection, integrity availability and confidentiality.

Cloud computing privacy and security issues do manifest themselves in the area of compliance and security policy and patch management as well as data transmission, authentication and access control (Kaur, 2018). Diaz, Martia and Rubio (2016) affirmed that user privacy and data security are the main reasons why organizations and users are hanging back on the adoption of cloud computing. Alsmadi and Prybutok (2018) further stated that privacy and security are major setbacks in the adoption of cloud computing. Another study conducted by Sharma and Kalra (2018) pinpointed privacy as the major challenge that hampers users from cloud migration.

He, Zhang, Li Zhu and Hu (2019) in another study affirmed that data integrity happened to be the major challenge in cloud computing; data protection migration from on-premise information to the risk of cloud attraction of accidental data deletion, data breach or intentional data deletion as confirmed by (Ramachandra, Iftikhar & Khan, 2017). Organizations that migrate to cloud computing platforms would lose control of data security rights (Marchisotti, Joia & Decarvalho, 2019).

In cloud computing adoption research conducted by Basahel, Yamin and Drijan (2016) where 77.5% of users succumb to the fact that privacy and security are the major issues in cloud computing adoption, those of the users do exist in communication industries, manufacturing, IT and education which responded to the questionnaire admitted to the issue of data privacy and security are impediment too cloud computing adoption.

Equally important, hackers do attack the network; malicious programs like viruses have also threatened the security of stored data in the cloud (Gangwar & Date, 2016). Another issue/impediment affecting the usage of cloud technology had to do with data theft, data loss and other are orchestrated by data security which is one of the major considerations of users in a view to migrate to a cloud platform. According to Yam, Yu, Gong and Li (2016), they termed security as a cogent barrier to cloud computing development. In another development, Ali et al (2015) advanced the use of the following challenges such as; legal issues, contractual issues, communication issues, and architectural issues. Alonso-Monsalve, Garcia-Car balleira & Calderon (2018) affirmed that privacy and security challenges prove to be the concern of an organization that engages in mobile computing for marketing and mobile remote access. Cloud computing has popularized the mobile computing implementation that takes the vast cloud

resources available. As confirmed by Ahmad, Wang, Ullah, Sheharyar and Mahmood (2018) smart and mobile devices have the power of offloading the complex computational requirement of the cloud in taking storage resources and high processing advantage. The mobile cloud computing proliferation does create another privacy concern and security concern for the users. As reported by Mollatn et al (2017) the vivid issue for mobile cloud computing users is related to privacy and security concerns of cloud computing, cloud platform shared environments do create proclivity of unapproved data access and unintentional altercation or data attackers as Ali, et al., (2018) informed.

The issue of CIA which connotes confidentiality, integrity and availability of data are prerequisites needed in cloud platform migration. The data loss of CIA in the cloud system can lead to a system unsafeand untrustworthy as a result of the fact that data had been the key user component as affirmed by Kumar, Raj, & Jelciana, 2018).

Security and trust have been the major impediments in cloud computing adoption, therefore, CIA maintenance in the cloud system does help in engendering security sense and trust in the users. The issue of trust in cloud service providers'platforms connotes the kernel that encourages the users in the adoption of cloud computing. The trust is being given rise to users in a situation where the service providers of the cloud can assure the CIA users of their data. The virtualized environment and mutual-tenancy environment make it important for different security measures (conventional type) like intrusion detection systems, antivirus software (host-based), and firewalls to accurately and adequately protect data and use via security threats through the virtualized environment as Subramanian & Jeyaraj, (2018) informed. Some of the privacy and security breaches in the cloud platform include the 2014 cloud service breach and other reported breaches like web services cloud storage server of Amazon Dropbox and Google Drive reported breaches as affirmed by Patel and Alabisi (2019).

Application integration and infrastructure management have been another impediment to cloud computing adoption, some of these infrastructure management issues arise from problems of expertise cloud service administrator or algorithm issues. For instance, research conducted by Madni et al., (2016) revealed that algorithm and scheduling schemes in the allocation of resources like memory and processor in cloud applications do pose an impediment to cloud computing successful implementation. Cloud applications do learn dependence on the middleware layer of the cloud platform is crucial for cloud users who want to integrate applications to create a complete virtual or IS cloud. The cloud platform's middleware layer

contains computing stacks and software virtualization. This software facilitates the management and creation of virtual machines that host various types of software applications. If there are management issues in the middleware layer, it can result in problematic application integration. This may manifest as an inability to connect applications to the cloud platform or as a failure to integrate cloud applications with on-premise applications. To provide users and organizations with a unified IS, a tightly integrated cloud service is necessary.

(ii) Fault tolerance

The issue of fault tolerance in the cloud system may challenge the reliability, availability and adoption of cloud technology. Sutaria, Prasad and Bhavsar (2017) define fault as the defective or abnormal state of a part or the whole system which prevents the system from functioning in line with the expectation. The inability of the system to perform its required service and functions which may be due to a bug or anomaly in many or one part of the whole system, fault actions do interfere with the execution of normal tasks which do cause delay or total halt in the cloud computing system.

Degradation in the cloud computing technology systems may be a result of fault which may ultimately lead to money and time loss on the part of the end-users as opined by (Louati, Abbes & Cerin, 2018). Faults can occur in either software, network or hardware of a cloud system (Hasan & Goraya, 2019). Saritha and Raju (2016) affirmed that cloud systems increasing functionality and application complexities as well as computation, storage resources failure and cloud computing faults reduce the overall performance of the cloud computing system.

In another study, Ding, Yao and Hao (2017) concluded that the faults' higher occurrence in cloud computing systems is associated with increased complexity and functionality. Kumara and Kaur (2018) attributed the cloud systems to the virtual cloud services' extensive use which led to availability and reliability issues. A fault is part of computing as a result of the virtualization amount as well as the involvement of physical servers (Shaikh and Ahmad, 2018). Cloud computing platforms do prevent the reliability and availability of the system. Reliability is a very crucial part of cloud computing which is a software and hardware probability system component that aided correct performance according to expectations of the users as opined by (Wang, Fu & Cui, 2019).

Therefore, IT administrators do ensure cloud computing system reliability through fault tolerance revising issues as Chiang, Chen & Hsieh (2018) affirmed in their study. The study of

Mesbah, Rahmani and Hosseinzabeh (2018) informed that close to 285 million dollars had been lost every year as a result of cloud service unreliability and unavailability. For example, in March 2015, Microsoft Azure was recorded to have recorded two service failures associated with faults which had suffered the users tremendously in the eastern and central parts of the United States of America as confirmed by (Wei & Pei-Li, 2016). Similarly, fault-related failure was also recorded in May 2015 by Apple Cloud Services, this had a negative affection on over two million users as Wei & Pei-Li, (2016) informed. Also, in the year 2011, Ali Cloud was recorded to have suffered a disk failure subject to the routine maintenance completion on their cloud platform which was responsible for customer data loss failure (Yan, Zhang, and Yang, 2016).

In addition, in the year 2017, several failures were recorded to have been suffered by cloud service providers such as the one suffered by IBM's cloud infrastructure failure on the 26th day of January 2017.

Another service failure was recorded by Gitlab's repository service outage on the 28th of February 2017. Another failure was recorded by Facebook on the 24th day of February. The failure of Amazon web service occurred on the 28th day of February 2017 that of Microsoft Azure failure was on March 16th, 2017, also Microsoft Office failure was recorded on the 21st day of March 2017 as documented by (Mesbaahi, Rahmani & Hosseinzadeh, 2018). Several cloud system faults are responsible for these failures which led to painful experiences for the users that were unable to access their account, critical data and services.

Kumari and Kaur (2018) in their study identified various types of cloud faults which are: (i) service expiry faults; (ii) Process faults (iii) Physical faults and (iv) Network faults. Kumari and Kaur (2018) affirmed further that Network faults are the most predominant fault in cloud computing because the cloud is network-based. The Network fault may be a result of network mode of failure, network congestion, and disconnection of the network in supporting distributed applications. Fault in cloud services do have a multiplier negative effect on business due to cloud platform disconnection. For instance, network fault may manifest in the form of loss of data, in a situation of data loss in a process of health information exchange over the network between the cloud-based electronic application for health records and between users via cloud platform disconnection.

Physical faults do occur mostly in hardware infrastructure such as power failure, storage hard disks, server processors, and servers.

Louati, Abbes and Cerin (2018) affirmed that physical faults occur in cloud computing systems as a result of the commodity hardware presence in the system. Commodity hardware does involve the optimization of available hardware components and uses from varying manufacturers in achieving cloud computing efficiency.

Commodity hardware maximization does expose hardware to conditions that were not originally designed for which may increase the cloud computing systems failure rates. Bala and Chana (2015) in their extensive study exemplified Hardware fault by analyzing the current task execution in a place where there is over-utilization of cloud resource tasks like storage disks, memory, and processors among others.

As for process faults, they do occur in a way of inefficient application processes, software issues, low resources, and service expiry faults in a situation when there is an expiration in resource services that deny the application of the use of such resources.

In another study, Smara, Aliouat, Pathan and Aliout (2017) categorized fault types in cloud computing into computational and data faults. Data faults occur in data exploitation in cloud computing systems, whereas computational faults refer to network faults, software faults and hardware faults (Smara, Aliouat, Pathan and Aliout, 2017).

Nazari Cheraghlou, Khandem-Zadeh & Haghparast (2016) opined that cloud computing fault tolerance is the cloud computing platform's capability to identify and detect faults and recuperate from faults without having a negative effect/impact on the overall cloud computing service.

Chaturvedi and Sharma (2017) equally affirmed that fault tolerance is the capability of a cloud system to handle failures which may happen or occur in the scheduling process, which may be connected to unavailability or failure of resources, overloaded resources, insufficient memory, network issues, task failure. Jiang and Hsu (2017) concluded that fault tolerance a redundant design technique that analyzes the duplicate component availability to counter primary competent failures which ensures uninterrupted service from the system to its users. Jiang and Hsu (2017) equally described fault tolerance as a standard technique which helps operation continuity as well as quality of service (QoS) increment amid system component system.

Finally, Zhi Xin, Lei and Zeyu (2017) describe fault tolerance as a mechanism that can mitigate cloud computing platform failures. Fault tolerance does play a crucial role in the reliability,

availability and resilience of cloud computing resources as well as users which is being considered as one of the factors or determinants of cloud computing adoption.

Yan, Zhang & Yang (2016) identified some hindrances and impediments to cloud computing adoption as follows:

(a) security reasons (it is the main factor which discourages cloud computing adoption for organizations and governments like storing sensitive data in virtual servers may be subjected to compromise which is an issue).

(b) Legal issues (Rules and regulations in cloud computing may serve as a challenge to cloud computing adoption as conflict may arise due to no acceptable international rules and regulations that govern cloud computing adoption.

(c) Data Transfer: (since data is being stored in a remote server, it looks impossible for the users to move or transfer data chunks to the transferring period in time.

Distributed computing ensures that customers' data and applications are replicated in many locations so that faults in some servers or locations do not affect users' experience. Users also have the opportunity to scale their requirements for service redundancy easily; the higher the redundancy, the higher the cost of service. According to Sharma et al. (2016),cloud environments easily implement disaster recovery procedures due to their inherent virtualization features. Cloud service providers invest huge amounts of capital in storage technology. This action translates to almost near-infinite storage for users. Users can scale their storage needs; the larger the storage required, the higher the cost to the user. Finally, the implementation of cloud computing ensures that organizations and individuals do not worry about application patches and upgrades because the cloud service provider automatically handles this.

Disadvantages of cloud computing software for institution

1. Not all the applications can run in the cloud system

One of the challenges of cloud computing systems is that not all applications can be run on cloud computing systems (Green, & Salkind, 2014). Not only that the cloud computing system may not equally have all the required features needed by the user (Groves, Presser, Tourangeau, West, Couper, Singer, Couper, 2012). This suggests that they have to deal with another service

provider that offers the required software needed by the institution or the institution may rely back to the traditional system in acquiring the software (Rowley, 2014).

2. Instability of Vendor

Vendor instability may lead to poor service, for instance, if there is new management that takes over the service provision of an institution, the new management may not be able to meet the requirements and expectations of the clients or measure up to the standards of the former/previous management. The other related issue is that some of the vendors may not have the needed and necessary backup arrangement, in that case, the student is requested to have the required backup on their own for their data (Rutberg,& Bouikidis, 2018;Gumuşoğlu, & Akay, 2017).

In other cases, there may be issues of lack of funding and lack of maturity in the cloud computing market; this may lead to service providers going to extinction from the business in reduction of the quality of rendered service (Guo, Hermanson, Berkshire, & Fulton, 2019). These could lead to the risk of cloud computing service use by students and higher education institute facilities (Gupta, Yun, Xu, & Kim, 2017).

3. Incompatibility of the browser

Some cloud computing systemsdo not support all the browsers. Therefore, there is a need to inform all the students, lecturers and other staff of the higher education institute about the supported browser to avert unsupported browser issues (Haegele, & Hodge, 2015).

4. Possible disruptions as a result of maintenance & upgrading

These may be upgrading performance exercises which may cause inconvenient for the service providers which may in turn affect the software usage by the students, the change in the feature in the software during the period of upgrading may cause issues with navigation via the software challenge for the student (Hales, 2016).

5. Issues of Integration

There may be issues of integration problems, as the existing software may be difficult to integrate with the cloud computing system (Hallova Polakovic Šilerova, & Slovakova,2019). (Hanifi, & Ali, 2017). (Hasan, & Goraya, 2018).Hassan, Nasir, Khairudin & Adon, (2017) established that the issue of integration had been the kernel constraints with cloud computing.

This may characterize problem to the existing application as it may need to provide data for supporting the cloud computing system. It is therefore necessary and highly expedient for higher education institutions to conduct a proper investigation, to unravel whether the cloud computing system could be aligned or integrated with the application beforeits implementation and adoption (Salookolaei, Liu, & Nasseri, 2018).

6. Standardization issues and lock-in on the part of the data vendor lock-in of data/vendor

Through lack of standardization happened to be another issue as higher education institutes may not be able to change the service providers in case of an unsatisfactory service from the current service providers (Hathout, Ghoniemy, & Ibrahim, 2017). Also, there may be a case of inability of some software being unable to fit in on some platforms which made it impossible to change the service providers on the way; in case the higher education institutes were not pleased with their service (Hazra, & Gogtay, 2016 and Sauermann, & Roach, 2013).

More importantly, there are issues of lack of universal interface and standards which may be responsible for lock-in of vendors (He, Dong, Ota, Fan, & Wang, 2016).

7. Constant changes in Technology

Day in and day out, there are changes in computer-based technology where in some cases the higher education institutes were unable to measure up with the changes as a result of budget issues (Hevia, & Constantin, 2018). Therefore, there is a need for cloud computing technology to be flexible to help higher education institutes cope with the different changes in their requirements of ICT (Hollier, Pettigrew, Slevin, Strickland, & Minto, 2016).

8. Poor ICT infrastructure and poor electricity supply

Some of the biggest challenges affecting cloud computing have beenthe lack of constant power supply (electricity) and lack of ICT infrastructure especially concerning Nigeria and African countries (Howard, Restrepo, &Chang, 2017). The computer system needs a constant electricity supply for powering and other cloud computing technology (Hsu, & Lin, 2016). Also at Nigeria Higher Education Institute, there are lack of access to computers and poor infrastructural access to the extent that students to computer ratio is about 50:1 in virtually all

Nigerian universities (Hsu, Schmeiser, Haggerty,& Nelson, 2017). The situation in South African higher Education Institutions, study had it that the electricity and ICT infrastructure is in a better condition when compared with the situation in Nigeria.

Cloud computing system disadvantages for service for students

(1) Security, Privacy and data loss of control

Data protection and security are major concerns because their security lies in the hands of service providers (Hui, Xiaomin, Huangke, Hui, Wen, Weidong, 2018).

(2) Cost of international reliance on it

In case of a poor network, access to cloud computing may be jeopardised as the quality of the internet will determine the quality of the cloud computing system (Hung, 2016). If the quality of the internet is bad the quality of cloud computing will be bad as well (Holubnycha, Kostikova, Kravchenko, Simonok, & Serheieva, . 2019).

(3) Unsolicited advertisements

There may be different unwarranted and unsolicited advertisements that may occur from time to time while adopting the use of a cloud computing system, this may cause distraction or disturbances for students to the extent that such students may be carried away in looking at unsolicited advertisements, which would affect the student academically negatively (Isaias, Reis, Coutinho, & Lencastre, 2017).

(4) The need to learn new skills

Cloud computing comes with learning new skills like the computer (Iyamu, & Mgudlwa, 2018 Schweizer, & Furley, 2016).However, it may discourage some students who do not have prior knowledge of computer systems before they gain admission into higher institutes of learning. This would affect the student in the adoption of cloud technology adoption.

(5) Possibility of students missing classes intentionally

The use of cloud computing makes it possible for students not to attend classes and rely on recorded lectures which inadvertently leads to a class attendance decrease (Jankowski &

Flannelly, 2015). There is a need for encouragement of class attendance due to interaction season among students and their tutors.

(6) Poor bandwidth

Poor bandwidth is problematic as a result of the fact that it has negative implications on the quality of cloud computing system applications (Jeferry, Kousiouris, Kyriazis, Altmann, Ciuffoletti, Maglogiannis, Zhao, 2015). In case of poor bandwidth, it will lead to a reduction in the quality of cloud computing service (Jennifer, & Mary, 2011). in a situation where real-time access is needed in a group session, poor bandwidth may affect the messages of the session.

(7) Poor awareness of the software service

Cloud computing lack of awareness may affect the confidence of students (Ji, & Liang, 2016). There is need for student developing confidence in cloud computing service via attending of training on means of adoption and usage of cloud computing for academic purposes. The students lack confidence in the cloud computing systems in their intended manner which ultimately affects their overall academic performance of the student (Joo, Park, & Lim, 2018)

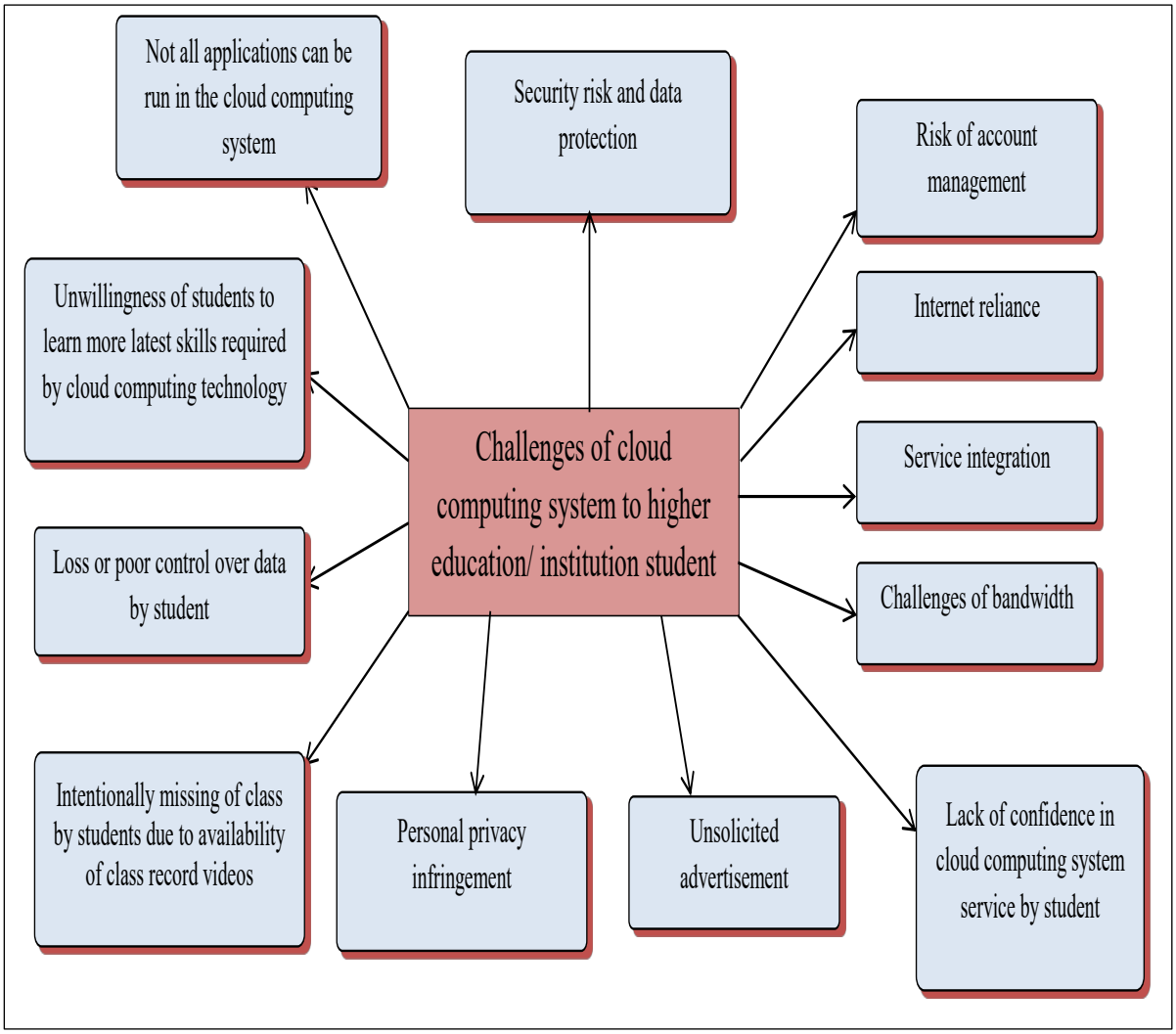


Figure 2.1: Challenges of Cloud computing system to student in Nigeria educational institution

Condition of Cloud Computing Adoption in Nigeria

The infrastructure challenge, anxiety regarding safety and security of data as well as government policies are some of the factors that inhibiting the growth of cloud computing in Nigeria. This is in spite of the number of efforts, there has still been slow and reluctant embracement of this new technological trend by many of Nigeria's business circles. The trend of this slow and reluctant embracement of this new technology can be traced to their resistant habit of leaving their technology assets to be hosted and managed by third parties (Ogunjobi, 2015). However, cloud computing technology offers the best services for achieving efficient and sustainable online data service to the target market. However, the cost of maintenance called for the need to contract these tasks to a third party thereby reducing the capital and operational expenses required to maintain the internet exclusively.

Consequently, Key cloud providers like Microsoft, IBM, Google and Cisco have established structures to drive the spread of cloud computing in Nigeria through either providing cloud services directly to organisations or in partnership with local IT firms for better integration and penetration. Several cloud service providers and services include Microsoft which offers Microsoft Azure, Microsoft Bing and Windows Live. In 2012, Wema Bank Nigeria Plc, affiliated with Microsoft used MS Exchange 2010, MS SharePoint Server 2010 and MS Lync Server 2010. Similarly, the Nigerian Airspace Management Agency (NAMA) deployed Windows Server 2012 and this permits several functions and saves cost.

Cisco, NetApp and Microsoft collaboration offer robust cloud services to users and subscribers. The NetApp technology is adopted by the Central Bank of Nigeria (CBN) and other top eight (8) banks in Nigeria (Nnadozie, 2013). Whilst, the advent of the Nigerian Uniform Bank Account Number (NUBAN) is a landmark innovation in the Nigerian banking sector thereby fostering cloud computing in Nigeria. Hence, cloud computing gained reasonable acceptability as the cost of infrastructure and software provisions are not friendly to the independent banks, instead, collectively shared among banks to reduce the cost of doing business and enhance profitability.

Again, Airtel Nigeria recently contracted its data centre infrastructure in Lagos to IBM thus, giving IBM managerial rights and falling operational costs. The partnership of IBM and Sunnet Technology solution providers was aimed at improving Nigerian businesses by giving organizations a vibrant infrastructure and cloud computing solution at a bearable cost and risk. Google's key partners with Descasio Ltd have numerous clients such as Coscharis Group, Transcorp and AMCOM, among others. Google Apps Engine cloud platform offers a medium for searches to be done with much data storage space available storing documents of a varied format, easy downloads and a host of others. For example, Gmail offers each user almost 10GB of inbox storage space in the cloud (Nnadozie, 2013).

Wyse Technology is another cloud provider that delivers its services to Electronic Test Company (eTC) in the conduct of examinations in Nigeria. With this development, testing will be fast and reliable without the inherent fraud that characterizes outdated paper-based examinations (Wyse, 2011). With the partnership principle, MainOne Technologies and MDX-i built Microsoft Azure's enterprise-grade infrastructure to offer flexible, highly available and fully secured private computing backgrounds to companies based on Pay–as–you–Go principle (Udofia, 2015).

Therefore, cloud computing is in the recent time gaining strong momentum from the public sector, with the Rivers State Government introducing the RIV Cloud in April 2012 supported and hosted by the MTN and GLOBACOM. This platform offers storage and application hosting to both public and private sectorsand will permitthe migration of tax filings online. The Nigerian National Petroleum Corporation (NNPC) also built a private cloud in July 2012. The Tier+3 data centre is estimated to save the NNPC some 5 million dollars every year by consolidating operations such as its procurement platform, its intranet and Microsoft Exchange mail service.

Industry analysts held that Nigeria has a cloud computing market potential of more than $1 billion if broadband infrastructure logjams are swiftly addressed to expand internet infiltration (Uzor, 2012). However, IT organizations and multinational data outfits, are now, confronted with the difficulty of dealing with huge data concerning how these data can add value to individuals.

Existing Cloud Computing Models in the Area of Technology and Cloud Adoption

Explanations for the existing models in the context of cloud computing was provided below and subsequently, Table 1 provides a summary of existing models in the general field of technology and cloud adoption.

2.4 Existing Theoretical Frameworks

2.4.1 Diffusion of Innovation (DOI)

The diffusion of innovation theory was developed by Rogers in 1962 to seek enquiries into the question of why, how and at what rate new ideas and technology spread. Diffusion is the process that aids the communication of innovation over time among members of the social system. Diffusion of innovation according to Rogers (1962), with successive groups of clients or consumers adopting new technology, the adoption of cloud computing will eventually get to its peak level. This means that, within the rate of adoption, there is a point where an innovation attains the level of critical mass. At that point, Geoffrey Moore hypothesizes that this point falls between the early adopters and the early majority (Stone, 2000).

Consequently, five fundamentals of diffusion of innovation theory that influence the spread of innovations were proposed by Rogers and this includes the innovation itself, adopters, communication channels, time, and a social system. This process relies heavily on social capital. While, the categories of adopters are innovators, early adopters, early majority, late

majority, and laggards, diffusion manifests itself in different ways and is highly subject to the type of adopters and innovation-decision process (Stone, 2000). Despite wide acceptability and applicability of the diffusion of innovation theory, the quantification of diffusion is extremely difficult if not completely impossible because of the complexity of human and human networks. Therefore, diffusion of innovation theory does not account for all variables, and as such might fail dire predictor of adoption (Wejnert, 2002).

2.4.2 The unified theory of acceptance and use of technology (UTAUT)

This is a technology acceptance model postulated by Venkatesh, Morris, Davis and Davis in 2003. This theory (UTAUT) is formulated to explain user intentions to utilise an information system and subsequent usage behaviour. And the theory holds that, there are four key constructs embedded in the theory, namely: performance expectancy, effort expectancy, social influence and enabling conditions (Koivimäki, Ristola&Kesti, 2007).

The first three hypotheses of the theory are direct determinant factors of both usage intention and usage behaviour, while the fourth hypothesis of the theory is a direct determining factor of user behaviour alone. Furtherance to the key hypotheses of this model, Eckhardt, Laumer, and Weitzel (2009) are in their view postulate that gender, age, experience, and voluntariness of use are suggested to moderate the impact of the four key hypotheses on usage intention and usage behaviour. The theory was advanced through a review and merging of the hypotheses of eight models that earlier research had employed to explain information systems usage behaviour and these right models include the theory of reasoned action, technology acceptance model, motivational model, theory of planned behaviour, a combined theory of planned behaviour/technology acceptance model, model of personal computer use, diffusion of innovations theory, and social cognitive theory). Subsequent validation by Venkatesh et al. (2003) of UTAUT in a longitudinal study found it to account for 70% of the variance in Behavioural Intention to Use (BI) and about 50% in actual use (Venkatesh et al, 2003).

Koivumäki et al (2007) applied this theory to the study of perceptions of 243 individuals in northern Finland on mobile services and technology and discovered that customer perception of using the devices is not in any way affected by the time rather, familiarity with the devices and user skills does impact on the perception of using the devices (Koivimäki et al, 2007). Similarly, Eckhardt et al. (2009) applied the theory to the study of the social influence of workplace referent groups (superiors, colleagues) on intention to adopt technology in 152

German companies and unveiled that, the impact of social influence from workplace referents on IT adoption is significant.

Curtis et al (2010) used the UTAUT to investigate the adoption of social media by 409 United States non-profit organizations. Though, before this investigation, UTAUT had not before been used in the study of social media in public relations. Their findings revealed that, well-defined public relations departments are most likely to accept social media technologies and utilise them to realise their organizational goals. Subsequently, women referred social media to be beneficial, and men showed more assurance in actively utilizing social media (Curtis et al, 2010)

Verhoeven, Heerwegh and De Wit (2010) studied computer use frequency in 714 university freshmen in Belgium using the UTAUT model and uncovered that, UTAUT was also suitable in explaining changing frequencies of computer use, and differences in information and communication technology skills in secondary school and the university (Verhoeven et al 2010).

Welch, Alade and Nichol (2020) utilized the UTAUT model to investigate the contributing factors to Mobile learning adoption among 118 museum staff in England. Also just like Curtis et al. (2010) averred that UTAUT had not before been applied to the use of just-in-time knowledge interventions to the development of technological knowledge within the museum sector. They found that UTAUT helped elucidate the determinants of mobile learning adoption (Welch et al, 2020).

2.4.3 The Technology Acceptance Model (TAM)

This is an information systems theory that models how users come to accept and use a technology was developed by Venkatesh and Davis in 2000 and later refined and expanded by Venkatesh et al. in 2003. The theory is developed with a focus on the utilization of technology by the people as the main target of the theory. Therefore, it suggests that the manipulation of the behavioural intents of the people through their attitude is a common move of the theory (Venkatesh & Davis, 2000 and; Venkatesh, 2000). The theory was applied in e-commerce with an enclosure of the effects of trust and perceived risk on system uses (Venkatesh &Bala, 2008). However, the technology acceptance model has despite its wide applicability and frequent refinement by the proponent of the theory, it suffers some drawbacks like uncertainty surrounding its applicability to empirical investigations, less explanatory and predictive power, triviality and absence of experimental values (Chuttur, 2009). Benbasat and Barki(2007) held

that, TAM "has distracted the attention of researchers away from some vital research subjects and this thus, birthed an artifice of improvement in the build –up of knowledge.

Also, the independent efforts of many researchers to magnify the TAM for continual adaptation of frequently changing IT environments has led to a state of theoretical chaos and confusion" (Benbasat&Barki, 2007). In broad terms, TAM pays more attention to the individual 'user' of a computer, with the concept of 'perceived usefulness', with extension to bring in more and more reasons for explaining how a user 'perceives' 'usefulness' and overlooks the fundamentally collective processes of IS development and implementation, devoid of question where more technology is really better, and the social consequences of IS use. Lunceford argues that the framework of perceived usefulness and ease of use overlooks some issues like cost and operational requirements that compel users into adopting the technology (Bass, 1969).

2.4.4 Technology Readiness (TR) model

This model was postulated by Parasuraman in 2000 to evaluate the hypotheses and its modules. It is a multidimensional psychographic hypothesis providing a means to the division of consumers upon which theybase their underlying positive and negative opinions of technology. Unlike TAM, it measures opinions an individual has about cutting-edge technology in general (Parasuraman & Charles, 2001). The four multidimensional divisions of TR include optimism, a positive view of technology and a belief that it offers people increased control, flexibility, and efficiency; innovativeness, that is, the propensity to be a technology forerunner and thought leader; discomfort –a perceived absence of control over technology and a sense of being dazed by it and; insecurity, that is, the disbelief of technology and doubt about its ability to work properly.

While optimism and innovativeness are sponsors of technology readiness, discomfort and insecurity are inhibitors. The model captures the puzzle that individuals may simultaneously hold both positive and negative beliefs. The Technology Readiness Index has been authenticated for being a forecaster of the adoption of innovative technologies, and the findings it delivers in some context parallel to the diverse strategies that would apply to a cutting-edge product or service (Roland & Kannan, 2002). It is commonly utilised in research to detect the general innovativeness of a population and/or as a controlling variable in a more comprehensive model that explains acceptance of a technology.

The unified theory of acceptance and use of technology (UTAUT) is formulated to explain user intentions to utilises an information system and subsequent usage behaviour. And the theory

holds that, there are four key constructs embedded in the theory, namely: performance expectancy, effort expectancy, social influence and enabling conditions (Koivimäki, Ristola and Kesti, 2007).

The first three hypothesis of the theory are direct determinant factors of both usage intention and usage behaviour, while, the fourth hypothesis of the theory is a direct determining factor of user behaviour alone. Furtherance to the key hypotheses of this model, Eckhardt, Laumer, and Weitzel (2009) are in their view postulates that, Gender, age, experience, and voluntariness of use are suggested to moderate the impact of the four key hypotheses on usage intention and usage behaviour. The theory was advanced through a review and merging of the hypotheses of eight models that earlier research had employed to explain information systems usage behaviour and these right models include the theory of reasoned action, technology acceptance model, motivational model, theory of planned behaviour, a combined theory of planned behaviour/technology acceptance model, model of personal computer use, diffusion of innovations theory, and social cognitive theory). Subsequent validation by Venkatesh et al. (2003) of UTAUT in a longitudinal study found it to account for 70% of the variance in Behavioural Intention to Use (BI) and about 50% in actual use (Venkatesh, Morris, Davis & Davis, 2003).Table 2.3 below shows a summary of the models. Table 1, models such as TRA, TRB, TTF, DTPB, and STAM were not included in this summary as they were deemed less relevant in capturing major elements for CTRAM. As such, TAM, TOE, DOI, UTAUT and TR represent the key contributing models as they incorporate numerous pertinent elements for CTRAM and, if combined, can potentially serve as a semi-hybrid representation of CTRAM.

Table 2.1: Summary of Existing Models and Sources

Existing Models	Source	Year of publication	Names of element	Applied in this research
TRA	Fishbein and Ajzen (1975).	1975	Attitude, belief and intentions	NO
TAM	Davis et al (1989).	1989	Perceived usefulness, perceived ease of use	YES
TOE	Tornatzky and Fleischer (1990)	1990	Environment, organization, technology	YES
TRB	Ajzen (1991)	1991	Attitude, behavior, intention	NO
DOI	Rogers (1995).	1995	Innovation, characteristics	YES
TTF	Dishaw and Strong (1999).	1999	Attitude to use, perceived ease of use, perceived usefulness	NO
DTPB	Taylor and Todd (1995).	1995	Subjective norms, perceived behavioral use	NO
UTAUT	Venkatesh et al (2003)	2003	Perceived ease of use, subjective norms, perceived usefulness	YES
TR	Parasuraman et al (2007).	2007	Expected service, perceived service	YES
STAM	Chen and Chan (2011).	2011	Social isolation, addiction, cost	NO

Source: Author's Compilation

Several theories were selected for the proposition of the CTRAM model, namely the diffusion of innovation (DOI) as championed by Rogers (1995), technology, organization, and environment (TOE), unified theory of acceptance and use of technology (UTAUT) by Venkatesh et al (2003); the technology acceptance model (TAM) founded by Davis et al (1989), desire framework (DF), and technology readiness (TR). These models have been applied in various fields towards evaluating the adoption of cloud computing as well as other aspects of technology usage and uptake. For example, Omar et al (2020) applied TOE, DOI and DF to evaluate key factors affecting the adoption of cloud computing in local government in Australia. Despite the prominence of these models, they offer relatively limited reflection on the social and organizational aspects of the technology acceptance process. As such, Table 2.2 outlines some of the limitations of existing models, which CTRAM seeks to overcome.

2.5 Critical Review of Existing Theories

The common features of the discussed theories remain in the efforts of the proponents of theories to promote rare attributes of each of the theories in bringing into the limelight the tool (technology) that matches the constantly changing world. In contrast, unlike UTAUT whichexplains the intention of technology's users and subsequent behavioural pattern of the

usage of the technology, the TAM exerted efforts in explaining the procedure for the acceptability of technology through adoption of cloud computing by individual and/or institutions, and then identified two main ingredients that are cardinal to influencing the move of the people or institutions on technology acceptability.

Similarly, with the aid of assessment of the construct of four dimensional psychographic hypotheses, the TR measures the beliefs of the people on technology acceptability, and of the four dimensions, two promotes technology readiness, while the other two are technology inhibitors. The diffusion of innovation theory seeks an enquiry into the question of how, why and at what rate the new idea or innovation spreads among the members of social system. And that, the theory believed that, the adoption of any new idea through the five fundamentals will rise and eventually reach peak and then gives way to the another emerging new idea. Of all the models of cloud computing, the diffusion of innovation is in the opinion and belief of the various researchers like Stone (2000); Noel (2009) and host of others, because it offers scientific justification for adopting any new idea in accordance to the capacity of individual or institution and viability of that innovation.

A study was undertaken to identify the factors affecting the IT implementation as the interface of the system, perceived usefulness, perceived ease of use and user behaviour. Based on these factors all the major technology adoption models discussed, namely the TAM, TOE, DOI, UTAUT, and the TR will fit well for the adoption of cloud computing in higher institutions. Other studies have investigated the factors involved in IT adoption and the best-fit model for technology acceptance.

When equating these models, DOI have focused more on anthropology, education, sociology, communication, and marketing. The DOI bases solely on innovation characteristics and the social aspects related to it. The DOI variables i.e. innovation characteristics, Individuals characteristics and organizational characteristics are limited, indicating the model to be inadequate when assessing the behaviour of technology adoption (Khan and Woosley, 2011). On the other hand, TOE deals categorically with organization and environmental features and has no association with the individual level. TOE has been applied in areas such as tourism and hospitality and in some technological fields like the open-source system, electronic procurement systems, and the Internet. TOE has not been popular in the field of technology especially not in the case of individual-level adoption. The main features of UTAUT are its eight characteristics of behaviour which include behaviour intentions or usage, performance

expectancy effort, facilitating condition, social influence, gender, age, experience, and voluntariness (Khan and Woosley, 2011). The UTAUT could be in some way regarded as an extension of the TAM version as it focuses on the adoption of individual level as well.

Table 2.4 below provides a tabulation representation of the comparison of the existing technology adoption models that are essential in the construction of CTRAM.

Table 2.2: Comparison of Existing Technology Adoption Models

	TAM	DOI	TOE	UTAUT
Core variables	- Perceived ease of use. - Perceived usefulness.	-Innovation characteristics. -Organization characteristics. -Individual characteristics	-External pressure -external support -Perceived competitive advantage	-Performance expectancy -Effort expectancy -Social influence
Theoretical background	- Base on behavior intention to use a system as the dependent variable - PEU and PU as the dependent construct	-Implementation success or adoption is the dependent variable. -Compatibility and complexity of technology and relative advantage are the independent factors.	-Implementation success or adoption is the dependent variable. -Compatibility and complexity of technology and relative advantage are the independent factors.	-Behavioral intention or the usage behavior dependent construct -Performance expectancy, effort, social influence, facilitating conditions, gender, age experience as independent factors
Category	- Organization - Individual	-Organization/Group -Individual	-Group -Organization	-Individual level adoption
Suitable application	- IT - Information system	-Anthropology -Marketing -Sociology	-Tourism and hospitality -External support	-IT -Healthcare
Limitations	-Lacks social aspects of IT acceptance process - Lacks external factors outside of an organization that affect the acceptance process	-Lack effective organization support at the micro firm level. -Does not include some important constructs like the environment and attitude construct	-Lack organization support at the micro firm level. -Constructs are difficult to define and measure especially at the technology aspect -Ignore individual support of information system acceptance	-Does not handle specific domains -Lack effective use in a voluntary setting -Lack effective use in an organization setting - Lack the process technology progress through to be adopted

Source: Author's compilation

From Table 2.4, the performance expectancy variable from UTAUT, which can be defined as the extent to which an individual believes the technology will help improve job performance,

is largely the same as the perceived usefulness from the TAM and those from the DOI. This variable is also the main predictor of intention across the three models. Similarly, effort expectancy can be defined as the extent to which the technology is perceived to be easy to use. The ease-of-use variable from TAM and DOI capture the essence of this construct. However, social influence can be defined as the extent to which an individual's decision to use a technology is impacted by another individual. This variable is represented as the subjective norm and the image variable in the DOI. While the original version of TAM did not include a variable for subjective norm, the second and updated version of TAM does. Each of the three models has been broadly implemented and has their respective limitations, as summarized above. These limitations therefore served as the central basis from where a further development was made to expand on the number of salient variables in order to derive a more comprehensive and specific construct in the form of CTRAM, which will combine the key characteristics of existing models to evaluate the uptake of cloud computing.

Limitations of the Existing Model

Even though all the models have strengths and are relevance, yet there are inherent drawbacks associated with the models. For instance, TAM is an outstanding model which has been cited more than 700 times (Bagozzi, 2007), there are still some limitations attached to the model. The meta-analysis that was conducted by Legris, Ingham and Collerette, (2003) of the current literatures on TAM as well as its applications, discovered many concerns, these include:

i. Most TAM studies involve students who lack a business background.
ii. Too much focus on office software or development applications instead of business applications.
iii. Self-reporting. TAM applies measurement of variance in self-reported usage, which cannot be entirely precise (Henderson & Divett, 2003 Subramanian, 1994).
iv. Factors considered in IT adoptions were influenced by the dynamic of a company. (Subramanian, 1994)

Researchers indicated limited relevance in TAM (Gefen and Straub, 1997) while others consider social factors to be missing when implementing TAM (Lai and Li, 2005). On the other hand, DOI is good at predicting technical, social and change and has been tested within other fields apart from IT, like the education system and the health sector (Dingfelder & Mandell, 2011) in anthropology and sociology (Makoza, 2015).

Research indicates technical complexity, technical compatibility, and relative advantage play a significantly crucial role in the adoption of innovation (Bradford & Florin 2003 and Taylor & Todd, 1995). Even though DOI has been largely implemented, it still comes with limitation.

DOI is mainly based on the innovation characteristic and social system around it. Because of this, the variables have been limited and all variations are tied to the variables within the model. These limitations suggest the inadequacy of variables within the adoption behaviour. Another setback is that the technology that is been considered does not make any difference. This means DOI requires some re-considerations (Khan & Woosley, 2011), combining all the technology adoption models in several areas of research, Hennington, and Janz (2007), state that due to the limitations of TAM, DOI, TOE and UTAUT, they have not had a huge impact in their applications in areas such as IT, sociology, economics, anthropology and psychology.

Hennington, and Janz (2007) conducted a study to evaluate the physician adoption of IT and reported the following finding:

i. TAM is self-reporting and could introduce partialities in the study
ii. TAM and DOI lack objective variables
iii. The UTAUT emphasizes contextual factors.

Yarbrough, and Smith (2007) conducted a study evaluating the existing technology acceptance models and the barriers to technology acceptance in health care, proposing the inadequacy of the TAM model and suggesting an enhanced model like the UTAUT. The study indicated the TAM supported partial acceptance factors but lacked the support of other factors that involved social, organizational and other external factors. Based on the literature review carried out, there is a lack of empirical investigation that combines all the variables found in all these models (TAM, DOI, UTAUT, TOE, and TR) to formulate a single comprehensive model.

The CTRAM has been created to encompass all the variables found in the models mentioned above. In the past, other models such as TAM have been extended to develop the UTAUT model which as we know is intended to explain the user's intention and subsequent usage behaviour towards using an information system (Venkatesh et al., 2003). Through comparison of these models, it is evident that they each have cons and limitation. That has led this research work to the invention a new adoption framework.

2.6 Research Gap

Globally, there are plentiful studies on technology and cloud computing adoption, more especially in the advanced economies such as Europe, Asia, and America. While there was evidence of studies in Africa and particularly in Nigeria, such studies are in limited supply lack the strong aggregation advantage of CTRAM. For instance, in Asia, Salim, Abdelghani, Abdullah and Mohammed Mispah (2021) studied the cloud computing systems' adoption in the higher education sector in Oman considering the COVID-19 pandemic. The study utilizes the partial least square technique of estimating the surveyed data to uncover the plan to use cloud computing in this context is significantly dependent on its perceived ease of use, usefulness, perceived reliability and responsiveness**.**

Abdullah, Nur and Zahurin (2020) studied the influencing factors on cloud computing adoption in higher education institutions (HEIs) of the least developed countries, concentrating on the Republic of Yemen. The study adopted the partial least square (PLS) method of estimating the collected data from sampled 328 respondents in 38 HEIs to unveil that, there is a mixed magnitude of the relationship of the examined latent variables like compatibility, security, technology readiness, top management support and reliability, among others with the cloud computing adoption in the Republic of Yemen. It is found that the variables like compatibility, top management support, technology readiness and reliability, among others bears positive and significant impact on cloud computing adoption, while, latent variables like regulatory policy and culture negatively related to cloud computing adoption at statistical significance.

Omar, Anup, Valmira and Shahnawaz (2020) evaluate key factors determining the adoption of cloud computing in local government organisations in Australia. The study employed survey method and inferential statistics as tools of analysis to discovered that, latent factors like compatibility, complexity, cost, security concerns, expected benefits and organization size impact positively on cloud computing at a statistically level of significance. This therefore, suggests intensification of the cloud computing technology adoption owing to its low cost and high benefits advantages in local organisations in particular and the state institutions in general.

