CLOUD COMPUTING ADOPTION MODEL WITH THE MODERATING ROLE OF PERCEIVED TRUST IN NORTH-ESTHERN NIGERIAN ACADEMIC LIBRARIES

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by

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LIST OF ABBREVIATIONS

CAATTs	Computer-Assisted Audit Tools and Techniques
CB- SEM	Covariance-Based Structural Equation Model
COM	Compatibility
CMV	Common Method Variance
CP	Competitive Pressure
DOI	Diffusion of Innovation Theory
ERP	Enterprises Resources Planning
EU	European Union
GR	Government Regulations
IaaS	Infrastructure as a Service
IACC	Intention to Adopt Cloud Computing
ICT	Information and Communication Technology
IT	Information Technology
MPCU	