Abdul-Noor (2019) evaluates cloud computing technology in higher education institutions in Yemen, the study utilizes partial least square as technique of estimating the model of the study. The results of estimation found that, relative advantage, compatibility, complexity, data concern, top management support and technology readiness had significant effects on perceived usefulness towards the intention for adopting cloud computing in HEIs in Yemen.

Rehana (2018) studied the challenges in cloud computing adoption: an empirical study of educational sectors of Saudi Arabia. Employing descriptive statistics in form frequency, percentage distribution and confidence interval as means of estimation for the study, the study found that, factors such as privacy, security and confidentiality are the major issues that need speedy attention of lawmakers to address. These factors serve as barriers to the adoption of cloud computing in the education sector in Saudi Arabia.

Al-Alaa and Ibrahim (2015) investigated the Cloud Computing Adoption by Higher Education Institutions in Saudi Arabia. The study used partial least square as the estimation technique to reveal that, the three basic factors (i.e. relative advantage, data privacy and complexity) are core to the consideration of the adoption of cloud computing technology by higher education institutions in Saud Arabia. Also found in the study that, the adoption rate thrives more among large universities than it is in small higher education institutions.

Similarly, in the European scene, Hakan (2021) studied Cloud Computing Adoption in Universities as a Guideline to Cloud Migration in Turkey. The study employed descriptive statistics in form of frequency and percentage distribution as well as Chi –square statistics to analyse the surveyed data. The study reveal that, the adoption of cloud computing is an important means of avoiding the high cost of maintaining IT technology in the universities within Turkey even though, the adoption rate in the universities Turkey are still very low. Also, the result of Chi –square statistics show a significant relationship between cloud computing awareness and use of cloud applications at one end while, at other end, there is a significant relationship between the use of virtualization technologies and the use of cloud applications.

In the African scene, using multiple regression model, Charles, Emily and Catherine (2021) assess the critical success factors of cloud computing in public universities in Kenya. The study reveal that, factors like management support, technical support and users' preparedness are key variables contributing to the critical success of cloud computing adoption in universities in Kenya.

Mohamed, Elesanmi and Bushra (2019) conducted a quantitative study of the factors affect cloud computing adoption in higher education institutions: A case study of Somali higher education institutions. The study utilized descriptive statistics and linear regression model to found that, the number of independent variables like the technological factors, organizational factors and environmental factors as an independent variable are significantly related and impact on cloud computing technology adoption in higher education institution in Somali.

Combining both qualitative and quantitative research methods, Makoza (2015) evaluate the Cloud computing adoption in Higher Education Institutions of Malawi. The study used inferential statistics as a tool of analysis to reveal that, because HEIs are still at early stage of adopting cloud computing, variables like top management support, potential security risks and inadequate legal frameworks poses challenges on the adoption of cloud computing technology by HEIs.

Narrowing to Nigeria, Imran, Ismail and Kazeem (2020) investigated the use of cloud computing technology for effective administration of universities in Nigeria. The study utilized descriptive and inferential statistics as the tools of analysis to reveal that, in line with the principle of SWOT analysis, there are concerns and challenges that impedes the adoption of cloud computing technology. However, there are massive benefits Nigerian universities stand to gets from adoption of cloud computing when the challenging factors that impedes the adoption of cloud computing technology in Nigerian universities are mitigated.

Jibril (2014) investigated the adoption of cloud computing in higher institutions in Nigeria, the study employed descriptive statistics and partial least square technique of estimating the surveyed data from 200 sampled respondents in higher education institutions in Nigeria. The result of estimated models found that seven out of ten covert variables were found to be in support of the adoption of cloud computing technology in higher education institutions in Nigeria, while the remaining three were found not to be in support of the adoption of cloud computing technology in higher education institutions in Nigeria. The study therefore inspires the management of higher education institutions to make a move on the adoption of cloud computing technology in the respective institutions in Nigeria.

Oyeleye, Fagbola, Temitayo and Daramola (2014) studied the impact and challenges of cloud computing adoption on public universities in Southwestern Nigeria. Using descriptive statistics in the form of frequency and percentage distribution, the study reveals that adopting cloud computing technology impacts on cost-effectiveness, enhanced availability, low environmental impact, reduced IT complexities, mobility, scalability, increased operability and reduced investment in physical assets in higher education institutions in Nigeria.

Pathak and Sudhir (2018) further investigated the factors affecting the adoption of cloud computing technology in educational institutions in Chandigarh. They argued that despites the mammoth promising advantages of cloud computing for been the latest asset of IT for various organisation. Evidence from the statistical test outcome of the research indicated that adopting

cloud computing in Chandigarh is affected by “support and integration of institution services with cloud computing and top management tendency to support cloud computing adoption”. In 2016, Appiahene, Yaw, and Bombie evaluated the cloud computing technology model for teaching and learning of information and communication technology. It was reported that the adoption of cloud computing has eliminated the existed boundary to student learning, while allowing adopters of the technology to access work anywhere, anytime, and share. With this juicy merit, this research work will implement the comprehensive technology readiness adoption model (CTRAM) in higher education in Nigeria.

Aririguzo and Agbaraji (2016) further show that cloud computing adoption is gaining momentum in recent time. After statistical test for cloud computing adoption as a secured and cost effective data storage system, it was ascertain that in the industrial cloud activities, banking recorded the highest with 64% while social media recorded second with 58%, online games recorded third with 45%, photos recorded forth with 29% and file sharing recorded lowest with 19% occurrence. Thus, having investigated cloud computing adoption in the industrial sector, this current research will add to the body of knowledge by considering the adoption of cloud computing in higher education sector in Nigeria, which to the best of my knowledge, studies of such kind is at best limited/scarce.

Cloud computing provides numerous benefits to both individuals and organizations. These benefits include but not limited to: (a) faster time to production and value,(b)reduced cost of operation,(c) high scalability and availability, (d) competitive advantage,(e) ubiquitous access to data and applications, (f) data back up and redundancy,(g) near infinite storage capacity, and (h) regularly updated applications. Cloudcomputingprovidesanon-demandplatformwithubiquitousaccessfor individuals and organizations to achieve their goals and objectives quickly (Benlian, Kettinger, Sunyaev & Winkler, 2018).Users will not have to worry about the deployment and maintenance of IS infrastructure since the cloud service provider will handle this aspect, thereby reducing the time to achieve personal and business value.

According to Kathuria, Mann, Khuntia, Saldanha, and Kauffman (2018), the potential value of cloud computing has motivated many organizations into the adoption of the computing model. Cloud computing provides cost savings in the longrun by eliminating the high cost of purchasing hardware, applications, and manpower (Ogiela,U., Takizawa, & Ogiela, L., 2018; Yu,Cao, & Schniederjans, 2017). According to Holubnycha, Kostikova, Kravchenko,

Simonok, & Serheieva, (2019), cloud computing is cost- effective because it reduces the cost of users' software application. Users' do not need to worry about purchase or updates to software applications as that has been addressed in the cloud computing backend. Cloud computing helps reduce costs since users only pay for computing resources used and can easily scale up or down as they require (Cearnău, 2018).

Additionally, individuals and organizations will reduce the cost of maintenance as they do not have to appropriate finances for the maintenance of IS infrastructure, support infrastructure, and support IT personnel. Cloud computing benefits regarding cost-saving has helped many businesses save as much as 22% on their total cost of operation (Joe- Wong, & Sen, 2018). In addition to the low cost of operation, cloud computing also offers users high scalability and availability (Si, Ke, & Shouyi, 2019).Users can easily scale their computing needs in a cloud computing environment. For example, users can demand an increase or decrease in their storage, processing, and memory requirements.

Users can also enjoy high availability of data and applications since most cloud computing service providers implement redundancy or disaster recovery (DR) sites, which ensure instant fail over in the event of a disaster in the primary cloud computing data center. The ability for cloud computing to provide users with low cost and highly scalable solution has attracted many startups. According to Ferri, Spanò, andTomo (2020), startups have benefited from cloud computing regarding the ability to easily penetrate markets with entry barriers reserved only for large enterprises. According to Akherfi, Gerndt, and Harroud (2018), cloud computing helps simplify IT resource management and maintenance. Organizations that adopt cloud computing can be competitive in the horizontal industry, and this is because they focus more on their core competencies, while cloud service providers help such companies optimize their service through cloud-based services. Such companies can leverage cloud computing services such as sales force, human resource applications, accounting applications, advertising applications, and the rest to increase their competitive advantage. Cloud computing ability to simplify the IT resource management and maintenance ensures that organizations and users focus on their core competence instead of dealing with the additional overhead of managing IT resources (Araya et al, 2018; Liu & Li, 2019).Ubiquity in cloud computing enables organizations the flexibility of the deployment and use of their IT resources(Liu,Chan,Yang,&Niu,2018).Ubiquity ensures that computing resources can be accessed by individuals and organizations from any computing device, at any time, and from anywhere in the world.

TAM was based on the theory of reasoned action (Omar, Anup, Valmira and Shahnawaz, 2020). TRA stated that “individual behaviour is driven by behavioural intention where the behavioural intention is a function of an individual’s attitude towards the behaviour and subjective norms surrounding the performance of the behaviour” (Omar, Anup, Valmira and Shahnawaz, 2020). In other words, “one’s behaviour and the intent to behave is a function of one’s attitude towards the behaviour and their perception about the behaviour” (Pathak and Sudhir 2018). Normative behaviour referred to beliefs of an individual that are accepted by specific people or groups and dictated whether behaving in a particular manner was appropriate. Attitude on the other hand is defined as “a favourable cognitive evaluation, emotional experience, or behavioural tendencies that people constantly held for a certain situation or ideas" (Pathak and Sudhir, 2018). Diaz, Martin & Rubio, (2016), conducted a research study looking at the application of the different technology acceptance models and their effectiveness under varying conditions. The researchers highlighted the different strengths and weaknesses of each model, and one of the weaknesses that played a role in the TRA framework not being used in this research study was that TRA assumed that once an individual has formed an intention to act, they will have the freedom to act in the intended manner. This was not the case though, individual behaviour was at times limited by ability, time, environment, or organization (Karim & Rampersad, 2017). The main objective of conducting this research study was to find out why certain organizations were potentially limited to actingas expected when it came to the adoption of the cloud, and what factors influenced their behaviour. The research questions and questionnaire were constructed to determine what environmental and organizational limits affected the university staff and students’ intentions to adopt the cloud. Since the TRA model assumed thatusers had the freedom to act as they intended to act and failed to account for the different factors that might affect the user’s intentions, this model could not be used in this research study.

The Theory of Planned Behaviour (TPB) was introduced to explain all user behaviour. The behavioural intent of this theory distinguishes it from all the other theories, this theory measured the person’s intention to do or to not to do something, and it stated that a person’s intention to behave in a particular way was influenced by their attitude that the behaviour will lead to expected results and the risks and benefits will be within the expected scope (Suhaib, 2020).

TPB stated that for an individual to behave in a certain way, it is dependent on their level of motivation (intention), and their ability (behavioural control) to perform that particular task.

While the TPB framework included some factors that were not considered previously when studying other technology adoption frameworks, TPB was still not suitable for this research study. TPB did not factor in issues that were outside of the organization and how these may impact technology acceptance, and user experience with using the technology Yousef, Rusli, Rodziah, & Yusmadi 2018).

This research was not only interested in the framework that studied the behaviour of the end-user (students and staff) but also a framework that studied the factors that might have not been directly linked with user behaviour but still affected the adoption of the technology. With the use of the TPB, some of the research questions were answered for this research study since the questionnaire was set to address even factors that were outside of user behaviour, which meant that the decision to adopt or not adopt the technology did not rely heavily on how the user felt about the technology, but could have also been determined by other factors other than user perception and attitude.

2.7 Chapter Summary

In this chapter, we present an overview of the concept of cloud computing comprising of its major types, benefits, challenges, and the current condition of cloud computing technology in Nigeria. The Chapter also, provides the existing major cloud computing models, their comparison, the empirical review, and shortcomings the shortcomings of the existing models and studies. In overcoming the challenges, the chapter contained the proposed CTRAM. The chapter ends with a summary of the Chapter. The next Chapter provides the methodology used in the research.

Additionally, individuals and organizations will reduce the cost of maintenance as they do not have to appropriate finances for the maintenance of IS infrastructure, support infrastructure, and support IT personnel. Cloud computing benefits regarding cost-saving has helped many businesses save as much as 22% on their total cost of operation (Joe- Wong, & Sen, 2018). In addition to the low cost of operation, cloud computing also offers users high scalability and availability (Si, Ke, &Shouyi, 2019).Users can easily scale their computing needs in a cloud computing environment. For example, users can demand an increase or decrease in their storage, processing, and memory requirements.

Users can also enjoy high availability of data and applications since most cloud computing service providers implement redundancy or disaster recovery (DR) sites, which ensure instant fail over in the event of a disaster in the primary cloud computing data centre. The ability of cloud computing to provide users with low-cost and highly scalable solutions has attracted many startups. According to Ferri, Spanò, and Tomo (2020), startups have benefited from cloud computing regarding the ability to easily penetrate markets with entry barriers reserved only for large enterprises.

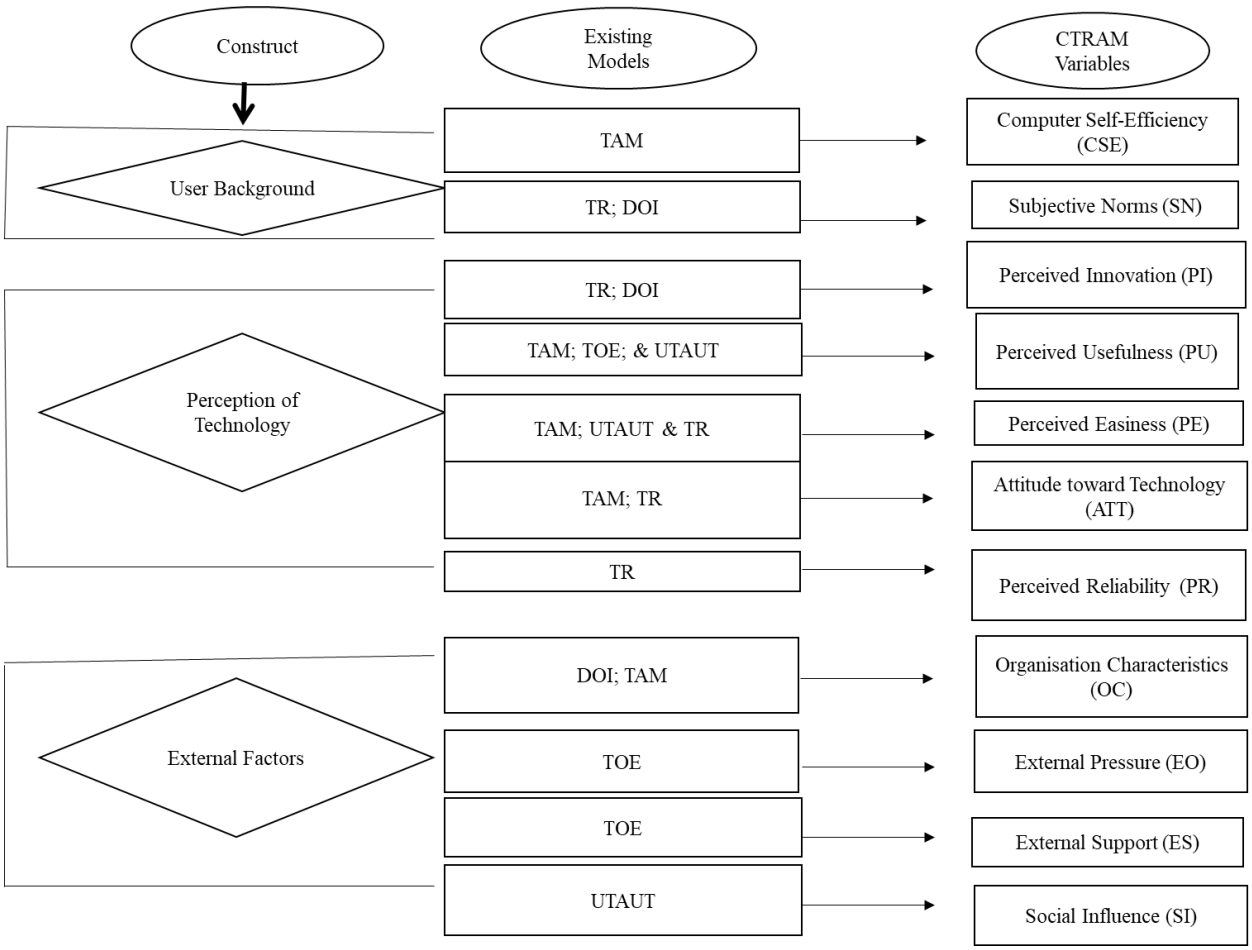
Cloud computing ability to simplify IT resource management and maintenance ensures that organizations and users focus on their core competence instead of dealing with the additional overhead of managing IT resources (Araya et al., 2018; Liu & Li., 2019). Ubiquity in cloud computing enables organizations the flexibility of the deployment and use of their IT resources (Liu, Chan, Yang, & Niu, 2018).Ubiquity ensures that computing resources can be accessed by individuals and organizations from any computing device, at any time, and from anywhere in the world. Users of cloud computing will benefit from reliable data and application backup, disaster recovery, and redundancy. This assertion is because cloud computing service providers generally implement distributed computing over-multiplied at a centers located in multiple cities and countries.

3 Chapter Three - Proposed Framework

3.1 Introduction

The preceding chapter presents the scholarly literature on cloud computing adoption in higher education institutes. This chapter analyses and examines the proposed framework, derivation of variables, the Comprehensive Technology Readiness Adoption Model as well as chapter summary. Users of cloud computing will benefit from reliable data and application backup, disaster recovery, and redundancy. This assertion is because cloud computing service providers generally implement distributed computing over multiple data centers located in multiple cities and countries as observed in Figure 3.1 and Table 3.1.

Figure 3.1: Proposed CTRAM Model



Source: Compiled by the Author

Table 3.1: CTRAM Variables

1. Individual Characteristics	
• **Computer self-efficacy (CSE)**	The degree to perform a certain task with a computer system.
• **Subjective Norms (SN)**	The actual status of an individual's technology usage or approach to handling technology.
2. Perception of Technology	
• **Perceived Innovation (PI)**	The degree of perception about technology in terms of innovativeness.
• **Perceived Usefulness (PU)**	The degree of perception about technology in terms of usefulness e.g. enhancing academic or job performance.
• **Perceived Easiness (PE)**	The degree to which individual believe that using a technology is easy.
• **Attitude towards Technology (ATT)**	A person's evaluation of technology or behaviour associated with the use of cloud computing.
• **Perceived Reliability (PR)**	The degree to which a person trusts or distrusts a technology and its ability to work properly.
3. External Factors	
• **Organizational Characteristics (OC)**	The extent to which an organization supports the adoption of a technology.
• **External Pressure (EP)**	The degree to which an individual feels pressured because of influence from external parties such as competitors, peers or management.
• **Technical Support (TS)**	Entails the perception of support received from an organization or colleagues.
• **Social Influence (SI)**	The degree to which a person feels a technology can affect a community.

Source: Compiled by the Author

After the review of the major existing cloud computing models and the empirical research effort by other researchers, this study identifies two major gaps, which this researcher aims to bridge. Firstly, from the review, it was discovered that several technology and cloud computing models exist, and they are relevant in cloud computing discussions. Despite their relevance and prevalence in the general subject domain, there has been relatively little work in the aggregation of these various approaches, and hence one principal aim of this research was to consider the collective aggregation of these methods in the case of Nigeria, to investigate how their collective application may lead to a refinement or combination of these techniques into a single tool for measuring cloud adoption. Thus, this research will contribute to the field by proposing a new comprehensive technology readiness adoption model (CTRAM) for the assessment of cloud computing adoption. The novelty of CTRAM over other models (such as TAM, TOE, and DOI amongst others) resides in its comprehensive and combined attributes of existing models.

Secondly, different from the existing studies, the research would help to deepen the understanding of core factors affecting the adoption of cloud computing in Nigeria by estimating the level of cloud computing adoption. In addition to the use of the CTRAM model, the research investigates how the differences in the University's status (private or public) affect the adoption of cloud computing.

3.2 Derivation of Variable

The derived CTRAM contains 11 variables that are classified into three main groups, namely individual characteristics, perception of technology, and external factors. Referring to Tables 2 and 3, the applicable models included in CTRAM are TR, UTAUT, DOI, TOE and TAM. The UTAUT was selected as represents an important tool for evaluating a user's acceptance of IT by assessing one's intention to partake in the use of information systems and how they behave during usage. UTAUT consists of four key variables: 1) performance expectancy, 2) effort expectancy, 3) social influence, and 4) facilitating conditions. Other factors such as age, gender, experience, and willingness to use may also be applied to moderate the influence of the four variables to reflect more accurately usage intention and behaviour.

Additionally, TAM introduces further measuring criteria to anticipate technology adoption with individual characteristics using notable variables such as perceived ease of use (PEU) and perceived usefulness (PU). The model focuses more on evaluating how a user's perception as part of the extent to which they accept and use technology. TAM remains a popular and important model as it helps to assess how certain factors influence a user's decision and attitude when they are confronted with new technology.

For determining a user's propensity to use technology, TR offers a concise set of basic independent variables, including innovativeness, optimism, discomfort, and insecurity. DOI provides a further dimension by exploring how, why, and the rate at which a new technology spreads. To achieve this, DOI poses three variables in the form of innovation characteristics, organizational characteristics, and individual characteristics. Finally, going beyond users' attitudes towards technology usage, the TOE model examines a firm's processes to adopt and implement innovative ideas in the context of (a) technologies which apply to the firm, (b) organization: characteristics and resources at disposal of a firm which includes its size and managerial structure, and (c) environmental in which it operates ranging from competition and government regulations. Dependent variables in TOE include intent to adopt and extent of adoption. As such, TOE was considered a vital model for inclusion in CTRAM.

Having identified the limitations of existing adoption models, the next step was to consider how they may be incorporated into CTRAM. Figure 1 below presents a conceptual model proposal for CTRAM, containing 11 key variables grouped into three core sections: individual characteristics, perception of technology, and external factors (the latter element being largely absent in existing models). Table 3.2 summarizes the nature of each variable from where methodological processes were devised to allow for formal testing of the validity and robustness of this model. These are presented in the next section and the results from validation tests are given in chapter 7

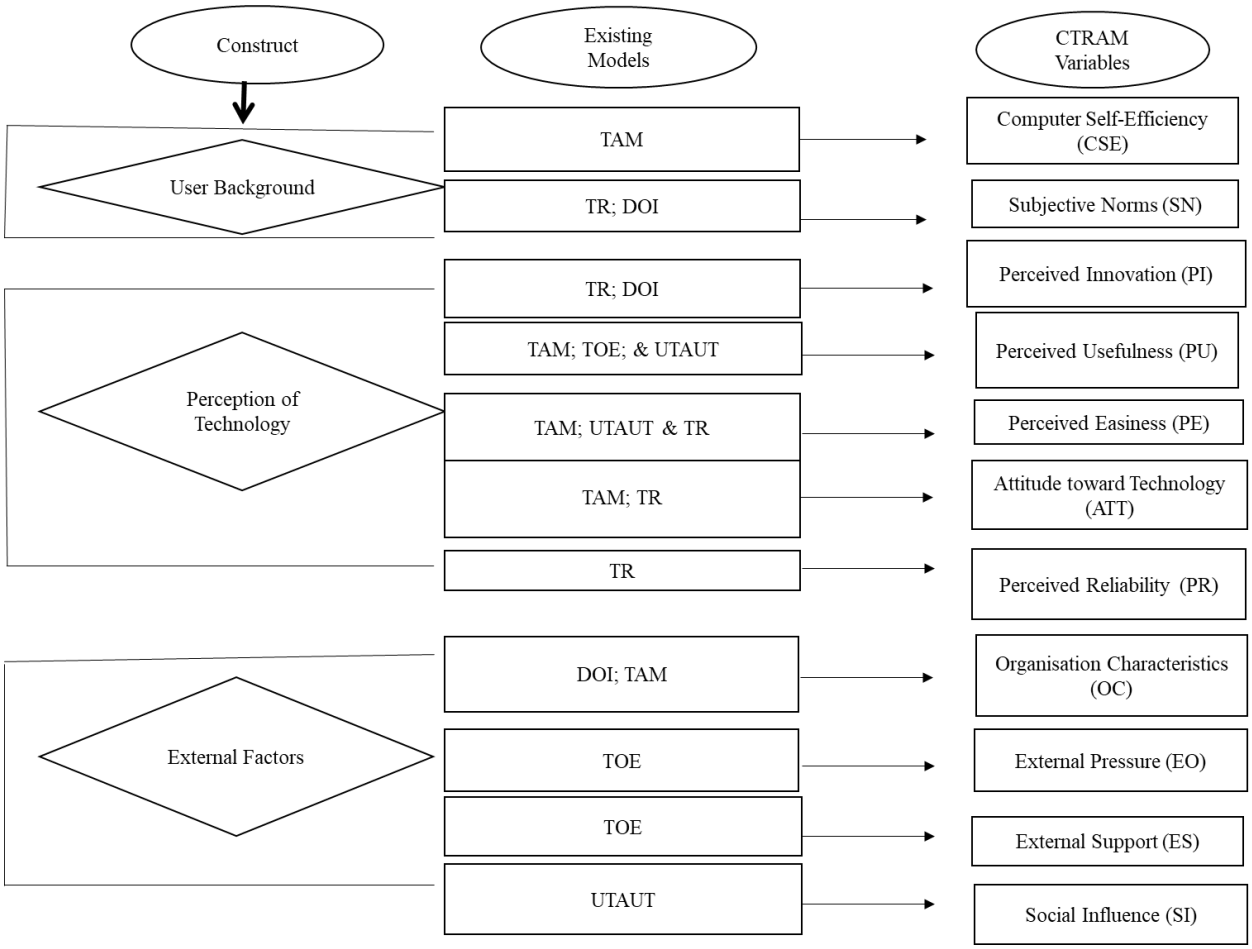
Table 3.2 summarizes the nature of each variable from where methodological processes were devised to allow for formal testing of the validity and robustness of this model in subsequent sub-sections.

Table 3.2: Recap of Proposed Variables

4. Individual Characteristics	
• **Computer self-efficacy (CSE)**	The degree to perform a certain task with a computer system.
• **Subjective Norms (SN)**	The actual status of an individual's technology usage or approach to handling technology.
5. Perception of Technology	
• **Perceived Innovation (PI)**	The degree of perception about technology in terms of innovativeness.
• **Perceived Usefulness (PU)**	The degree of perception about technology in terms of usefulness e.g. enhancing academic or job performance.
• **Perceived Easiness (PE)**	The degree to which individual believe that using a technology is easy.
• **Attitude towards Technology (ATT)**	A person's evaluation of technology or behaviour associated with the use of cloud computing.
• **Perceived Reliability (PR)**	The degree to which a person trusts or distrusts a technology and its ability to work properly.
6. External Factors	
• **Organizational Characteristics (OC)**	The extent to which an organization supports the adoption of a technology.
• **External Pressure (EP)**	The degree to which an individual feels pressured because of influence from external parties such as competitors, peers or management.
• **Technical Support (TS)**	Entails the perception of support received from an organization or colleagues.
• **Social Influence (SI)**	The degree to which a person feels a technology can affect a community.

As shown in the Table above, the CTRAM has eleven variables that are grouped into three different sections that is individual characteristics, perception of technology and external factors.

Figure 3.2: Recap of CTRAM Model



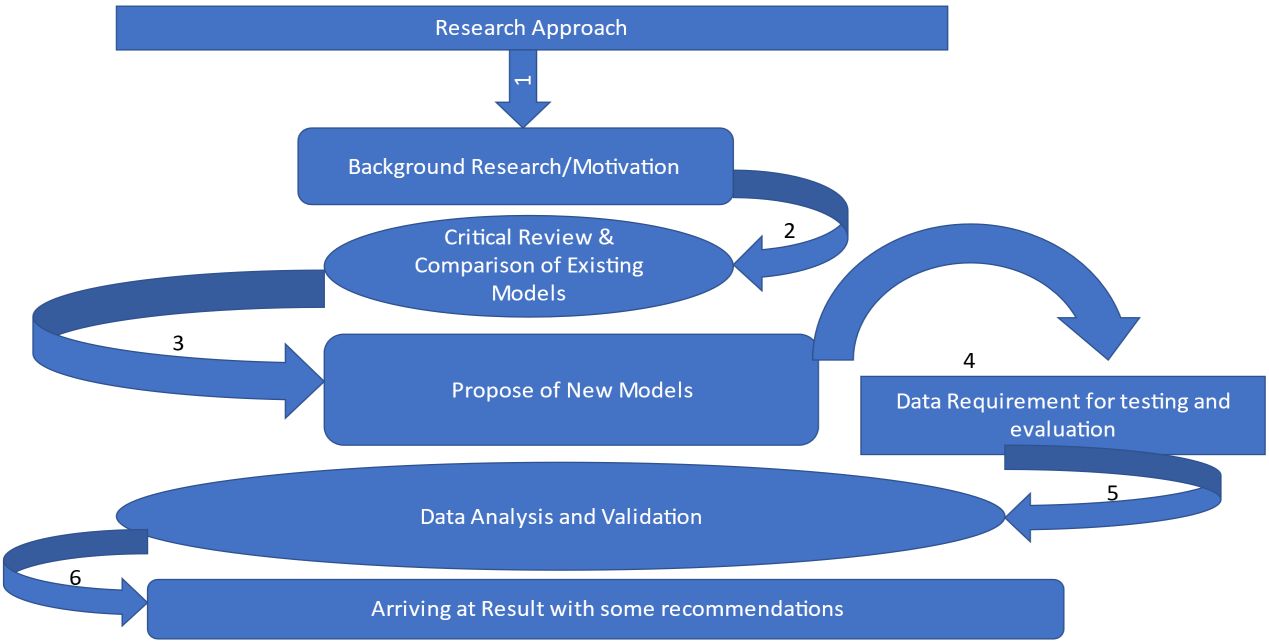
Source: Compiled by the Author

Having described and presented the propose working model, in this section, we presented a recap of the research protocol adopted in arriving at the CTRAM. At the initial stage the background of this research has identified and described the nature and history of cloud computing with its challenges identified in the literature review. Succinctly, using the background information, the root of the problem was studied applying the proper context of the problem as described in the literature Chapter 1 (see problem domain). At this stage, technology adoption models were identified which have so far been used to establish a new adoption model. The model was tested in the subsequent section empirically through a survey focusing on university students and staff.

3.3 Comprehensive Technology Readiness Adoption Model

The proposed theoretical framework has defined key concepts of this research, thereby proposing relations between them. Relevant existing theories and models were discussed based on literature. The diagram in Figure 3.3 is the research framework for this research.

Figure 3.3: Recap of the research framework



Source: Author's Compilation

As depicted in the figure above, the background of this research has identified from the underline motivation and statement of the research problem (see, chapter one). Based on the background information, the root of the problem was studied as described in the literature review section. The technology adoption models were identified which have so far been used to establish a new adoption model.

The proposed theoretical framework was used in designing a survey questionnaire which has been used to gather data. This data has now been statistically analysed to determine the correlations and relationships between variable in the proposed model. But more importantly, the analysed data was used to answer the current research questions (see, chapter one for the research questions). After all the data was analyzed, the findings were presented and discussed in the subsequent sections.

In the Model proposition of Comprehensive Technology Readiness Model (CTRAM), It was revealed and reviewed four (4) existing technology models. There were the selection of Core variables and redundancy was found in the construct which led to the merger of some of the

variables into one, this was responsible for the giving of a new title and a few of the variables remained unchanged.

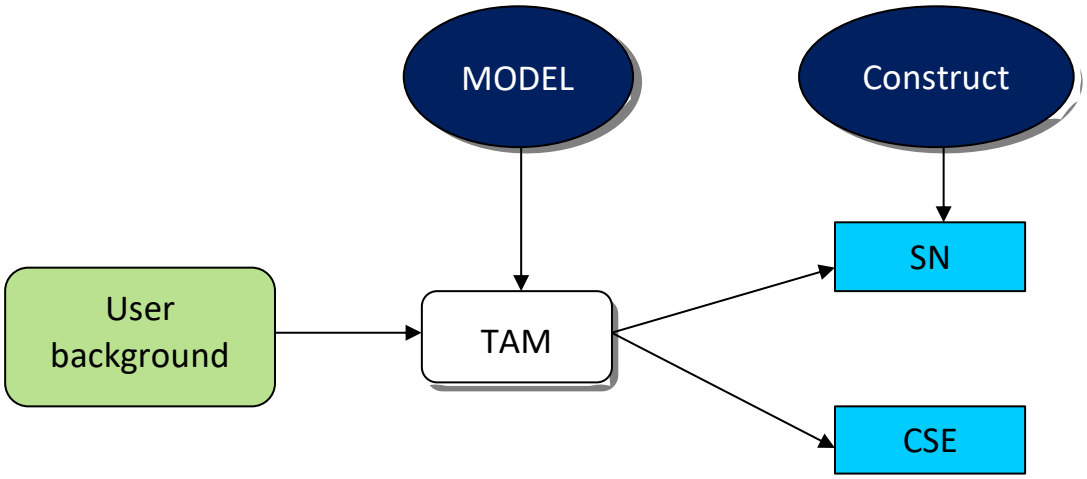


Figure 3.4: User background

The user background of CTRAM only adopted one technological model TAM-SN&CSE. Computer-self efficacy (CSE) and subjective norms (SN) were variables presented and contained in the users' backgrounds.

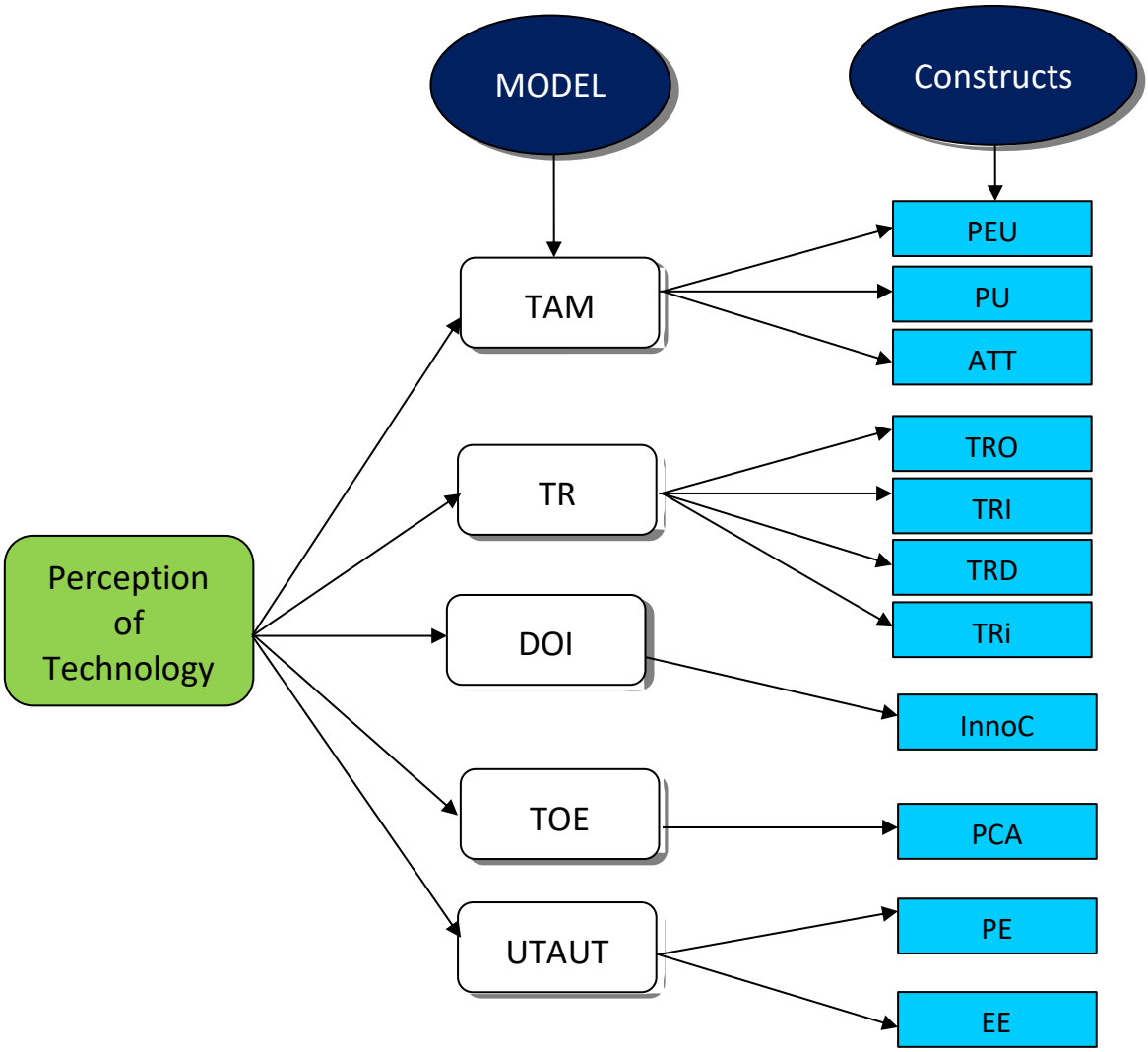


Figure 3.5: Core variables

The CTRAM core variables were almagam of five technology adoption models which are UTAU, TOE, DOI, TR and TAM. With respect to TAM variables as observed in this section entails; TRI, TRD, TRO, TR, ATT, PU and PEU. PCA was adopted from TOE and from UTAU's EE and PE were equally adopted from it.

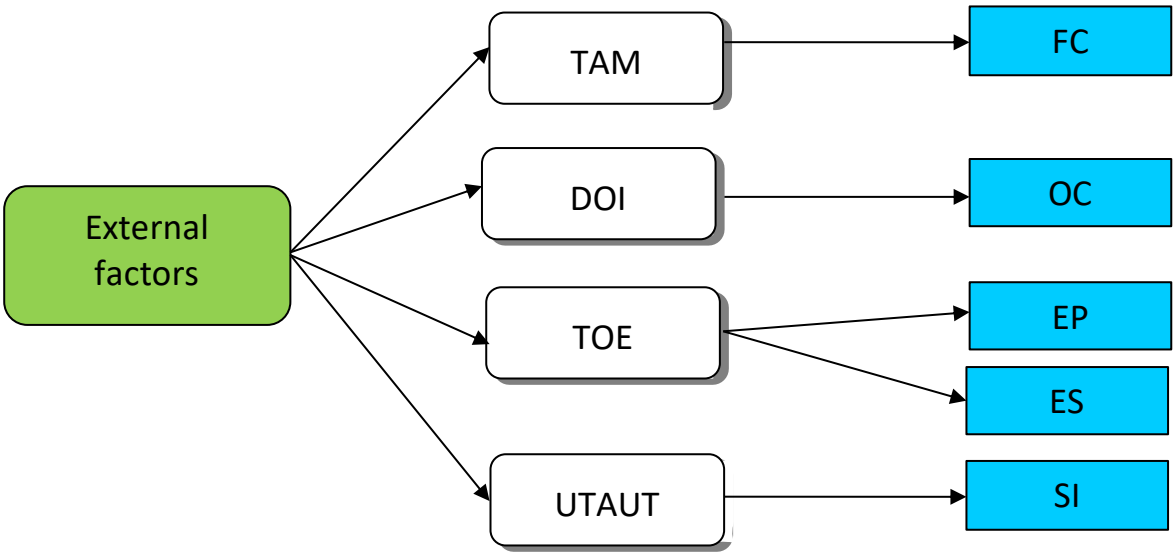


Figure 3.6: External Factors

In the model's third section, some of the variables adopted are; UTAUT-SI- EP & ES TOE, DOI-OC, and TAM-FC, these are merged into four variables.

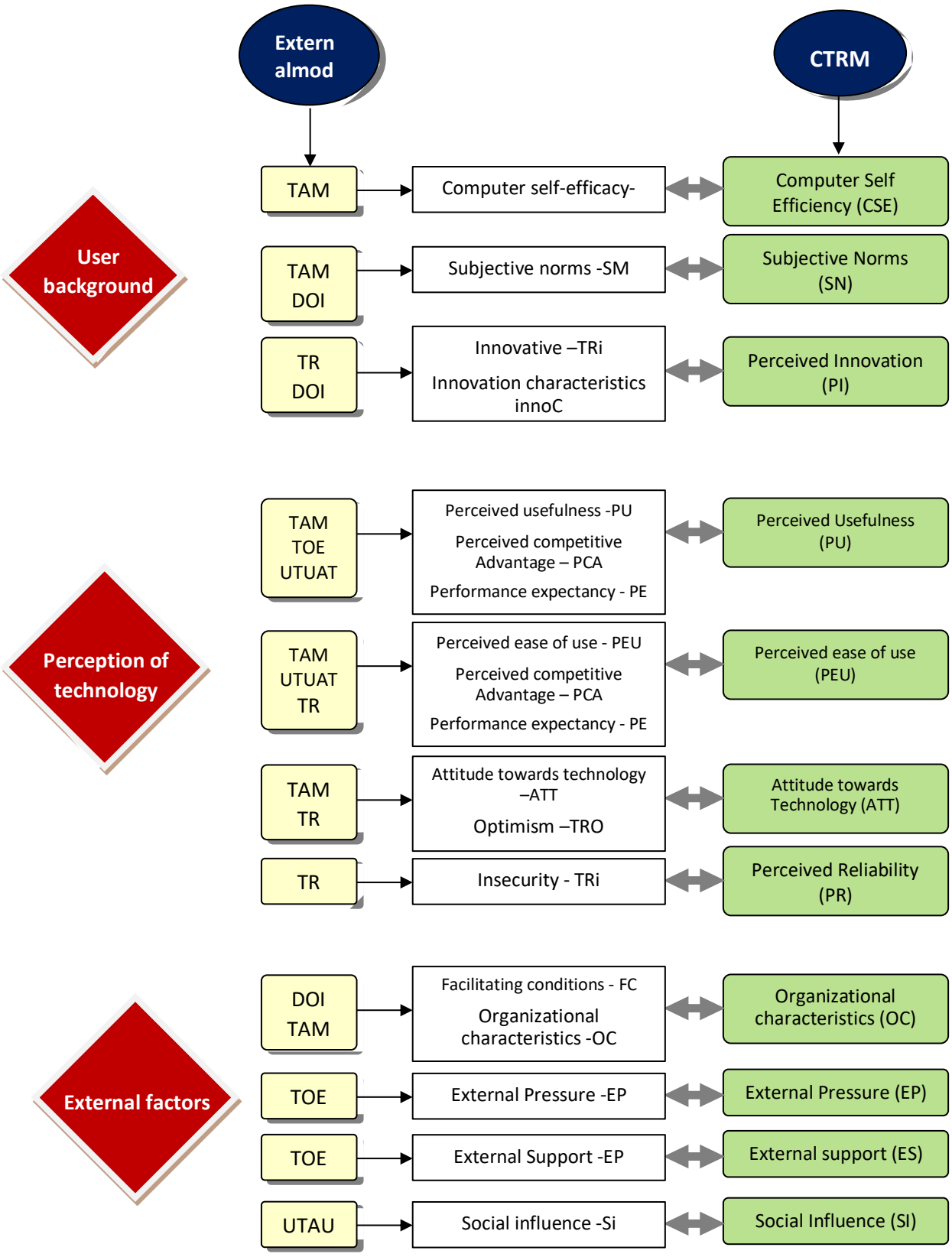


Figure 3.7: Overview of comprehensive technology adoption models

User background was the variable that was focused on in the first section, the SN, CSE and TAMs are being adopted to reflect the CTRAM's subjected norms (SN) and computer self-efficacy (CSE).

The core variables were introduced in the second section, which was as preponderant of the other existing model mergers. DOI, TRI, and TRs were being merged into a new construct, Perceived innovation (PI), TAM-PU, TOE-PCA and UTAUT-PE which resulted in perceived usefulness (PU).

On the third basis, TAM-PEU, UTAUT-EE and TRD are being merged to result in perceived reliability as a TR's-Tri branding to result in external support (EP), social influence (SI)

The research seeks to find out the various existing technology adoption models for cloud computing services in educational institutions. Building on the year 1 progress report of the Programme, the following existing technology adoption models are identified.

Generally, technology adoption theories focus mainly on the features that lead and encourage potential users to adopt a technology. Several theories have been identified namely, diffusion of innovation (DOI); technology, organization, and environment (TOE); unified theory of acceptance and use of technology (UTAUT); and technology acceptance model (TAM) and technology readiness (TR). These models distinctively focus on specific features that are used in measuring technology adoption (Miltgen, et al., 2013).

DOI uses individual characteristics, internal characteristics of the structure of an organization and the external characteristics of the organization which logically precedes an organization's innovativeness. The TOE model establishes three features within the context of an enterprise that will have the capacity to influence either character or development or even the behaviour of people to adopt and implement a technological innovation. This might be in the context of technological, organizational, or environmental context. TAM is a model that introduces measuring criteria to anticipate the technology adoption by individual characteristics with main variables such as perceived ease of use (PEU) and perceived usefulness (PU).While the model of UTAUT integrates the features of the theory of reasoned action (TRA), the theory of planned behaviour (TPB), as well as TAM features (Miltgen et al., 2013).

In TRA, behaviour can mainly be projected by the person's attitudes towards the execution of the behaviour in question, over the prevailing effect of behavioural intention. The significant attitudes in this process are those that are explicit to the explicit behaviour being studied, it is

not adequate to ponder over the individual's attitudes more commonly (Fishbein & Ajzen 1975). However, TAM is used to evaluate how a user decides to accept or use a technology. It explains that anytime a user is confronted with a new technology, some factors influence the decision-making regarding if, when, and how to use it. TAM has two key variables. Firstly, perceived ease of use is the degree to which the user of a technology thinks using that technology will be easy. Secondly, perceived usefulness is the degree to which a person thinks using a technology will improve their job ability.

For TOE, the theory studies a firm's process in which it adopts and implements innovative ideas in the context of technologies which apply to the firm, or in the context of an organization which specifies the characteristics and resources at the disposal of a firm which includes its size and managerial structure, and the environmental in which it operates ranging from competition and government regulations. However, for TPB popularly proposed by Ajzen (1991)to expand on the projecting power found in the TRA, the theory suggests that intention toward behaviour, subjective norms, and perceived behavioural control, collectively represent a person's behavioural intents and behaviours.

In the DOI theory, the model tries to find out how, why, and the rate at which an idea of invention of technology spreads. To achieve this, the theory suggested the adoption of three separate variables. They are innovation characteristics, and organizational and individual characteristics. Another important model is Task Technology Fit (TTF) whose theoretical background focuses on discovering the factors associated with the utilization of software and the relationship with user performance. Dishaw and Strong (1999), state that TTF concentrates on the match amid user task needs and the existing functionality of the IT.

A variant of TPB and TRA is the Decomposition and Crossover Effects in the Theory of Planned Behavior (DTPB). In proposing this model, the developers of the model (Taylor and Todd, 1995) studied three variations found in the Theory of Planned Behaviour and matched it with Theory of ';Reasoned Action assessed using data from a consumer setting to understand the contacts amongst the belief structures and the antecedents of intention.

The UTAUT wasdesigned to check a user's acceptance of IT, the model examines a user's intention to partake in using an information system and how he behaves with its usage subsequently. It consists of four key variables. These are performance expectancy, effort expectancy,social influence, and facilitating conditions. Other factors such as age, gender,

experience, and willingness to use maybe applied in moderating the influence of the four main variables on usage intention and behaviour.

For determining the user's propensity to use a technology, TR has developed basic variables. They are Innovativeness, Optimism, Discomfort, and insecurity. These variables are all independent. While aiming to study older people, the Senior Technology Adoption Model (STAM) explain the variance in the use of gerontechnology amides elderly people which is according to Chen and Chen(2011) is motivated by the result expectations and social influences, and supported by facilitators, but non-use of gerontechnology relates to personal, technological, and environmental blockage.

Conclusively, the Value Attitude Behaviour Model perceived those values of individuals, influences their attitude, and their attitude, in turn, influences their behaviour. In addition to these models, other researchers have also that added new variables based on the technology adoption model. For instance, Agarwal and Prasad (199perceives8) added the construct of compatibility in the Technology Acceptance Model. Dishaw and Strong (1999) integrated Technology Acceptance Model with Task-technology Fit. Agarwal and Karahanna (2000) added cognitive absorption, playfulness and self-efficacy based on Technology Acceptance Model.

Additionally, Venkatesh and Davis (2000) added subjective norms with Technology Acceptance Model. Chau and Hu (2002) integrated peer Influence with Technology Acceptance Model. Gefen et al. (2003) added the construct named trust with Technology Acceptance Model. Walczuch et al. (2007) integrated technology readiness with Technology Acceptance Model. Chen et al. (2009) synthesized the essence of technology readiness, Technology Acceptance Model, and Theory of Planned Behaviour to propose an integrated model for understanding customer's continued use of self-service technologies. Lee (2009) united the Technology Acceptance Model with the Theory of Planned Behaviour, perceived risk and perceived benefit to understand the adoption of Internet banking.

3.4 Chapter Summary

Upon reviewing the various technology adoption models and having identified the shortcomings of the models, the second question that the study aims to answer is; what is the proposed comprehensive technology readiness adoption model for cloud computing in higher

education in Nigeria. In this research, we proposed an aggregate model for cloud computing in higher education in Nigeria.

In proposing this model known as Comprehensive Technology Readiness Adoption Model (CTRAM), five existing technology adoption models were reviewed. All core variables of the models were selected and found redundancy in some of the variables. For this reason, some of the variables were merged into one and given a new title whilst few of the variables remained unchanged.

The core construct of CTRAM is a combination of variables adopted from the five technology adoption models, TAM, TR, DOI, TOE and UTAUT. TAM's variables used in this construction include PEU, PU and ATT. TR's variables include TRO, TRI, TRD and TRi. For DOIInnoC was used. PCA was used from TOE and lastly the UTAUT's PE and EE were also adopted. Performance Expectancy from the UTAUT, which is described as the extent in which the individual user of a technology believes that a technology can render help in improving job performance is considered same with perceived usefulness in TAM as well as its the relative advantages from DOI. The variable also serves as the actual predictor of intentions among the four models. Then the effort expectancy can be referred to extent in which the ease of use of technology is perceived.

The essence of the variable is captured from the DOI and TAM (Vankatesh et al., 2003 Henderson & Divett, 2003). Students may not have total confidence in cloud computing because it is relatively new to them. It may take the user a while before they can adjust to the newly implemented technology. The complexity of a new technology often becomes a barrier to implementation, thus negatively affecting adoption. Innovation characteristics refer to the complexity of a technology in DOI and insecurity refers to distrust and uncertainty about the performance of a technology.

RESEARCH METHODOLOGY

4 CHAPTER FOUR - RESEARCH METHODOLOGY

4.1 Introduction

The quantum of information collected in the chapter guide the formulation of the research objectives and the data collection procedures to be adopted in this thesis. The technique implemented in the thesis is a survey questionnaire. This chapter has provided the research approach undertaken. This comprises research design, determination of participants, data collection procedure, data analysis and the techniques adopted to ensure the validity and reliability of the results. In this chapter, challenges that emanated during the data collection and analysis were discussed and the remedies taken to ensure the authenticity, reliability and authenticity including the ethical issues that had to be addressed before the research took place.

4.2 Research Design

The purpose and philosophy behind this thesis are to explore the technology adoption framework and digital literacy model of cloud computing services in higher education institutions in Nigeria and use the result of the study to suggest a robust cloud computing model geared towards enhancing the adoption of the model in the higher institutions by both staff and students in Nigeria. Consequently, a researcher must select an appropriate research design in a study guiding the process that will lead to the researcher assigning an approach for achieving the research objectives. Thus, Yin (2009) opined that "in the most elementary sense, the design is the logical sequence that connects the empirical data to a study's initial research questions and, ultimately, to its conclusions.

Therefore, a mixed research design involving qualitative and quantitative research designs was adopted to explore, examine, describe, and interpret what has happened regarding the phenomenon under investigation. A quantitative procedure is being used by quantitative researchers for an in-depth exploration of a bounded system which may be a program, event, or an action concerning individuals singly or in a group and the system of interest (Creswell & Plano, 2015). A bounded system according to literature refers to the separation of the case in terms of time, place or even some physical boundaries as intended by a research study. Thus, quantitative and qualitative design were appropriate in the setting since the collected data and its subsequent analysis contained both numerical and verbal information, obtained from responses via a distributed questionnaire.

Quantitative research focuses on using data to comprehend a situation. This technique can be used to compare recent findings to those of previous studies. According to Bryman (2012), empirical and systematic explorations of quantitative properties use quantitative research methods. They rely on actual data, and statistical analysis is used to infer conclusions from those facts. Surveys, which are frequently used in quantitative research and involve the use of different techniques like questionnaires or interviews, can be carried out in person, over the phone, on the internet, or by email.

Several quantitative research methods are used depending on the kind of data to be applied in the research. They are:

i. Survey research: Commonly encompasses a big number to gather a large amount of data. It is a quantitative method that has a fixed set of closed questions and are normally easy to answer.
ii. Correlational research: Used to check or find if there is any relationship between two or more variables. The outcome could be negative, positive or even neutrally correlated. For instance: Academic staff find cloud computing easier to use compared to students. This could mean that higher education helped the staff in terms of digital capacity to use cloud compared, while student will lower education level find it tougher to use cloud computing. The correlation is in the case of an increasing linear relationship,-1 in the case of a decreasing linear relationship, and some value in between in all other cases, indicating the degree of linear dependence or 1, the stronger the correlation between the variables. If the converse is not true because the correlation is 0. But the converse is not true because the correlation coefficient detects only linear dependencies between two variables.
iii. Multiple Regression study: Using the relative contribution effects (Beta Weights) of independent variables to the dependent variable. The B is referred to as partial correlation, the Beta weight (β) is the weight contribution of each variable. We also have t values for all the variables and the probability values (sig.t) Note the ranking of the variables according to their weight contributions. You will notice that the constant is under B and not under Beta weight (β).
iv. Cross sectional study: This kind of study involves observation whereby a group of audience is observed at a particular point in time. This group of audience are selected in a manner based on similarities in all the variables excluding the main one that is been researched.

v. Causal-Comparative research: Solely based comparison, this method's focus is to find the cause-effect among two or more variables. For instance, it can be used to check and evaluate the performance of a group of staff within an organization.

However, qualitative design entails evaluating and analyzing non-numerical data. It is primarily exploratory in nature and is intended to investigate the underlying causes of respondents' behaviour (Denzin & Lincoln, 2006). It is employed to identify trends in beliefs and viewpoints. This strategy makes use of a variety of data collection and analysis techniques, including focus groups, interviews, observations, ethnography, and open-ended questionnaires (Denzin & Lincoln, 2006). This method enables academics to understand the subtleties and complexity of human behaviour (Cohen, Manion, & Morrison, 2010).

As earlier stated, this research involves the use of mixed design for understanding of the research problem. A mixed-method strategy involves gathering, analyzing, and integrating both quantitative and qualitative data at a specific step of the research process in a single study (Tashakkori & Teddlie, 2003; Creswell, 2014). For example, Tashakkori and Teddlie (2003), Creswell, Fetters, and Ivankova (2004), Creswell, Plano Clark, Gutmann, and Hanson (2003), Sandelowski (2000), Creswell (1999), and Tashakkori, Teddlie, and Teddlie (1998) all provide examples of mixed approaches designs.

A questionnaire was used as the data collection tool in this study and was chosen given its essential characteristic of allowing a potentially wide coverage of sample participants with relatively limited expense (Osuala, 2001). As mentioned in Chapter 1, Nigeria was selected as the case study for three reasons. First, relatively little work has been conducted in this country with respect to the subject area, especially in terms of higher-education settings, and represented not only a notable research gap but also a central motivating factor. Second, with this relatively paucity of research in mind, an evaluation in the case of Nigeria would enable policy implications to be identified given the country is currently prioritizing digital transformation research and agenda. Third, results pertaining to Nigeria can lead to contributions to further empirical findings that may be extended to close regions that are currently experiencing similar rates of development and policy changes.

The selection of research approach depends on the nature of the research problem, thereby governing the research question and the implementation strategy (Creswell, 2014). Based on this research which involves aggregating existing cloud computing models to arrive at a comprehensive technology readiness and adoption model, a systematic research approach is

selected involving the identification of a problem, reviewing the existing research effort, highlighting the gap in the literature, determining a data collection procedure and analysis. The systematic approach adopted is explained in Figure 3.3 as the research framework.

As shown in the figure 3.3, the background of this research has identified from the underline motivation (see, chapter one). Using the background information, the root of the problem was studied applying the proper context of problem identification as described in the literature review section. The technology adoption models were identified which have so far been used to establish a new adoption model. The model was tested empirically through a survey focusing on university student and staff. The proposed theoretical framework has defined key concepts of this research, thereby proposing relations between them.

The proposed theoretical framework (CTRAM) was used in designing a survey questionnaire which has been used to gather data. This data has now been statistically analysed to determine the correlations and relationships between variable in the CTRAM. But more importantly, the analysed data was used to answer the current research questions (see, chapter one for the research questions). After all the data was analyzed, the findings were presented and discussed in the subsequent sections.

4.3 Population and Samples

Every research is limited in scope and coverage; therefore, this study is not an exception. According to Creswell's (2009) definition, a population is "a sizable group of individuals processing one or more traits in common on which a research study focuses. A study's population is the set of people from which the researcher hopes to derive study results (Kothari, 2004). In most cases, covering the entire population is hardly possible because of large size of the population, cost involve and limited time for the research to be completed. To address this concern, researchers rely on sample. A sample, according to Kothari (2004), is a "small group of subjects taken from the population in which the researcher is interested in gathering information and formulating study results."

4.4 Survey Design Rationale

Survey research is defined as "the process of gathering data from a sample of people through their responses to questions" (Check & Schutt, 2012, p. 160). This kind of research according to Ponto (2005) permits the use of numerous techniques for participant recruitment, data collection, and instrumentation. Survey research can employ quantitative research techniques

(such as using numerically rated items on surveys), qualitative research techniques (such as utilizing open-ended questions), or both (i.e., mixed methods).

A primary survey was designed and implemented in the form of a questionnaire. The full contents of the questionnaire are outlined in Table 4.1. The survey contents were grouped into three core categories, comprising of 91 questions in total. The first category represents measures for individual characteristics, which consists of three sub-divisions: demographic, computer self-efficacy, and subjective norms. The second category reflects the perception of technology, which includes five sub-divisions: perceived innovation, perceived usefulness, perceived easiness, attitude towards technology, and perceived reliability. Finally, the third category captures information on external factors via four sub-divisions: organizational characteristics, external pressure, technical support, and social influence.

Table 4.1: Questionnaire design against CTRAM

Individual Characteristics	**Demographic**	**DM1-DM6**	**Gender, age, education, discipline, job role, university**
	Computer Self-Efficacy	CSE1-CSE5	Former experience with cloud computing
	Subjective Norms	SN1-SN2 SN3 SN4 SN5 SN6 SN7 SN8 SN9	You are very current and up to date with the latest technology You consider yourself to be among the first people to try it among your friends You consider yourself first to try a new technology among your classmates You usually figure out high-tech products and services without help from others You enjoy the challenges of using new high-tech products or services You avoid new technology if it is time consuming Complication of high-tech product or service scares you You do no not need new technology, satisfied with existing one
Perception of Technology	Perceived Innovation	PI1 PI2 PI3 PI4 PI5	How much would you prefer to save your documents online How much would you like to have access to MAC operating system online How much would you like access to features exclusive to MAC operating system How much would you like access to Microsoft office 365 online How much would you like access to operating system online
	Perceived Usefulness	PU1-PU3 PU4 PU5 PU6 PU7 PU8 PU9 PU10-PU14	How much would you like access to online storage Online applications can improve students' creativity Accessing Operating system online may be slow due to network issues Access to lab software from home will be beneficial for you Installation of software on your local computer can be slow, time consuming Access to application means you have more free space on your local computer Does the speed matter to you when access operating system or applications online What is your perceived usefulness of these e-learning features
	Perceived Easiness	PE1-PE4	Using cloud storage/applications/software is easy
	Attitude Towards Technology	ATT1 ATT2 ATT3 ATT4 ATT5 ATT6	You feel you can have control over your everyday activities with the use of cloud computing You get more freedom of mobility with cloud computing You feel as though cloud computing can enhance your learning abilities You feel cloud computing can enhance your work efficiency How much do you trust cloud computing in general You believe cloud computing will cut down cost of operation in the university
	Perceived Reliability	PR1 & PR4 PR2 PR3, PR5 & PR7 PR6	How much are you worried about CC accessibility How much are you worried about CC reliability How much are you worried about CC security How much are you worried about CC privacy
External Factors	Organizational Characteristics	OC1-OC3 OC4 OC5 OC6	Is the university willing to pay for high cost CC product and services There are sufficient computers in the university labs for students to practice with To what extent do you agree that campus Wi-Fi cloud is a good idea? Other universities have far more advanced computers than our university lab
	External Pressure	EP1 EP2-EP3 EP4	There are universities in Nigeria that have already adopted cloud computing There is pressure from the university to teach and communicate with students via digital technology There is pressure from the government to teach using digital technology
	Technical Support	TS1-TS2 TS3 TS4 TS5	Does the university have enough for routine check and maintenance of computing resources Do you have the impression that IT support team is always happy to help Rate the efficiency and promptness of response from IT support team Rate the level of knowledge and skills of the IT support staffs
	Social Influence	SI1 SI2 SI3 SI4	Sharing learning resources online have a positive impact on a student's learning ability The opportunity to practice another operating system (such as MAC) gives students more experience Using different software increases knowledge and skills among the community of students Working together in a lab increases the chances of sharing idea with fellow pees

Source: Author's Field Survey, 2022

The study participants comprised staff and students in higher education institutions (i.e. universities) across Nigeria. At the time of writing, Nigeria had a capacity of approximately 1.9 million university staff and students (Statista, 2021), representing a substantial population that the survey could not realistically aim to target fully. However, a sample population was ultimately chosen based on Krejcie and Morgan's (1970) recommendations based on an extrapolation from the entire population, as shown in Table 4.2 Krejcie and Morgan (1970) provide recommended sample sizes for various population ranges, thus helping to affirm suitable quantities of participants this survey – in this case, a total population of over 1 million equates to a sample of 384 persons. Following this, the survey sought to obtain around 400 participants, as well as the application of stratified sampling and simple random sampling techniques [1]during the administration of the questionnaire. These additional methods were adopted given that the survey was aimed solely at higher education institutions in the country.

Table 4.2: Krejcie and Morgan (1970) Sample Table

Table 3.1

Table for Determining Sample Size of a Known Population

N	S	N	S	N	S	N	S	N	S
10	10	100	80	280	162	800	260	2800	338
15	14	110	86	290	165	850	265	3000	341
20	19	120	92	300	169	900	269	3500	346
25	24	130	97	320	175	950	274	4000	351
30	28	140	103	340	181	1000	278	4500	354
35	32	150	108	360	186	1100	285	5000	357
40	36	160	113	380	191	1200	291	6000	361
45	40	170	118	400	196	1300	297	7000	364
50	44	180	123	420	201	1400	302	8000	367
55	48	190	127	440	205	1500	306	9000	368
60	52	200	132	460	210	1600	310	10000	370
65	56	210	136	480	214	1700	313	15000	375
70	59	220	140	500	217	1800	317	20000	377
75	63	230	144	550	226	1900	320	30000	379
80	66	240	148	600	234	2000	322	40000	380
85	70	250	152	650	242	2200	327	50000	381
90	73	260	155	700	248	2400	331	75000	382
95	76	270	159	750	254	2600	335	1000000	384

Note: N is Population Size; S is Sample Size *Source: Krejcie & Morgan, 1970*

[1]The stratified random approach divides the population into groups initially. There are some people from each group in the sample, where members of each group are selected at random. In a probability sampling strategy known as stratified sampling, I (the researcher) divide the entire population into various subgroups or strata before randomly choosing the final participants proportionately from each stratum.

From the above procedures, the country was stratified into six geopolitical zones, from where 64 participants were selected from each, this giving a potential total of around 384 survey respondents. The use of random selection helped to avoid subjective bias arising from any personal choice of sampling units, whereby each member of the sample population is given an equal chance of being selected. A total of 384 questionnaires were distributed to the target respondents, as represented by staff and students in higher institutions in Nigeria, from where a very positive 260 (or 67.7 %) were successfully completed, returned, and usable for final data analysis. This rate was sufficient as responses of over 50% are typically considered healthy for survey research (Sekaran, 2003).

4.5 Data Analytical Approach

Data analysis approach, accordingKothari (2004) entails breaking down a large amount of information into manageable components, creating summaries, looking for patterns, and using statistical methods. In this way, data analysis aids in research problem resolution, conclusion-making, and ultimately, the useful suggestion of potential policy implications and actions.

The primary data collected via the questionnaire were analyzed using descriptive[2] and inferential[3] statistical techniques such as Chi-square Automatic Interaction Detector (CHAID), Logistic Regression (LR), Linear Regression and Correlation analysis technique. These techniques were chosen due to their suitability in answering the research questions and would help to provide objective and measurable insights on the topic.

The specification of CTRAM also involves the determination of dependent and independent variables to express the mathematical relationship between the two. Here, the dependent variable was designated as the adoption of cloud computing (CC) as measured by a dummy variable, the readiness to adopt cloud computing or not, using binary values of 0 and 1. The explanatory variables were established from available evidence in current literature to reflect

[2]The word "descriptive statistics" refers to data analysis that aids in describing, displaying, or summarizing data in an understandable fashion so that, for instance, patterns may appear from the data. However, descriptive statistics do not let us draw any inferences from the data we have examined or come to any conclusions about any potential hypotheses. They serve only as a means of describing our data.

[3]Inferential statistics enable the use of samples to extrapolate conclusions about the populations from which they were collected. It is crucial that the sample fairly depicts the population. A sample is not anticipated to accurately represent the population because sampling inevitably results in sampling error. This leads to the development of inferential statistics. The two primary techniques used in inferential statistics are (1) parameter estimation and (2) statistical hypothesis testing.

influences on the adoption of cloud computing, using variables including CSE, SN, OC, TS, and EP (see Table 3). The relationship between these variables can therefore be represented as:

$Y_i = f(Xi)$

Where Y= Adoption of cloud computing.

X= Affecting factors. Thus, the predictive model is specified as:

$$\boldsymbol{CC} = \alpha_0 + \beta_1 \mathbf{CSE} + \beta_2 \mathbf{SN} + \beta_3 \mathbf{EF} + \boldsymbol{\mu_i}$$

Where Y_i =is the dummy dependent variable, measuring adoption of cloud computing,

$$\int_0^1 = \ 1 \ if \ HE \ adopt/ready \ to \ adopt \ CC \ and \ 0 \ if \ they \ do \ not$$

While, CSE is computer self-efficiency, SN is subject norms, EF is external factors.

$$\int_0^1 = \ 1 \ if \ the \ listed \ factors \ influence \ the \ adoption \ of \ CC$$
$$0 \ if \ it \ does \ not$$

$\beta_{i's}$ =are respectively the slope coefficients measuring the marginal effect of the independent variables

α = Constant Value

$\boldsymbol{\mu}_i$= random error term

The a priori expectation is $\beta_1, \beta_2, \beta 3 > 0$. If estimates of the parameters of the model produce magnitudes and signs (number) not in conformity with adoption models, they should be rejected unless there is sufficient reason to believe that in that instance, adoption models do not hold.

4.6 Reliability and Validity of Research Instrument

The validity of research instrument (questionnaire) is the method of determining and analyzing the suitability of the appropriateness of the research instruments (questionnaire) to see whether the research instrument (questionnaire) can measure exactly what it is intended to measure (Check & Schutt, 2012).

A pilot test was conducted before the final survey. This experiment was carried out to evaluate the study's efficiency as a source of data. Five professionals in academia with years of research

experience received the draft survey. After assessing the survey questions, the questionnaires were updated based on their feedback and suggestions before the final versions were distributed to respondents. In general, the test group agreed that it was clear and free from ambiguity that the questionnaires' focus was on the research topic. This guaranteed that the questionnaire would address the study's goals and central question. The questionnaires' final versions were created following the pilot tests.

Through factor analysis, the researcher assessed the reliability of the research data. The research supervisor also offered advice on the instruments' content, making sure that all the goals of the study were covered by the queries or data gathered therein. This gave the survey a noteworthy level of construct validity. The questionnaire's design was also examined to make sure that the questions were not misunderstood toenable collection of useful data.

Similarly, the questionnaires were made in a clear, concise manner to reduce confusion among respondents and to assure the validity of the research findings. The Cronbach's-alpha test is a frequently employed test to assess internal reliability, according to Bryman and Bell (2007:164) and Hair et al. (2000:652). To guarantee that the data acquired was reliable, the researcher also carried out a reliability analysis. The outcomes were contrasted with the Cronbach's alpha guidelines, which interpret the coefficient alpha values as stated in the table 4.4.

Table 4.3: The Rule of Thumb for Cronbach's Alpha Coefficient Value

Alpha Coefficient Range	Strength of Association
Less than 0.60	Poor
0.60 to less than 0.70	Moderate
0.70 to less than 0.80	Good
0.80 to less than 0.90	Very good
0.90 and above	Excellent

Source: Adopted from Hair, et al. (2003). Essential of business research methods.

4.7 Ethical Research

Prior to the start of data collection, ethical permission was necessary in accordance with University of Hertfordshire regulations. Following their consent, the respondents were made aware of the goals of the study and how the data they gave would be utilized. The University of Hertfordshire's OMR reading machine was used to acquire the data (responses) into excel. All participants' information was guaranteed to remain private and anonymous.

In the process of study, the ethics of research are followed by the researcher and conduct the research under the rules and guidelines of the code of ethics of researchers. While conducting the research, they ensure that no one will get harmed like issues will not arise in the financial sector; plagiarism and stress will not arise on a psychological level. Even the researcher should ensure that the research is based on the information and data that follow the rights and policies and it gives the right knowledge to the reader. The researcher should ensure that they are not forcing them to participate in any manner directly or indirectly (Ali, Paris and Gunasekaran, 2019). Although, during the survey the data is collected in the secured way and ensure that no illegal methods are used to collect the data and information. In spite of this to maintain the consistency in the research, the researcher should take advice from the supervisor so they can guide them in every stage. This also reduced the chance of issues. Moreover, the authors used in the literature review from previous study are ensured that properly applied or referred, so that it will not affect the current research. The data used in the research should be deleted permanently after completing the research. The researchers are liable to store the data in their system or anywhere is completely against the law. In case of this research the survey is done based on the Google tool so they ensure that the collected information is from the correct source. Also, they should understand that the participant will not get harmed and hurt during the survey. Even while conducting the survey the researcher should make sure if the reader will not get hurt and disappointed at the end of the research.

Informed consent is a critical aspect of ethical research practice (Brear, 2018). According to Simon, Schartz, Rosenthal, Eisenstein, and Klein (2018), informed consent is the process through which researchers truthfully communicate information about research and research participation to prospective participants, who, in turn, decide whether to participate or not in the research study. Research participants must possess the capacity to comprehend the information provided in the informed consent form (ICF) and be able to decide on whether to proceed with research participation (Munley, Buser, Gaudreau, Breault, & Bazzano, 2018). According to Chiumento, Khan, Rahman, and Frith (2016), the use of informed consent in research studies is to uphold ethical standards during research involving human subjects. Participants' rights, such as privacy, security, and personal autonomy, are to be protected and respected by researchers (Hevia & Constantin, 2018).

I made available an Institutional Review Board (IRB) approved ICF containing all information about the research study to potential participants. This action ensured that participants made informed decisions regarding the ICF. Gentry, Lepere, and Opel (2017) state that informed

consent involve divulging research information to the potential participants; this information includes but not limited to: description of the research, risks, benefits, assessment of participant's comprehension, and solicitation of preference and decisions.

Participants accessed the consent form via e-mail from their designated contact person and will need to click on a link to complete the online survey. Participants that click on the online survey link automatically provide implied consent. I configured the online survey (Survey Monkey) to collect data anonymously, meaning that Survey Monkey did not collect information such as names of participants, name of participants' organization, IP address, and the location of the participants. Sequel to the completion of the data collection phase, I deleted all information on the online survey to ensure the security, confidentiality, and privacy of participants. The violation of participants' rights to anonymity and confidentiality are two significant ethical concerns researchers should avoid (Roberts & Allen, 2015). Therefore, researchers' assurance of confidentiality, anonymity, and the purpose of a study to participants are important elements of an informed consent form (Yin, 2014).

I ensured the privacy and confidentiality of study participants. This action is in line with the Belmont Report on the guidelines for the protection of human subjects in research (National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, 1978). I assured the participants of their confidentiality in the informed consent provided to them. I have already certified the understanding of my confidentiality requirements during research involving human subjects by completing the National Institutes of Health Protecting Human Research Participants online training course (Certification Number: 2557799).

I explicitly stated in the consent form the free will of the participants to withdraw participation from the study at any time; participants may choose not to start participation if they do not agree to terms and conditions of participation or withdraw during participation. Participants that are willing to withdraw may do so in writing via their organization (although no participant withdrew throughout the data collection process).

In a situation where a participant withdraws participation, then his or her participation will be rendered incomplete and not included for further analysis. Tideman and Svensson (2015) state the need for researchers to ensure that participants' voluntary participation, the option to opt-out of a research, confidentiality assurance, and the understanding to make an informed decision.

Research participation incentives engender motivation in participants, which helps increase the response rate (Göritz & Neumann, 2016; Hsu, Schmeiser, Haggerty, & Nelson, 2017). I did not provide financial incentives to participants. However, I emphasized the importance and benefits of the research as a way of incentivizing participants in this study.

According to Robinson (2014), researchers must inform participants of the purpose of the research study, participation requirements, the voluntariness of participation, and the protection of confidentiality. I ensured the ethical protection of participants by preserving the privacy and security of participants. All participants participated anonymously, and data collected was stored in an encrypted form in a password protected computer. Before engaging participants, I emphasized their autonomy and the purpose of the research, their participation requirements, possible risks of participation, and the preservation of their privacy, security, and autonomy. I will ensure that I securely store all information acquired from participants for five years. Subsequently, I will destroy all data following established destruction procedures at the end of five years. Finally, I did not collect names and other personally identifiable information of research sites and participants.

4.8 Transition and Summary

The key techniques that were employed for the major portions of this study were provided in this chapter and explained. The research design, the intended audience (study population), the sample and the sampling techniques, the data collection techniques, a summary of the data analysis, ethical considerations, the reliability and validity of the research instrumentare all included. The chapter summary of the study concludes this chapter. The analysis of the data was given as findings in the discussion and conclusion chapters, the hypotheses were examined and either accepted or denied, and conclusions were drawn based on the study's overall findings, which led to conclusions and recommendations.

DATA COLLECTION AND ANALYSIS

5 Chapter Five-Data Collection and Analysis

5.1 Introduction

As outlined in Chapter 1, the central aim of this research is to investigate the adoption of cloud computing services and understand how users can enhance literacy levels via cloud computing in higher educational institutes across Nigeria. These core research questions are statistically analyzed below using a combination of statistical techniques and in accordance with the regression model presented in Chapter 3.

5.2 Descriptive Statistic

This chapter presents the result of the research carried out on a comprehensive technology readiness adoption framework for assessing cloud technology in higher education in Nigeria. Eleven research questions and six hypotheses were formulated and tested. The data were analyzed using frequency count, percentages, bar, pie charts, T-test, Analysis of variance (ANOVA), Pearson Product Moment Correlation (PPMC) and Regression Analysis. The summary of data analysis is discussed in Table 5.1.

5.2.1 Individual Characteristics

Table 5.1: Frequency Distribution of Respondents by Gender

Gender	Frequency	Percentage
Male	189	72.7
Female	71	27.3
Total	**260**	**100.0**

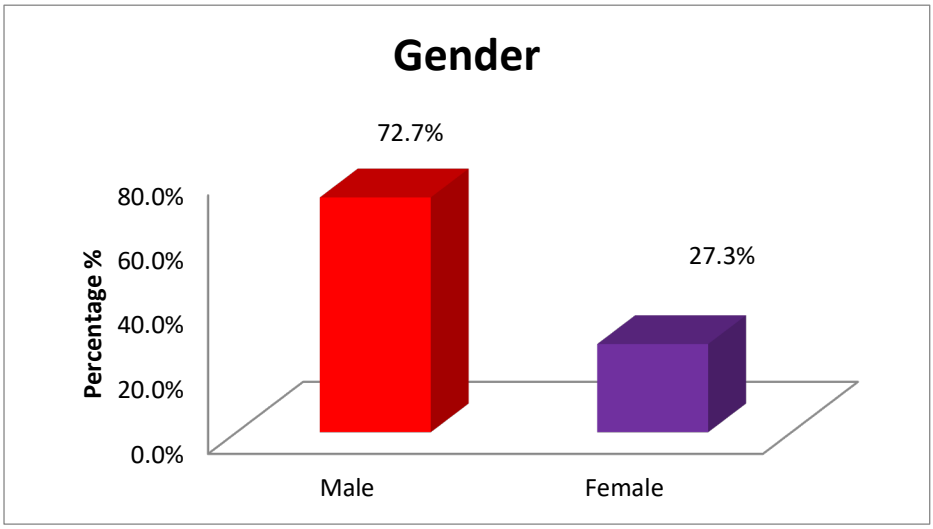


Figure 5.1: Bar chart showing Respondents by Gender

Table and figure 5.1 revealed that 189 representing 72.7% of the respondents were males, 71 of them or 27.3% were females. Therefore the above result implies that majority of the respondents were males.

Table 5.2: Frequency Distribution of Respondents by Age

Age group	Frequency	Percentage
18 to 25yrs	146	56.2
26 to 35yrs	41	15.8
36 to 45yrs	49	18.8
46 to 55yrs	24	9.2
55yrs and above	0	0.0
Total	**260**	**100.0%**

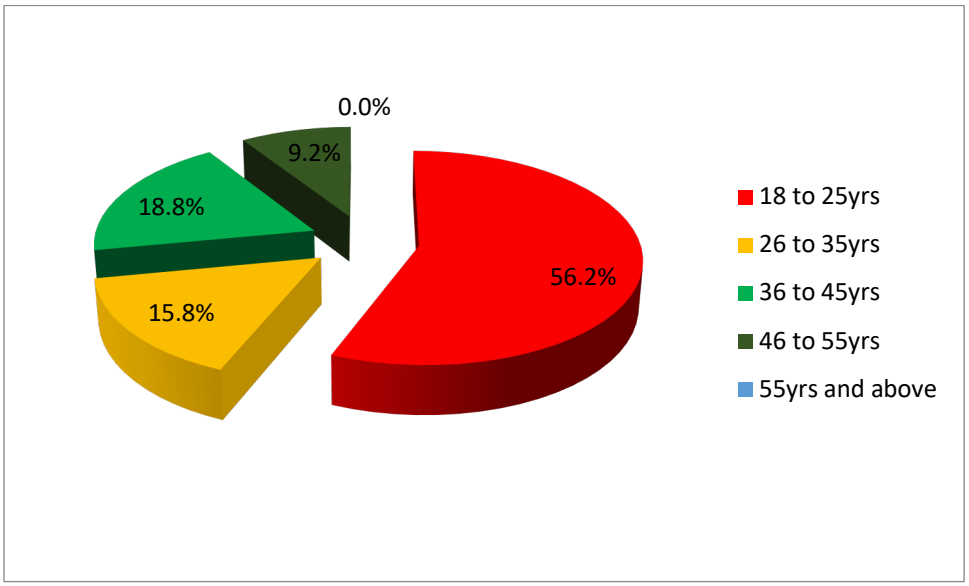


Figure 5.2: Pie chart showing Respondents by Age group

Table and figure 5.2 revealed the frequency distribution according to age range of the respondents. The result showed that respondents with age range of 18 to 25 years were 146 (56.2%) while those with age range of 26 to 35 years were 41 (15.8%) and respondents with age range of 36 to 45 years were 49 (18.8%) while respondents with age range of 46 to 55years were 24 (9.2%) of the total respondent. This showed that respondents with age range of 18 to 25 years had the highest percentage.

Table 5.3: Frequency Distribution of Respondents Educational Level

Educational Level	Frequency	Percentage
Doctorate	19	7.3
Master's Degree	66	25.4
Bachelor's Degree	175	67.3
A Level	0	0.0
GCSE	0	0.0
Total	**260**	**100.0**

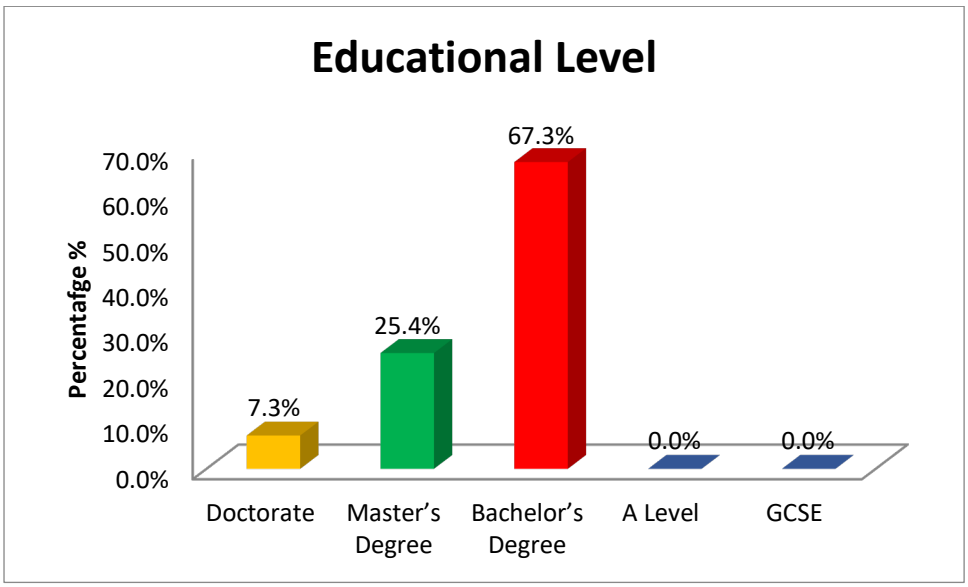


Figure 5.3: Bar chart showing Respondents by Educational level

Table and figure 5.3 revealed that 19 representing 7.3% of the respondents had doctorate education, and 66 of them or 25.4% had Master Degree, while Bachelor's Degree holder were 175 (67.3%) of the total respondent. The above result implies that majority of the respondents who have Bachelor degrees and above tend to give PU1 a high score.

Table 5.4: Frequency Distribution of Respondents by Discipline

Discipline	Frequency	Percentage
Science & Engineering	194	74.6
Art & Humanities	66	25.4
Total	**260**	**100.0**

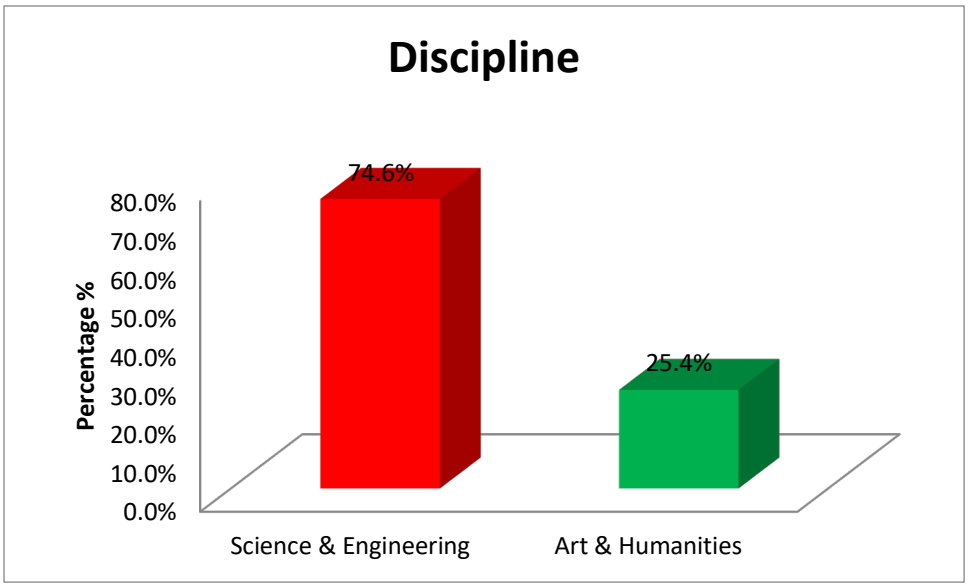


Figure 5.4: Bar chart showing Respondents by Discipline

Table and figure 5.4 revealed that 194 representing 74.6% of the respondents were specialist in Science & Engineering and 66 of them or 25.4% were Art & Humanities. The above result implies that majority of the respondents were specialist in Science & Engineering.

Table 5.5: Frequency Distribution of Respondents by Role in the University

Role in the University	Frequency	Percentage
Students	184	70.8
Academician	50	19.2
Researcher	15	5.8
Professional/Admin	11	4.2
Total	**260**	**100.0**

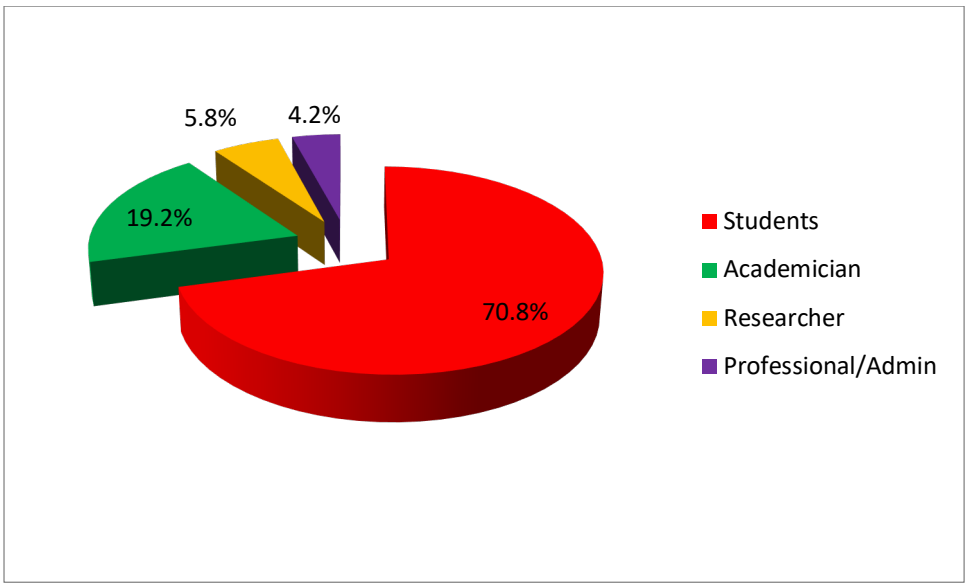


Figure 5.5: Pie chart showing Respondents by Role in the University

Table and figure 5.5 revealed that 184 representing 70.8% of the respondents indicated Students and 50 of them or 19.2% indicated Academician, 15 representing 5.8% of the respondents indicated Researcher while 11 of them or 4.2% indicated Professional/Admin. The above result implies that majority of the respondents were students.

5.2.2 Perception of Technology

Table 5.6:Respondents'level of awareness about cloud computing

Response	Frequency	Percent
Yes	216	83.1
No	44	16.9
Total	260	100.0

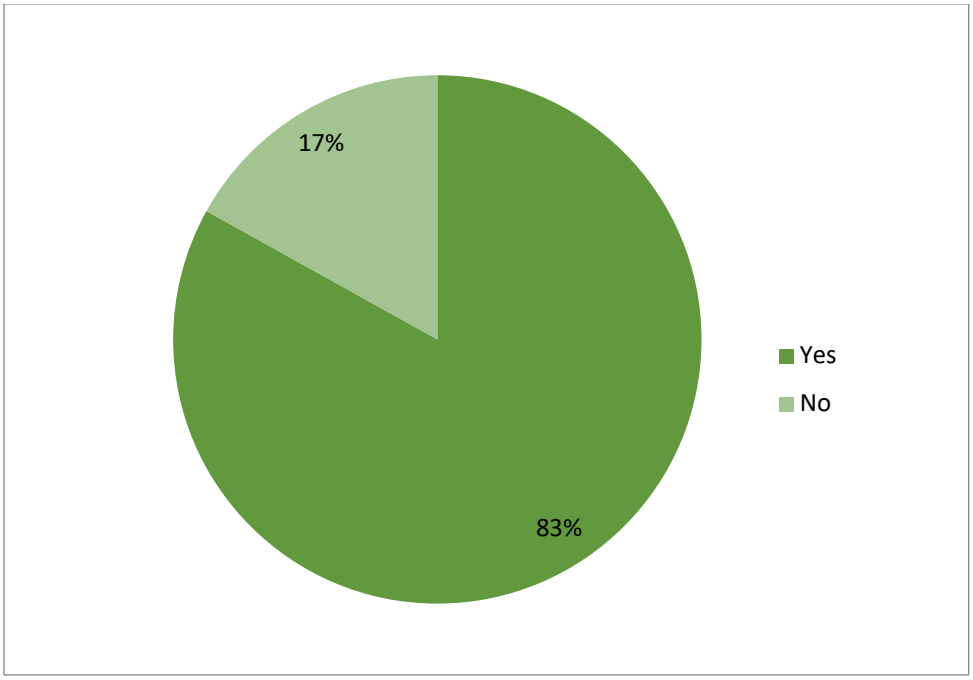


Figure 5.6: Respondents' level of awareness about cloud computing

The responses on the level of knowledge of cloud computing. Table and Figure 5.6 shows that majority 216(83.1%) have heard of cloud computing before while 44(16.9%) disagreed. It implies that majority of the respondentsheard of cloud computing before (see table and figure 5.6 for details)

Table 5.7: Respondents' level of use of cloud computing

Responses	Frequency	Percent
Yes	174	66.9
No	77	29.6
No Responses	9	3.5
Total	260	100.0

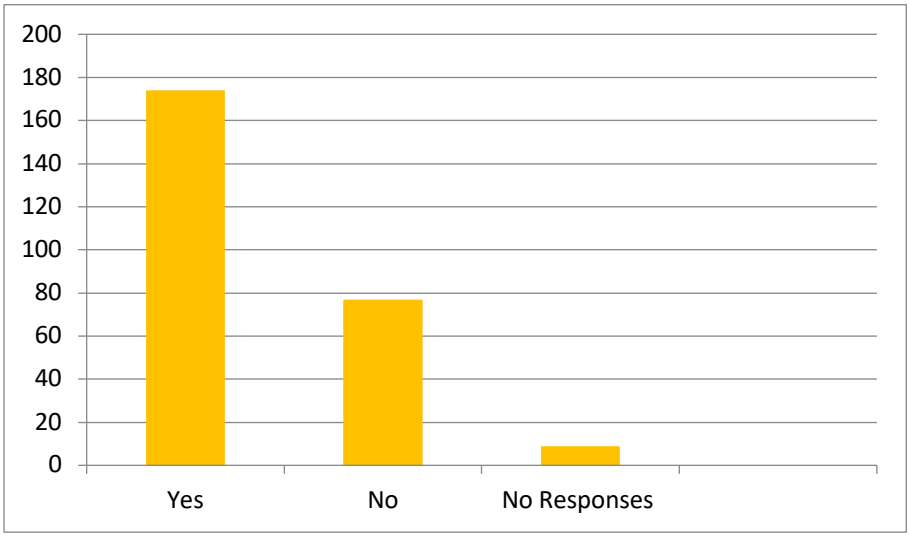


Figure 5.7: Respondents level of use of cloud computing

The responses on the level of uses of cloud computing. Table and figure 5.7 clearly shows that majority 174(66.9%) have used cloud computing before while 77(29.6%) said no and 9(3.5%) did not respond to the item in the questionnaire. It implies that majority of the respondent used cloud computing before.

Table 5.8: The type of cloud computing service the respondents had used before

Responses	Frequency	Percent
Yes (STaaS, SaaS, PaaS and IaaS)	141	54.2
No	29	11.2
Don't know	7	2.7
No responses	83	31.9
Total	260	100.0

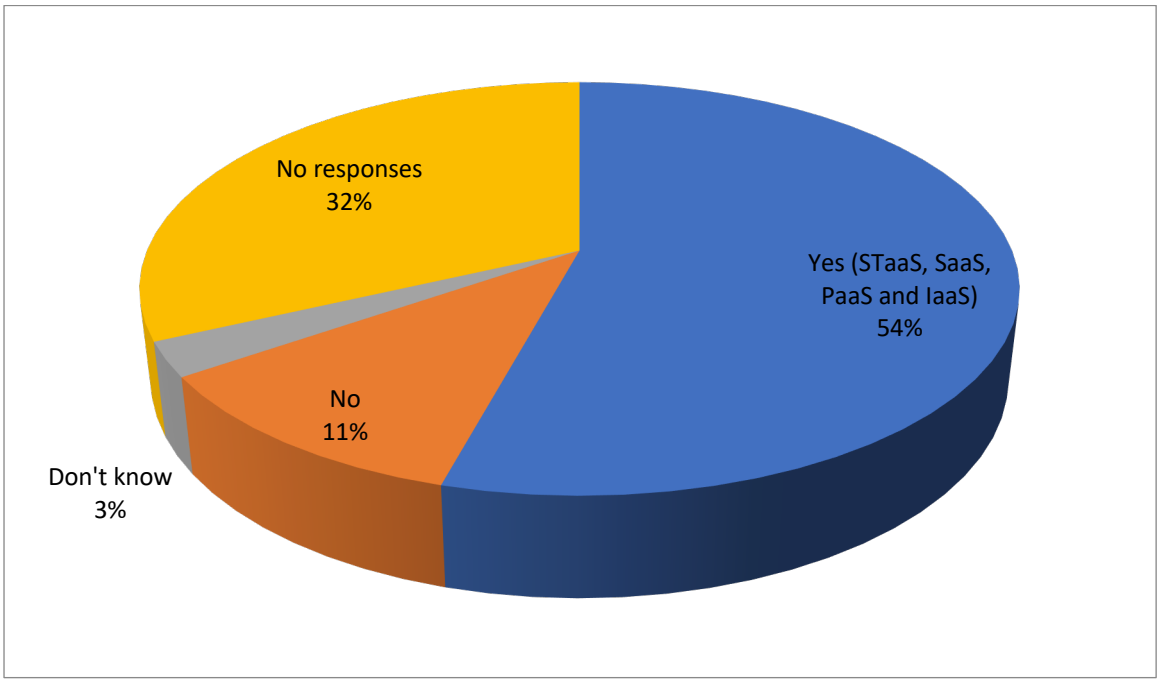


Figure 5.8: The model of cloud computing used by the respondents before with the percentage of the respondents

The responses on the type of cloud service have you used before. Table and figure 5.8 shows that majority 141(54.2%) have used (STaaS, SaaS, PaaS and IaaS) before while 29(11.2%) said no and 79(2.7%) has no knowledge while 83(31.9%) did not respond to the item in the questionnaire. It implies that majority of the respondent used cloud computing before.

Table 5.9: The model of cloud computing the respondents had use before

Responses	Frequency	Percent
Storage-as-a-Service (STaaS)	25	9.6
Software-as-a-Service (SaaS)	59	22.7
Platform-as-a-Service (PaaS)	34	13.1
Infrastructure-as-a-Service (IaaS)	61	23.5
No Responses	81	31.2
Total	260	100.0

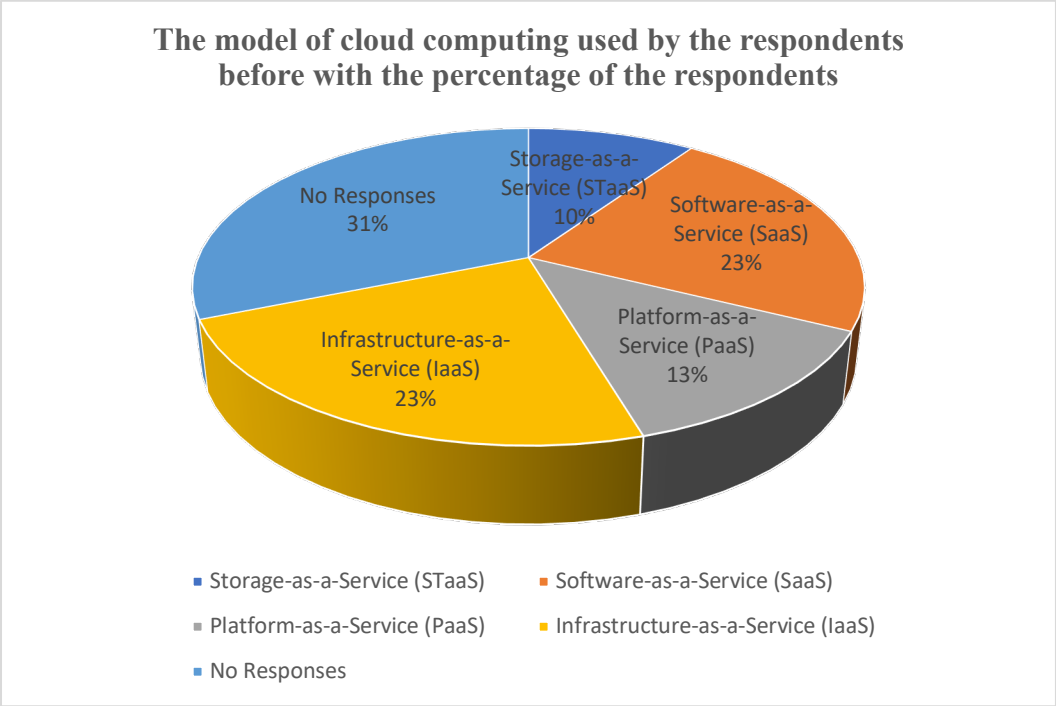


Figure 5.9: Models of Cloud computing

The responses on the model of cloud computing had use before. Table and figure 5.9 clearly shows that majority 61(23.5%) have used Infrastructure-as-a-Service (IaaS) before while 59(22.7%) used Software-as-a-Service (SaaS) and 34(13.1%) have used Platform-as-a-Service (PaaS) while 25(9.6%) used Storage-as-a-Service (STaaS), while 81(31.2%) did not respond to the item in the questionnaire. It implies that majority of the respondent used Infrastructure-as-a-Service (IaaS) before.

Table 5.10: If your answer to question 9 is yes, how frequent will you say you use cloud computing?

Responses	Frequency	Percent
Multiple times a day	85	32.7
Once daily	88	33.8
Frequent (3-4 times in a week)	3	1.2
No response	84	32.3
Total	260	100.0

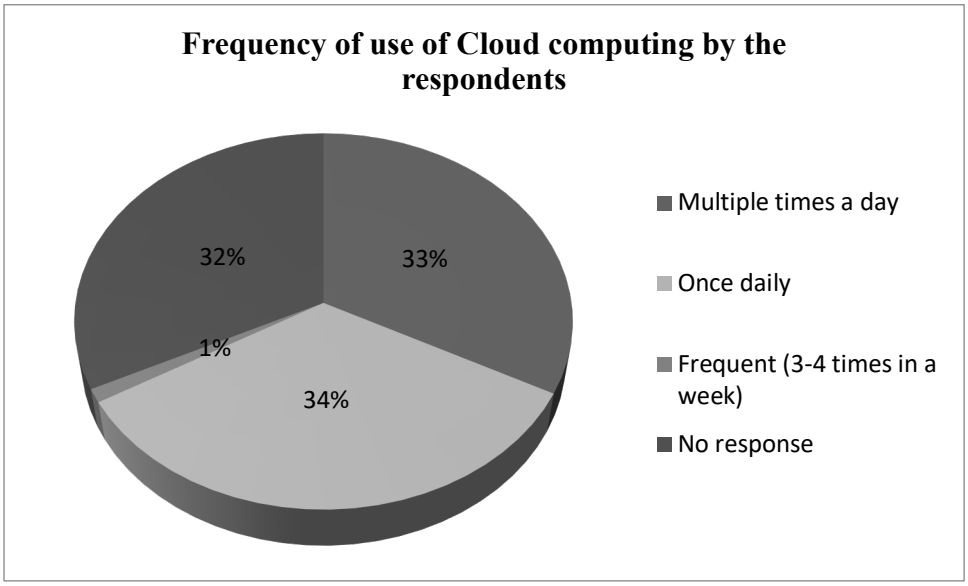


Figure 5.10: Frequency of use of Cloud computing by the respondents

The responses on the frequent use of cloud computing. Table and figure 5.10 shows that majority 88(33.8%) have used once daily while 85 (32.7%) used Multiple times a day and 3 (1.2%) have used Frequent (3-4 times in a week) while 84 (32.3%) did not respond to the item in the questionnaire. It implies that majority of the respondent frequent used cloud computing once daily.

Table 5.11: How often do you need to use a portable storage device (e.g. USB memory stick) or cloud-based storage to save your files?

Response	Frequency	Percent
Never	2	.8
A couple of times per month	6	2.3
Frequent (3-4 times in a week)	47	18.1
Once daily	91	35.0
Multiple times a day	114	43.8
Total	260	100.0

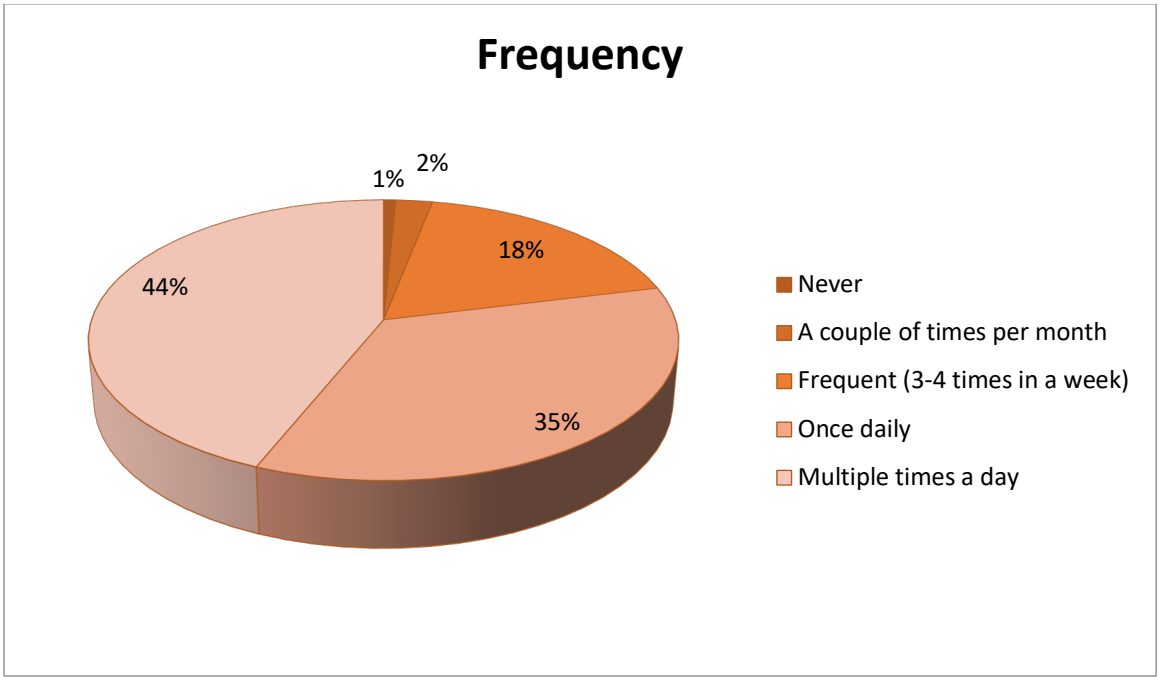


Figure 5.11: How often do you need to use a portable storage device

The responses on how often do they need to use a portable storage device (e.g. USB memory stick) or cloud-based storage to save files. Table 5.11 and figure clearly shows that majority 114 (43.8%) often need to use a portable storage device (e.g. USB memory stick) or cloud-based storage to save files in Multiple times a day while 91 (35.0%) used Once daily and 47 (18.1%) have used Frequent (3-4 times in a week) while 6 (2.2%) indicated a couple of times per month and 2 (0.8%) indicated never. It implies that majority of the respondent frequent used a portable storage device (e.g. USB memory stick) or cloud-based storage to save files in Multiple times a day.

5.2.3 External factor

Table 5.12: The using Microsoft Office (Word, Excel, Power Point)

S/N	Items	Very good	Good	Neutral	Not so good	Terrible
1	how proficient (skillful)are you with using Microsoft Office (Word, Excel, PowerPoint)	117 45.0%	104 40.0%	32 12.3%	5 1.9%	2 0.8%
2	How familiar are you with Windows operating system?	44 16.9%	44 16.9%	32 12.3%	86 33.1%	54 20.8%
3	How familiar are you with MAC operating system?	25 9.6%	39 15.0%	51 19.6%	72 27.7%	73 28.1%
4	How familiar are you with Linux operating system?	47 18.1%	63 24.2%	39 15.0%	54 20.8%	57 21.9%
5	How skillful are you on fixing a physical computer hardware?	112 43.1%	95 36.5%	40 15.4%	13 5.0%	0 0.0%

Sources: Researcher's field-report, 2022

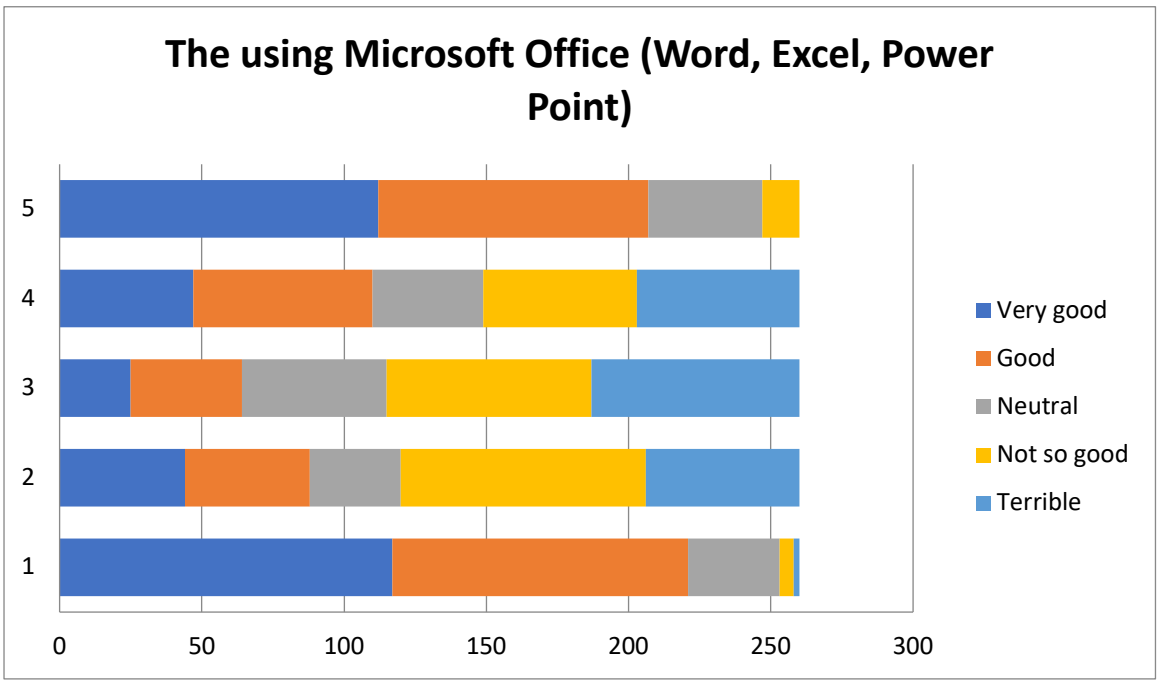


Figure 5.12: The using Microsoft Office (Word, Excel, Power Point)

Table and figure 5.12 clearly shows the responses on the proficient (skillful) are you with using Microsoft Office (Word, Excel, PowerPoint). The findings show that 45.0%, and 40.0%, respondents representing 85.0% agreed good in using Microsoft Office (Word, Excel, Power Point) while 15.0% disagreed. It implies that majority of the respondent good in using Microsoft Office (Word, Excel, Power Point).

The study also reveals that 16.9%, 16.9%, respondents representing 33.8% familiar with use of Windows operating system while 66.2% of the respondent disagreed. It implies that majority of the respondent not familiar with use of Windows operating system. In addition, it show that 18.1%, 24.2%, respondents representing 42.3% familiar with Linux operating system while 57.7% disagreed. It implies that majority of the respondent not familiar with Linux operating system.

The study also reveals that 43.1%, 36.5%, respondents representing 79.6% are skillful on fixing a physical computer hardware while 20.4% of the respondent disagreed. It implies that majority of the respondent are skillful on fixing physical computer hardware.

Table 5.13: Respondents understanding the roles of computer architecture

Items	Very well	Well enough	Neutral	Not so well	Terrible
How much do you understand computer architecture such as the roles of CPU, RAM, and hard disk?	78 30.0%	137 52.7%	42 16.2%	3 1.2%	2 0.8%

Sources: Researcher's field-report, 2022

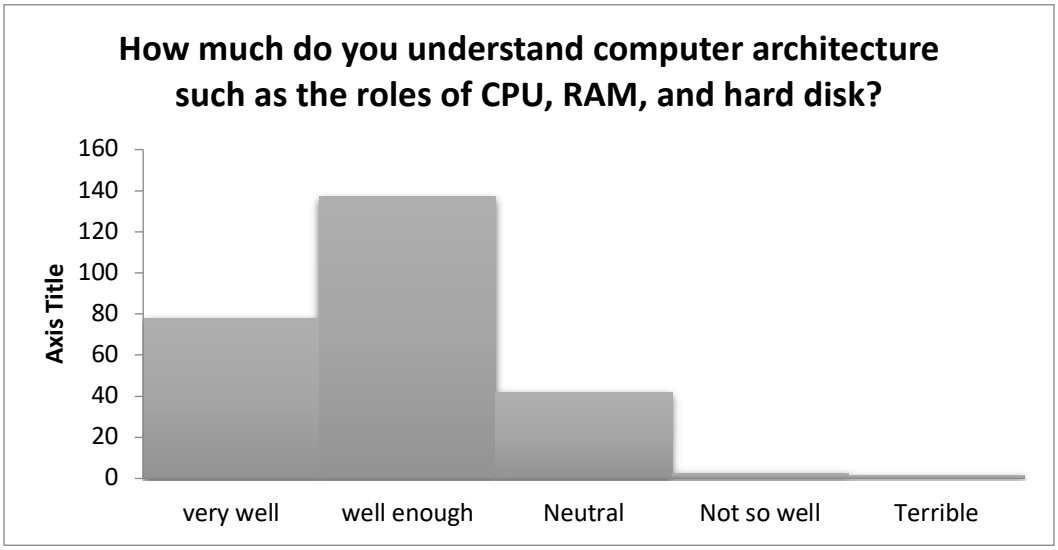


Figure 5.13: Respondents understanding the roles of computer architecture

Findings from table 5.13 and figure 5.13 show that 30.0%, 52.7%, respondents representing 72.7% agreed that understand computer architecture such as the roles of CPU, RAM, and hard disk were well enough while 27.3% not well. It implies that majority of the respondents understand that computer architecture such as the roles of CPU, RAM, and hard disk were well enough.

In other words, how much do you rely on digital format? For instance, (i) some prefer traditional pen & paper notes whilst some tend to use their phone/pad/PC to make notes. (ii) Some print papers to read, whilst others read on phone/pad/PC

Table 5.14: Respondents preference of traditional pen & paper notes

S/N	Items	All the time	Often	Neutral	Not so much	Not at all
1	How dependent are you on computers to perform your daily tasks? In other words, how much do you rely on digital format?	17 6.5%	209 80.4%	5 1.9%	16 6.2%	13 5.0%
2	How much do you rely on online utilities when developing course content?	19 7.3%	207 79.6%	4 1.5%	12 4.6%	18 6.9%
3	how much do you rely on online utilities to manage course content?	17 6.5%	207 79.6%	6 2.3%	18 6.9%	12 4.6%
4	How much do you rely on online utilities for the purpose of standardization of content, such as managing consistency?	4 1.5%	212 81.5%	11 4.2%	24 9.2%	9 3.5%
5	how much do you rely on online utilities to deliver content such as lecture slides, coursework, attendance, grades?	90 34.6%	117 45.0%	32 12.3%	20 7.7%	1 0.4%

Sources: Researcher's field-report, 2022

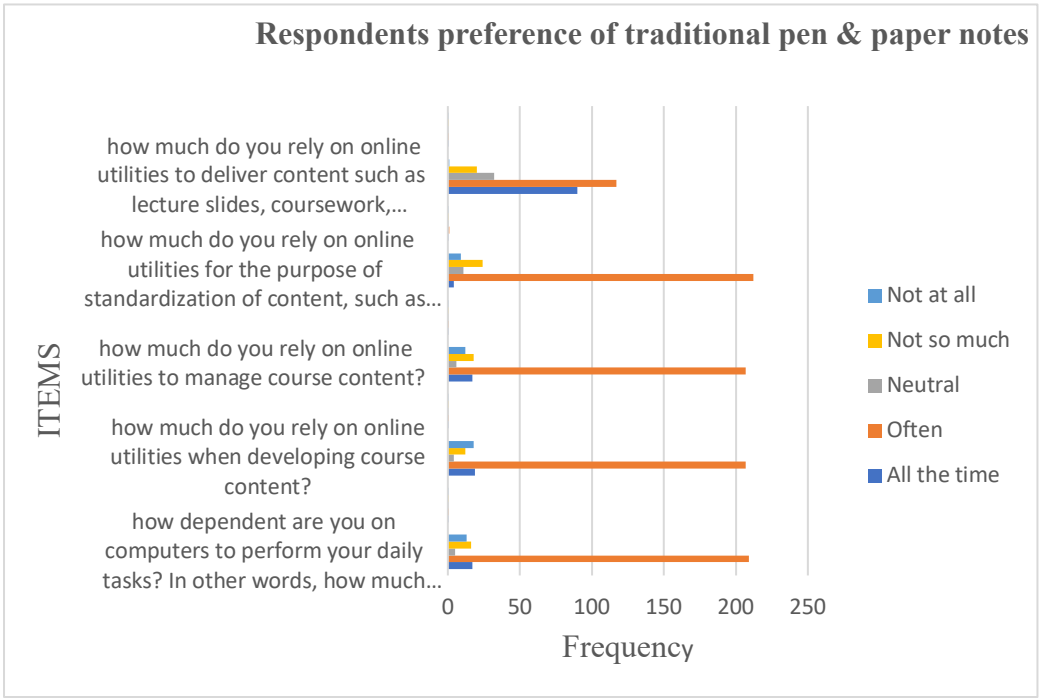


Figure 5.14: Respondents' preference for traditional pen & paper notes

Table and Figure 5.14 clearly show the responses on other words, how much do you rely on digital format? For instance, (i) some prefer traditional pen & paper notes whilst some tend to use their phone/pad/PC to make notes. (ii) Some print papers to read, whilst others read on phone/pad/PC. The findings show that 6.5%, and 80.4%, respondents representing 86.9% often dependent on computers to perform your daily tasks? In other words, how much do you rely on digital format while 13.1% not often. It implies that majority of the respondent often dependent on computers to perform your daily tasks.

The study also reveals that 7.3%, 79.6%, respondents representing 86.9% often on rely on online utilities when developing course content while 66.2% of the respondent disagreed. It implies that majority of the respondent on rely on online utilities when developing course content.In addition, it show that 6.5%, 79.6%, respondents representing 86.1% rely on online utilities to manage course content while 13.9% not rely on online utilities to manage course content. It implies that majority of the respondent rely on online utilities to manage course content.

The study also reveals that 1.5%, and 81.5%, respondents representing 82.0% rely on online utilities for the purpose of standardization of content, such as managing consistency while 18.0% of the respondent not. It implies that majority of the respondent are rely on online utilities for the purpose of standardization of content, such as managing consistency

The study also reveals that 34.6%, and 45.0%, respondents representing 79.6% rely on online utilities to deliver content such as lecture slides, coursework, attendance, grades while 20.4% of the respondent not. It implies that majority of the respondent are rely on online utilities to deliver content such as lecture slides, coursework, attendance, grades.

5.3 Analysis of Variables within components:

5.3.1 Variables for Individual Characteristics

Table 5.15: The actual status of technology usage

S/N	Items	SA	SLA	Nu	SLD	SD
1	You are very current and up to date with the latest technology in general''. On a scale of 1-5, how much do you agree with this statement?	77 29.6%	97 37.3%	37 14.2%	35 13.5%	14 5.4%
2	You are current and up to date with the latest technological developments only in the fields of your personal interest''. On a scale of 1-5, how much do you agree with this statement?	88 33.8%	109 41.9%	32 12.3%	17 6.5%	14 5.4%
3	Most of the time when a new technology is released, you consider yourself to be among the first people to try it among your friends''. On a scale of 1-5, how much do you agree with this statement?	93 35.8%	130 50.0%	25 9.6%	5 1.9%	7 2.7%
4	You can usually figure out new high-tech products and services without help from others''. On a scale of 1-5, how much do you agree with this statement?	92 35.4%	88 33.8%	48 18.5%	28 10.8%	4 1.5%
5	Sometimes it is challenging to figure out how to use new technology, but you enjoy these challenges''. On a scale of 1-5, how much do you agree with this statement?	65 25.0%	32 12.3%	37 14.2%	88 33.8%	38 14.6%
	''Learning about new technology is time consuming, hence you will avoid it''. On a scale of 1-5, how much do you agree with this statement?	42 16.2%	56 21.5%	39 15.0%	76 29.2%	47 18.1%
	''The complication and efforts of learning or adapting to any type or form of new technology may scare you''. On a scale of 1-5, how much do you agree with this statement?	54 20.8%	21 8.1%	15 5.8%	92 35.4%	78 30.0%
	''You do not see the need to try a new technology because what you have now works just fine''. On a scale of 1-5, how much do you agree with this statement?	72 27.7%	78 30.0%	26 10.0%	58 22.3%	26 10.0%

Sources: Researcher's field-report, 2022

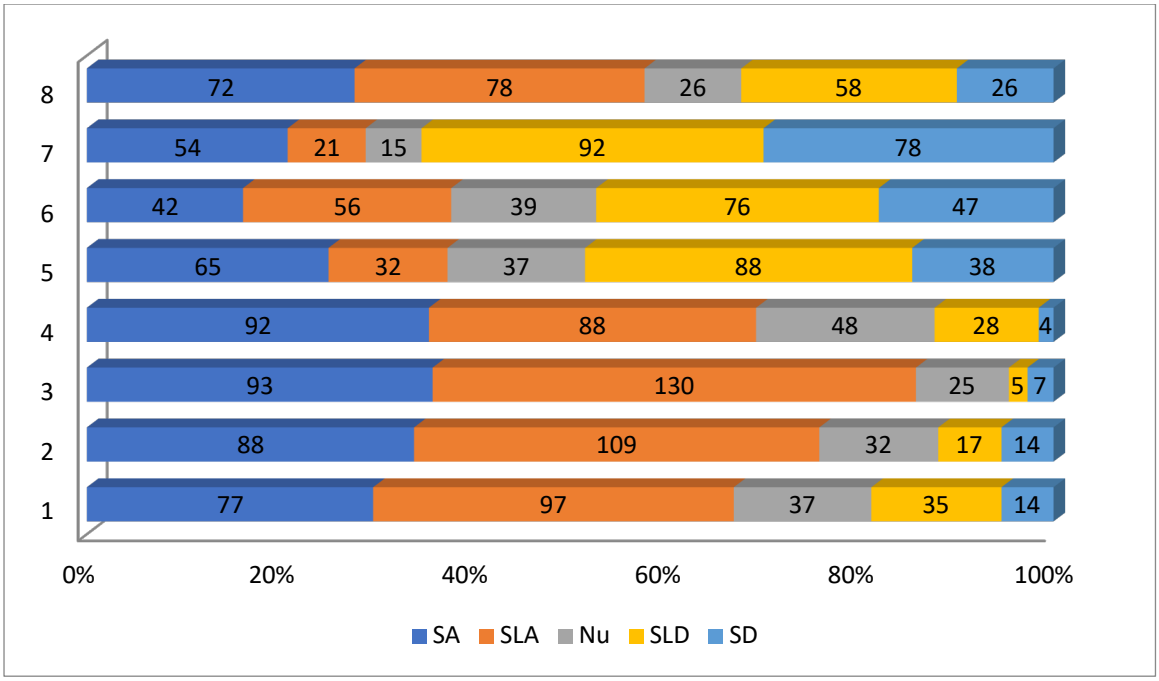


Figure 5.15: The actual status of technology usage

Findings from table and figure 5.15 show that 29.6%, 37.3%, respondents representing 66.9% agreed that current and up to date with the latest technological developments only in the fields of your personal interest''. while 33.3% disagreed. The study also reveals that 33.8%, 41.9%, respondents representing 75.7% agreed that current and up to date with the latest technological developments only in the fields of your personal interest while 24.3% of the respondents disagreed. In addition, it shows that 35.8%, 50.0%, respondents representing 85.8% agreed that most of the time when a new technology is released, they consider themselves to be among the first people to try it among their friends while 14.2% disagreed. The study also reveals that 35.4%, 33.8%, respondents representing 69.2% agreed that they usually figure out new high-tech products and services without help from others while 30.8% of the respondents disagreed.

Furthermore, it reveals that 25.0%, 12.3%, respondents representing 37.3% agreed that sometimes it is challenging to figure out how to use new technology, but enjoy these challenges while majority 62.7% of the respondent disagreed. In addition, it show that 16.2%, 21.5%, respondents representing 47.7% agreed that Learning about new technology is time consuming, hence you will avoid itwhile majority 52.3% disagreed. The study also reveals that 20.8%, 8.1%, respondents representing 28.9% agreed that complication and .efforts of learning or adapting to any type or form of new technology may scare while 71.1% of the respondent disagreed. Furthermore, it reveals that 27.7%, 30.0%, respondents representing 57.7% agreed

that they do not see the need to try a new technology because what you have now works just finewhile majority 42.3% of the respondent disagreed

5.3.2 Variables for Perception of Technology

Table 5.16: The Respondents Technology Usage or Approach to Handling Technology

c1 (SUBJECTIVE NORMS: THE ACTUAL STATUS OF YOUR TECHNOLOGY USAGE OR APPROACH TO HANDLING TECHNOLOGY)	Spearman's rho : Correlation Coefficient	1.000
	Sig. (2-tailed)	.
	N	260
c2	Correlation Coefficient	.161**
	Sig. (2-tailed)	.009
	N	260
c3	Correlation Coefficient	.265**
	Sig. (2-tailed)	.000
	N	260
c4	Correlation Coefficient	.285**
	Sig. (2-tailed)	.000
	N	260
c5	Correlation Coefficient	.367**
	Sig. (2-tailed)	.000
	N	260
c6	Correlation Coefficient	.250**
	Sig. (2-tailed)	.000
	N	259
c7	Correlation Coefficient	.092
	Sig. (2-tailed)	.140
	N	260
c8	Correlation Coefficient	.466**
	Sig. (2-tailed)	.000
	N	260
**. Correlation is significant at the 0.01 level (2-tailed).		
*. Correlation is significant at the 0.05 level (2-tailed).		

Table 5.16 reveals the actual status of respondents technology usage or approach to handling technology, this implies that people who have Bachelor degrees and above tend to give actual status of technology usage or approach to handling technology a very high score.

5.3.3 Variables for External Factors

Table 5.17: The Degree of Perception about Cloud Computing in Terms of Innovativeness

D1 PERCEPTION OF TECHNOLOGY (PERCEIVED INNOVATION (PI):THE DEGREE OF PERCEPTION ABOUT CLOUD COMPUTING IN TERMS OF INNOVATIVENESS.)	Spearman's rho :Correlation Coefficient	1.000
	Sig. (2-tailed)	.
	N	260
d2	Correlation Coefficient	.435**
	Sig. (2-tailed)	.000
	N	260
d3	Correlation Coefficient	.256**
	Sig. (2-tailed)	.000
	N	260
d4	Correlation Coefficient	.281**
	Sig. (2-tailed)	.000
	N	260
d5	Correlation Coefficient	-.058
	Sig. (2-tailed)	.355
	N	260
**. Correlation is significant at the 0.01 level (2-tailed).		
*. Correlation is significant at the 0.05 level (2-tailed).		

Table 5.17 reveals the respondents'degree of perception about cloud computing in terms of innovativeness, this implies that people who have Bachelor's degrees and above tend to give perceived innovation about the degree of perception about cloud computing a very high score.

5.3.3.1 Effect of Individual Factors

In order to evaluate or unravel the degree of individual factors o the adoption of cloud computing decision in higher institutions of learning in Nigeria, the students and staff (respondents) were asked a series of questions in which their responses were measured with the aid of five (5) point Likert type interval scale which are: 1= Strongly disagree, 2= Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree. The resultsare summarized in Table 5.18.

Table 5.18: Effect of Individual Factors (N = 260)

	Min	Max	Mean	Std Deviation	Statistic	LCI	UCI
Former experience with cloud computing (CSE1)	1.00	5.00	3.4269	1.44663	0.14888	1.99	3.56
You are very current and up to date with the latest technology (SN1)	2.00	5.00	3.8999	1.22932	0.11979	2.89	4.12
You consider yourself to be among the first people to try it among your friends (SN2)	2.00	5.00	3.4000	1.63634	0.16845	1.88	3.57
You consider yourself first to try a new technology among your classmates(SN3)	2.00	5.00	3.9610	1.49565	0.14777	2.67	4.19
You usually figure out high-tech products and services without help from others (SN4)	3.00	5.00	4.2610	1.53552	0.14969	2.84	4.39
You enjoy the challenges of using new high-tech products or services (SN5)	3.00	5.00	4.5610	0.86926	0.08549	4.4867	4.6355
You avoid new technology if it is time consuming (SN6)	3.00	5.00	4.6100	0.79936	0.078559	4.5367	4.6785
Complication of high-tech product or service scares you (SN7)	2.00	5.00	4.6100	0.87199	0.085678	4.5365	4.6757
You do no not need new technology, satisfied with existing one (SN8)	2.00	5.00	4.4600	0.98619	0.096869	4.3753	4.6857

NOTE: CSE = Computer Self Efficacy, SN= Subjective Norm

Key

Min Minimum

Max Maximum

Statistic Test for mean location

LCI Lower Confidence Interval

UCI Upper Confidence Interval

The confidence interval is being calculated with the random variable assumption.

From Table 18, it can be concluded that the 95% confidence of this result suggests that the mean is located in between the two intervals and cannot be higher than the UCI, also it cannot be lower than the LCI. The mean average for different categories of individual factors was then subjected to computation and ranking.

CSE MEAN = (CSE01)/1 = 3.7231

SN MEAN = (SN01+SN02+SN03+SN04+SN05 +SN06+SN07+SN08)/8 = 4.2204

GROUP MEAN FOR INDIVIDUAL FACTORS = (CSE MEAN + SN MEAN) /2 = 3.972

Table 5.19: Ranking for Individual Factors

S/N	Factor	Average Mean
1.	Computer Self Efficacy	3.7231
2	Subjective Norm	4.2204
3	Group mean for individual factors	3.972

The outcome of the ranking of individual factors as reflected in table 5.19 clearly shows that Subjective Norm was ranked the highest with average mean of 4.2204 followed by Computer Self Efficacy of 3.7231 whereas the group mean for Individual factors stood at 3.972, an indication that shows that the two elements of individual factors determine the level of cloud computing acceptance in Nigeria higher institutions of learning.

5.3.3.2 Effect of Technological Factors

In order to evaluate or unravel the degree of technological factors on the adoption of cloud computing decision in higher institutions of learning in Nigeria, the students and staff (respondents) were asked series of questions in which their responses were measured with the aid of five (5) point likert type interval scale which are: 1= Strongly disagree, 2= Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree. These result were summarized in table 5.19a.

Table 5.20: Effect of Technological Factor (N = 260)

	Min	Max	Mean	Std Deviation	Statistic	LCI	UCI
Online applications can improve students' creativity (PU1)	1.00	5.00	4.2000	1.08225	0.115973	3.9960	4.3060
Accessing Operating system online may be slow due to network issues (PU2)	1.00	5.00	3.9000	1.19759	0.118260	3.7937	3.8284
Access to lab software from home will be beneficial for you (PU3)	1.00	5.00	4.1000	1.36756	0.134254	3.9879	4.2342
Installation of software on your local computer can be slow, time consuming (PU4)	1.00	5.00	3.5600	1.34567	0.131979	3.4391	3.6821
Access to application means you have more free space on your local computer(PU5)	1.00	5.00	3.6010	1.38844	0.136279	3.7344	3.7363
Does the speed matter to you when access operating system or applications online (PU6)	2.00	5.00	3.8600	1.36575	0.137785	3.7344	3.9878
What is your perceived usefulness of these e-learning features (PU7)	2.00	5.00	4.1100	1.17993	0.134254	3.9879	4.2342
Using cloud storage/applications/software is easy (PE1)	2.00	5.00	4.1100	1.13185	0.115764	4.2561	4.4659
You feel you can have control over your everyday activities with the use of cloud computing (ATT1)	3.00	5.00	4.6000	1.91242	0.111153	4.1100	4.3100
You get more freedom of mobility with cloud computing (ATT2)	3.00	5.00	4.7560	1.11966	0.089649	4.3326	4.4696
You feel as though cloud computing can enhance your learning abilities (ATT3)	3.00	5.00	4.8000	1.12966	0.099926	3.7602	3.9599
You feel cloud computing can enhance your work efficiency (ATT4)	3.00	5.00	4.6500	1.12966	0.095965	4.1162	4.2959
How much do you trust cloud computing in general (ATT5)	3.00	5.00	4.8600	0.97891	0.089478	4.1217	4.6785
You believe cloud computing will cut down cost of operation in the university (ATT6)	3.00	5.00	4.8100	0.69937	0.78557	4.5437	4.8946
How much are you worried about CC accessibility (PR1)	2.00	5.00	4.2153	0.55853	0.054647	4.8176	4.8671
How much are you worried about CC reliability (PR2)	2.00	5.00	4.3100	0.68225	0.066993	4.7551	4.3299
How much are you worried about CC security (PR3)	2.00	5.00	4.5600	1.22434	0.124599	3.9929	4.4146
How much are you worried about CC privacy (PR4)	2.00	5.00	4.4600	1.16441	0.114629	4.1976	4.6419

NOTE: PU = Perceived Usefulness, PE = Perceived Easiness, ATT – Attitude towards Technology and PR - Perceived Reliability

Key
Min Minimum
Max Maximum
Statistic Test for mean location
LCI Lower Confidence Interval
UCI Upper Confidence Interval

From table 5.20, It can be concluded that the 95% confidence of this result suggest that the mean is being located in between the two intervals and cannot be higher than the UCI, also it cannot be lower than the LCI. The mean average for different categories of technological factors were then subjected to computation and ranking.

PU MEAN = (PU01+PU02+PU03+PU04+PU05+PU06+PU07)/7 = 3.3172
PE MEAN = (PE01)/1 = 4.1100
ATT MEAN = (ATT01+ ATT02+ ATT03+ ATT04+ ATT05+ ATT06)/6 = 3.9443
PR MEAN= (PR01+ PR02+ PR03+ PR04)/4 = 4.3863
GROUP MEAN FOR TECHNOLOGICAL FACTORS = (PU MEAN + PE MEAN+ATT MEAN + PR MEAN) /4 = 3.9395

Table 5.21: Ranking for Technological Factors

S/N	Factor	Average Mean
1.	Perceived Usefulness	3.3172
2	Perceived Easiness	4.1100
3	Attitude towards Technology	3.9443
4	Perceived Reliability	4.3863
5	Group mean for Technological factors	3.9395

The outcome of the ranking of Technological factors as reflected in table 5.21 clearly shows that Perceived Reliability was ranked the highest withaverage mean of 4.3863 followed by Perceived Easiness with an average mean of 4.1100, Attitude towards Technology had an average of 3.9443 whereas the Perceived Usefulness had the least average mean of 3.3172. Also, the group mean for Technological factors stood at 3.9395. An indication shows that the four elements of Technological factors determine the level of cloud computing acceptance in Nigeria'shigher institution of learning.

5.3.3.3 Effect of External Institutional Factors

In order to evaluate or unravel the degree of external factors on the adoption of cloud computing decision in higher institutions of learning in Nigeria, the students and staff (respondents) were asked a series of questions in which their responses were measured with the aid of five (5) point Likert type interval scale which is: 1= Strongly disagree, 2= Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree. These resultsare summarized in Table 5.22.

Table 5.22: Effect of External Factor (N = 260)

	Min	Max	Mean	Std Deviation	Statistic	LCI	UCI
Is the university willing to pay for high cost CC product and services (OC1)	2.00	5.00	4.5899	0.69359	0.082546	4.5186	4.6615
There are sufficient computers in the university labs for students to practice with (OC2)	2.00	5.00	4.5100	0.89963	0.078186	4.4239	4.5982
To what extent do you agree that campus Wi-Fi cloud is a good idea? (OC3)	1.00	5.00	4.3100	1.18539	0.12617	4.1759	4.4262
Other universities have far more advanced computers than our university lab(OC4)	2.00	5.00	4.5600	0.89815	0.09794	4.4742	4.6479
Access to application means you have more free space on your local computer(EP1)	1.00	5.00	3.5600	1.46738	0.143926	3.6739	3.6739
There are universities in Nigeria that have already adopted cloud computing (EP2)	2.00	5.00	3.7000	1.29877	0.12749	3.8274	3.7275
There is pressure from the university to teach and communicate with students via digital technology (EP3)	2.00	5.00	2.9000	1.54648	0.151875	2.9517	2.9597
There is pressure from the government to teach using digital technology (EP4)	1.00	5.00	3.2000	1.72998	0.169769	3.3678	3.2678
Does the university have enough for routine check and maintenance of computing resources (TS1)	2.00	5.00	4.1000	0.92873	0.077794	4.0799	4.0799
Do you have the impression that IT support team is always happy to help (TS2)	1.00	5.00	4.7560	1.11966	0.089649	4.3326	4.4696
Rate the efficiency and promptness of response from IT support team (TS3)	1.00	5.00	3.6899	1.61353	0.165977	3.8449	3.7449
Rate the level of knowledge and skills of the IT support staffs (TS4)	1.00	5.00	4.4000	1.14221	0.112158	4.4121	4.5121
Sharing learning resources online have a positive impact on a student's learning ability (SI1)	1.00	5.00	2.9600	1.40999	0.13938	2.9894	2.9894
The opportunity to practice another operating system (such as MAC) gives students more experience (SI2)	1.00	5.00	1.4980	0.154179	0.154179	2.7331	2.7331

NOTE: OC = Organizational Characteristics, EP = External Pressure, TS = Technical Support and SI – Social Influence.

OC MEAN = (OC01+OC02+OC03+OC04)/4 = 4.4925

EP MEAN = (EP01+ EP02+ EP03+ EP04)/4 = 3.3400

TS MEAN = (TS01+ TS02+ TS03+ TS04)/4 = 4.2365

SI MEAN= (SI01+ SI02)/2 = 2.22904

GROUP MEAN FOR EXTERNAL FACTORS = (OC MEAN + EP MEAN+TS MEAN + SI MEAN) /4 = 3.57451

Key

Min Minimum

Max Maximum

Statistic Test for mean location

LCI Lower Confidence Interval

UCI Upper Confidence Interval

It can be concluded from table 5.22 that the 95% confidence of this result suggest that the mean is being located in between the two intervals and cannot be higher than the UCI, also it cannot be lower than the LCI. The mean average for different categories of external factors were then subjected to computation and ranking.

Table 5.23: Ranking for External Factors

S/N	Factor	Average Mean
1.	Organizational Characteristics	4.4925
2	External Pressure	3.3400
3	Technical Support	4.2365
4	Social Influence	2.22904
5	Group mean for External factors	3.57451

The outcome of the ranking of External factors as reflected in table 5.23 clearly shows that Organizational Characteristics was ranked the highest with average mean of 4.4925 followed by Technical Support with an average mean of 4.2365, the External Pressure had an average of 3.3400 whereas the Social Influence had the least average mean of 2.22904. Also the group mean for External factors stood at 3.57451. An indication that shows that the four elements of External factors determine the level of cloud computing acceptance in Nigeria higher institution of learning.

5.3.3.4 Overall ranking for Cloud Computing determinant factors

The Overall ranking for Cloud Computing determinant factors is reflected in table 5.24

Table 5.24: The overall ranking for determinant factors of cloud computing acceptance

Overall Rank No	Factor	Average Mean
1	Organizational Characteristics	4.4925
2	Perceived Reliability	4.3863
3	Technical Support	4.2365
4	Subjective Norm	4.2204
5	Perceived Easiness	4.1100
6	Attitude towards Technology	3.9443
7	Computer Self Efficacy	3.7231
8	External Pressure	3.3400
9	Perceived Usefulness	3.3172
10	Social Influence	2.22904

The overall ranking for determinant factors of cloud computing acceptance in higher institution of learning in Nigeria is shown in table 5.24 asOrganizational Characteristics is rated 1st with overall ranking of 4.4925, Perceived Reliability is rated as 2nd with overall ranking of 4.3863, Technical Support is rated as 3rd with overall ranking of 4.2365, Subjective Norm is rated 4th with overall ranking of 4.2204 whereas Perceived Easiness is rated 5th with overall ranking of 4.1100. Attitude towards Technology is rated 6th with overall ranking of 3.9443, Computer Self Efficacy is rated 7th with overall ranking of 3.7231, also External Pressure is rated 8th with overall ranking of 3.3400 whereas Perceived Usefulness is rated 9th overall ranking of 3.3172 and Social Influence is rated 10th with overall ranking of 2.22904. All the factors accounts for the cloud computing acceptance by the respondents in Nigeria higher institution of learning with varying level of ranking.

5.3.3.5 The Drivers of Cloud Computing acceptance in Nigeria Higher Institution of Learning

In a view of assessing the drivers of Cloud Computing acceptance in Nigeria Higher Institution of Learning by evaluating which of the factors that play the major role in the cloud computing adoption decision in Nigeria higher institutions of learning, the respondents were subjected to some questions in which their responses were measured and summarized in table 5.25.

Table 5.25:The Drivers of Cloud Computing acceptance in Nigeria Higher Institution of Learning (N = 260)

	Min	Max	Mean	Std Deviation	Statistic	LCI	UCI
Removing of expertise barriers that affecting the modernization of education processes by the introduction of IT	3.00	5.00	4.2100	0.78918	0.088342	4.0339	4.1883
Averting capital expenditure in software, hardware, IT support	3.00	5.00	4.4795	0.77199	0.089591	4.2999	4.4579
Enhancing of security via outsourcing platforms/infrastructure/ services	2.00	5.00	3.7610	1.19321	0.126956	3.6453	3.7769
Scalability and Flexibility of IT resources	2.00	5.00	4.5322	0.91269	0.094117	4.3391	4.6252
Increasing of computing capacity and education performance.	1.00	5.00	4.5611	0.79744	0.078371	4.3938	4.5284
Diversification of IT systems	3.00	5.00	4.1111	0.91242	0.075234	3.9269	4.0951
IT infrastructure optimization of virtual machines	3.00	5.00	4.4100	0.55537	0.089639	4.2326	4.3896
Education Continuity and Disaster recovery capabilities.	4.00	5.00	4.8610	1.67410	0.054640	4.7176	4.7945
Assessing the profitability and feasibility of new services (i.e developing of education and business cases into the Cloud)	4.00	5.00	4.3100	1.16742	0.054697	4.0976	4.3146
Addition of redundancy so as to increase availability and resilience	2.00	5.00	4.7420	0.87199	0.089592	4.5642	4.7212
Controlling marginal costs and profit on education.	2.00	5.00	3.8100	1.91950	0.116943	3.5952	3.8169

Key

Min Minimum

Max Maximum

Statistic Test for mean location

LCI Lower Confidence Interval

UCI Upper Confidence Interval

The Drivers of Cloud Computing in Nigeria Higher Institution of Learning as depicted in table 5.25 shows that Education Continuity and Disaster recovery capabilities accounted for the highest mean of 4.8610, closely followed by Addition of redundancy so as to increase availability and resilience with mean ranking of 4.7420, while Increasing of computing capacity and education performance took the third ranking with 4.5611 closely followed by Scalability and Flexibility of IT resources that had the mean ranking of 4.5322. Averting capital expenditure in software, hardware, IT support was rated fifth with mean ranking of 4.4795 followed by IT infrastructure optimization of virtual machines with mean ranking of 4.4100,

whereas Assessing the profitability and feasibility of new services (i.e. developing of education and business cases into the Cloud) recorded the seventh mean ranking of 4.3100 followed by Removing of expertise barriers that affecting the modernization of education processes by the introduction of IT with mean ranking of 4.2100. Also Diversification of IT systems with mean ranking of 4.1111 was ranked ninth whereas controlling marginal costs and profit on education was rated tenth with mean ranking of 3.8100 and the least mean ranking was Enhancing of security via outsourcing platforms/infrastructure/ services with mean ranking of 3.7610. This clearly portrayed the fact that each of these drivers determines the adoption of cloud computing acceptance with varying ranking.

5.3.3.6 The Challenges affecting Cloud Computing acceptance in Nigeria Higher Institution of Learning

In a view of assessing the challenges affecting the acceptance of Cloud Computing in Nigeria Higher Institution of Learningby evaluating which of the challenges affecting most the acceptance of cloud computing adoption decision in Nigeria higher institutions of learning, the respondents were subjected to some questions in which their responses were measured and summarized in table 5.26.

Table 5.26: The Challenges of Cloud Computing in Nigeria Higher Institution of Learning (N = 260)

	Min	Max	Mean	Std Deviation	Statistic	LCI	UCI
Security issue	3.00	5.00	4.9100	0.041889	0.041275	4.8799	4.9413
Data / Services Availability	3.00	5.00	4.6610	0.75627	0.084137	4.5881	4.7341
Data / Services Integrity	2.00	5.00	4.6610	0.68193	0.07685	4.5954	4.7268
Data Confidentiality	2.00	5.00	4.9610	0.23472	0.032924	4.9392	4.9829
Privacy issue	3.00	5.00	4.8610	0.37746	0.046913	4.8352	4.8969
Repudiation issue	3.00	5.00	4.4100	0.83189	0.091548	3.3297	4.4915
Data / Services loss of control	3.00	5.00	4.4100	1.05741	0.161174	4.2986	4.5136
Lack / poor knowledge in the subject area	4.00	5.00	3.1600	1.54236	0.145538	2.9988	3.3112
Loosing of current information	4.00	5.00	3.2610	1.38282	0.151174	4.1267	3.3955
Poor providers liability in case there is security issue	1.00	5.00	3.6610	1.43552	0.149693	4.5215	3.7997
Poor government regulation	2.00	5.00	2.7600	1.41966	0.14927	3.6229	2.8992
Cost of cloud migrating services	2.00	5.00	3.5610	1.36738	0.13926	3.4282	3.6939

Key

Min Minimum

Max Maximum

Statistic Test for mean location

LCI Lower Confidence Interval

UCI Upper Confidence Interval

Table 5.26 presented the challenges affecting Cloud Computing acceptance in Nigeria's Higher Institutions of Learning Data confidentiality was ranked first with a 4.9610 mean, closely followed by security issues with a mean ranking of 4.9100 while the challenges of privacy were ranked third with a mean of 4.8610 followed by Data / Services integrity and service availability with a mean ranking of 4.6610 respectively. The challenges of repudiation and Data / Services loss of control on respective cases were ranked sixth with a 4.4100 mean ranking. Poor providers' liability in case there is a security issue took the eighth ranking with 3.6610 mean while the Cost of cloud migrating services accounted for the ninth ranking with 3.5610 mean. Loosing of current information recorded a mean of 3.2610 and a Lack / poor knowledge in the subject area recorded mean ranking of 3.1600. The least ranked challenges according to the table is poor government regulation with mean ranking of 2.7600, this further shows that there are different challenges affecting the adoption of cloud computing in Nigeria higher institutions of learning in varying ranking.

5.4 Analysis of Research Questions

5.4.1 Individual Characteristics

RQ_1: What are the influences of individual characteristics on the cloud computing adoption in Nigeria Universities?

The analysis of the influence of individual characteristics on the cloud computing adoption is presented in table 5.27.

Table 5.27: The influence of individual characteristics on the cloud computing adoption in Nigeria University

S/N	Attribute	SA	SLA	Nu	SLD	SD	Weighted Mean	Std. Dev.
1	You are very current and up to date with the latest technology in general''(CSE1).	77 29.6%	97 37.3%	37 14.2%	35 13.5%	14 5.4%	3.5007	.55284
2	You are current and up to date with the latest technological developments only in the fields of your personal interest''(SN1).	88 33.8%	109 41.9%	32 12.3%	17 6.5%	14 5.4%	3.80	1.001
3	Most of the time when a new technology is released, you consider yourself to be among the first people to try it among your friends''(SN2).	93 35.8%	130 50.0%	25 9.6%	5 1.9%	7 2.7%	3.85	1.051
4	You can usually figure out new high-tech products and services without help from others'' (SN3).	92 35.4%	88 33.8%	48 18.5%	28 10.8%	4 1.5%	3.5076	.56170
5	Sometimes it is challenging to figure out how to use new technology, but you enjoy these challenges'' (SN4).	65 25.0%	32 12.3%	37 14.2%	88 33.8%	38 14.6%	3.5603	.48577
6	''Learning about new technology is time consuming, hence you will avoid it''(SN5).	42 16.2%	56 21.5%	39 15.0%	76 29.2%	47 18.1%	3.6144	.50718
7	''The complication and efforts of learning or adapting to any type or form of new technology may scare you''(SN6).	54 20.8%	21 8.1%	15 5.8%	92 35.4%	78 30.0%	3.5007	.55284
8	''You do not see the need to try a new technology because what you have now works just fine''(SN1).	72 27.7%	78 30.0%	26 10.0%	58 22.3%	26 10.0%	3.5076	.56172
	Average Weighted Mean						**3.6052**	

NOTE: CSE = Computer Self Efficacy, SN= Subjective Norm

SA = Strongly agree, S.L.A = Slightly agree, Nu = Neutral, SLD = Slightly disagree

SD = Strongly disagree

Table 5.27 shows the average weighted mean of 3.6052, and the weighted means ranging from 3.85 to 3.5007, the respondents tended to agree to a greater extent to the statement provided and accorded to them. On this premise, the respondents do tend and agree to a greater extent

that the university staff and students do possesses various individual characteristics which influences cloud computing adoption in their respective university. This shows that individual characteristics had influence on the cloud computing adoption in Nigeria Universities.

The outcome of this study support the finding of Abdullah, Nur and Zahurin (2020) that studied the influencing factors on cloud computing adoption in higher education institution(HEIs) of the least developed countries, concentrating on the Republic of Yemen. The study adopted the partial least square (PLS) method of estimating the collected data from sampled 328 respondents in 38 HEIs to unveiled that, there is mixed magnitude of relationship of the examined latent variables like compatibility, security, technology readiness, top management support and reliability, among others with the cloud computing adoption in the Republic of Yemen. It is found that, the variables like compatibility, top management support, technology readiness and reliability, among others bears positive and significant impact on cloud computing adoption, while, latent variables like regulatory policy and culture negatively related to cloud computing adoption at statistical significance

The outcome of this study equally inclined with the finding of Omar, Anup, Valmira and Shahnawaz (2020) evaluates key factors determining the adoption of cloud computing in local government organisations in Australia. The study employed survey method and inferential statistics as tools of analysis to discovered that, latent factors like compatibility, complexity, cost, security concerns, expected benefits and organization size impact positively on cloud computing at a statistically level of significance. This therefore, suggests intensification of the cloud computing technology adoption owing to its low cost and high benefits advantages in local organisations in particular and the state institutions in general.

5.4.1.1 Perception of Technology

RQ_2: What are the influences of technological factors on the cloud computing adoption in Nigeria Universities?

The analysis of the influence of technological factors on the cloud computing adoption is presented in table 5.28.

Table 5.28:The influence of technological factors on the cloud computing adoption in Nigeria University

S/N	Attribute	Definitely yes	Likely	Maybe or maybe not	Unlikely	Definitely not	Weighted Mean	Std. Dev.
1	Online applications can improve students' creativity (PU1)	95 36.5%	97 37.3%	27 10.4%	35 13.5%	06 2.3%	3.5007	.65284
2	Accessing Operating system online may be slow due to network issues (PU2)	80 30.7%	100 38.5%	45 17.3%	25 9.6%	10 3.8%	3.5177	.57633
3	Access to lab software from home will be beneficial for you (PU3)	78 30.0%	128 49.2%	49 18.8%	49 18.8%	5 1.9%	3.6042	.47100
4	Installation of software on your local computer can be slow, time consuming (PU4)	58 22.3%	80 30.8%	68 26.2%	10 3.8%	44 16.9%	3.6603	.47850
5	Access to application means you have more free space on your local computer(PU5)	65 25.0%	32 12.3%	37 14.2%	88 33.8%	38 14.6%	3.5007	.55584
6	Does the speed matter to you when access operating system or applications online (PU6)	52 20.0%	76 29.2%	89 34.2%	23 8.8%	20 7.6%	3.5076	.56175
7	''The complication and efforts of learning or adapting to any type or form of new technology may scare you'' (SN6).	63 24.2%	75 28.8%	42 16.2%	45 17.3%	35 13.5%	3.4841	.52810
8	Your perceived usefulness of these e-learning features is positive (PU7)	82 31.5%	98 37.7%	36 13.8%	22 6.1%	22 8.5%	3.80	1.008
9	Using cloud storage application software is easy (PE1).	77 29.6%	97 37.3%	37 14.2%	35 13.5%	14 5.4%	3.88	.876
10	You feel you can have control over your everyday activities with the use of cloud computing (ATT1)	78 30.0%	99 38.1%	32 12.3%	37 14.2%	14 5.4%	3.76	1.000
11	You get more freedom of mobility with cloud computing (ATT2)	63 24.3%	110 42.3%	55 21.2%	22 8.5%	10 3.8%	3.76	1.043
12	You feel as though cloud computing can enhance your learning abilities (ATT3).	89 34.2%	108 41.5%	58 22.3%	28 10.8%	5 1.9%	3.87	1.045
13	You feel cloud computing can enhance your work efficiency (ATT4)	75 28.8%	97 37.3%	47 18.1%	21 8.1%	20 7.7%	4.07	. .900
14	You trust cloud computing in general (ATT5)	42 16.2%	56 21.5%	39 15.0%	76 29.2%	47 18.1%	3.80	1.014
15	You believe cloud computing will cut down cost of operation in the university (ATT6)	59 22.7%	99 38.1%	25 9.6%	48 18.5%	29 11.1%	3.85	1.073
16	You are worried about CC accessibility (PR1)	82 31.6%	88 33.8%	46 17.7%	38 14.6%	06 2.3%	4.00	.926
17	You are worried about CC reliability (PR2)	78 30.0%	128 49.2%	49 18.8%	50 19.2%	4 1.5%	3.77	1.071
18	You are worried about CC security (PR3)	55 21.1%	73 28.1%	89 34.2%	23 8.8%	20 7.6%	3.74	1.065
19	You are worried about CC privacy (PR4)	49 18.8%	109 41.9%	25 9.6%	48 18.5%	29 11.1%	3.80	1.047
	Average Weighted Mean						**3.7251**	

NOTE: PU = Perceived Usefulness, PE = Perceived Easiness, ATT – Attitude towards Technology and PR - Perceived Reliability

Table 5.28 shows the average weighted mean of technological factors which is 3.7251, and the weighted means ranging from 4.07 to 3.4841, the respondents tended to agree to a greater extent to the statement provided and accorded to them that University that have all the necessary infrastructure is out to adopt the cloud computing technology for their education. The

implication of this is that all the attributes of technological factors do have influence on cloud computing adoption in Nigeria Universities.

The outcome of this study collaborate the finding of AlAlaa and Ibrahim (2015) who investigated the Cloud Computing Adoption by Higher Education Institutions in Saudi Arabia. The study used partial least square as the estimation technique to reveal that, the three basic factors (i.e.relative advantage, data privacy and complexity) are core to the consideration of the adoption of cloud computing technology by higher education institutions in Saudi Arabia.

The result also support the finding of Hakan (2021) found that Cloud Computing Adoption in Universities as a Guideline to Cloud Migration in Turkey. The study reveal that, the adoption of cloud computing is an important means of avoiding the high cost of maintaining IT technology in the universities within Turkey even though, the adoption rate in the universities Turkey are still very low. Also, the result of Chi –square statistics show a significant relationship between cloud computing awareness and use of cloud applications at one end while, at other end, there is a significant relationship between the use of virtualization technologies and the use of cloud applications.

5.4.2 External Factors

RQ_3: What are the influences of external factors on the cloud computing adoption in Nigeria Universities?

The analysis of the influences of external factors on the cloud computing adoption in Nigeria Universities is shown in table 5.29.

Table 5.29: The influence of external factors on the cloud computing adoption in Nigeria University

S/N	Attribute	SA	SLA	Nu	SLD	SD	Weighted Mean	Std. Dev.
1	Your university willing to pay for high cost CC product and services (OC1)	93 35.8%	130 50.0%	25 9.6%	5 1.9%	7 2.7%	3.82	1.102
2	There are sufficient computers in the university labs for students to practice with (OC2)	82 31.6%	88 33.8%	46 17.7%	38 14.6%	06 2.3%	4.00	.926
3	The extent you agree that campus Wi-Fi cloud is a good idea? (OC3)	42 16.2%	56 21.5%	39 15.0%	76 29.2%	47 18.1%	3.85	1.071
4	Other universities have far more advanced computers than our university lab(OC4)	61 23.5%	72 27.7%	42 16.2%	45 17.3%	40 15.4%	4.12	.773
5	Access to computer application means you have more free space on your local computer(EP1)	65 25.0%	32 12.3%	37 14.2%	88 33.8%	38 14.6%	4.00	.44473
6	There are universities in Nigeria that have already adopted cloud computing (EP2)	80 30.7%	100 38.5%	45 17.3%	25 9.6%	10 3.8%	4.01	1.007
7	There is pressure from the university to teach and communicate with students via digital technology (EP3).	43 16.5%	95 36.5%	42 16.2%	45 17.3%	35 13.5%	4.02	.880
8	There is pressure from the government to teach using digital technology (EP4)	88 33.8%	92 35.4%	36 13.8%	22 6.1%	22 8.5%	3.70	1.008
9	Your university have enough for routine check and maintenance of computing resources (TS1)	55 21.1%	65 25.0%	65 25.0%	45 17.3%	30 11.5%	3.77	.876
10	You have the impression that IT support team is always happy to help (TS2)	78 30.0%	99 38.1%	32 12.3%	37 14.2%	14 5.4%	4.07	1.016
11	Rate the efficiency and promptness of response from IT support team (TS3)	63 24.3%	110 42.3%	55 21.2%	22 8.5%	10 3.8%	4.06	.958
12	Rate the level of knowledge and skills of the IT support staffs (TS4)	59 22.7%	68 26.2%	58 22.3%	40 15.4%	35 13.5%	4.02	.873
13	Sharing learning resources online have a positive impact on a student's learning ability (SI1)	90 34.2%	110 41.5%	27 22.3%	23 10.8%	10 1.9%	3.83	1.008
14	The opportunity to practice another operating system (such as MAC) gives students more experience (SI2)	79 30.4%	101 38.8%	48 18.5%	30 11.5%	2 0.8%	3.78	1.100
	Average Weighted Mean						**3.93**	

SA = Strongly agree, S.L.A = Slightly agree, Nu = Neutral, SLD = Slightly disagree

SD = Strongly disagree

Table 5.29 shows the average weighted mean of external factors which is 4.01, and the weighted means ranging from 3.93 to 3.77, the respondents tended to agree to a greater extent to the statement provided and accorded to them that University external factors like finance, regulatory policies, government,efficiencies of IT support team, routine check and maintenance of computing resources etc.had an influence on cloud computing technology adoption. The implication of this is that external factors had an influence on cloud computing adoption at Nigeria University

The outcome of this study is in line with the findings of Jibril (2014) who found that, seven out of ten covert variables were found to be in support of adoption of cloud computing technology in higher education institutions in Nigeria, while the remaining three were found not to be in support of the adoption of cloud computing technology in higher education institutions in Nigeria. The study therefore inspires the managements of higher education institutions to make move on adoption of cloud computing technology in the respective institutions in Nigeria.

Also the outcome of the study equally confirm the finding of Oyeleye, FagbolaTemitayo and Daramola (2014) that studied the impact and challenges of cloud computing adoption on public universities in South –western Nigeria. Using descriptive statistics inform of frequency and percentage distribution, the study reveal that, adopting cloud computing technology impacts on cost effectiveness, enhanced availability, low environmental impact, reduced IT complexities, mobility, scalability, increased operability and reduced investment in physical asset in higher education institutions in Nigeria.

RQ_4: What is the impact of cloud computing adoption on the Nigeria University performance?

The analysis of the impact of cloud computing adoption on the Nigeria University performance is shown in table 5.30.

Table 5.30: The impact of cloud computing adoption on the Nigeria University performance

S/N		Mean	Std. Deviation	Rank	Agreement Degree
1	Afford the student the opportunity of learning independently	7.7118	3.07246	2	High
2	Improved learning and academic performance	8.2603	3.66636	1	High
3	Perceived university benefit in all ramification	9.7100	2.08460	7	High
4	Student/staff accessibility to current and updated information	12.0775	2.80823	3	High
5	Student creativity and know-how	8.5000	2.75366	4	High
6	Staff / student cooperation with peers and cloud providers	8.75188	2.23864	6	High
7	University management support.	8.8260	2.30330	5	High
8	Operation cost reduction	10.3581	2.0756	8	High
9	Perceived privacy and security	11.1004	2.0054	9	High

Table 5.30 presents the mean value and standard deviation of the analyzed questionnaire. The values clearly pictured the varying impact of cloud computing adoption on the University performance in Nigeria, with the subscale with the highest mean value was Student/staff accessibility to current and updated information with the value 12.0775 with the standard deviation of 2.80823. The implication of this is that cloud computing model the adapted model (CTRAM) adoption by staff and students of Nigerian University had different impact on the Nigeria University performance with high degree of agreement.

5.4.3 Spearman correlation tested for Normality

Table 5.31: The Computer Self-Efficacy

10	Spearman's rho : Correlation Coefficient	1.000
	Sig. (2-tailed)	.
	N	260
b2	Correlation Coefficient	.260**
	Sig. (2-tailed)	.000
	N	251
b3	Correlation Coefficient	-.048
	Sig. (2-tailed)	.526
	N	177
b4	Correlation Coefficient	.174*
	Sig. (2-tailed)	.020
	N	179
b5	Correlation Coefficient	-.079
	Sig. (2-tailed)	.300
	N	176
b6	Correlation Coefficient	.009
	Sig. (2-tailed)	.888
	N	260
b7	Correlation Coefficient	.149*
	Sig. (2-tailed)	.016
	N	260
b8	Correlation Coefficient	.264**
	Sig. (2-tailed)	.000
	N	260
b9	Correlation Coefficient	-.059
	Sig. (2-tailed)	.347
	N	260
b10	Correlation Coefficient	-.084
	Sig. (2-tailed)	.176
	N	260
b11	Correlation Coefficient	.025
	Sig. (2-tailed)	.688
	N	260
b12	Correlation Coefficient	.256**
	Sig. (2-tailed)	.000
	N	259
b13	Correlation Coefficient	.155*
	Sig. (2-tailed)	.012
	N	260
b14	Correlation Coefficient	-.002
	Sig. (2-tailed)	.985
	N	61
b15	Correlation Coefficient	.075
	Sig. (2-tailed)	.565
	N	61
b16	Correlation Coefficient	-.049
	Sig. (2-tailed)	.705
	N	61
b17	Correlation Coefficient	-.017
	Sig. (2-tailed)	.896
	N	61
b18	Correlation Coefficient	.200**
	Sig. (2-tailed)	.001
	N	260
**. Correlation is significant at the 0.01 level (2-tailed).		
*. Correlation is significant at the 0.05 level (2-tailed).		

Table 5.31 reveals that out of 18 items on Computer Self-Efficacy majority 11 items were insignificant while only 7 items were significant.

5.5 Testing of Hypotheses

In order to answer the stated hypotheses, the following hypothesis was tested:

Hypothesis One

H_0: University management support had no significant effect on Cloud computing adoption among Students and Staff of Nigeria University

H_1: University management support had a significant effect on Cloud computing adoption among Students and Staff of Nigeria University

This testing of the stated hypothesis is presented in Table 5.32.

Table 5.32: Summary table of University management support on cloud computing adoption among Students and Staff of Nigeria University

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.530	.080		31.745	.000
	University management support	.534	.035	.718	15.245	.000
a. Cloud computing adoption among Students and Staff of Nigeria University						

Table 5.32 reveals the contribution of the independent variables to the dependent variable expressed as beta weights. Using the regression coefficients to determine the relative contributions of the independent variables to the explanation of the dependent variable, the positive value of university management support ($\beta = 0.534$, $t = 15.245$, $P < 0.05$), has a relative contribution to the Cloud computing adoption among Students and Staff of Nigeria University. In a nutshell, University management support has a relatively significant effect on Cloud computing adoption among Students and Staff of Nigeria University.

The outcome of this study which held the view that University management support has a relative contribution to Cloud computing adoption among Students and Staff of Nigeria University supports the view of Abdullah, Nur& Zahurin, (2020) who opined that both the government and management and school authority support are the main factors that influence cloud computing adoption in higher education institutions of least developed countries like that

of Republic of Yemen.The outcome of the study is also in tandem with the work of Abdul-Noor, (2019) who equally held the view that school authority support is the kernel of the Cloud computing adoption model in higher education institutions in Yemen, this result equally aligned with the work of Ahmed, (2020) whose findings shows that Organizational support and enabling Technology organization environment inTelkomnika influences effective cloud computing adoption.

Hypothesis Two

H_0: Staff/Student cooperation with peers and cloud providers on cloud computing adoption had no significant effect on Cloud computing adoption among Students and Staff of Nigeria University

H_1: Staff/Student cooperation with peers and cloud providers on cloud computing adoption had a significant effect on Cloud computing adoption among Students and Staff of Nigeria University

Table 5.33: Summary table ofStaff/Student cooperation with peers and cloud providers on cloud computing adoption among Students and Staff of Nigeria University

Model	Sum of Squares	Df	Mean Square	R	R Square	F	Sig
Regression	50.747	1	50.747	.718	.516	232.425	.000[a]
Residual	47.598	258	.218				
Total	98.345	259					

Table 5.33 were used to test for the significance of the relationship using Regression ANOVA which produced ($F_{value} = 232.425 > F_{tab} = 3.89; P < 0.05$). Since F-value is greater than F-tabulated and P-value (0.000) was less than 0.05 alpha levels, this implies that there is no evidence for the acceptance of H_0 (i.e. H_0 is rejected). The result indicates that there is a significant effect of Staff/Student cooperation with peers and cloud providers on cloud computing adoption among Students and Staff of Nigeria University.

Also, it can be deduced from the table the degree of relationship between Staff/Student cooperation with peers and cloud providers on cloud computing adoption among Students and

Staff of Nigeria University with correlation coefficient R=0.718. This indicates that there was a strong positive relationship between the independent variables and dependent variable. R-square is used to know the degree of the effectiveness of Staff/Student cooperation with peers and cloud providers on cloud computing adoption among Students and Staff of Nigeria University is equal to 0.516. Therefore Staff/Student cooperation with peers and cloud providers contributed 51.6% delivery that is; loan provision and utilization has 51.6% effect on cloud computing adoption among Students and Staff of Nigeria University. The other variations accounting for the remaining 48.4% can be explained by other factors which cannot be known by this study.

The findings of this study that indicate that there is a significant effect of Staff/Student cooperation with peers and cloud providers on cloud computing adoption among Students and Staff of Nigeria University is in conformity with the work of AlAlaa, & Ibrahim, (2015), whose study highlighted the fact that synergy and cooperation among the major school actors like the staff, students, peers, ICT and cloud providers is the main factors that influence Cloud computing adoption by higher education institutions in Saudi Arabia. Also, the outcome of this research supports the view of Alamoudi & Alamoudi, (2016) whose opinion centred on cooperation among staff and students in the adoption of Cloud computing

Hypothesis Three

H_0: Student/Staff creativity and know-how had no significant effect on Cloud computing adoption among Students and Staff of Nigeria University

H_1: Student/Staff creativity and know-how had a significant effect on cloud computing adoption among Students and Staff of Nigeria University

Table 5.34: Correlation between Student/Staff creativity and know-how and Cloud computing adoption in Nigeria University

Variables	$\overline{X}$	S.D	R	P	Remark
Cloud computing adoption in Nigeria University	808852.6	188231.278			
Student/Staff creativity and know how	99555555.5	141998090.753	.408	0.276	Not sig

Correlation Significant at *P<0.05 level.

The table 5.34 showed (r) that there is no significant relationship betweenStudent/Staff creativity and know-how and Cloud computing adoption in Nigeria University at (r=0.408,

P>0.05). Shows that P was greater than 0.05 level of significance. Therefore,the hypothesis was accepted that is, there is no significant relationship between Student/Staff creativity and know-how and Cloud computing adoption at Nigeria University.

In conclusion, the analysis early on it shows that Student/Staff creativity and know-how do not justify the interest of staff and students in Cloud computing adoption at Nigeria University.

The reason for this no significant relationship between Student/Staff creativity and know-how and Cloud computing adoption in Nigeria University may be a result of the fact that in spite of the abundance of skills, technical know-how and creative minds possessed by the students and staff of Nigeria University if the enabling environment, organizational, managerial factor does not support the use of cloud technological factor such skills, technical know-how and creative mind possessed by the students and staffs will materialize to nothing to the extent that such technical known how will not be able to actualize the intention of influencing cloud computing adoption among students and staff in Nigeria higher institution.

The outcome of this study that there is no significant relationship between Student/Staff creativity and know-how and Cloud computing adoption in Nigeria University is variant with the work of Alenezi, (2019) who suggested that staff and student technological awareness, innovation, creative skills and resourcefulness is the leading factors that shape cloud computing enhancement and adoption in teaching and learning in Saudi Arabian universities. Equally, the result negates the work of Ali, Wood-Harper & Mohamad (2018) who perceived the need for creativity and technological know-how by staff and students in the adoption of cloud computing adoption and usage in higher education.

Hypothesis Four

H_0: Student/Staff accessibility to current and updated information had no significant effect on Cloud computing adoption among Students and Staff of Nigeria University

H_1: Student/Staff accessibility to current and updated information had a significant effect on Cloud computing adoption among Students and Staff of Nigeria University

Model Summary

Model	R	R. Square	Adjusted R. Square	Std. Error of the Estimate
1	.921[a]	.849	.841	572.303

a. Predictors: (Constant), Student/Staff accessibility to current and updated information

Coefficients[a]

Table 5.35: Summary table of Student/Staff accessibility to current and updated information on Cloud computing adoption among Students and Staff of Nigeria University

Model	Unstandarlized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
1 Predicator: Student/Staff accessibility to current and updated information	-69.574	162.933		-.427	.674
	.902	.087	.921	10.326	.000

Predicators: Student/Staff accessibility to current and updated information

Dependent variable: Cloud computing adoption among Students and Staff of Nigeria University

As shown in table 5.35, r = 0.921, r^2 = 0.849, r^2 = 0.849 x 100 = 84.9% (coefficient of determination). Therefore, we reject the hypothesis that the Cloud computing adoption among Students and Staff of Nigeria University is not a function of the Student/Staff accessibility to current and updated information. The coefficient of determination (84.9%) shows that 84.9% of the variation in the Cloud computing adoption among Students and Staff of Nigeria University was accounted for by Student/Staff accessibility to current and updated information.

The result of this hypothesis that Student/Staff accessibility to current and updated information had a significant effect on Cloud computing adoption among Students and Staff of Nigeria Universitynegates the study of Ali, Soar & Yong, (2016) who perceived current and updated information as well as communication and funding as a bane and major challenges that have implication on Cloud computing adoption in Australian regional municipal governments. However, the results support the work of Baki, Birgoren, & Aktepe, (2018) who rated updated information as chief factor that influences cloud adoption among distance learning students in Turkey.

Hypothesis Five

H_0: Student/Staff experience and expertise with cloud computing had no significant effect on Cloud computing adoption among Students and Staff of Nigeria University

H_1: Student/Staff experience and expertise with cloud computing had a significant effect on Cloud computing adoption among Students and Staff of Nigeria University

Table 5.36: Composite contribution of Student/Staff experience and expertise with cloud computing on Cloud computing adoption among Students and Staff of Nigeria University

Source of variation	Sum of squares	Df	Mean squares	F	Sig.	Remarks
Regression	635.124	3	211.708	13.997	.000[a]	Reject H_O
Residual	17152.089	256	15.125			
Total	17787.213	259				

Multiple R = 0.189[a]
R-Square = 0.36
Adjusted R-Square = 0.33
Standard Error = 3.88913

Predictors: Student/Staff experience and expertise with cloud computing

Dependent Variable: Cloud computing adoption among Students and Staff of Nigeria University. (Constant)

Table 5.36 revealed significant combined contribution of the independent variables; Student/Staff experience and expertise with cloud computing to the prediction of the dependent variable, Cloud computing adoption among Students and Staff of Nigeria University. ($F_{3,1137}$ = 13.997; $p < .05$). This means that Student/Staff experience and expertise with cloud computing had a significant effect on Cloud computing adoption among Students and Staff of Nigeria University. The analysis also yielded a co-efficient of multiple regression of 0.189[a] and multiple R-square of 0.36 and adjusted R-square = 0.33 indicating that all the independent variables (Student/Staff experience and expertise as well as knowledge) accounted for 33.0 % of the Cloud computing adoption among Students and Staff of Nigeria University.

The null hypothesis which stated that Student/Staff experience and expertise with cloud computing had no significant effect on Cloud computing adoption among Students and Staff of Nigeria University is therefore rejected.

The outcome of this hypothesis that Student/Staff experience and expertise with cloud computing had a significant effect on Cloud computing adoption among Students and Staff of Nigeria University is consonance with the study of Basahel, Yamin & Drijan, (2016) who held the view that workers experience, expertise, skillfulness and capability do influence cloud computing adoption for small and medium enterprises in Saudi Arabia. The study also conform with the work of Charles, Emily& Catherine, (2021) who listed virtuosity, ability, proficiencies and competencies as critical success factors for adoption of Cloud computing in public universities in Kenya.

Hypothesis Six

H_0: Perceived University benefit had no significant effect on Cloud computing adoption among Students and Staff of Nigeria University

H_1: Perceived University benefit had a significant effect on Cloud computing adoption among Students and Staff of Nigeria University

Table 5.37: Relative contribution of perceived university benefit on Cloud computing adoption among Students and Staff of Nigeria University

Variables	B	SEB	Brta	T	P	Remark
Cloud computing adoption among Students and Staff of Nigeria University	54.891	2.270		24.183	.000	
Perceived University benefit	.094	.036	.078	2.626	.009	Sig

Table 5.37 revealed the relative contribution of independent variables to the prediction of the dependent variable Cloud computing adoption among Students and Staff of Nigeria University. Perceived University benefit (Beta = .078; t = 2.626; p < .05) This data implied that Perceived University benefit had a significant effect on Cloud computing adoption among Students and Staff of Nigeria University.

The outcome of this study that Perceived University benefit had a significant effect on Cloud computing adoption among Students and Staff of Nigeria University is in line with the work of Dahunsi & Owoseni, (2015) who opined that Cloud computing in Nigeria had several benefits such as cost reduction, ease of operation, interconnectivity, pay as you go, make work and study faster among others. The result also in line with the work of Fathali, & Okada, (2018) in their study on Technology acceptance model in technology-enhanced OCLL contexts that identified that the benefit of cloud computing outweigh its demerit in solving day to day problem.

Hypothesis Seven

H_0: Operation cost reduction had no significant effect on Cloud computing adoption among Students and Staff of Nigeria University

H_1: Operation cost reduction had a significant effect on Cloud computing adoption among Students and Staff of Nigeria University

Table 5.38: Relative contribution of operation cost reduction on Cloud computing adoption among Students and Staff of Nigeria University

Variables	B	SEB	Brta	T	P	Remark
Cloud computing adoption among Students and Staff of Nigeria University	58.454	3.123		22.207	.000	
Operation cost reduction	.172	.033	.119	5.156	.000	Significant

Table 5.38 revealed the relative contribution of each of the independent variables to the prediction of the dependent variable Cloud computing adoption among Students and Staff of Nigeria University. Operation cost reduction i.e. cloud computing save cost (Beta = .119; t = 5.156; $p < 0.05$), this shows that the null hypothesis that states that Operation cost reduction had no significant effect on Cloud computing adoption among Students and Staff of Nigeria University is being rejected whereas the alternative hypothesis that states that Operation cost reduction had a significant effect on Cloud computing adoption among Students and Staff of Nigeria University is being accepted.

The outcome of this hypothesis that states that Operation cost reduction had a significant effect on Cloud computing adoption among Students and Staff of Nigeria University is in line with

the work ofGital & Zambuk, (2011) who held the view that Cloud computing technology is : Solution to ICT in higher education in Nigeria by reducing operational cost, reduction of overall cost in the running of higher institution and cheap to adopt by students.

Hypothesis Eight

H_0: Perceived privacy and security of information had no significant effect on Cloud computing adoption among Students and Staff of Nigeria University

H_1: Perceived privacy and security of information had a significant effect on Cloud computing adoption among Students and Staff of Nigeria University

Table 5.39: Relative contribution of perceived privacy and security information on Cloud computing adoption among Students and Staff of Nigeria University

Variables	B	SEB	Brta	T	P	Remark
Cloud computing adoption among Students and Staff of Nigeria University	56.348	1.984		28.752	.000	
Perceived privacy and security of information	.043	.023	.043	1.869	.026	Significant

Table 5.39 revealed the relative contribution of each of the independent variables to the prediction of the dependent variable Cloud computing adoption among Students and Staff of Nigeria University. Perceived privacy and security of information i.e. information or data on cloud computing would be saved and secured (Beta = .043; t = 1.869; $p < 0.05$). This signified a significant relationship that is the null hypothesis that states that Perceived privacy and security of information had no significant effect on Cloud computing adoption among Students and Staff of Nigeria University is being rejected whereas the alternative hypothesis that states that perceived privacy and security of information had a significant effect on Cloud computing adoption among Students and Staff of Nigeria University is being accepted.

The study result on Perceived privacy and security of information had a significant effect on Cloud computing adoption among Students and Staff of Nigeria University support the work of Hallova, Polakovič, Šilerova, & Slovakova, (2019) who in their findings perceived that cloud computing provided forum for Data protection and security in SMEs under enterprise

infrastructure, they also opined that there is perceived privacy provided by cloud computing technology among SMEs under enterprise infrastructure .

Hypothesis Nine

H_0: Triability/experiment by students and staff of cloud computing had no significant effect on Cloud computing adoption among Students and Staff of Nigeria University

H_1: Triability/experiment by students and staff of cloud computing had a significant effect on Cloud computing adoption among Students and Staff of Nigeria University

Table 5.40: Relative contribution of Triability/experiment by students and staff of cloud computingon Cloud computing adoption among Students and Staff of Nigeria University

Variables	B	SEB	Brta	T	P	Remark
Cloud computing adoption among Students and Staff of Nigeria University	53.986	2.642		28.370	.000	
Triability/experiment by students and staff of cloud computing	.092	.018	.180	4.978	.000	Significant

Table 5.40 revealed the relative contribution of each of the independent variables to the prediction of the dependent variable Cloud computing adoption among Students and Staff of Nigeria University. Triability/experiment by students and staff of cloud computing i.e continuous and persistence practice of cloud computing technology within and outside the university environment (Beta = .180; t = 4.978; $p < 0.05$), This signified a significant relationship that is the null hypothesis that states that Triability/experiment by students and staff of cloud computing had no significant effect on Cloud computing adoption among Students and Staff of Nigeria University is being disregarded whereas the alternative hypothesis that states that Triability/experiment by students and staff of cloud computing had a significant effect on Cloud computing adoption among Students and Staff of Nigeria University is being sustained.

The outcome of this hypothesis that states that Triability/experiment by students and staff of cloud computing had a significant effect on Cloud computing adoption among Students and Staff of Nigeria University is being supported by the study of Hsu & Lin, (2016) in their study

on Exploring factors affecting the adoption of Internet of things services where they opined that persistence experiment by staff and workers on the use of computing technology enhances the adoption and utilization of the technology in their respective companies.

Hypothesis Ten

Ho1: There is no significant joint and relative effect of Computer Self-Efficiency (CSE) and Subjective Norms (SN) on user background of cloud technology in higher education in Nigeria.

Hi : There is significant joint and relative effect of Computer Self-Efficiency (CSE) and Subjective Norms (SN) on user background of cloud technology in higher education in Nigeria was analysed by multiple regression and presented in table 5.41.

Table 5.41: Summary of multiple regression analysis showing the joint and independent effect of Computer Self-Efficiency (CSE) and Subjective Norms (SN) on user background of cloud technology in higher education in Nigeria

Variables	β	T	P	R	R^2	Ad R^2	F	P
Computer Self-Efficiency (CSE)	.53	10.74	<.05					
Subjective Norms (SN)	.31	6.30	<.05					
				.60	.36	.35	72.15	<.05

Dependent Variable: User background of cloud technology

From the results from Table 5.41, Computer Self-Efficiency (CSE) and Subjective Norms (SN) significantly jointly predict user background of cloud technology in higher education in Nigeria(R^2 = .36; F (2/260) = 72.15 p < .05). This mean that Computer Self-Efficiency (CSE) and Subjective Norms (SN) had 35% of the variance observed in user background of cloud technology in higher education in Nigeria, other factors not captured in this contributed much more on user background of cloud technology. Further results from Table 5.37 shows that Computer Self-Efficiency (CSE) (β = .53; t = 10.74; p < .05), and Subjective Norms (SN)(β= .31; t = 6.30; p < .0%) had significant independent influence on user background of cloud technology.

This result corroborate the view of African scene, using multiple regression model, Charles, Emily and Catherine (2021) assess the critical success factors of cloud computing in public universities in Kenya. The study reveals that factors like management support, technical support and users' preparedness are key variables contributing to the critical success of cloud computing adoption in universities in Kenya.

The result also supports the finding of Mohamed, Elesanmi and Bushra (2019) conducted a quantitative study of the factors that affect cloud computing adoption in higher education institutions: A case study of Somali higher education institutions. The study utilized descriptive statistics and a linear regression model to find that, the number of independent variables like the technological factors, organizational factors and environmental factors as independent variables is significantly related and impact on cloud computing technology adoption in higher education institutionsSomalia.

In this study, the following related equations are developed to propose prior expectations on the dependent and independent variables: Regression Model of Computer Self-Efficiency (CSE) and Subjective Norms (SN) on user background of cloud technology in higher education in Nigeria

$Y= \beta_0+ \beta_{x1}+ \beta_{x2}$
Where Y (Cloud technology (CT)is measured by:
X (Computer Self-Efficiency (CSE) is measured by:
X1= External Pressure (EP)
X2= Subjective Norms (SN)
The prior expectations of this study is that X1, X2,(Computer Self-Efficiency (CSE) and Subjective Norms (SN)) are expected to have a relationship with Y1, (Cloud technology in higher education.

Hypothesis Eleven

Ho: There is no significant joint and relative effect of Perceived Innovation (PI), Perceived Usefulness (PU), Perceived Easiness (PE), Attitude toward Technology (ATT), and Perceived Reliability (PR) on Perception of cloud technology in higher education in Nigeria.

Hi: There is significant joint and relative effect of Perceived Innovation (PI), Perceived Usefulness (PU), Perceived Easiness (PE), Attitude toward Technology (ATT), and Perceived

Reliability (PR) on Perception of cloud technology in higher education in Nigeria. This was tested with a multiple regression analysis as shown in table 5.42.

Table 5.42: Summary of multiple regression analysis showing the joint and independent effect of Perceived Innovation (PI), Perceived Usefulness (PU), Perceived Easiness (PE), Attitude toward Technology (ATT), and Perceived Reliability (PR) on Perception of cloud technology in higher education in Nigeria

Variables	β	t	P	R	R^2	Ad R^2	F	P
Perceived Innovation (PI)	.21	2.64	<.05					
Perceived Usefulness (PU)	.18	1.61	<.05					
Perceived Easiness (PE)	.36	4.71	<.05					
Attitude toward Technology (ATT)	.19	1.98	<.05					
Perceived Reliability (PR)	.23	3.63	<.05					
				.27	.07	.05	4.19	<.05

Dependent Variable: Perception of cloud technology

From the results from Table 5.42, Perceived Innovation (PI), Perceived Usefulness (PU), Perceived Easiness (PE), Attitude toward Technology (ATT), and Perceived Reliability (PR) significantly jointly predict Perception of cloud technology in higher education in Nigeria(R^2 = .07; F (5/260) = 4.190 p < .05). This mean that Perceived Innovation (PI), Perceived Usefulness (PU), Perceived Easiness (PE), Attitude toward Technology (ATT), and Perceived Reliability (PR) had 5% of the variance observed in Perception of cloud technology in higher education in Nigeria, other factors not captured in this contributed much more on user background of cloud technology. Further results from Table 5.39 shows that Perceived Easiness (PE) (β = .36; t = 4.71; p < .05), Perceived Reliability (PR) (β = .23; t = 3.63; p < .05), Perceived Innovation (PI) (β = .21; t = 2.64; p < .05), Attitude toward Technology (ATT) (β = .19; t = 1.98; p < .05),and Perceived Usefulness (PU)(β = .18; t = 1.61; p < .0%) had significant independent influence on Perception of cloud technology in higher education in Nigeria.

This result supports the view of combining both qualitative and quantitative research methods, Makoza (2015) evaluate the Cloud computing adoption in Higher Education Institutions of Malawi. The study used inferential statistics as a tool of analysis to reveal that, because HEIs are still at early stage of adopting cloud computing, variables like top management support,

potential security risks and inadequate legal frameworks poses challenges on the adoption of cloud computing technology by HEIs.

Narrowing to Nigeria, Imran, Ismail and Kazeem (2020) investigated the use of cloud computing technology for effective administration of universities in Nigeria. The study utilized descriptive and inferential statistics as the tools of analysis to reveal that, in line with the principle of SWOT analysis, there are concerns and challenges that impedes the adoption of cloud computing technology. However, there are massive benefits Nigerian universities stand to gets from adoption of cloud computing when the challenging factors that impedes the adoption of cloud computing technology in Nigerian universities are mitigated.

In this study, the following relating equations are developed to propose prior of expectation on the dependent and independent variables: Regression Model of Perceived Innovation (PI), Perceived Usefulness (PU), Perceived Easiness (PE), Attitude toward Technology (ATT), and Perceived Reliability (PR) on Perception of cloud technology in higher education in Nigeria

$Y= \beta_0+ \beta_{x1}+ \beta_{x2}+ \beta_{x3}+ \beta_{x4}$

Where Y (Cloud technology (CT) is measured by:

X (Perceived Innovation (PI) is measured by:

X1= Perceived Usefulness (PU)

X2= Perceived Easiness (PE)

X3= Attitude toward Technology (ATT)

X4= Perceived Reliability (PR)

The prior expectations of this study is that X1, X2, X3 , X4 (Perceived Innovation (PI), Perceived Usefulness (PU), Perceived Easiness (PE), Attitude toward Technology (ATT), and Perceived Reliability (PR) are expected to have a relationship with Y1, (Cloud technology in higher education.

Hypothesis Twelve

Ho: There is no significant joint and relative effect of Organisation Characteristics (OC), External Pressure (EP), External Support (ES) and Social Influence (SI) on External Factors in assessing cloud technology in higher education in Nigeria.

Hi : There is significant joint and relative effect of Organisation Characteristics (OC), External Pressure (EP), External Support (ES) and Social Influence (SI) on External Factors in assessing

cloud technology in higher education in Nigeria. This was tested with a multiple regression analysis as shown in table 5.43.

Table 5.43: Summary of multiple regression analysis showing the joint and independent effect of Organisation Characteristics (OC), External Pressure (EP), External Support (ES) and Social Influence (SI) on External Factors of cloud technology in higher education in Nigeria

Variables	β	T	P	R	R^2	Ad R^2	F	P
Organisation Characteristics(OC)	.20	3.42	<.05					
External Pressure (EP)	-.30	-4.87	<.05					
External Support (ES)	.17	2.81	<.05					
Social Influence (SI)	-.06	-.97	>.05					
				.36	.13	.11	9.71	<.05

Dependent Variable: User background of cloud technology

From the results from Table 5.43, Organisation Characteristics (OC), External Pressure (EP), External Support (ES) and Social Influence (SI) on External Factors of cloud technology in higher education in Nigeria(R^2 = .36; F (2,260) = 72.15 p < .05). This mean that Characteristics (OC), External Pressure (EP), External Support (ES) and Social Influence (SI) on External Factors had 35% of the variance observed in user background of cloud technology in higher education in Nigeria, other factors not captured in this contributed much more on user background of cloud technology. Further results from Table 6.38 shows that Computer Self-Efficiency (CSE) (β = .53; t = 10.74; p < .05), and Subjective Norms (SN) had significant independent influence (β = .31; t = 6.30; p < .0%) on user background of cloud technology.

This result supports the view of Pathak and Sudhir (2018) further investigated the factors affecting the adoption of cloud computing technology in educational institutions in Chandigarh. They argued that despites the mammoth promising advantages of cloud computing for been the latest asset of IT for various organisation. Evidence from the statistical test outcome of the research indicated that adopting cloud computing in Chandigarh is affected by "support and integration of institution services with cloud computing and top management tendency to support cloud computing adoption". In 2016, Appiahene, Yaw, and Bombie evaluated the cloud computing technology model for teaching and learning of information and

communication technology. It was reported that the adoption of cloud computing has eliminated the existed boundary to student learning, while allowing adopters of the technology to access work anywhere, anytime, and share. With this juicy merit, this research work will implement the comprehensive technology readiness adoption model (CTRAM) in higher education in Nigeria.

In this study, the following relating equations are developed to propose prior of expectation on the dependent and independent variables: Regression Model of Organisation Characteristics (OC), External Pressure (EP), External Support (ES) and Social Influence (SI) on External Factors in assessing cloud technology in higher education in Nigeria

$Y= \beta_0+ \beta_{x1}+ \beta_{x2}+ \beta_{x3}$

Where Y (Cloud technology (CT) is measured by:

X = Organisation Characteristics (OC) is measured by:

X1= External Pressure (EP)

X2= External Support (ES)

X3= Social Influence (SI)

The prior expectations of this study is that X1, X2, X3, (Organisation Characteristics (OC), External Pressure (EP), External Support (ES) and Social Influence (SI) on External Factors in assessing cloud technology in higher education in Nigeria.

Hypothesis Thirteen

Ho: There is no significant difference in the influence exerted by male and female on user background of cloud technology in higher education in Nigeria.

Hi : There is significant difference in the influence exerted by male and female on user background of cloud technology in higher education in Nigeria, This was tested with a t-test analysis as shown in table 5.44.

Table 5.44: T-test of difference in the influence exerted by male and female on user background of cloud technology in higher education in Nigeria

Variable	Gender	N	Mean	SD	df.	t-Cal	t-Crit	P
User background of cloud technology	Male	189	14.01	1.66	258	2.951	1.960	0.021 (p<0.05) It Significant
	Female	715	16.45	1.50				
	Total	260						

Table 5.44 revealed that there is significant difference in the influence exerted by male and female on user background of cloud technology in higher education in Nigeria. It was observed that the t-Calculated value was greater than t-Critical values (t-Cal= 2.951 > t-Crit =1.960), (P<0.05). There was a significant difference. Also the mean difference shows that female has high mean value of 16.45 than male mean value of 14.01. Therefore it was concluded that, there is significant difference in the influence exerted by male and female on user background of cloud technology in higher education in Nigeria.

This result supports the view of Venkatesh et al. (2003) who found that Gender and voluntariness of use are suggested to moderate the impact of the four key hypotheses on usage intention and usage behaviour, of UTAUT in a longitudinal study found it to account for 70% of the variance in Behavioural Intention to Use (BI) and about 50% in actual use (Venkatesh et al, 2003). This is a technology acceptance model postulated by Venkatesh, Morris, Davis and Davis in 2003. This theory (UTAUT) is formulated to explain gender user intentions to utilises an information system and subsequent usage behaviour. And the theory holds that, there are four key constructs embedded in the theory, namely: performance expectancy, effort expectancy, social influence and enabling conditions (Koivimäki, Ristola & Kesti, 2007).

Hypothesis Fourteen

Ho: There is no significant influence of education level on external factor of cloud technology in higher education in Nigeria

Hi: There is significant influence of education level on external factor of cloud technology in higher education in Nigeria. This was tested with a ANOVA analysis as shown in table 5.45

Table 5.45: Summary of ANOVA of education level on external factor of cloud technology in higher education in Nigeria

Education level	N	Mean	Std Dev	Sum of Square	df.	Mean Square	F	p.(Sig)
Doctorate	19	17.16	2.11	28.823	2	14.411	5.510	0.005
Master's Degree	66	15.80	1.36	672.143	260	2.615		significant
Bachelor's Degree	175	15.93	1.64	700.965	259			
Total	260							

Table 5.45 present the ANOVA analysis showed that there was significant influence of education level on external factor of cloud technology in higher education in Nigeria. The result revealed three differences means values of education level. The mean scores of doctorate education has mean value of 17.16, follow by Bachelors' Degree education means of 15.93, and Master degree education has mean of 15.80. Therefore, it can be concluded that there was significant influence of education level on external factor of cloud technology (F value (2/260)= 5.510, Pro=0.005 < 0.05). That is, there is significant influence of education level on external factor of cloud technology in higher education in Nigeria.

This result correlate the view of Welch, Alade and Nichol (2020) utilized UTAUT model to investigate the contributing external factors to Mobile learning adoption among 118 museum staff in England. Also just like Curtis et al. (2010) averred that, UTAUT had not before been applied to the use of just-in-time knowledge interventions to the development of technological knowledge within the museum sector. They found that UTAUT was helpful in elucidating the determinants of mobile learning adoption (Welch et al, 2020).

Hypothesis Fifteen

Ho: There is no significant influence of age groups on user background of cloud technology in higher education in Nigeria

Hi: There is significant influence of age groups on user background of cloud technology in higher education in Nigeria, This was tested with a ANOVA analysis as shown in table 5.46

Table 5.46: Summary of ANOVA of age groups on user background of cloud technology in higher education in Nigeria

Age group	N	Mean	Std Dev	Sum of Square	df.	Mean Square	F	p.(Sig)
18 to 25yrs	146	15.95	1.67	24.528	3	8.176	2.798	0.041
26 to 35yrs	41	16.49	1.45	748.007	256	2.922		
36 to 45 yrs	49	16.12	1.77	772.535	259			
46 to 55 yrs	24	16.92	2.14					
Total	260							

Table 5.46 present the ANOVA analysis showed that there is significant influence of age groups on user background of cloud technology in higher education in Nigeria. The result revealed four differences means values of age group. The mean scores of age range of 46 to 55 yrs has mean of 16.92, follow by age range of 26 to 35yrs means of 16.49, age range of 36 to 45yrs means of 16.12 and age range of 18 to 25yrs means of 15.95.

Therefore, it can be concluded that there is significant influence of age groups on user background of cloud technology (F value (3/256) = 2.798, Pro=0.041 < 0.05). That is, there is significant influence of age groups on user background of cloud technology in higher education in Nigeria.

This result support the finding of Eckhardt, Laumer, and Weitzel (2009) are in their view postulates that, age, experience, and voluntariness of use are suggested to moderate the impact of the four key hypotheses on usage intention and usage behaviour. The theory was advanced through a review and merging of the hypotheses of eight models that earlier research had employed to explain information systems usage behaviour and these right models includes: theory of reasoned action, technology acceptance model, motivational model, theory of planned behaviour, a combined theory of planned behaviour/technology acceptance model, model of personal computer use, diffusion of innovations theory, and social cognitive theory).

Hypothesis Sixteen

Ho :: There is no significant relative contribution ofIndividual Factors, Technological Factors and External Factors to cloud computing adoption in Nigeria Higher Institution.

H_1 :: There is a significant relative contribution ofIndividual Factors, Technological Factors and External Factors to cloud computing adoption in Nigeria Higher Institution.

Table 5.47: Relative contributions ofIndividual Factors, Technological Factors and External Factors to cloud computing adoption among students and staff in Nigeria Higher Institution

Independent Variables	B	Std. error	Beta	T	P	Remark
(Constant) Cloud computing adoption in Nigeria Higher Institution	45.994	4.115		11.177	0.000	
Individual factor	.320	.087	.122	3.701	0.000	Sig
Technological factor	.236	.061	.248	7.538	0.000	Sig
External factor	.189	.038	.369	9.235	0.000	Sig

a. Dependent Variable: cloud computing adoption among students and staff in Nigeria Higher Institution

Table 5.47 revealed the relative contribution of each of the independent variables as determinants of the dependent variable (cloud computing adoption in Nigeria Higher Institution). External factor (Beta = .369; t = 9.235; p < .05) was the most potent determinant out of the three variables (as it entails organizational and managerial factor) closely followed by Technological factor (Beta = .248; t = 7.538; p < .05) which is next in order of potency while individual factor is the third determining factors of cloud adoption in order of potency among students and staff in Nigeria higher institution as (Beta = .122; t = 3.701; p < 0.05). Therefore, the postulated null hypothesis is rejected in favour of the alternative hypothesis. This means that each of the three independent variables, that is, Individual Factors, Technological Factors and External Factors significantly contributed to the determination of cloud computing adoption among students and staff in Nigeria Higher Institution. However external factor is the leading determining factor out of the three factors.

The outcome of the hypothesis pertaining to the dominance of external factor as a leading determining factor in the determination of cloud computing adoption among students and staff in Nigeria Higher Institution is in line with the study of critical success factors for adoption of Cloud computing in public universities in Kenya conducted by Charles, Emily & Catherine,

(2021) where they held the view that out of the three factors determining the adoption of Cloud computing in public universities in Kenya, External factor was ranked first.

5.6 Factor Analysis (Grand Bassa)

Is there any relationship among independents variables of category captures information on external factors via four sub-divisions: organizational characteristics, external pressure, technical support, and social influence?

Table 5.48: Inter-correlation Matrix of independents and dependent variables

Variable	1	2	3	4	5	6
Computer Self-Efficacy	1.000					
SN1 (P value)	.229 .000	1.000				
SN2 (p value)	.053 .142	.780 .000	1.000			
SN3 (p value)	.043 .195	.665 .000	.645 .000	1.000		
SN4 (p-value)	.141 .002	.631 .000	.506 .000	.599 .000	1.000	
SN5 (p-value)	.065 .096	.533 .000	.525 .000	.658 .000	.422 .000	1.000
Mean	**47.13**	**18.04**	**38.66**	**14.35**	**51.69**	**33.55**
Standard Deviation	**12.61**	**3.820**	**6.074**	**2.627**	**8.964**	**6.08**

**Correlation is significant at the 0.01 level (1-tailed).

Table 5.48 showed that: there was a significant relationship among independents variables of category captures information on external factors via four sub-divisions: organizational characteristics, external pressure, technical support, and social influence. That is, N1 ($r = .229$, $N = 1266$, $p < .01$, and N2 ($r = .200$**, $N = 1266$, $p < .01$) has significant with Computer Self-Efficacy while N3 ($r = .043$, $N = 1266$, $p > .01$), and N4 ($r = .065$, $N = 1266$, $p > .01$) has no significant with category captures information. It implies that, there was a relationship among

independents variables of external factors via four sub-divisions: organizational characteristics, external pressure, technical support, and social influence

5.7 Prediction of the tested Hypothesis with the aid of Logistic Regression

The Statistical Package for Social Sciences (SPSS) was used to analyze the collected data. The model was validated by completing a faster analysis after which a logistic regression analysis was employed to test the research hypothesis. This employed method provides the possibility of predicting the factors that are significant in forecasting the cloud computing process adoption.

The construct validity method enables the creation of a set of new variables as well as correlation analysis between items that are highly correlated among or between them, those variables are called factors.

Convergence validity is an essential and integral part of the construct validity which depicts or shows whether there is convergence of all elements that measure one factor. The correlation between each item and their respective construct is determined by factor loading, following the pronouncement of Hair, Black, Babon and Anderson (2010) which stated that any factor loading greater than 0.7 is very good.

The construct validity second stage which requires verification is that of discriminant validity which unravels the difference that exists between the construct with the most appropriate cross-loading search. Cross-loading presence implies that there are weaknesses in the model.

The identification of cross-loading for an item of one construct with that of items of other constructs implies that such respective items do not really measure only in factor but more.

In a way of testing the convergent and discriminant reliability of the model, faster analysis was dispatched to reduce/ lessen the amount as fasten and to discard items with high cross-loadings.

Logistic regression was carried out in a way of testing the hypothesis and also to predict the cloud computing adoption process. The coefficient designates the relative influence / effect/outcome of the construct on that of the dependent variable.

With respect to this study the dependent variable (being an adapting university or non-adopting university of cloud computing) and logistic regression was explained to discriminate the factors that impact cloud computing adopting decision.

Logistic regression was adopted in order to examine/test the stated hypothesis. The dependent variables is the cloud computing adoption within the university settings in Nigeria (marked with Yes or No). The independent variables are the composite values being determined by the factor analysis. Normality tests were equally performed for those new variables and the outcome of the result sows that they are normally distributed.

Upon the completion of the logistic regression, multi-collinearity is an important data property that needs to be studied. In a situation where there is a high correlation between the independent variable and the dependent variables as well as a very low correlation between those of the independent variables, which implies an excellent context.

The most widely accepted method of investigating in determining multi-collinearity of the independent variables are that of variance influence factor (VIF) and that of tolerance, with a big value of tolerance and a smaller level or degree of VIF which implies a desirable lower level of multi-collinearity. As observed by Yos et al (2014). Multi-collinearity is very suitable in model predictability because the presence of that property indicated that the coefficient values were not properly or correctly predicted and resulted in the insignificant nature of the independent variable as opined by Yoo et al., (2014). The recommendations are that of tolerance greater or higher than 0.1 and the VIF lower than that of 10.

The method of decreasing the collinearity negative influence is to discard the items with high multi-colinearity as well as other factors. The adoption and external influence as used on this study recorded a very high level of collinearity which implies that one of the factors must be removed from the model. It was decided due to the external influence to keep the influence of external factors on cloud adoption as a relevant hypothesis.

Table 5.49: Collinearity Results

Independent variable	Collinearity Results	
	Tolerance	VIF
University management support	0.474	4.882
Staff / student cooperation with peers and cloud providers	0.535	4.225
Student creativity and know-how	0.585	5.697
Student/staff accessibility to current and updated information	0.632	8.697
Perceived university benefit	0.668	3.856
Operation cost reduction	0.468	4.225
Perceived privacy and security	0.852	3.883
Triability/experiment y student and staff	0.796	7.586
Student and staff experience with cloud computing	0.953	3.953

Table 5.49 shows the VIF and tolerance of the independent variable. Prior to the conduct of logistic regression, it is important to enquiry on mean for all independent variables in a way of seeing how the data are being spread among the two group of university (public and private) in Nigeria with respect to their adoption or non-adoption of cloud computing. In way of testing the hypothesis so as to assess the decision of implementing the variation of cloud computing by each independent variable among or between the two groups and test the significant the group

Table 5.50: Descriptive statistics up groups in One way ANOVA test

Independent variable	Mean difference between groups	Group means Test of equality	
	(mean adopting university) – (mean non-adopting university	F	Sig.
University management support	0.2496	2.889	0.358
Staff / student cooperation with peers and cloud providers	0.3697	8.019	0.191
Student / staff accessibility to current and updated information	0.1169	1.875	0.685
Student and staff experience with cloud computing	0.8514	38.324	0.110
Perceived university benefit	0.6048	10.675	0.111
Operation cost reduction	0.5382	8.312	0.119
Perceived privacy and security	0.2158	2.866	0.324
Triability/experiment by student and staff	0.2883	3.038	0.468

From table 5.50, it can be inferred that for statistics of interest this is the significance (sig.) the p-value is seen to be smaller than 0.05 for: “Student and staff experience”, “student/staff creativity and knowhow”, “perceived university benefit” and operation cost relation. This can be explained and interpreted that among these stated variables there exist a significant differences between the groups, staff / student co-operation with peers and cloud providers equally have a 90% level of significance. The implication of this is that the stated five variables hold the biggest differences between the groups, which show that the five variables had potential to shape the logistic regression model.

The logistic regression do compute the log likelihood value of all the independent variables with the use of Enter method, while the dependent variable is holding the Yes or No values. In a way of understanding the manner of the dependent variable variation can be explained by the model. (The equivalent of R^2in the multiple regression).

Table 5.51: The Goodness of fit for the researched mode

Step	-2 log Likelihood	Cox and Snell R2	Naglkerke R2
1	11.844	0.619	0.743

Table 5.51clearly shows this. Table 4 presented the summary of the goodness of fit features of the model: the Nagelkerke R square results and the cox and Snell R square results was use in the determination of the explained variation, which is otherwise known as pseudo R^2 values (and compute the lower results than that of those from the multiple regression as being opined by (Engle and Mcfadden, 1994). As stated in the model, the explained variation stated in the dependent variable do span from 53.8% to 66.2% inspite of whether there is reference to Nagelkerke R^2 or Cox and Snell R^2 or not.

Table 5.52: The Homer and Lemeshow test

Step	Chi-square	Sig
1	11.951	0.347

As observed from table 5.52, the application of the interpretative criteria for those values implies the existence of strong characteristics because theoretically R ranges from 0 to 1 with the bigger values implies better model fit. Hosmer and Lemeshow goodness of fit statistic is the second measure of the model fit as observed in Table 5.52, which measures the correspondence between the predicted values and actual values of the dependent variable as observed by Engle and McFadden, 1994. As observed in this study the better model fit exist by a smaller difference in the predicted and observed values with that of a good model fit being shown by a non-significant chi-square value. In this result, the result of Hosmer-Lemeshow clearly /provide evidence that the test is not significant statistically which means that the model is predictive since the P is greater than 0.05 $p > 0.05$.

Table 5.53: Accuracy of the researched model classification

Observed		Predicted		
		Adopted		Percentage correct
		Yes	No	
Adoption	**Yes**	294	50	94.214
	No	30	10	63.184

The method of classification accuracy was employed in evaluating the model's goodness of fit as observed in table 5.53 which noted that 63% of the non-adopting university is predicted accurately as being non-adopting. The number is relatively bigger for adopting university with 94% of the cases being correctly and accurately predicted. The model's classification accuracy is 81.2516, which indicated 81.25% of the cases being predicted accurately by the model by the cloud computing implementation decision.

This is a significant level of prediction accuracy. If the decision with the sample is being settled by random choice (185 non-adopting universities and 199 adopting universities), it equally proceeded from $(185/384)^2 + (199/384)^2$ which accounted to 52.56%. This implies that the logistic regression outcomes had a higher predictive degree level than that of the random choice procedure.

On the basis of the consideration of the results of the three tests, it can be deduced that the goodness of fit of the model is good. The last step to examine the correlation that exists between the dependent variable and that of the independent variables as well as to uncover if there exist any significant rapport between or among the variables.

Table 5.54: Logistic regression result

	B	S.E	Wald	df	Sig.	Exp (B)
University management support	0.364	0.443	1.739	1	0.539	**2.412**
Staff/Student cooperation with peers and cloud providers	1.693	0.524	15.965	1	0.000[x]	**5.926**
Student/Staff creativity and know how	0.702	0.729	1.955	1	0.442	**2.935**
Student/Staff accessibility to current and updated information	0.221	0.679	1.156	1	0.943	**2.239**
Student and Staff experience/expertise with cloud computing	1.961	0.953	6.467	1	0.011[x]	**8.137**
Perceived university benefit	2.453	1.791	2.954	1	0.274	**11.499**
Operation cost reduction	0.585	0.296	7.647	1	0.001[x]	**2.717**
Perceived privacy and security	0.122	0.145	2.597	1	0.859	**2.122**
Triability/experiment by student and Staff	0.167	0.643	1.123	1	0.924	**2.171**
Constant	**0.376**	**1.353**	**1.156**	**1**	**0.942**	**-**

***Correlation is significant at 0.05 level.**

Table 5.54 presented the regression findings which indicated that out of the stated nine (9) independent variables, three (3) of them had very significant relationship with respect to decision to implement cloud computing technology on their universities (the independent variable); student and staff experience/expertise with cloud computing, staff/student co-operation with peers and cloud providers and that of operation cost reduction with that of their afferent hypotheses. From the exponential and original co-efficient, the width and orientation of the correlation can be acknowledged. I made use of Wald test (Wald column) to determine the statistical significance for each of the independent variables, which is found in the 'sig' column with the significant variables of less than 0.05 for the column. From the table 5.58, "student/staff experience and expertise with cloud computing" ($p = 0.011$), "staff/student co-operation cost reduction" recorded ($p = 0.001$) which add significantly to the prediction/model. This implies that these variables had a positive correlation with the cloud computing adoption decision which is shown by the sign of the coefficient B). this shows that cloud computing implementation probability is higher for staff/students with greater level of experience and

expertise on cloud computing, who equally had a better knowledge about cost of operation by cloud computing technology and also those staff/student that can cooperate better with their peers and cloud providers.

This is a logical reason because those with little information and competence regarding any information will raise hesitations about the technology. Also staff and student co-operation and strong relationship with peers and cloud providers equally increases the implementation decision of cloud computing technology adoption. Finally the results shows that university whose their management have the current and updated information about cloud costs as well as the potential decrease in university overall as a result of technological implementation increase their likelihood tendency of cloud computing adoption. Because most of the Nigerian universities do not have enough resources at their disposal of investing resources on new technologies, therefore the management of those universities are trying to document themselves on various means of decreasing the general costs so as to make the correct and valid decision. The student/staff experience/ expertise and know how on cloud computing signified the main factors/components that influence the adoption of cloud computing among Nigerian universities. Nigeria universities can make use of different social networking companies like Twitter, Instagram, LinkedIn and Facebook with the essence of making universities more aware of cloud computing benefit. The main benefit of implementing cloud computing technology is cost reduction among universities and other public institution and to reinforce data security and confidentially in the digital space.

5.8 Chapter Summary

In this chapter, we present the result of data collection and analysis, the result of the descriptive statistics is being displayed in this chapter with respect to individual characteristics, perception of technology and variables for external factors. The Chapter also, provides the correlation analysis of variables within components, the research question were also tested as well as the testing of research hypothesis. The result of Factor Analysis clearly shows that there was a significant relationship among independents variables of category captures information on external factors via four sub-divisions: organizational characteristics, external pressure, technical support, and social influence. This connotes that Social Influence (SI) is inversely associated with External Factors of cloud technology in higher education in Nigeria. The next chapter will present Summary of the thesis, conclusion of the findings, recommendations, limitations of the study and scope of the future work.

The logistic regression findings are grounded on the odds of happening. For instance, for an additional unit increase in student/staff experience and expertise on cloud computing, the odds of cloud computing implementation increased by a factor of 1.860 (B column). The notion of odds ratio do means the probability of non-occurrence of that phenomenon. The value of Exp(B) minus one (1) produce the odds percentage modification.

The findings of the regression analysis shows that student/staff cooperation with peers, student/staff experience and expertise on cloud computing and the "operation cost reduction are statistically significant which confirmed Hypothesis III, VIII, and X. The remaining other hypothesis are not statistically and scientifically significant on the decision of implementing cloud computing in Nigeria University as spelt out by the logistic regression analysis.

The results implied that for students/staffs whose experiment and expertise with different features of cloud computing is higher, which indicated that those staff/student implement cloud computing technology in their respective university.

CONCLUSIONS

6 Chapter Six - Conclusions

6.1 Summary of the Thesis

Technology acceptance and readiness to adopt cloud computing has become a necessity in Nigeria and other developing countries. Despite the clear advantages of increased cloud computing uptake in higher education, it remains at an immature state in developing countries. This thesis had been undertaking in five different Chapters, with Chapter one featuring the introduction aspect of the research, literature review is in Chapter two and proposed framework was presented in chapter three while methodology been covered in Chapter four. The data collection and analysis was presented in Chapter fiveand the final Chapter (Chapter six) presented the summary, conclusion, recommendations, limitations of the study and scope of future work.

6.2 Conclusions of the Findings

The results from this study have contributed to the relative paucity of studies specific to Nigeria in this particular field through the examination of the readiness and acceptability of cloud computing in higher education in the country. The CTRAM model has been proposed by combining several popular models such as DOI, UTAUT, TAM, TR and DF, and was subjected to testing using primary data from 260 respondents representing staff and students across a broad range of higher education institutions across Nigeria.

Reiteration of the proposed model was presented in Figure 3.2. In order to show the final conclusive effectiveness of the model on the basis of the potency of the components (Individual factor, Technological factor and external factor) as shown in the figure 6.1 which revealed the relative contribution of each of the independent variables as determinants of the dependent variable (cloud computing adoption in Nigeria Higher Institution). External factor was the most potent determinant out of the three variables (as it entails organizational and managerial factor) closely followed by Technological factor while individual factor is the third determining factors of cloud adoption in order of potency among students and staff in Nigeria higher institution. Overall, the full model results do provide support for fifteen out of sixteen hypothesis for example hypothesis sixteen confirmed that External factor had the strongest influence on the cloud adoptionamong the staff and student of Nigeria Higher Institution followed by Technological factor and individual factor in that order.

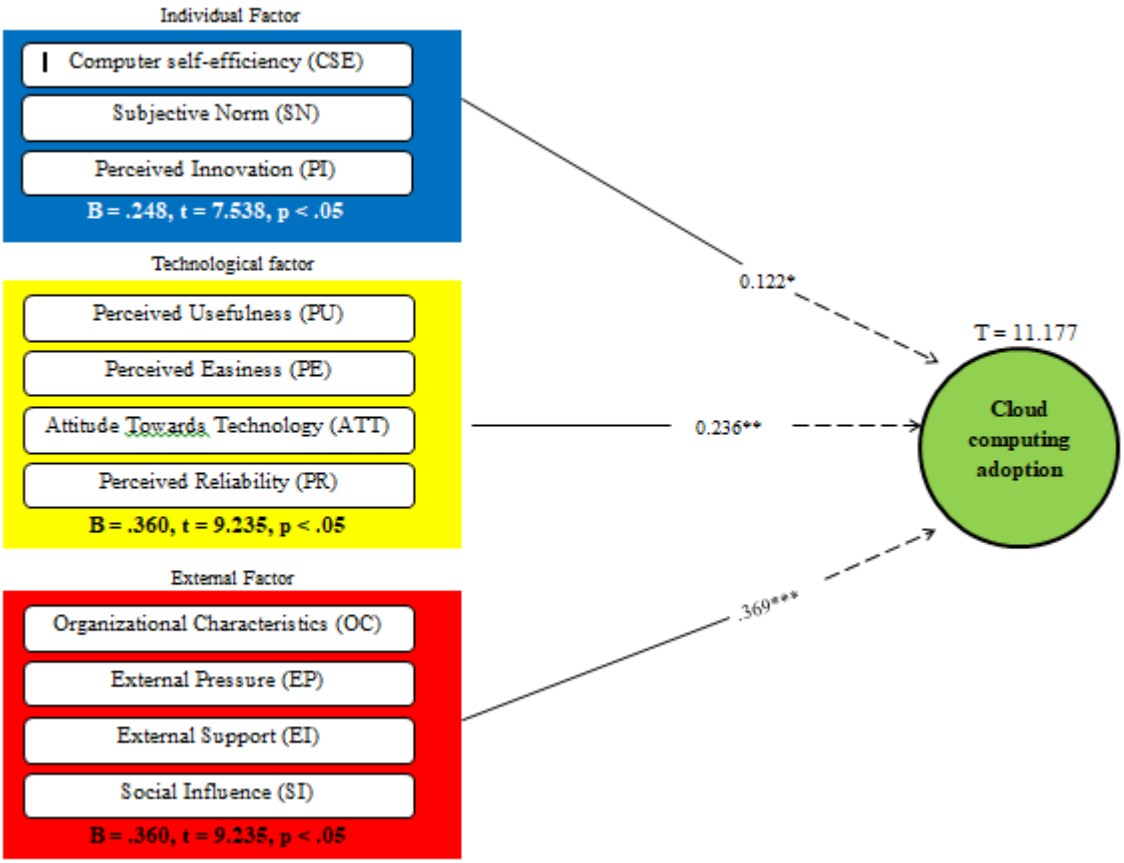


Figure 6.1: Testing for the potency of the model factor

The overall findings from analysis revealed that the perception of cloud computing increases in line with the increase participants' knowledge of the existence of cloud computing. Similarly, the perception of cloud computing also increases in tandem with subject norms. This observation is also consistent for organizational characteristics as an external factor, which was found to explain changes on the feasibility and implementation of cloud computing by 59.1%. Combining the factors for external pressure revealed that it has the potential of inhibiting or creating barriers to the deployment of cloud computing in the Nigerian higher institutions. However, among the external pressure factors, EP4 (representing pressure from the government to teach using digital technology) was found to be a significant motivating factor for the deployment of cloud computing across the country's higher education institutions. This therefore has important implications for the development of ongoing and new policies to encourage and support future uptake.

The CHAID analysis indicated that 54.4 per cent of the Universities in Nigeria have adopted cloud computing while 45.6 per cent have not yet adopted cloud computing. Computer self-

efficiency (CSE4) measured by the frequency of using cloud computingis the most contributing factor to the use/adoption of cloud computing in the CHAID with a Chi-square value of 41.2 at 1% level of significance. The second most contributing factor to the use and adoption of cloud computing following CSE4 is the PI1 (perceived innovation factor). The logistic regression indicates that computer efficiency, subjective norms, perceived innovation, perceived usefulness, attitude towards technology and external pressure are the factors that are enhancing the adoption of cloud computing by the Nigerian public and private Universities.

Each of the stated objectives as highlighted in chapter one were analyzed in the research question analysis as revealed in chapter five of the thesis such as inIndividual Characteristics; The study established that there is positive significant relationship between Computer Self-Efficiency (CSE) and user background of cloud technology in higher education in Nigeria (r (260); = .510**, P=0.000 <.05). This means that Computer Self-Efficiency (CSE) increases, as user background of cloud technology in higher education increases. The study also established that there is positive significant relationship between Subjective Norms (SN) and user background of cloud technology in higher education in Nigeria (r (260); = .269**, P=0.000 <.05) This means that Subjective Norms (SN) increases, as user background of cloud technology in higher education increases.

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With respect toPerception of Technology**,** The study also show there is positive significant relationship between Perceived Innovation (PI) and Perception of cloud technology in higher education in Nigeria (r (260); = .135**, P=0.029 <.05). This means that Perceived Innovation (PI) increases, as Perception of cloud technology in higher education increases.

The study also established that there is positive significant relationship between Perceived Usefulness (PU) and Perception of cloud technology in higher education in Nigeria (r (260); = .135**, P=0.011 <.05). This means that Perceived Usefulness (PU) increases, as Perception of cloud technology in higher education increases. The study also established that there is positive significant relationship between Perceived Easiness (PE) and Perception of cloud technology in higher education in Nigeria (r (260); = .202**, P=0.001 <.05) This means that Perceived Easiness (PE) increases, as Perception of cloud technology in higher education increases.

The study equally established that there is positive significant relationship between Attitude toward Technology (ATT) and Perception of cloud technology in higher education in Nigeria (r (260); = .203**, P=0.001 <.05). This means that Attitude toward Technology (ATT)

increases, as Perception of cloud technology in higher education increases.Equally established by the study is that there is positive significant relationship between Perceived Reliability (PR) and Perception of cloud technology in higher education in Nigeria (r (260); = .238**, P=0.000 <.05), which implies that as Perceived Reliability (PR) increases, as Perception of cloud technology in higher education increases.

As for the External Factors, the study unraveled that there is no significant relationship between Organisation Characteristics (OC) and External Factors for assessing cloud technology in higher education in Nigeria (r (260); = .107, P=0.086 >.05). This means that Organisation Characteristics (OC) decreases, as External Factors for assessing cloud technology in higher education in Nigeria decreases.The study also shows that there is negative significant relationship between External Pressure (EP) and External Factors for assessing cloud technology in higher education in Nigeria (r (260); = -.255**, P=0.000 <.05). This connotes that External Pressure (EP) is inversely associated with External Factors of cloud technology in higher education in Nigeria. It is also established by the study that that there is positive significant relationship between External Support (ES) and External factors for assessing cloud technology in higher education in Nigeria (r (260); = .134**, P=0.031 <.05). This means that External Support (ES) increases, as External factors assessing cloud technology in higher education increases.

Finally the study unraveled that there is negative significant relationship between Social Influence (SI) and External Factors in assessing cloud technology in higher education in Nigeria (r (260); = -.152*, P=0.014 <.05). This connotes that Social Influence (SI) is inversely associated with External Factors of cloud technology in higher education in Nigeria.

Since the outcome of this study confirmed that all the elements of Individual characteristics, technological features and external factors of the CTRAM model had a direct significant relationship on the influence of staff and cloud adoption in Nigeria Universities, which is in line with the findings of previous work conducted on the Individual characteristics, technological factors and external factors influence on cloud computing adoption by other researchers in both developing and developed nations of the world, (Abdullah, Nur and Zahurin, 2020;Omar, Anup, Valmira and Shahnawaz, 2020;Abdul-Noor, 2019;AlAlaa and Ibrahim, 2015;Hakan, 2021; Rehana, 2018 and Baburajan, 2018).

This justified the facts that this study had fully addressed all of the main study aims. Within these conclusions conducted in Nigeria Universities, the outcome of this study can be generalized to other Nigeria higher institutions of learning such as Polytechnic, Colleges of Education and Monotechnic concerning the influence of the CTRAM model on the level of technological perception by students and staffs of such institutions as being done in Nigerian universities by this study. With respect to research hypothesis as stated in chapter one, table 6.1 presents the mapping as being analyzed and discussed in chapter five ,

Table 6.1: Hypothesis Mapping

Hypothesis Statement	Result	Discussion
Hypothesis One	University management support has relative significant effect on the Cloud computing adoption among Students and Staff of Nigeria University	This shows that government, management, Orgarnizational support had influence on cloud computing decision adoption in higher education institutions in Nigeria. The outcome of this hypothesis is in line with little research question three which confirm that all attributes of External Factors including management support have influence on cloud computing adoption in higher education in Nigeria
Hypothesis Two	The result indicates that there is a significant effect of Staff/Student cooperation with peers and cloud providers on cloud computing adoption among Students and Staff of Nigeria University.	The study established that synergy and cooperation among the major school actors like the staff, students, peers, ICT and cloud providers is the main factors that influence Cloud computing adoption by higher education institutions in Nigeria. This hypothesis support the outcome of the third research question which established that External Factors including (Staff/Student cooperation with peers and cloud providers) have influence on cloud computing adoption in higher education in Nigeria
Hypothesis Three	The study unraveled that there is no significant relationship between Student/Staff creativity and know-how and Cloud computing adoption in Nigeria.	The outcome of this study indicates that Student/Staff creativity and know-how does not justify the interest of staff and students in Cloud computing adoption in Nigeria University. This outcome of the hypothesis is a little bit differ from the outcome of research question two which shows that Technological Factors including (Student/Staff creativity and know-how) have influence on cloud computing adoption in higher education in Nigeria

Hypothesis Four	Student/Staff accessibility to current and updated information had a significant effect on Cloud computing adoption among Students and Staff of Nigeria University	This implies the current and updated information as well as communication and judgment of one's capability in using a computer had impact on the level of computer cloud adoption which is in line with the outcome of research question one which shows that individual factorsthat comprise of Computer Self Efficacy (CSE) and user background of cloud technology had influence on cloud computing adoption in higher education in Nigeria**.**
Hypothesis Five	Student/Staff experience and expertise with cloud computing had a significant effect on Cloud computing adoption among Students and Staff of Nigeria University.	The outcome of this study supports the result of research question one which shows that individual factors (Subjective Norms (SN) and user background of cloud technology is part of) had influence on cloud computing adoption in higher education in Nigeria**.**
Hypothesis Six	Perceived University benefit had a significant effect on Cloud computing adoption among Students and Staff of Nigeria University.	The outcome of this study that Perceived University benefit had a significant effect on Cloud computing adoption among Students and Staff of Nigeria University is in line with the work of Dahunsi & Owoseni, (2015) who opined that Cloud computing in Nigeria had several benefits such as cost reduction, ease of operation, interconnectivity, pay as you go, make work and study faster among others.
Hypothesis Seven	Operation cost reduction had a significant effect on Cloud computing adoption among Students and Staff of Nigeria University	The outcome of this study that Operation cost reduction had a significant effect on Cloud computing adoption is in line with the outcome of fourth research question which identified the ranking of the impact of cloud computing adoption on the overall performance of Nigeria University System. The outcome the hypothesis is equally in line with the work of Gital & Zambuk, (2011) who held the view that Cloud computing technology is : Solution to ICT in higher education in Nigeria by reducing operational cost, reduction of overall cost in the running of higher institution and cheap to adopt by students.

Hypothesis Eight	Perceived privacy and security of information had a significant effect on Cloud computing adoption among Students and Staff of Nigeria University.	The study result on Perceived privacy and security of information had a significant effect on Cloud computing adoption among Students and Staff of Nigeria University support the work of Hallova, Polakovič, Šilerova, & Slovakova, (2019) who in their findings perceived that cloud computing provided forum for Data protection and security in SMEs under enterprise infrastructure
Hypothesis Nine	Triability/experiment by students and staff of cloud computing had a significant effect on Cloud computing adoption among Students and Staff of Nigeria University	The outcome of this hypothesis that states that Triability/experiment by students and staff of cloud computing had a significant effect on Cloud computing adoption among Students and Staff of Nigeria University is being supported by the study of Hsu & Lin, (2016) in their study on Exploring factors affecting the adoption of Internet of things services where they opined that persistence experiment by staff and workers on the use of computing technology enhances the adoption and utilization of the technology in their respective companies.
Hypothesis Ten	Computer Self-Efficiency and Subjective Norms (SN)had significant independent influence on user background of cloud technology.	The outcome of this study support the result of research question one which shows that individual factors (Subjective Norms (SN) and user background of cloud technology is part of) had influence on cloud computing adoption in higher education in Nigeria**.** This result corroborate the view of Charles, Emily and Catherine (2021) that assess the critical success factors of cloud computing in public universities in Kenya, which unravelled the fact that factors like management support, technical support and users' preparedness are key variables contributing to the critical success of cloud computing adoption in universities in Kenya.

Hypothesis Eleven	Perceived Easiness, Perceived Reliability, Perceived Innovation, Attitude toward Technology and Perceived Usefulnesshad significant independent influence on Perception of cloud technology in higher education in Nigeria.	The outcome of this hypothesis is in line with the result of research question twoTechnological Factors including (Perceived Easiness, Perceived Reliability, Perceived Innovation, Attitude toward Technology and Perceived Usefulness) have influence on cloud computing adoption in higher education in Nigeria
Hypothesis Twelve	Orgarnizational Characteristics (OC), External Pressure (EP), External Support (ES) and Social Influence (SI) had significant influence onuser background of cloud technology in higher education in Nigeria,	This hypothesis support the outcome of the third research question which established that External Factors including (Orgarnizational Characteristics (OC), External Pressure (EP), External Support (ES) and Social Influence (SI)) have influence on cloud computing adoption in higher education in Nigeria
Hypothesis Thirteen	There is significant difference in the influence exerted by male and female on user background of cloud technology in higher education in Nigeria.	This result of this research hypothesis supports the view of Venkatesh et al. (2003) who found that Gender and voluntariness of use are suggested to moderate the impact of the four key hypotheses on usage intention and usage behaviour, of UTAUT in a longitudinal study found it to account for 70% of the variance in Behavioural Intention to Use (BI)
Hypothesis Fourteen	There is significant influence of education level on external factor of cloud technology adoption in higher education in Nigeria.	This result correlate the view of Welch, Alade and Nichol (2020) utilized UTAUT model to investigate the contributing external factors to Mobile learning adoption among 118 museum staff in England.
Hypothesis Fifteen	There is significant influence of age groups on user background of cloud technology in higher education in Nigeria.	This result support the finding of Eckhardt, Laumer, and Weitzel (2009) are in their view postulates that, age, experience, and voluntariness of use are suggested to moderate the impact of the four key hypotheses on usage intention and usage behaviour.

Hypothesis Sixteen	There is no significant relative contribution ofIndividual Factors, Technological Factors and External Factors to cloud computing adoption in Nigeria Higher Institution.	The outcome of the hypothesis pertaining to the dominance of external factor as a leading determining factor in the determination of cloud computing adoption among students and staff in Nigeria Higher Institution is in line with the study of critical success factors for adoption of Cloud computing in public universities in Kenya conducted by Charles, Emily & Catherine, (2021) where they held the view that out of the three factors determining the adoption of Cloud computing in public universities in Kenya, External factor was ranked first.

Application of the study to professional practice

This research unravels study on comprehensive technology readiness adoption framework for assessing cloud technology on higher education in Nigeria. The outcome of the study showed that computer self-efficiency and subjective norms (SN) had significant influence on the user background of cloud technology. The result also established that Perceived Innovation (PI), Perceived Easiness, Perceived Reliability, Attitude toward Technology (ATT) and Perceived Usefulness had significant influence on perception of cloud technology adoption in higher education in Nigeria.

The outcome of this study may serve as a knowledge base from where IT administrators in Nigeria Educational sector for them to address various technical challenges connected with cloud computing adoption in Nigeria higher education.

Also, the result of this study may equally contribute to IT practice by knowledge gap fixing/filling with respect to existing literature regarding to comprehensive technology readiness adoption framework in the assessment of cloud technology in higher education in Nigeria. The knowledge addition in the literature will assist in understanding and awareness of adoption of cloud computing in higher institution in Nigeria. The outcome of the study further shows that there are many factors that determine the adoption of cloud computing technology in higher institution in Nigeria.

Pertaining to the issue of challenges affecting cloud computing in which the IT administrators are seriously concerned with data availability preservation, integrity and confidentiality

preservation which the IT administrators will like to confirm whether the cloud computing adoption in the country can preserve the integrity and confidentiality of the data.

The knowledge gained from this study can be adopted and applied by IT administrators in the higher education sector in Nigeria so as to help them assess the security implications of data in cloud computing adoption. The perception of the school management, government and school owners on the higher education sector may assist and gear them towards either persuade or dissuade them from cloud computing adoption.

Social change Implication

The essence of this study was based on comprehensive technology in higher education in Nigeria. The study findings would serve as valuable information source for the government of Nigeria towards IT administrator knowledge in cloud computing system management.

Accordingly, the increase in knowledge of government IT administrator will serve as an improvement in the cloud computing systems which in turn led to government service delivery improvement with respect to business and citizens passport registration, national identity number registration, drivers licencing, vehicle registration, tax payment among others would be made available on the cloud based electric (e-government) platform for business and citizens for assessment via a single-window portal. Integrated government services and data that is being hosted on cloud platform would assist government and policy maker in Information system cost reduction (IS), efficiency increase, performance and productivity. If the government agencies, parastatals or department can successful adopt the use of cloud computing, they need less to worry regarding information system but need to focus more on service efficiency and performance increase.

This service improvement from the government would ensure business and citizen benefit tremendously from the government policies. For instance, there would be ease of service delivery for citizens to have their health services processing, having their passports with ease, vehicles registration, drivers licence, etc. as for business, cloud computing system do help business in the processing time reduction for company registration, tax clearance and other government information among others.

6.3 Recommendations

Based on findings of the study, the study recommends the following:

i) For Nigeria to join league of developed nations United Kingdom and Ireland in educational institutions, cloud computing technology advancement, there is need for Nigeria country to overcome some challenges especially with respect to practical skills training to the students, faculty members, administrators and other actors for the quick adoption of the cloud technology adoption in the country educational sector. Since cloud computing had practical, theoretical and cutting-edge technological work are important skills. The three facets especially the practical aspect of cloud computing need to be fully understood, because it is meaningless to say a society or nation or even an individual is advancing progressively with respect to cloud-based system technological revolution in the education sector. The university and higher institute of education can adopt the use of cloud services via standards relevant infrastructure pulling up. This suggestion can sound like directing it to the university management, but not always so. The university management can influence the implementation of cost-effective emerging technologies to deliver and provide the students with equitable learning access.

ii) The Nigerian National IT Department Agency (NITDA), in association with other relevant actors in the government should engage in the audits of cloud computing practice in higher institutions of learning and other government agencies in Nigeria. This act will create a maturity in cloud computing that need to be filled via extant laws and cloud computing policies as well as creating cloud computing awareness and IT administrators capacity development programmes. Not only that, but also the Nigeria National IT Development Agency should review their policy on cloud computing with the aid of knowledge and information gained from this study.

iii) There is need for sensitization and awareness through holding of workshops to introduce the members of the faculties of various higher institutions concerning cloud computing value, cloud storage and applications. Not only that, but also Higher institutions in Nigeria should intensify efforts to enable increased and more speedy adoption of cloud computing, as well as to make its usage compulsory for

all staff and students, especially given that the results indicate high levels of readiness for the adoption of cloud computing among participants.

iv) There is need to motivate members of the University community to establish private repositories and they all need to participate in them to earn publication of electronic course, course enrichment activities, training tests, preparation of lectures and scientific research.

v) Higher institutions in Nigeria should intensify efforts to enable increased and more speedy adoption of cloud computing, as well as to make its usage compulsory for all staff and students, especially given that the results indicate high levels of readiness for the adoption of cloud computing among participants.

vi) It is further recommended that since Nigerian higher institutions currently have a positive perception of cloud computing and, therefore, from a policy perspective, this should serve as an encouraging sign that user resistance to increased uptake is likely to be low.

6.4 Limitations of the Study

The primary drawback of this study is that it can only be used to Nigerian public and private Universities. Only staff and students in the Nigerian private and public Universities, participated in the survey. Therefore, the study solely captures the truth of the Nigerian Universities case. Additionally, because this study's analysis is done at the University level but relying on staff and students.Another limitation of the study is that the study uses statistical tools including Chi-square Automatic Interaction Detector (CHAID), Logistic Regression (LR), Linear Regression and Correlation analysis technique.

The next drawback is that this study used a cross-sectional methodology rather than a longitudinal one. In essence, a cross-sectional method examines the correlations between constructs at a certain time rather than their causal relationships across a long period of time. Utilizing a comprehensive technology readiness adoption model necessitates assessing the properties of the innovation both before and after deployment, necessitating a longitudinal study.

Some of the issues that had effect on the internal validity of the study are the researcher inability to give a valid response appropriately with questions on social, behavioural and relational issue. The limitation of this was that data were only collected from the selected higher institution IT administrator and students. In both Northern and Southern part of Nigeria which may serve as a limit for generalisability of my research for the whole Nigeria as a country. Also, the use of closed-ended questionnaire may equally prevent the participants from making provision of additional information or data that may be an important benefit for the study.

A related limitation of the study was the issue of utilization of limited dependent and independent variables for the statistical analysis. The reluctance of some of the respondents in completion of the questionnaire within the time frame allotted for the study which in turn delayed the time in reaching the sample size target and ultimately affects the study cost and researchers morales.

The degree classifications, the location of the study with respect to Nigeria as well as fact that Universities that did not have cloud computing were not represented in this study among others were classified as other limiting factors identified during the course of this study.

6.5 Scope of Future Work

The following research suggestions can be taken into consideration by researchers looking at technology and cloud computing models to improve this current study.

i. Other researchers can extend the scope to accommodate Collages, Polytechnics and Monotechnic institutions. Moreover, panel studies might be an extension to focus on some selected developing countries at a time.
ii. Additionally, because this study's analysis is done at the University level but relying on staff and students. Thus, organizational level analysis is required.
iii. To ascertain the variance in adoption constructs in the future work, a longitudinal study should be carried out in future research.
iv. Given the size of the survey questionnaire, machine learning techniques using Shapley values and sentiment analysis could have equally been a veritable tool for robustness analysis.
v. The researcher advises more research to be conducted to determine whether the presented findings are applicable to other industries.

Reflection

The study perceived the core construct of CTRAM as a combination of variables adopted from the five technology adoption models, TAM, TR, DOI, TOE and UTAUT. TAM's variables used in this construction include PEU, PU and ATT. TR's variables include TRO, TRI, TRD and TRi. For DOIInnoC was used. PCA was used from TOE and lastly the UTAUT's PE and EE were also adopted. Performance Expectancy from the UTAUT, which is described as the extent in which the individual user of a technology believes that a technology can render help in improving job performance is considered same with perceived usefulness in TAM as well as its the relative advantages from DOI.

For determining a user's propensity to using technology, TR offers a concise set of basic independent variables, including innovativeness, optimism, discomfort, and insecurity. DOI provides a further dimension by exploring how, why, and the rate at which a new technology spreads. To achieve this, DOI poses three variables in the form of innovation characteristics, organizational characteristics, and individual characteristics. Finally, going beyond users' attitudes towards technology usage, the TOE model examines a firm's processes to adopt and implement innovative ideas in the context of (a) technologies which are applicable to the firm, (b) organization: characteristics and resources at disposal of a firm which includes its size and managerial structure, and (c) environmental in which it operates ranging from competition and government regulations. Dependent variables in TOE include intent to adopt and extent of adoption. As such, TOE was considered a vital model for inclusion in CTRAM.

Having identified the limitations of existing adoption models, the next step was to consider how they may be incorporated into CTRAM as explained in chapter three which presents a conceptual model proposal for CTRAM, containing 11 key variables grouped into three core sections: individual characteristics, perception of technology, and external factors (the latter element being largely absent in existing models).

The variable also serves as the actual predictor of intentions among the four models. Then the effort expectancy can be referred to extent in which the ease of use of a technology is perceived. The essence of the CTRAM variable is captured from the DOI and TAM (Vankatesh et al., 2003 and Henderson & Divett, 2003).

CTRAM adoption had some benefits such as cost effectiveness, enhanced availability, low environmental impact, reduced IT complexities, mobility, scalability, increased operability and reduced investment in physical asset in higher education institutions in Nigeria.

Some of the limitations affecting the smooth operation of the model are that students may not have total confidence in cloud computing because it is relatively new to them. It may take the user a while before they are able to adjust to the newly implemented technology. The complexity of a new technology often become a barrier for implementation, thus negatively affecting adoption.

But with the improvement in factors like management support, technical support and users' preparedness, cloud computing awareness are key areas needed for critical success of cloud computing adoption in universities in Nigeria

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8 Appendix

8.1 Appendix A: Survey Questionnaire

Technology Adoption Framework and Digital Literacy Model of Cloud Computing Services in Higher Education

Preamble

The objective of this questionnaire is to collect information in relation to designing a Technology Adoption Framework (TAF) and Digital Literacy Model (DLM) of Cloud computing services in higher education institutes. Your answer is important for us to carry out an accurate and precise research in this area. Your personal information will be kept confidential and the data will be exclusively used for this research only. The questionnaire comprises three sections. Please read the questions in each section carefully and complete the questionnaire according to the given instructions.

About the Topic:

This questionnaire is mainly about cloud computing. Cloud computing is a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or cloud provider interaction.

It is a technology that uses the internet and central remote servers to maintain data and applications. Cloud computing allows users (consumers and businesses) to use applications without installation and access their personal files at any computer with internet access. This technology allowGs for much more efficient computing by centralizing storage, memory, processing and bandwidth.

INSTRUCTIONS:

This questionnaire comprises of **91 questions**. After reading each question, choose from the available options **(A, B, C, D, E)** as contained in the **OMR sheet.**

- Where the question is **Non-Applicable** to you, **leave black**.
- Where the options are **fewer than 5,** choose your answer as appropriate.

For each question, you are required to shade **only 1** among the 5 available options. If you need to change your answer, make sure you properly erase your previous choice.

Section 1: Individual Characteristics

1.1 *Demographic & Background*

1. Gender: (DM1)

A	B
Male	Female

2. Your age group (in years): (DM2)

A	B	C	D	E
18-25	26-35	36-45	46-55	Over 55

3. Your education level? (DM3)

A	B	C	D	E
Doctorate	Master's Degree	Bachelor's Degree	A Level	GCSE

4. What is your discipline? (DM4)

A	B
Science & Engineering	Art & Humanities

5. What is your role in the university? (DM5)

A	B	C	D
Student	Academician	Researcher	Professional/Admin

6. In which university are you currently studying/working? (DM6)

A	B
Government	Private

1.2 ***Computer Self-Efficacy:*** *The degree to which you can perform certain task with a computer software or hardware.*

7. Have you heard of cloud computing before? (CSE1)

A	B
Yes	No

8. Have you used cloud computing before?(CSE2.a)

A	B
Yes	No

If yes, which type of cloud service have you used before? (CSE2.b)

☐ Don't know

9. If your answer to question 9 is yes, which model of cloud computing did you use?(CSE3)

A	B	C	D
Storage-as-a-Service (STaaS)	Software-as-a-Service (SaaS)	Platform-as-a-Service (PaaS)	Infrastructure-as-a-Service (IaaS)

10. If your answer to question 9 is yes, how frequent will you say you use cloud computing?

A	B	C	D	E
Multiple times a day	Once daily	Frequent (3-4 times in a week)	A couple of times per month	Never

(CSE4)

11. If your answer to question 9 is yes, have you ever used cloud computing for academic purpose? (CSE5)

A	B
Yes	No

12. On a scale of 1-5, how often do you need to use a portable storage device (e.g. USB memory stick) or cloud-based storage to save your files? (CSE6)

A	B	C	D	E
Multiple times a day	Once daily	Frequent (3-4 times in a week)	A couple of times per month	Never

13. On a scale of 1-5, how proficient (skillful) are you with using Microsoft Office (Word, Excel, PowerPoint)? (CSE7)

A	B	C	D	E
Very good	Good	Neutral	Not so good	Terrible

14. How familiar are you with Windows operating system? (CSE8)

A	B	C	D	E
Very good	Good	Neutral	Not so good	Terrible

15. How familiar are you with MAC operating system? (CSE9)

A	B	C	D	E
Very good	Good	Neutral	Not so good	Terrible

16. How familiar are you with Linux operating system? (CSE10)

A	B	C	D	E
Very good	Good	Neutral	Not so good	Terrible

17. On a scale of 1-5, how skillful are you on fixing a physical computer hardware? (CSE11)

A	B	C	D	E
Very good	Good	Neutral	Not so good	Terrible

18. On a scale of 1-5, how much do you understand computer architecture such as the roles of CPU, RAM, and hard disk? In other words, the general knowledge of computer system. (CSE12)

A	B	C	D	E
Very well	Well enough	Neutral	Not so well	Terrible

19. On scale 1-5, how dependent are you on computers to perform your daily tasks? In other words, how much do you rely on digital format? For instance, (i) some prefer traditional pen & paper notes whilst some tend to use their phone/pad/PC to make notes. (ii) Some print papers to read, whilst others read on phone/pad/PC. (CSE13)

A	B	C	D	E
All the time	Often	Neutral	Not so much	Not at all

20. **Staff only:** On a scale of 1-5, how much do you rely on online utilities when developing course content? (CSE14)

A	B	C	D	E
All the time	Often	Neutral	Not so much	Not at all

21. **Staff only:** On a scale of 1-5, how much do you rely on online utilities to manage course content? (CSE15)

A	B	C	D	E
All the time	Often	Neutral	Not so much	Not at all

22. **Staff only:** On a scale of 1-5, how much do you rely on online utilities for the purpose of standardization of content, such as managing consistency? (CSE16)

A	B	C	D	E
All the time	Often	Neutral	Not so much	Not at all

23. **Staff only:** On a scale of 1-5, how much do you rely on online utilities to deliver content such as lecture slides, coursework, attendance, grades? (CSE17)

A	B	C	D	E
All the time	Often	Neutral	Not so much	Not at all

1.3 ***Subjective Norms:*** *The actual status of your technology usage or approach to handling technology*

A	B	C	D	E

Strongly agree	Slightly agree	Neutral	Slightly disagree	Strongly disagree

24. ‘*’You are very current and up to date with the latest technology in general’’*. On a scale of 1-5, how much do you agree with this statement? (SN1)

25. ‘‘*You are current and up to date with the latest technological developments only in the fields of your personal interest*’’. On a scale of 1-5, how much do you agree with this statement? (SN2)

A	B	C	D	E
Strongly agree	Slightly agree	Neutral	Slightly disagree	Strongly disagree

26. ‘‘*Most of the time when a new technology is released, you consider yourself to be among the first people to try it among your friends’’*. On a scale of 1-5, how much do you agree with this statement? (SN3)

A	B	C	D	E
Strongly agree	Slightly agree	Neutral	Slightly disagree	Strongly disagree

27. *‘‘You can usually figure out new high-tech products and services without help from others’’*. On a scale of 1-5, how much do you agree with this statement? (SN4)

A	B	C	D	E
Strongly agree	Slightly agree	Neutral	Slightly disagree	Strongly disagree

28. *‘‘Sometimes it is challenging to figure out how to use new technology, but you enjoy these challenges’’*. On a scale of 1-5, how much do you agree with this statement? (SN5)

A	B	C	D	E

Strongly agree	Slightly agree	Neutral	Slightly disagree	Strongly disagree

29. *''Learning about new technology is time consuming, hence you will avoid it''*. On a scale of 1-5, how much do you agree with this statement? (SN6)

A	B	C	D	E
Strongly agree	Slightly agree	Neutral	Slightly disagree	Strongly disagree

30. *''The complication and efforts of learning or adapting to any type or form of new technology may scare you''*. On a scale of 1-5, how much do you agree with this statement? (SN7)

A	B	C	D	E
Strongly agree	Slightly agree	Neutral	Slightly disagree	Strongly disagree

31. *''You do not see the need to try a new technology because what you have now works just fine''*. On a scale of 1-5, how much do you agree with this statement? (SN8)

A	B	C	D	E
Strongly agree	Slightly agree	Neutral	Slightly disagree	Strongly disagree

Section 2: Perception of Technology

2.1 ***Perceived Innovation (PI):*** *The degree of perception about cloud computing in terms of innovativeness.*

32. Traditionally USB device is the common choice for file storage. On a scale of 1-5, how much would you prefer to save your personal content/document online? (PI1)

A	B	C	D	E

Definitely yes	Likely	Maybe or maybe not	Unlikely	Definitely not

33. On a scale of 1-5, how much would you like to have access to Apple MAC operating system online (subject to a minimum fee, for example $1 per hour)? (PI2)

A	B	C	D	E
Definitely yes	Likely	Maybe or maybe not	Unlikely	Definitely not

34. On a scale of 1-5, how much would you like to have access to that are exclusive only to MAC operating system such as iTunes, iMovie, Pages, Numbers, iMessage, X code? (PI3)

A	B	C	D	E
Definitely yes	Likely	Maybe or maybe not	Unlikely	Definitely not

35. Microsoft Office 365 can be offered to institutions (e.g. Universities) for online use (subject to certain cost), which includes software packages such as Word, Excel and PowerPoint. On a scale of 1-5, how much would you like to use these software online? (PI4)

A	B	C	D	E
Definitely yes	Likely	Maybe or maybe not	Unlikely	Definitely not

36. Traditionally, all operating systems are pre-installed on your local machines. On a scale of 1-5, how much would you like to access a different operating system online from your computer? (PI5)

A	B	C	D	E
Definitely yes	Likely	Maybe or maybe not	Unlikely	Definitely not

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2.2 ***Perceived Usefulness (PU):*** *The degree of perception about cloud computing in terms of usefulness e.g. enhancing academic or job performance.*

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37. *''Most Storage-as-a-Service (SaaS) for example, Dropbox, provide features such as tracking historical version, which means when you make some changes to your*

document and save it, those changes will be reflected on any device when you access that document online''. In the future, you can access any historical version if needs be. To what extent would you like to use such feature? (PU1)

A	B	C	D	E
Definitely yes	Likely	Maybe or maybe not	Unlikely	Definitely not

38. *''Traditionally, people normally carry your storage device (e.g. USB drive) with them when travelling''*. On a scale of 1-5, how much would you prefer to be able to access your documents through the internet rather than carrying your storage device? This would mean that you can access documents anywhere and anytime in the world. (PU2)

A	B	C	D	E
Definitely yes	Likely	Maybe or maybe not	Unlikely	Definitely not

39. *''Your storage device i.e. USB memory stick will have a limited amount of storage capacity e.g. 16GB, 32GB, 64GB''*. On a scale of 1-5, how much would you like to have a high storage capacity of 1 terabyte (TB) or even more, delivered to you online? (There may be a fee involved). (PU3)

A	B	C	D	E
Definitely yes	Likely	Maybe or maybe not	Unlikely	Definitely not

40. *''Access to a variety of applications online can help students to be more creative with their coursework''*. To what extent do you agree with the statement? (PU4)

A	B	C	D	E
Strongly agree	Slightly agree	Neutral	Slightly disagree	Strongly disagree

41. *''Accessing a MAC operating system remotely/online, it might feel like you are using a slow machine because of network delay''*. On a scale of 1-5, how much would you consider this as a problem? (PU5)

A	B	C	D	E

Not a problem at all. Continue to use	Put me off a bit	Neutral	Annoys me and may consider stopping	Huge problem. Will not use it all

42. *''Access to lab software from home will be beneficial for you, so you do not have to come to the university all the time''*. On a scale of 1-5, to what extent do you believe it will be beneficial to you? (PU6)

A	B	C	D	E
Definitely yes	Likely	Maybe or maybe not	Unlikely	Definitely not

43. *''Installation of software on your local computer can be slow, time consuming and involves admin permission issues''*. On a scale of 1-5, how much would you rather simply access a software without the need of installation? (PU7)

A	B	C	D	E
Definitely yes	Likely	Maybe or maybe not	Unlikely	Definitely not

44. *''Having several software installed locally on your personal computer often consumes many resources, for example, slowing down CPU speed, occupying RAM & hard disk space''*. On a scale of 1-5, how likely are you to use software online instead of using it locally based on this reason? (PU8)

A	B	C	D	E
Definitely yes	Likely	Maybe or maybe not	Unlikely	Definitely not

45. *''Accessing a MAC remotely/online can sometimes be slow because many users are accessing it at the same time''*. On a scale of 1-5, how much will the speed of the operating system be a main concern to you? (PU9)

A	B	C	D	E
Not a problem at all. Will	Put me off a bit	Neutral	Annoys me and may consider stopping	Huge problem. Will not use it all

continue to use				

The following e-learning features can be broadly categorized as cloud computing technology. On a scale of 1-5, what is your perceived usefulness of these features?

		A	**B**	**C**	**D**	**E**
		Extremely useful	partially useful	Neutral	Not very useful	Completely useless
S/N	***e-learning features***					
46.	Keeping track of grades on assignments and tests online (PU10)					
47.	Online discussions. (PU11)					
48.	Turn-it-In for assignments and project (PU12)					
49.	Online access to sample exams and quizzes for learning purposes (PU13)					
50.	Online syllabus (PU14)					
51.	Getting instructor's feedback and grades on assignments online (PU15)					

52. **Staff only:** After watching the demo, on a scale of 1-5, how much do you think cloud computing can help you with developing contents such as lecture notes and coursework design? (PU16)

A	B	C	D	E
Extremely helpful	partially helpful	Neutral	Not very helpful	Completely irrelevant

53. **Staff only:** After watching the demo, on a scale of 1-5, how much do you think cloud computing will help you with managing course content? (PU17)

A	B	C	D	E
Extremely helpful	partially helpful	Neutral	Not very helpful	Completely irrelevant

54. **Staff only:** After watching the demo, on a scale of 1-5, how much do you think cloud computing will help you with standardizing your course content? (PU18)

A	B	C	D	E
Extremely helpful	partially helpful	Neutral	Not very helpful	Completely irrelevant

55. **Staff only:** After watching the demo, on a scale of 1-5, how much do you think cloud computing will help you in delivering your course content? (PU19)

A	B	C	D	E
Extremely helpful	partially helpful	Neutral	Not very helpful	Completely irrelevant

2.3 ***Perceived Easiness (PE):*** *The degree to which you believe that using cloud computing is easy.*

A	B	C	D	E

Strongly agree	Slightly agree	Neutral	Slightly disagree	Strongly disagree

56. After watching the demo, on a scale of 1-5, how much will you agree to this statement? ‘‘*Storing and retrieving documents online is relatively simple to do, and its does not take much effort’’*. (PE1)

57. After watch the demo, how much will you rate the easiness of using Microsoft office online on a scale of 1-5? (PE2)

A	B	C	D	E
Very easy	Slightly easy	Neutral	Slightly difficult	Very difficult

58. After watching the demo, on a scale of 1-5, to what extent do you agree with the statement?
‘‘*Using a MAC operating system online is the same as owning the MAC itself? There are no complications’’*. (PE3)

A	B	C	D	E
Strongly agree	Slightly agree	Neutral	Slightly disagree	Strongly disagree

59. A thin client lab PC is a lightweight computer that only have peripheral devices (e.g. mouse, keyboard, and screen), load operating system, and retrieve resources (e.g. operating system, software) from a server. It is the same process as a computer. On a scale of 1-5, how easy will you say it is to use features on a lab PC as described? (PE4)

A	B	C	D	E
Very easy	Slightly easy	Neutral	Slightly difficult	Very difficult

2.4 ***Attitude towards Technology (ATT):*** *Your evaluation of cloud computing or behaviour associated with the use of cloud computing.*

60. *''After watching several demos of cloud computing, you feel you can have control over your everyday activities with the use of cloud computing''*. On a scale of 1-5, how much will you agree to this statement? (ATT1)

A	B	C	D	E
Strongly agree	Slightly agree	Neutral	Slightly disagree	Strongly disagree

61. *''You get more freedom of mobility with cloud computing''*.On a scale of 1-5, how important is the mobility to you? (ATT2)

A	B	C	D	E
Strongly agree	Slightly agree	Neutral	Slightly disagree	Strongly disagree

62. *''After watching the demos, you feel as though cloud computing can enhance your learning abilities*.'' On a scale of 1-5, how much will you agree to this statement? (ATT3)

A	B	C	D	E
Extremely important	Important	Neutral	Doesn't really matter	Not important at all

63. **Staff only**. *''After watching the demos, you feel cloud computing can enhance your work efficiency''.* On a scale of 1-5, how much will you agree to this statement? ATT4)

A	B	C	D	E
Strongly agree	Slightly agree	Neutral	Slightly disagree	Strongly disagree

64. *''After watching the demo, how much do you trust cloud computing in general''*? On a scale of 1-5 (ATT5)

A	B	C	D	E
Very confident. I	Mostly confident	Neutral	Somehow unconfident	I don't trust them at all

fully trust them				

65. *''After watching the demo, you believe cloud computing will cut down cost of operation in the university''*. On a scale of 1-5, how much will you agree to this statement? (ATT6)

A	B	C	D	E
Strongly agree	Slightly agree	Neutral	Slightly disagree	Strongly disagree

2.5 **Perceived Reliability (PR):***The degree to which a person trusts or distrust a technology and its ability to work properly.*

66. If you use online storage service, data are stored and managed by the host cloud provider e.g. Dropbox, iCloud. On a scale of 1-5, how much are you worried that a third party might access your data? (PR1)

A	B	C	D	E
Not a problem at all. Will continue to use	Put me off a bit	Neutral	Annoys me and may consider stopping	Huge problem. Will not use it all

67. Even though your files are always ready to download, you need the internet to access these files online. The unreliable internet service could hinder the performance of cloud computing and in turn affect your studies. On a scale of 1-5, how likely might this be of some concern to you? (PR2)

A	B	C	D	E
Not a problem at all. Will continue to use	Put me off a bit	Neutral	Annoys me and may consider stopping	Huge problem. Will not use it all

68. Accessing application and files online means you can ONLY rely on the cloud computing providers to deal with the virus or malware attacks. On a scale of 1-5, how much are you confident with their security measurement? (PR3)

A	B	C	D	E
Very confident. I fully trust them	Mostly confident	Neutral	Somehow unconfident	I don't trust them at all

69. Denial of service (DOS) is a cyber-attack in which the perpetrator seeks to make a machine or network resource unavailable temporarily or indefinitely disrupting services. Such attack could potentially affect users of cloud computing. For example, if Dropbox server is under such attack, then you will not be able to access the storage. (However, Dropbox will do everything they can to avoid this from happening). To what extent might this be of some concern to you? (PR4)

A	B	C	D	E
Not a problem at all. Will continue to use	Put me off a bit	Neutral	Annoys me and may consider stopping	Huge problem. Will not use it all

70. In a lab environment, all security issues are managed centrally on a server. To what extent do you agree this is an effective solution? (PR5)

A	B	C	D	E
Highly effective	Good enough	Neutral	Not very effective	Ineffective

71. Phishingattack is often used to steal user data, including login credentials and credit card numbers. All SaaS providers (e.g. Dropbox) endeavours to prevent unsolicited access of user data and files. On a scale of 1-5, how much are you still concerned with this matter? (PR6)

A	B	C	D	E

Not a problem at all. Will continue to use	Put me off a bit	Neutral	Scares me and may consider stopping	Huge problem. Will not use it all

72. **Staff only:** Security and privacy is an important aspect of cloud computing. With so much student data stored in place, would you recommend outsourcing a cloud provider to store student data? (PR7)

A	B	C	D	E
Definitely yes	Likely	Maybe or maybe not	Unlikely	Definitely not

Section 3: External Factors

3.1 ***Organizational Characteristics (OC) – (Staff only):*** *The extent to which the university supports the adoption of cloud computing.*

73. **Staff only:** The higher the storage capacity, the higher the cost. Do you feel the university management is willing to pay for higher storage space in the cloud? (OC1)

A	B	C	D	E
Definitely yes	Likely	Maybe or maybe not	Unlikely	Definitely not

74. **Staff only:** A large number of computers will be required in the university labs to accommodate the huge number of students. To what extent do you feel the university is willing to purchase more computers to accommodate the large number of students? (0C2)

A	B	C	D	E
Definitely yes	Likely	Maybe or maybe not	Unlikely	Definitely not

75. **<u>Staff only:</u>**Both student and staff need a lot of storage space for primarily study or work purpose. On a scale of 1-5, how likely is the university willing to pay for such services? (OC3)

A	B	C	D	E
Definitely yes	Likely	Maybe or maybe not	Unlikely	Definitely not

76. *''There are sufficient computers in the university labs for students to practice with''*. On a scale of 1-5, to what extent do you agree with this statement? (OC4)

A	B	C	D	E
Strongly agree	Slightly agree	Neutral	Slightly disagree	Strongly disagree

77. If Wi-Fi cloud can be installed on campus, it will make it easy to enjoy the benefits of cloud computing by using personal computers or mobile phones to access certain application online without the need to visit the computer labs. To what extent do you agree that campus Wi-Fi cloud is a good idea? (OC5)

A	B	C	D	E
Strongly agree	Slightly agree	Neutral	Slightly disagree	Strongly disagree

78. *''Other universities have far more advanced computers than the once you currently have in the university computer labs''*. To what extent do you agree with this statement? (OC6)

A	B	C	D	E
Strongly agree	Slightly agree	Neutral	Slightly disagree	Strongly disagree

3.2 ***External Pressure (EP):*** *The degree to which you feel pressured because of influence from external parties such as competitors, peers or management.*

79. *''There are universities in Nigeria that have already adopted cloud computing''*. On a scale of 1-5, to what extent do you agree with the statement that ''to be competitive, your university need to do the same''? (EP1)

A	B	C	D	E
Strongly agree	Slightly agree	Neutral	Slightly disagree	Strongly disagree

80. *''There is pressure from within the university to improve method of teaching and communicating with students via digital technology''*. On a scale of 1-5, to what extent will you agree to this statement? (EP2)

A	B	C	D	E
Strongly agree	Slightly agree	Neutral	Slightly disagree	Strongly disagree

81. *''Student are demanding improved quality of teaching in the area of e-learning''*. On a scale of 1-5, to what extent will you agree to this statement? (EP3)

A	B	C	D	E
Strongly agree	Slightly agree	Neutral	Slightly disagree	Strongly disagree

82. *''There is pressure from government bodies that demands high quality standard education using digital technology''*. On a scale of 1-5, to what extent will you agree to this statement? (EP4)

A	B	C	D	E
Strongly agree	Slightly agree	Neutral	Slightly disagree	Strongly disagree

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3.3 ***Technical Support (TS):*** *Your perception of support received from the university or fellow colleagues.*

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83. **Staff only:** Routine checks, and upgrades of computing resources are essential. Would you say the university have sufficient IT staffs for that role? (TS1)

A	B	C	D	E
Strongly agree	Slightly agree	Neutral	Slightly disagree	Strongly disagree

84. The cloud computing providers should offer us with help and advice about cloud computing. On a scale of 1-5, how much do you agree with the statement? (TS2)

A	B	C	D	E
Strongly agree	Slightly agree	Neutral	Slightly disagree	Strongly disagree

85. Do you have the impression that IT support team is always happy to help? On a scale of 1-5, how would you rate the level of your satisfactory with the attitude you get from the IT support team whenever you need help? (TS3)

A	B	C	D	E
Very satisfied	Happy	Neutral	Not satisfied	Highly disappointed

86. On a scale of 1-5, how much would you rate the efficiency and promptness for the response you get when you request for help from IT support team? (TS4)

A	B	C	D	E
Very fast	Moderate	Neutral	Slow	No response

87. On a scale of 1-5, how would you rate the level of knowledge and skills of the IT support staffs? How effective are they in rendering solution to problems? (TS5)

A	B	C	D	E
Highly effective	Good enough	Neutral	Not very effective	Ineffective

3.4 ***Social Influence (SI):*** *The degree to which you feel cloud computing can impact the learning community.*

88. *''The ability to share learning resources online will have a positive impact on a student's learning ability''*. On a scale of 1-5, how much do you agree with the statement? (SI1)

A	B	C	D	E
Strongly agree	Slightly agree	Neutral	Slightly disagree	Strongly disagree

89. *''The opportunity to practice another operating system (such as MAC) gives students more experience, hence more chance to find a job''*. On a scale of 1-5, how much do you agree with the statement? (SI2)

A	B	C	D	E
Strongly agree	Slightly agree	Neutral	Slightly disagree	Strongly disagree

90. *''Working with different software increases knowledge and skills among the community of students of different background''*. On a scale of 1-5, how much do you agree with the statement? (SI3)

A	B	C	D	E
Strongly agree	Slightly agree	Neutral	Slightly disagree	Strongly disagree

91. *''Working together in a lab increases the chances of sharing idea with fellow peers''*. On a scale of 1-5, how much do you agree with the statement? (SI4)

A	B	C	D	E
Strongly agree	Slightly agree	Neutral	Slightly disagree	Strongly disagree

8.2 Appendix B: Krejcie and Morgan (1970) Sample Table

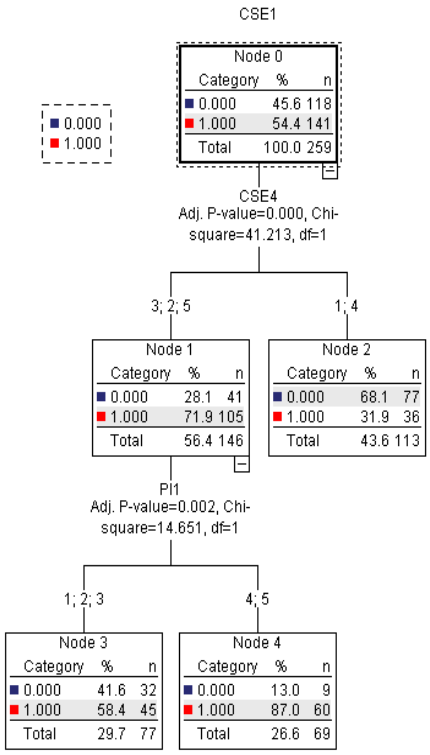
Table 3.1

Table for Determining Sample Size of a Known Population

N	S	N	S	N	S	N	S	N	S
10	10	100	80	280	162	800	260	2800	338
15	14	110	86	290	165	850	265	3000	341
20	19	120	92	300	169	900	269	3500	346
25	24	130	97	320	175	950	274	4000	351
30	28	140	103	340	181	1000	278	4500	354
35	32	150	108	360	186	1100	285	5000	357
40	36	160	113	380	191	1200	291	6000	361
45	40	170	118	400	196	1300	297	7000	364
50	44	180	123	420	201	1400	302	8000	367
55	48	190	127	440	205	1500	306	9000	368
60	52	200	132	460	210	1600	310	10000	370
65	56	210	136	480	214	1700	313	15000	375
70	59	220	140	500	217	1800	317	20000	377
75	63	230	144	550	226	1900	320	30000	379
80	66	240	148	600	234	2000	322	40000	380
85	70	250	152	650	242	2200	327	50000	381
90	73	260	155	700	248	2400	331	75000	382
95	76	270	159	750	254	2600	335	1000000	384

Note: N is Population Size; S is Sample Size *Source: Krejcie & Morgan, 1970*

8.3 Appendix C: CHAID & LR SPSS output



Classification

Observed	Predicted		
	0	1	Percent Correct
0	77	41	65.3%
1	36	105	74.5%
Overall Percentage	43.6%	56.4%	70.3%

Growing Method: CHAID
Dependent Variable: CSE1

Risk

Estimate	Std. Error
.297	.028

Growing Method: CHAID
Dependent Variable: CSE1

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	46.133	12	.000
	Block	46.133	12	.000
	Model	46.133	12	.000

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	311.283[a]	.164	.218

a. Estimation terminated at iteration number 4 because parameter estimates changed by less than .001.

8.4 Appendix D: Reliability Result for all the Variables

Reliability Statistics

Cronbach's Alpha	N of Items
.804	91

```
DATASET ACTIVATE DataSet1.
DATASET CLOSE DataSet3.
RELIABILITY
  /VARIABLES=DM1 DM2 DM3 DM4 DM5 DM6 CSE1 CSE2 CSE3 CSE4 CSE5 CSE6 C
SE7 CSE8 CSE9 CSE10 CSE11 CSE12 CSE13 CSE14 CSE15 CSE16 CSE17 SN
   1 SN2 SN3 SN4 SN5 SN6 SN7 SN8 PI1 PI2 PI3 PI4 PI5 PU1 PU2 PU3 PU4 PU5 PU6 PU
7 PU8 PU9 PU10 PU11 PU12 PU13 PU14 PU15 PU16
    PU17 PU18 PU19 PE1 PE2 PE3 PE4 ATT1 ATT2 ATT3 ATT4 ATT5 ATT6 PR1 PR2 PR
3 PR4 PR5 PR6 PR7 OC1 OC2 OC3 OC4 OC5 OC6 EP1 EP2 EP3 EP4
    TS1 TS2 TS3 TS4 TS5 SI1 SI2 SI3 SI4
  /SCALE('ALL VARIABLES') ALL
  /MODEL=ALPHA.
```

Reliability Result for Demographic & Background Variables

Reliability Statistics

Cronbach's Alpha	N of Items
.706	6

```
RELIABILITY
  /VARIABLES=DM1 DM2 DM3 DM4 DM5 DM6
  /SCALE('ALL VARIABLES') ALL
  /MODEL=ALPHA.
```

Reliability Result for Computer self-efficiency Variables

Reliability Statistics

Cronbach's Alpha	N of Items
.075	17

```
RELIABILITY
```

```
  /VARIABLES=CSE1 CSE2 CSE3 CSE4 CSE5 CSE6 CSE7 CSE8 CSE9 CSE10 CSE11 CS
E12 CSE13 CSE14 CSE15 CSE16 CSE17
  /SCALE('ALL VARIABLES') ALL
  /MODEL=ALPHA.
```

Reliability Result for Subjective Norms Variables

Reliability Statistics

Cronbach's Alpha[a]	N of Items
.860	8

```
RELIABILITY
  /VARIABLES=SN1 SN2 SN3 SN4 SN5 SN6 SN7 SN8
  /SCALE('ALL VARIABLES') ALL
  /MODEL=ALPHA.
```

Reliability Result for Perceived Innovation Variables

Reliability Statistics

Cronbach's Alpha	N of Items
.610	5

```
RELIABILITY
  /VARIABLES=PI1 PI2 PI3 PI4 PI5
  /SCALE('ALL VARIABLES') ALL
  /MODEL=ALPHA.
```

Reliability Result for Perceived usefulness Variables

Reliability Statistics

Cronbach's Alpha[a]	N of Items
.534	19

```
RELIABILITY
  /VARIABLES=PU1 PU2 PU3 PU4 PU5 PU6 PU7 PU8 PU9 PU10 PU11 PU12 PU13 PU14
 PU15 PU16 PU17 PU18 PU19
  /SCALE('ALL VARIABLES') ALL
  /MODEL=ALPHA.
```

Reliability Result for Perceived Easiness Variables

Reliability Statistics

Cronbach's Alpha[a]	N of Items
.640	4

```
RELIABILITY
  /VARIABLES=PE1 PE2 PE3 PE4
  /SCALE('ALL VARIABLES') ALL
  /MODEL=ALPHA.
```

Reliability Result for Attitude toward Technology Variables

Reliability Statistics

Cronbach's Alpha	N of Items
.717	6

```
RELIABILITY
  /VARIABLES=ATT1 ATT2 ATT3 ATT4 ATT5 ATT6
  /SCALE('ALL VARIABLES') ALL
  /MODEL=ALPHA.
```

Reliability Result for Perceived Reliability Technology Variables

Reliability Statistics

Cronbach's Alpha	N of Items
.688	7

```
RELIABILITY
  /VARIABLES=PR1 PR2 PR3 PR4 PR5 PR6 PR7
  /SCALE('ALL VARIABLES') ALL
  /MODEL=ALPHA.
```

Reliability Result for Organisational Characteristics Variables

Reliability Statistics

Cronbach's Alpha	N of Items
.722	6

```
RELIABILITY
  /VARIABLES=OC1 OC2 OC3 OC4 OC5 OC6
```

/SCALE('ALL VARIABLES') ALL

/MODEL=ALPHA.

Reliability Result for External Pressure Variables

Reliability Statistics

Cronbach's Alpha	N of Items
.520	4

RELIABILITY
/VARIABLES=EP1 EP2 EP3 EP4
/SCALE('ALL VARIABLES') ALL

/MODEL=ALPHA.

Reliability Result for Technical Support Variables

Reliability Statistics

Cronbach's Alpha[a]	N of Items
.875	5

RELIABILITY
/VARIABLES=TS1 TS2 TS3 TS4 TS5
/SCALE('ALL VARIABLES') ALL

/MODEL=ALPHA.

Reliability Result for Social Influence Variables

Reliability Statistics

Cronbach's Alpha[a]	N of Items
.788	4

RELIABILITY
/VARIABLES=SI1 SI2 SI3 SI4
/SCALE('ALL VARIABLES') ALL

/MODEL=ALPHA.

8.5 Appendix E: Frequency Table

Gender:

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	189	72.7	72.7	72.7
	Female	71	27.3	27.3	100.0
	Total	260	100.0	100.0	

Your age group (in years)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18-25yrs	146	56.2	56.2	56.2
	26-35yrs	41	15.8	15.8	71.9
	36-45yrs	49	18.8	18.8	90.8
	46-55yrs	24	9.2	9.2	100.0
	Total	260	100.0	100.0	

Your education level?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Doctorate	19	7.3	7.3	7.3
	Master's Degree	66	25.4	25.4	32.7
	Bachelor's Degree	175	67.3	67.3	100.0
	Total	260	100.0	100.0	

What is your discipline?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Science & Engineering	194	74.6	74.6	74.6
	Art & Humanities	66	25.4	25.4	100.0
	Total	260	100.0	100.0	

What is your role in the university?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Student	184	70.8	70.8	70.8
	Academician	50	19.2	19.2	90.0
	Researcher	15	5.8	5.8	95.8
	Professional/Admin	11	4.2	4.2	100.0
	Total	260	100.0	100.0	

Correlations

Descriptive Statistics

	Mean	Std. Deviation	N
User background	16.16	1.727	260
COMPUTER SELF-EFFICACY	24.55	4.131	260

Correlations

		User background	COMPUTER SELF-EFFICACY
User background	Pearson Correlation	1	.510**
	Sig. (2-tailed)		.000
	N	260	260
COMPUTER SELF-EFFICACY	Pearson Correlation	.510**	1
	Sig. (2-tailed)	.000	
	N	260	260

**. Correlation is significant at the 0.01 level (2-tailed).

Correlations

Descriptive Statistics

	Mean	Std. Deviation	N
User background	16.16	1.727	260
SUBJECTIVE NORMS	27.55	6.049	260

Correlations

		User background	SUBJECTIVE NORMS
User background	Pearson Correlation	1	.269**
	Sig. (2-tailed)		.000
	N	260	260
SUBJECTIVE NORMS	Pearson Correlation	.269**	1
	Sig. (2-tailed)	.000	
	N	260	260

**. Correlation is significant at the 0.01 level (2-tailed).

Correlations

Descriptive Statistics

	Mean	Std. Deviation	N
Perception of Cloud technology	16.13	1.629	260
PERCEIVED INNOVATION	20.42	3.160	260

Correlations

		Perception of Cloud technology	PERCEIVED INNOVATION
Perception of Cloud technology	Pearson Correlation	1	.135*
	Sig. (2-tailed)		.029
	N	260	260
PERCEIVED INNOVATION	Pearson Correlation	.135*	1
	Sig. (2-tailed)	.029	
	N	260	260

*. Correlation is significant at the 0.05 level (2-tailed).

Correlations

Descriptive Statistics

	Mean	Std. Deviation	N
Perception of Cloud technology	16.13	1.629	260
PERCEIVED USEFULNESS	37.33	4.666	260

Correlations

		Perception of Cloud technology	PERCEIVED USEFULNESS
Perception of Cloud technology	Pearson Correlation	1	.157*
	Sig. (2-tailed)		.011
	N	260	260
PERCEIVED USEFULNESS	Pearson Correlation	.157*	1
	Sig. (2-tailed)	.011	
	N	260	260

*. Correlation is significant at the 0.05 level (2-tailed).

Correlations

Descriptive Statistics

	Mean	Std. Deviation	N
Perception of Cloud technology	16.13	1.629	260
PERCEIVED EASINESS	16.05	2.225	260

Correlations

		Perception of Cloud technology	PERCEIVED EASINESS
Perception of Cloud technology	Pearson Correlation	1	.202**
	Sig. (2-tailed)		.001
	N	260	260
PERCEIVED EASINESS	Pearson Correlation	.202**	1
	Sig. (2-tailed)	.001	
	N	260	260

**. Correlation is significant at the 0.01 level (2-tailed).

Correlations

Descriptive Statistics

	Mean	Std. Deviation	N
Perception of Cloud technology	16.13	1.629	260
ATTITUDE TOWARDS TECHNOLOGY	26.18	2.512	260

Correlations

		Perception of Cloud technology	ATTITUDE TOWARDS TECHNOLOGY
Perception of Cloud technology	Pearson Correlation	1	.203**
	Sig. (2-tailed)		.001
	N	260	260
ATTITUDE TOWARDS TECHNOLOGY	Pearson Correlation	.203**	1
	Sig. (2-tailed)	.001	
	N	260	260

**. Correlation is significant at the 0.01 level (2-tailed).

Correlations

Descriptive Statistics

	Mean	Std. Deviation	N
Perception of Cloud technology	16.13	1.629	260
PERCEIVED RELIABILITY	26.16	5.048	260

Correlations

		Perception of Cloud technology	PERCEIVED RELIABILITY
Perception of Cloud technology	Pearson Correlation	1	.238**
	Sig. (2-tailed)		.000
	N	260	260
PERCEIVED RELIABILITY	Pearson Correlation	.238**	1
	Sig. (2-tailed)	.000	
	N	260	260

**. Correlation is significant at the 0.01 level (2-tailed).

Correlations

Descriptive Statistics

	Mean	Std. Deviation	N
External Factors	15.99	1.645	260
ORGANIZATIONAL CHARACTERISTICS	24.02	2.554	260

Correlations

		External Factors	ORGANIZATIONAL CHARACTERISTICS

External Factors	Pearson Correlation	1	.107
	Sig. (2-tailed)		.086
	N	260	260
ORGANIZATIONAL CHARACTERISTICS	Pearson Correlation	.107	1
	Sig. (2-tailed)	.086	
	N	260	260

Correlations

Descriptive Statistics

	Mean	Std. Deviation	N
External Factors	15.99	1.645	260
EXTERNAL PRESSURE	15.06	3.222	260

Correlations

		External Factors	EXTERNAL PRESSURE
External Factors	Pearson Correlation	1	-.255**
	Sig. (2-tailed)		.000
	N	260	260
EXTERNAL PRESSURE	Pearson Correlation	-.255**	1
	Sig. (2-tailed)	.000	
	N	260	260

**. Correlation is significant at the 0.01 level (2-tailed).

Correlations

Descriptive Statistics

	Mean	Std. Deviation	N
External Factors	15.99	1.645	260
EXTERNAL SUPPORT	19.00	3.467	260

Correlations

		External Factors	EXTERNAL SUPPORT
External Factors	Pearson Correlation	1	.134*
	Sig. (2-tailed)		.031
	N	260	260
EXTERNAL SUPPORT	Pearson Correlation	.134*	1
	Sig. (2-tailed)	.031	
	N	260	260

*. Correlation is significant at the 0.05 level (2-tailed).

Correlations

Descriptive Statistics

	Mean	Std. Deviation	N
External Factors	15.99	1.645	260
SOCIAL INFLUENCE	22.00	1.391	260

Correlations

		External Factors	SOCIAL INFLUENCE
External Factors	Pearson Correlation	1	-.152*
	Sig. (2-tailed)		.014
	N	260	260
SOCIAL INFLUENCE	Pearson Correlation	-.152*	1
	Sig. (2-tailed)	.014	
	N	260	260

*. Correlation is significant at the 0.05 level (2-tailed).

Regression

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics: R Square Change	F Change	df1	df2	Sig. F Change
1	.600[a]	.360	.355	1.387	.360	72.158	2	260	.000

a. Predictors: (Constant), SUBJECTIVE NORMS, COMPUTER SELF-EFFICACY

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	277.808	2	138.904	72.158	.000[b]
	Residual	494.727	260	1.925		
	Total	772.535	259			

a. Dependent Variable: User background

b. Predictors: (Constant), SUBJECTIVE NORMS, COMPUTER SELF-EFFICACY

Coefficients[a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	8.148	.680		11.974	.000
	COMPUTER SELF-EFFICACY	.225	.021	.538	10.741	.000
	SUBJECTIVE NORMS	.090	.014	.316	6.304	.000

a. Dependent Variable: User background

Regression

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics R Square Change	F Change	df1	df2	Sig. F Change
1	.276[a]	.076	.058	1.581	.076	4.190	5	254	.001

a. Predictors: (Constant), PERCEIVED RELIABILITY, PERCEIVED INNOVATION, PERCEIVED EASINESS, ATTITUDE TOWARDS TECHNOLOGY, PERCEIVED USEFULNESS

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	52.391	5	10.478	4.190	.001[b]
	Residual	635.163	254	2.501		
	Total	687.554	259			

a. Dependent Variable: Perception of Cloud technology

b. Predictors: (Constant), PERCEIVED RELIABILITY, PERCEIVED INNOVATION, PERCEIVED EASINESS, ATTITUDE TOWARDS TECHNOLOGY, PERCEIVED USEFULNESS

Coefficients[a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	11.930	1.233		9.678	.000
	PERCEIVED INNOVATION	.006	.040	.216	2.640	.009
	PERCEIVED USEFULNESS	-.004	.030	.180	1.612	.039

	PERCEIVED EASINESS	.087	.051	.360	4.711	.000
	ATTITUDE TOWARDS TECHNOLOGY	.064	.048	.199	1.986	.018
	PERCEIVED RELIABILITY	.044	.027	.236	3.634	.004

a. Dependent Variable: Perception of Cloud technology

Regression

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.364[a]	.132	.119	1.544	.132	9.717	4	255	.000

a. Predictors: (Constant), SOCIAL INFLUENCE, ORGANIZATIONAL CHARACTERISTICS, EXTERNAL PRESSURE, EXTERNAL SUPPORT

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	92.712	4	23.178	9.717	.000[b]
	Residual	608.254	255	2.385		
	Total	700.965	259			

a. Dependent Variable: External Factors

b. Predictors: (Constant), SOCIAL INFLUENCE, ORGANIZATIONAL CHARACTERISTICS, EXTERNAL PRESSURE, EXTERNAL SUPPORT

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	15.080	2.065		7.302	.000
	ORGANIZATIONAL CHARACTERISTICS	.134	.039	.209	3.425	.001
	EXTERNAL PRESSURE	-.154	.032	-.301	-4.879	.000
	EXTERNAL SUPPORT	.084	.030	.178	2.811	.005
	SOCIAL INFLUENCE	-.073	.075	-.062	-.976	.330

a. Dependent Variable: External Factors

COMPUTER SELF-EFFICACY(Have you heard of cloud computing before?)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	216	83.1	83.1	83.1
	No	44	16.9	16.9	100.0
	Total	260	100.0	100.0	

Have you used cloud computing before?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	174	66.9	69.3	69.3
	No	77	29.6	30.7	100.0
	Total	251	96.5	100.0	
Missing	System	9	3.5		
Total		260	100.0		

If yes, which type of cloud service have you used before?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	141	54.2	79.7	79.7
	No	29	11.2	16.4	96.0
	Don't know	7	2.7	4.0	100.0
	Total	177	68.1	100.0	
Missing	System	83	31.9		
Total		260	100.0		

If your answer to question 9 is yes, which model of cloud computing did you use?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Storage-as-a-Service (STaaS)	25	9.6	14.0	14.0
	Software-as-a-Service (SaaS)	59	22.7	33.0	46.9
	Platform-as-a-Service (PaaS)	34	13.1	19.0	65.9
	Infrastructure-as-a-Service (IaaS)	61	23.5	34.1	100.0
	Total	179	68.8	100.0	
Missing	System	81	31.2		

Total		260	100.0		

If your answer to question 9 is yes, how frequent will you say you use cloud computing?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Multiple times a day	85	32.7	48.3	48.3
	Once daily	88	33.8	50.0	98.3
	Frequent (3-4 times in a week)	3	1.2	1.7	100.0
	Total	176	67.7	100.0	
Missing	System	84	32.3		
Total		260	100.0		

If your answer to question 9 is yes, have you ever used cloud computing for academic purpose?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	60	23.1	23.1	23.1
	No	53	20.4	20.4	43.5
	3	91	35.0	35.0	78.5
	4	48	18.5	18.5	96.9
	5	8	3.1	3.1	100.0
	Total	260	100.0	100.0	

On a scale of 1-5, how often do you need to use a portable storage device (e.g. USB memory stick) or cloud-based storage to save your files?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	2	.8	.8	.8
	A couple of times per month	6	2.3	2.3	3.1
	Frequent (3-4 times in a week)	47	18.1	18.1	21.2
	Once daily	91	35.0	35.0	56.2
	Multiple times a day	114	43.8	43.8	100.0
	Total	260	100.0	100.0	

On a scale of 1-5, how proficient (skillful)are you with using Microsoft Office (Word, Excel, PowerPoint)?

	Frequency	Percent	Valid Percent	Cumulative Percent

Valid	Terrible	2	.8	.8	.8
	Not so good	5	1.9	1.9	2.7
	Neutral	32	12.3	12.3	15.0
	Good	104	40.0	40.0	55.0
	Very good	117	45.0	45.0	100.0
	Total	260	100.0	100.0	

How familiar are you with Windows operating system?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Terrible	54	20.8	20.8	20.8
	Not so good	86	33.1	33.1	53.8
	Neutral	32	12.3	12.3	66.2
	Good	44	16.9	16.9	83.1
	Very good	44	16.9	16.9	100.0
	Total	260	100.0	100.0	

How familiar are you with MAC operating system?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Terrible	73	28.1	28.1	28.1
	Not so good	72	27.7	27.7	55.8
	Neutral	51	19.6	19.6	75.4
	Good	39	15.0	15.0	90.4
	Very good	25	9.6	9.6	100.0
	Total	260	100.0	100.0	

How familiar are you with Linux operating system?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Terrible	57	21.9	21.9	21.9
	Not so good	54	20.8	20.8	42.7
	Neutral	39	15.0	15.0	57.7
	Good	63	24.2	24.2	81.9
	Very good	47	18.1	18.1	100.0
	Total	260	100.0	100.0	

On a scale of 1-5, how skillful are you on fixing a physical computer hardware?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not so good	13	5.0	5.0	5.0
	Neutral	40	15.4	15.4	20.4
	Good	95	36.5	36.5	56.9
	Very good	112	43.1	43.1	100.0
	Total	260	100.0	100.0	

On a scale of 1-5, how much do you understand computer architecture such as the roles of CPU, RAM, and hard disk? In other words, the general knowledge of computer system

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not so good	3	1.2	1.2	1.2
	Neutral	42	16.2	16.2	17.3
	Good	137	52.7	52.7	70.0
	Very good	78	30.0	30.0	100.0
	Total	260	100.0	100.0	

On scale 1-5, how dependent are you on computers to perform your daily tasks? In other words, how much do you rely on digital format? For instance, (i) some prefer traditional pen & paper notes whilst some tend to use their phone/pad/PC to make notes. (ii

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at all	13	5.0	5.0	5.0
	Not so much	16	6.2	6.2	11.2
	Neutral	5	1.9	1.9	13.1
	Often	209	80.4	80.4	93.5
	All the time	17	6.5	6.5	100.0
	Total	260	100.0	100.0	

Staff only:On a scale of 1-5, how much do you rely on online utilities when developing course content?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at all	18	6.9	6.9	6.9
	Not so much	12	4.6	4.6	11.5
	Neutral	4	1.5	1.5	13.1
	Often	207	79.6	79.6	92.7
	All the time	19	7.3	7.3	100.0
	Total	260	100.0	100.0	

Staff only: On a scale of 1-5, how much do you rely on online utilities to manage course content?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at all	12	4.6	4.6	4.6
	Not so much	18	6.9	6.9	11.5
	Neutral	6	2.3	2.3	13.8
	Often	207	79.6	79.6	93.5
	All the time	17	6.5	6.5	100.0
	Total	260	100.0	100.0	

Staff only: On a scale of 1-5, how much do you rely on online utilities for the purpose of standardization of content, such as managing consistency?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at all	9	3.5	3.5	3.5
	Not so much	24	9.2	9.2	12.7
	Neutral	11	4.2	4.2	16.9
	Often	212	81.5	81.5	98.5
	All the time	4	1.5	1.5	100.0
	Total	260	100.0	100.0	

Staff only: On a scale of 1-5, how much do you rely on online utilities to deliver content such as lecture slides, coursework, attendance, grades?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at all	1	.4	.4	.4
	Not so much	20	7.7	7.7	8.1
	Neutral	32	12.3	12.3	20.4
	Often	117	45.0	45.0	65.4
	All the time	90	34.6	34.6	100.0
	Total	260	100.0	100.0	

(SUBJECTIVE NORMS: THE ACTUAL STATUS OF YOUR TECHNOLOGY USAGE OR APPROACH TO HANDLING TECHNOLOGY)You are very current and up to date with the latest technology in general''. On a scale of 1-5, how much do you agree with this statement?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	14	5.4	5.4	5.4
	Slightly disagree	35	13.5	13.5	18.8
	Neutral	37	14.2	14.2	33.1
	Slightly agree	97	37.3	37.3	70.4
	Strongly agree	77	29.6	29.6	100.0
	Total	260	100.0	100.0	

You are current and up to date with the latest technological developments only in the fields of your personal interest''. On a scale of 1-5, how much do you agree with this statement?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	14	5.4	5.4	5.4
	Slightly disagree	17	6.5	6.5	11.9
	Neutral	32	12.3	12.3	24.2
	Slightly agree	109	41.9	41.9	66.2
	Strongly agree	88	33.8	33.8	100.0
	Total	260	100.0	100.0	

Most of the time when a new technology is released, you consider yourself to be among the first people to try it among your friends''. On a scale of 1-5, how much do you agree with this statement?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	7	2.7	2.7	2.7
	Slightly disagree	5	1.9	1.9	4.6
	Neutral	25	9.6	9.6	14.2
	Slightly agree	130	50.0	50.0	64.2
	Strongly agree	93	35.8	35.8	100.0
	Total	260	100.0	100.0	

You can usually figure out new high-tech products and services without help from others''. On a scale of 1-5, how much do you agree with this statement?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	4	1.5	1.5	1.5
	Slightly disagree	28	10.8	10.8	12.3
	Neutral	48	18.5	18.5	30.8
	Slightly agree	88	33.8	33.8	64.6
	Strongly agree	92	35.4	35.4	100.0
	Total	260	100.0	100.0	

Sometimes it is challenging to figure out how to use new technology, but you enjoy these challenges''. On a scale of 1-5, how much do you agree with this statement?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	38	14.6	14.6	14.6
	Slightly disagree	88	33.8	33.8	48.5
	Neutral	37	14.2	14.2	62.7
	Slightly agree	32	12.3	12.3	75.0
	Strongly agree	65	25.0	25.0	100.0
	Total	260	100.0	100.0	

'Learning about new technology is time consuming, hence you will avoid it''. On a scale of 1-5, how much do you agree with this statement?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	47	18.1	18.1	18.1
	Slightly disagree	76	29.2	29.2	47.3
	Neutral	39	15.0	15.0	62.3
	Slightly agree	56	21.5	21.5	83.8
	Strongly agree	42	16.2	16.2	100.0
	Total	260	100.0	100.0	

The complication and efforts of learning or adapting to any type or form of new technology may scare you''. On a scale of 1-5, how much do you agree with this statement?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	78	30.0	30.0	30.0
	Slightly disagree	92	35.4	35.4	65.4
	Neutral	15	5.8	5.8	71.2
	Slightly agree	21	8.1	8.1	79.2
	Strongly agree	54	20.8	20.8	100.0
	Total	260	100.0	100.0	

You do not see the need to try a new technology because what you have now works just fine''. On a scale of 1-5, how much do you agree with this statement?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	26	10.0	10.0	10.0
	Slightly disagree	58	22.3	22.3	32.3
	Neutral	26	10.0	10.0	42.3
	Slightly agree	78	30.0	30.0	72.3
	Strongly agree	72	27.7	27.7	100.0
	Total	260	100.0	100.0	

PERCEPTION OF TECHNOLOGY(PERCEIVED INNOVATION (PI):THE DEGREE OF PERCEPTION ABOUT CLOUD COMPUTING IN TERMS OF INNOVATIVENESS.)Traditionally USB device is the common choice for file storage. On a scale of 1-5, how much would you prefer to save your persona

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Definitely not	41	15.8	15.8	15.8
	Unlikely	47	18.1	18.1	33.8
	Maybe or maybe not	4	1.5	1.5	35.4
	Likely	47	18.1	18.1	53.5
	Definitely yes	121	46.5	46.5	100.0
	Total	260	100.0	100.0	

On a scale of 1-5, how much would you like to have access to Apple MAC operating system online (subject to a minimum fee, for example $1 per hour)?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Definitely not	31	11.9	11.9	11.9
	Unlikely	30	11.5	11.5	23.5
	Maybe or maybe not	50	19.2	19.2	42.7
	Likely	98	37.7	37.7	80.4
	Definitely yes	51	19.6	19.6	100.0
	Total	260	100.0	100.0	

On a scale of 1-5, how much would you like to have access tothat are exclusive only to MAC operating system such as iTunes, iMovie, Pages, Numbers, iMessage, X code?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Unlikely	7	2.7	2.7	2.7
	Maybe or maybe not	10	3.8	3.8	6.5
	Likely	86	33.1	33.1	39.6
	Definitely yes	157	60.4	60.4	100.0
	Total	260	100.0	100.0	

Microsoft Office 365 can be offered to institutions (e.g. Universities) for online use (subject to certain cost), which includes software packages such as Word, Excel andPowerPoint. On a scale of 1-5, how much would you like to use these software online?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Definitely not	2	.8	.8	.8
	Unlikely	6	2.3	2.3	3.1
	Maybe or maybe not	25	9.6	9.6	12.7
	Likely	67	25.8	25.8	38.5
	Definitely yes	160	61.5	61.5	100.0
	Total	260	100.0	100.0	

Traditionally, all operating systems are pre-installed on your local machines. On a scale of 1-5, how much would you like to accessa different operating system online fromyour computer?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Definitely not	1	.4	.4	.4
	Unlikely	10	3.8	3.8	4.2
	Maybe or maybe not	14	5.4	5.4	9.6
	Likely	86	33.1	33.1	42.7
	Definitely yes	149	57.3	57.3	100.0
	Total	260	100.0	100.0	

PERCEIVED USEFULNESS (PU):The degree of perception about cloud computing in terms of usefulness e.g. enhancing academic or job performance(Most Storage-as-a-Service (SaaS) for example, Dropbox, provide features such as tracking historical version, which m

		Frequency	Percent	Valid Percent	Cumulative Percent
Traditionally, people normally carry your storage device (e.g. USB drive) with them when travelling''. On a scale of 1-5, how much would you prefer to be able to access your documents through the internet rather than carrying your storage device? This wou	Definitely not	2	.8	.8	.8
	Unlikely	1	.4	.4	1.2
	Maybe or maybe not	16	6.2	6.2	7.3
	Likely	62	23.8	23.8	31.2
	Definitely yes	179	68.8	68.8	100.0
	Total	260	100.0	100.0	
Valid	Definitely not				
	Unlikely				
	Maybe or mayb				
	Likely				
	Definitely yes				
	Total				
Valid					

Your storage device i.e.USB memory stick will have a limited amount of storage capacity e.g. 16GB, 32GB, 64GB''. On a scale of 1-5, how much would you like to have a high storage capacity of 1 terabyte (TB) or even more,delivered to you online? (There may

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Definitely not	5	1.9	1.9	1.9
	Unlikely	8	3.1	3.1	5.0
	Maybe or maybe not	15	5.8	5.8	10.8
	Likely	87	33.5	33.5	44.2
	Definitely yes	145	55.8	55.8	100.0
	Total	260	100.0	100.0	

Access to a variety of applications online can help students to be more creative with their coursework''. To what extent do you agree with the statement?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	36	13.8	13.8	13.8
	Slightly disagree	31	11.9	11.9	25.8
	Neutral	19	7.3	7.3	33.1
	Slightly agree	102	39.2	39.2	72.3
	Strongly agree	72	27.7	27.7	100.0
	Total	260	100.0	100.0	

Accessing a MAC operating system remotely/online, it might feel like you are using a slow machine because of network delay''. On a scale of 1-5, how much would you consider this as a problem?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Huge problem. Will not use it all	1	.4	.4	.4
	Annoys me and may consider to stop	3	1.2	1.2	1.5
	Neutral	18	6.9	6.9	8.5
	Put me off a bit	108	41.5	41.5	50.0
	Not a problem at all. Continue to use	130	50.0	50.0	100.0
	Total	260	100.0	100.0	

Access to lab software from home will be beneficial for you, so you do not have to come to the university all the time''.On a scale of 1-5, to what extent do you believe it will be beneficial to you?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Definitely not	3	1.2	1.2	1.2
	Unlikely	20	7.7	7.7	8.8
	Maybe or maybe not	19	7.3	7.3	16.2
	Likely	104	40.0	40.0	56.2
	Definitely yes	114	43.8	43.8	100.0
	Total	260	100.0	100.0	

Installation of software on your local computer can be slow, time consumingand involves admin permission issues''. On a scale of 1-5, how much would you rather simply access a software without the need of installation?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Definitely not	8	3.1	3.1	3.1
	Unlikely	32	12.3	12.3	15.4
	Maybe or maybe not	38	14.6	14.6	30.0
	Likely	76	29.2	29.2	59.2
	Definitely yes	106	40.8	40.8	100.0
	Total	260	100.0	100.0	

Having several software installed locally on your personal computer often consumesmany resources, for example, slowing down CPU speed, occupying RAM & hard disk space''. On a scale of 1-5, how likely are you to use software online instead of using it loca

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Definitely not	32	12.3	12.3	12.3
	Unlikely	33	12.7	12.7	25.0
	Maybe or maybe not	25	9.6	9.6	34.6
	Likely	99	38.1	38.1	72.7
	Definitely yes	71	27.3	27.3	100.0
	Total	260	100.0	100.0	

Accessing a MAC remotely/online can sometimes be slow because many users are accessing it at the same time''. On a scale of 1-5, how much will the speed of the operating system be a main concern to you?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Huge problem. Will not use it all	2	.8	.8	.8
	Neutral	22	8.5	8.5	9.2
	Put me off a bit	72	27.7	27.7	36.9
	Not a problem at all. Continue to use	164	63.1	63.1	100.0
	Total	260	100.0	100.0	

E-LEARNING FEATURES(Getting instructor's feedback and grades on assignments online The following e-learning features can be broadly categorized as cloud computing technology. On a scale of 1-5, what is your perceived usefulness of these features?)(

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Completely useless	15	5.8	5.8	5.8
	Not very useful	19	7.3	7.3	13.1
	Neutral	7	2.7	2.7	15.8
	partially useful	84	32.3	32.3	48.1
	Extremely useful	135	51.9	51.9	100.0
	Total	260	100.0	100.0	

Online discussions.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Completely useless	13	5.0	5.0	5.0
	Not very useful	12	4.6	4.6	9.6
	Neutral	10	3.8	3.8	13.5
	partially useful	77	29.6	29.6	43.1
	Extremely useful	148	56.9	56.9	100.0
	Total	260	100.0	100.0	

Turn-it-In for assignments and project

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Completely useless	1	.4	.4	.4
	Not very useful	1	.4	.4	.8

	Neutral	9	3.5	3.5	4.2
	partially useful	73	28.1	28.1	32.3
	Extremely useful	176	67.7	67.7	100.0
	Total	260	100.0	100.0	

Online access to sample exams and quizzes for learning purposes.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Completely useless	2	.8	.8	.8
	Not very useful	6	2.3	2.3	3.1
	Neutral	23	8.8	8.8	11.9
	partially useful	110	42.3	42.3	54.2
	Extremely useful	119	45.8	45.8	100.0
	Total	260	100.0	100.0	

Online syllabus

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not very useful	12	4.6	4.6	4.6
	Neutral	11	4.2	4.2	8.8
	partially useful	69	26.5	26.5	35.4
	Extremely useful	168	64.6	64.6	100.0
	Total	260	100.0	100.0	

Getting instructor's feedback and grades on assignments online

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	partially useful	211	81.2	81.2	81.2
	Extremely useful	49	18.8	18.8	100.0
	Total	260	100.0	100.0	

STAFF ONLY:After watching the demo, on a scale of 1-5, how muchdo you think cloud computing can help you with developing contents such as lecture notes and coursework design?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not very helpful	1	.4	.4	.4
	partially helpful	242	93.1	93.1	93.5
	Extremely helpful	17	6.5	6.5	100.0
	Total	260	100.0	100.0	

Staff only:After watching the demo, on a scale of 1-5, how much do you think cloud computing will help you with managing course content?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	partially helpful	245	94.2	94.2	94.2
	Extremely helpful	15	5.8	5.8	100.0
	Total	260	100.0	100.0	

Staff only:After watching the demo, on a scale of 1-5, how much do you think cloud computing will help you with standardizing your course content?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Completely irrelevant	1	.4	.4	.4
	partially helpful	210	80.8	80.8	81.2
	Extremely helpful	49	18.8	18.8	100.0
	Total	260	100.0	100.0	

Staff only:After watching the demo, on a scale of 1-5, how much do you think cloud computing will help you in delivering your course content?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Completely irrelevant	4	1.5	1.5	1.5
	Not very helpful	6	2.3	2.3	3.8
	Neutral	27	10.4	10.4	14.2
	partially helpful	78	30.0	30.0	44.2
	Extremely helpful	145	55.8	55.8	100.0
	Total	260	100.0	100.0	

PERCEIVED EASINESS (PE): The degree to which you believe that using cloud computing is easy(After watching the demo, on a scale of 1-5, how much will you agree to this statement? ‘‘Storing and retrieving documents online is relatively simple to do, and it

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	11	4.2	4.2	4.2
	Slightly disagree	4	1.5	1.5	5.8
	Neutral	22	8.5	8.5	14.2
	Slightly agree	76	29.2	29.2	43.5
	Strongly agree	147	56.5	56.5	100.0
	Total	260	100.0	100.0	

After watch the demo, how much will you rate the easiness of using Microsoft office online on a scale of 1-5?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very difficult	29	11.2	11.2	11.2
	Slightly difficult	42	16.2	16.2	27.3
	Neutral	50	19.2	19.2	46.5
	Slightly easy	75	28.8	28.8	75.4
	Very easy	64	24.6	24.6	100.0
	Total	260	100.0	100.0	

After watching the demo, on a scale of 1-5, to what extent do you agree with the statement? ‘‘Using a MAC operating system online is the same as owning the MACitself? There are no complications’’

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	2	.8	.8	.8
	Slightly disagree	12	4.6	4.6	5.4
	Neutral	83	31.9	31.9	37.3
	Slightly agree	98	37.7	37.7	75.0

	Strongly agree	65	25.0	25.0	100.0
	Total	260	100.0	100.0	

A thin client lab PCis a lightweight computer that only have peripheral devices (e.g. mouse, keyboard, and screen), load operating system, and retrieve resources (e.g. operating system, software) from a server. It is the same process as a computer.On a sc

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very difficult	2	.8	.8	.8
	Slightly difficult	1	.4	.4	1.2
	Neutral	12	4.6	4.6	5.8
	Slightly easy	91	35.0	35.0	40.8
	Very easy	154	59.2	59.2	100.0
	Total	260	100.0	100.0	

ATTITUDE TOWARDS TECHNOLOGY (ATT): Your evaluation of cloud computing or behaviour associated with the use of cloud computing(After watching several demos of cloud computing, you feel you can have control over your everyday activities with the use of clou

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	2	.8	.8	.8
	Neutral	15	5.8	5.8	6.5
	Slightly agree	59	22.7	22.7	29.2
	Strongly agree	184	70.8	70.8	100.0
	Total	260	100.0	100.0	

You get more freedom of mobility with cloud computing''.On a scale of 1-5, how important is the mobility to you?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Slightly disagree	2	.8	.8	.8
	Neutral	7	2.7	2.7	3.5
	Slightly agree	63	24.2	24.2	27.7
	Strongly agree	188	72.3	72.3	100.0
	Total	260	100.0	100.0	

After watching the demos, you feel as though cloud computing can enhance your learning abilities.'' On a scale of 1-5, how much will you agree to this statement?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neutral	1	.4	.4	.4
	Important	209	80.4	80.4	80.8
	Extremely important	50	19.2	19.2	100.0
	Total	260	100.0	100.0	

STAFF ONLY(''After watching the demos, you feel cloud computingcan enhance your work efficiency''. On a scale of 1-5, how much will you agree to this statement?)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	2	.8	.8	.8
	Slightly disagree	24	9.2	9.2	10.0
	Neutral	20	7.7	7.7	17.7
	Slightly agree	114	43.8	43.8	61.5
	Strongly agree	100	38.5	38.5	100.0
	Total	260	100.0	100.0	

'After watching the demo, how much do you trust cloud computing in general''? On a scale of 1-5

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somehow unconfident	7	2.7	2.7	2.7
	Neutral	8	3.1	3.1	5.8
	Mostly confident	93	35.8	35.8	41.5
	Very confident. I fully trust them	152	58.5	58.5	100.0
	Total	260	100.0	100.0	

After watching the demo, you believe cloud computing will cut down cost of operation in the university''. On a scale of 1-5, how much will you agree to this statement?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	8	3.1	3.1	3.1
	Slightly disagree	21	8.1	8.1	11.2
	Neutral	25	9.6	9.6	20.8
	Slightly agree	94	36.2	36.2	56.9
	Strongly agree	112	43.1	43.1	100.0
	Total	260	100.0	100.0	

PERCEIVED RELIABILITY (PR):The degree to which a person trusts or distrust a technology and its ability to work properly(If you use online storage service, dataare stored and managed by the host cloud provider e.g. Dropbox, iCloud. On a scale of 1-5, how

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Huge problem. Will not use it all	42	16.2	16.2	16.2
	Annoys me and may consider to stop	25	9.6	9.6	25.8
	Neutral	31	11.9	11.9	37.7
	Put me off a bit	59	22.7	22.7	60.4
	Not a problem at all. Continue to use	103	39.6	39.6	100.0
	Total	260	100.0	100.0	

Even though your files are always ready to download, you need the internet to access these files online. The unreliable internet service could hinder the performance of cloud computing and in turn affect your studies. On a scale of 1-5, how likely might t

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Huge problem. Will not use it all	16	6.2	6.2	6.2
	Annoys me and may consider to stop	35	13.5	13.5	19.6
	Neutral	42	16.2	16.2	35.8
	Put me off a bit	66	25.4	25.4	61.2
	Not a problem at all. Continue to use	101	38.8	38.8	100.0
	Total	260	100.0	100.0	

Accessing application and files online means you can ONLY rely on the cloud computing providers to deal with the virus or malware attacks. On a scale of 1-5, how much are you confident with their security measurement?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	I don't trust them at all	34	13.1	13.1	13.1
	Somehow unconfident	35	13.5	13.5	26.5
	Neutral	31	11.9	11.9	38.5
	Mostly confident	83	31.9	31.9	70.4
	Very confident. I fully trust them	77	29.6	29.6	100.0
	Total	260	100.0	100.0	

Denial of service (DOS) is a cyber-attack in which the perpetrator seeks to make a machine or network resource unavailable temporarily or indefinitely disrupting services. Such attack could potentially affect users of cloud computing. For example, if Drop

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Huge problem. Will not use it all	4	1.5	1.5	1.5
	Annoys me and may consider to stop	20	7.7	7.7	9.2
	Neutral	61	23.5	23.5	32.7
	Put me off a bit	114	43.8	43.8	76.5
	Not a problem at all. Continue to use	61	23.5	23.5	100.0
	Total	260	100.0	100.0	

In a lab environment, all security issues are managed centrally on a server. To what extent do you agree this is an effective solution?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Ineffective	38	14.6	14.6	14.6
	Not very effective	33	12.7	12.7	27.3
	Neutral	19	7.3	7.3	34.6
	Good enough	81	31.2	31.2	65.8
	Highly effective	89	34.2	34.2	100.0
	Total	260	100.0	100.0	

Phishing attack is often used to steal user data, including login credentials and credit card numbers. All SaaS providers (e.g. Dropbox) endeavours to prevent unsolicited access of user data and files. On a scale of 1-5, how much are you still concerned w

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neutral	1	.4	.4	.4
	Put me off a bit	223	85.8	85.8	86.2
	Not a problem at all. Continue to use	36	13.8	13.8	100.0
	Total	260	100.0	100.0	

STAFF ONLY(Security and privacy is an important aspect of cloud computing. With so much student data stored in place,would you recommend outsourcing a cloud provider to store student data?)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Definitely not	7	2.7	2.7	2.7
	Unlikely	19	7.3	7.3	10.0
	Maybe or maybe not	8	3.1	3.1	13.1
	Likely	221	85.0	85.0	98.1
	Definitely yes	5	1.9	1.9	100.0
	Total	260	100.0	100.0	

EXTERNAL FACTORS(ORGANIZATIONAL CHARACTERISTICS (OC) – (STAFF ONLY): The extent to which the university supports the adoption of cloud computing)(STAFF ONLY)The higher the storage capacity, the higher the cost. Do you feel the university management is wil

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Definitely not	11	4.2	4.2	4.2
	Unlikely	16	6.2	6.2	10.4
	Maybe or maybe not	7	2.7	2.7	13.1
	Likely	216	83.1	83.1	96.2
	Definitely yes	10	3.8	3.8	100.0
	Total	260	100.0	100.0	

Staff only:A large amount of computers will be required in the university labs to accommodate the huge number of students. To what extent do you feel the university is willing to purchase more computers to accommodate the large number of students?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Definitely not	9	3.5	3.5	3.5
	Unlikely	15	5.8	5.8	9.2
	Maybe or maybe not	16	6.2	6.2	15.4
	Likely	211	81.2	81.2	96.5
	Definitely yes	9	3.5	3.5	100.0
	Total	260	100.0	100.0	

Staff only:Both student and staff need a lot of storage space for primarily study or work purpose. On a scale of 1-5, how likely is the university willing to pay for such services?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Definitely not	48	18.5	18.5	18.5
	Unlikely	36	13.8	13.8	32.3
	Maybe or maybe not	37	14.2	14.2	46.5
	Likely	87	33.5	33.5	80.0
	Definitely yes	52	20.0	20.0	100.0
	Total	260	100.0	100.0	

'There are sufficient computers in the university labs for students to practice with''. On a scale of 1-5, to what extent do you agree with this statement?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	1	.4	.4	.4
	Neutral	3	1.2	1.2	1.5
	Slightly agree	55	21.2	21.2	22.7
	Strongly agree	201	77.3	77.3	100.0
	Total	260	100.0	100.0	

If Wi-Ficloud can be installed on campus,it will make it easy to enjoy the benefits of cloud computing by using personal computers or mobile phones to access certain application online without the need to visit the computer labs. To what extent do you ag

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	10	3.8	3.8	3.8
	Slightly disagree	35	13.5	13.5	17.3
	Neutral	21	8.1	8.1	25.4
	Slightly agree	65	25.0	25.0	50.4
	Strongly agree	129	49.6	49.6	100.0
	Total	260	100.0	100.0	

Other universities have far more advanced computers than the once you currently have in the university computer labs''. To what extent do you agree with this statement?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	1	.4	.4	.4
	Slightly disagree	1	.4	.4	.8
	Neutral	13	5.0	5.0	5.8
	Slightly agree	97	37.3	37.3	43.1
	Strongly agree	148	56.9	56.9	100.0
	Total	260	100.0	100.0	

EXTERNAL PRESSURE (EP): The degree to which you feel pressured because of influence from external parties such as competitors, peers or management.(There are universities in Nigeria that have already adopted cloud computing''. On a scale of 1-5, to what e

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	19	7.3	7.3	7.3
	Slightly disagree	28	10.8	10.8	18.1
	Neutral	64	24.6	24.6	42.7
	Slightly agree	52	20.0	20.0	62.7
	Strongly agree	97	37.3	37.3	100.0
	Total	260	100.0	100.0	

There is pressure from within the university to improve method of teaching and communicating with students via digital technology''. On a scale of 1-5, to what extent will you agree to this statement?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	16	6.2	6.2	6.2
	Slightly disagree	32	12.3	12.3	18.5
	Neutral	23	8.8	8.8	27.3
	Slightly agree	68	26.2	26.2	53.5
	Strongly agree	121	46.5	46.5	100.0
	Total	260	100.0	100.0	

Student are demanding improved quality of teaching in the area of e-learning''. On a scale of 1-5, to what extent will you agree to this statement?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	38	14.6	14.6	14.6
	Slightly disagree	34	13.1	13.1	27.7
	Neutral	22	8.5	8.5	36.2
	Slightly agree	69	26.5	26.5	62.7
	Strongly agree	97	37.3	37.3	100.0
	Total	260	100.0	100.0	

'There is pressure from government bodies that demands high quality standard education using digital technology''. On a scale of 1-5, to what extent will you agree to this statement?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	10	3.8	3.8	3.8
	Slightly disagree	16	6.2	6.2	10.0
	Neutral	5	1.9	1.9	11.9
	Slightly agree	206	79.2	79.2	91.2
	Strongly agree	23	8.8	8.8	100.0
	Total	260	100.0	100.0	

TECHNICAL SUPPORT (TS)STAFF ONLY: Your perception of support received from the university your fellow colleagues STAFF ONLY(Staff only:Routine checks, and upgrades of computing resources are essential. Would you say the university have sufficient IT staffs f

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	4	1.5	1.5	1.5
	Slightly disagree	3	1.2	1.2	2.7
	Neutral	31	11.9	11.9	14.6
	Slightly agree	107	41.2	41.2	55.8
	Strongly agree	115	44.2	44.2	100.0
	Total	260	100.0	100.0	

The cloud computing providers should offerus with help and advice about cloud computing. On a scale of 1-5, how much do you agree with the statement?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	56	21.5	21.5	21.5
	Slightly disagree	46	17.7	17.7	39.2
	Neutral	18	6.9	6.9	46.2
	Slightly agree	93	35.8	35.8	81.9
	Strongly agree	47	18.1	18.1	100.0
	Total	260	100.0	100.0	

Do you have the impression that IT support team is always happy to help? On a scale of 1-5, how would you rate the level of your satisfactory with the attitude you get from the IT support team whenever you need help?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Highly disappointed	40	15.4	15.4	15.4
	Not satisfied	58	22.3	22.3	37.7
	Neutral	18	6.9	6.9	44.6
	Happy	79	30.4	30.4	75.0
	Very satisfied	65	25.0	25.0	100.0
	Total	260	100.0	100.0	

On a scale of 1-5, how much would you rate the efficiency and promptness for the response you get when you request for help from IT support team?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No response	2	.8	.8	.8
	Slow	32	12.3	12.3	13.1
	Neutral	55	21.2	21.2	34.2
	Moderate	102	39.2	39.2	73.5
	Very fast	69	26.5	26.5	100.0
	Total	260	100.0	100.0	

On a scale of 1-5, how would you rate the level of knowledge and skills of the IT support staffs? How effective are they in rendering solution to problems?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not very effective	1	.4	.4	.4
	Neutral	13	5.0	5.0	5.4

	Good enough	82	31.5	31.5	36.9
	Highly effective	164	63.1	63.1	100.0
	Total	260	100.0	100.0	

SOCIAL INFLUENCE (SI): The degree to which you feel cloud computing can impact the learning community (The ability to share learning resources online will have a positive impact on a student's learning ability''. On a scale of 1-5, how much do you agree w

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	2	.8	.8	.8
	Slightly disagree	16	6.2	6.2	6.9
	Neutral	28	10.8	10.8	17.7
	Slightly agree	74	28.5	28.5	46.2
	Strongly agree	140	53.8	53.8	100.0
	Total	260	100.0	100.0	

'The opportunity to practice another operating system (such as MAC) gives students more experience, hence more chance to find a job''. On a scale of 1-5, how much do you agree with the statement?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Slightly disagree	4	1.5	1.5	1.5
	Neutral	13	5.0	5.0	6.5
	Slightly agree	95	36.5	36.5	43.1
	Strongly agree	148	56.9	56.9	100.0
	Total	260	100.0	100.0	

Working with different software increases knowledge and skills among the community of students of different background''. On a scale of 1-5, how much do you agree with the statement?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Slightly disagree	4	1.5	1.5	1.5
	Neutral	5	1.9	1.9	3.5
	Slightly agree	48	18.5	18.5	21.9
	Strongly agree	203	78.1	78.1	100.0
	Total	260	100.0	100.0	

Working together in a lab increases the chances of sharing idea with fellow peers''. On a scale of 1-5, how much do you agree with the statement?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Slightly agree	130	50.0	50.0	50.0
	Strongly agree	130	50.0	50.0	100.0
	Total	260	100.0	100.0	

8.6 Appendix F:Analysis and Discussion

Validity of the questions according to 5 experts answers

Constructs	Items	Totally Fit (5)	Fit (4)	Moderate (3)	Unfit (2)	Totally Unfit	Validity (%)
Demographic (DM)	DM1-DM6	3 3	2 2				92% 92%
Computer Self-Efficacy (CSE)	CSE1-CSE5	3 3	2 2				92% 92%
Subjective Norms (SN)	SN1-SN2 SN3 SN4 SN5 SN6 SN7 SN8 SN9	5 4 3 3 4 4 3 4 4	 1 2 2 1 1 2 1 1				100% 96% 92% 92% 80% 96% 92% 96% 96%
Perceived Innovation (PI)	PI1 PI2 PI3 PI4 PI5	3 3 4 4 3	2 2 1 1 1				92% 92% 96% 96% 96%
Perceived Usefulness (PU)	PU1-PU3 PU4 PU5 PU6 PU7 PU8 PU9 PU10-PU14	3 2 3 3 5 3 3 3	2 3 2 2 1 1 2	 1 1 	 . 		92% 88% 92% 92% 100% 88% 88% 92%
Perceived Easiness (PE)	PE1-PE4	5					100%
Attitude Towards Technology (ATT)	ATT1 ATT2 ATT3 ATT4 ATT5 ATT6	5 2 3 2 3 5	 3 2 3 2 				100% 88% 92% 88% 92% 100%
Perceived Reliability (PR)	PR1 & PR4 PR2 PR3, PR5 & PR7 PR6	3 2 3 3 5 2	2 2 2 2 3	 1 			92% 84% 92% 92% 100% 88%
Organizational Characteristics (OC)	OC1-OC3 OC4 OC5 OC6	3 3 2 5	2 2 3 				92% 92% 88% 100%
External Pressure (EP)	EP1 EP2-EP3 EP4	2 3 4	3 2 1				88% 92% 92%
Technical Support (TS)	TS1-TS2 TS3 TS4 TS5	3 4 2 3	2 1 2 2	 1 			92% 92% 84% 92%
Social Influence (SI)	SI1 SI2 SI3 SI4	5 5 4 4	 1 1			 **Total**	100% 100% 96% 96% **88%**

Reliability Statistics

Variable	Cronbach's Alpha	Number of Items
Demographic and Background	0.706	6
Computer self-efficiency	0.750	17
Subjective Norms	0.860	8
Perceived Innovation	0.610	5
Perceived Usefulness	0.534	19
Perceived Easiness	0.640	4
Attitude toward Technology	0.717	6
Perceived Reliability	0.688	7
Organisational Characteristics	0.722	6
External Pressure	0.520	4
Technical Support	0.875	5
Social Influence	0.788	4
Overall Average Measurement	0.806	91

Questionnaire design against CTRAM

Individual Characteristics	Demographic	DM1-DM6	Gender, age, education, discipline, job role, university
	Computer Self-Efficacy	CSE1-CSE5	Former experience with cloud computing
	Subjective Norms	SN1-SN2	You are very current and up to date with the latest technology
		SN3	You consider yourself to be among the first people to try it among your friends
		SN4	You consider yourself first to try a new technology among your classmates
		SN5	You usually figure out high-tech products and services without help from others
		SN6	You enjoy the challenges of using new high-tech products or services
		SN7	You avoid new technology if it is time consuming
		SN8	Complication of high-tech product or service scares you
		SN9	You do no not need new technology, satisfied with existing one
Perception of Technology	Perceived Innovation	PI1	How much would you prefer to save your documents online
		PI2	How much would you like to have access to MAC operating system online
		PI3	How much would you like access to features exclusive to MAC operating system
		PI4	How much would you like access to Microsoft office 365 online
		PI5	How much would you like access to operating system online
	Perceived Usefulness	PU1-PU3	How much would you like access to online storage
		PU4	Online applications can improve students' creativity
		PU5	Accessing Operating system online may be slow due to network issues
		PU6	Access to lab software from home will be beneficial for you
		PU7	Installation of software on your local computer can be slow, time consuming
		PU8	Access to application means you have more free space on your local computer
		PU9	Does the speed matter to you when access operating system or applications online
		PU10-PU14	What is your perceived usefulness of these e-learning features
	Perceived Easiness	PE1-PE4	Using cloud storage/applications/software is easy
	Attitude Towards Technology	ATT1	You feel you can have control over your everyday activities with the use of cloud computing
		ATT2	You get more freedom of mobility with cloud computing
		ATT3	You feel as though cloud computing can enhance your learning abilities
		ATT4	You feel cloud computing can enhance your work efficiency
		ATT5	How much do you trust cloud computing in general
		ATT6	You believe cloud computing will cut down cost of operation in the university
	Perceived Reliability	PR1 & PR4	How much are you worried about CC accessibility
		PR2	How much are you worried about CC reliability
		PR3, PR5 & PR7	How much are you worried about CC security
		PR6	How much are you worried about CC privacy
External Factors	Organizational Characteristics	OC1-OC3	Is the university willing to pay for high cost CC product and services
		OC4	There are sufficient computers in the university labs for students to practice with
		OC5	To what extent do you agree that campus Wi-Fi cloud is a good idea?
		OC6	Other universities have far more advanced computers than our university lab
	External Pressure	EP1	There are universities in Nigeria that have already adopted cloud computing
		EP2-EP3	There is pressure from the university to teach and communicate with students
		EP4	via digital technology

			There is pressure from the government to teach using digital technology
	Technical Support	TS1-TS2 TS3 TS4 TS5	Does the university have enough for routine check and maintenance of computing resources Do you have the impression that IT support team is always happy to help Rate the efficiency and promptness of response from IT support team Rate the level of knowledge and skills of the IT support staffs
	Social Influence	SI1 SI2 SI3 SI4	Sharing learning resources online have a positive impact on a student's learning ability The opportunity to practice another operating system (such as MAC) gives students more experience Using different software increases knowledge and skills among the community of students Working together in a lab increases the chances of sharing idea with fellow pees

Source: Researcher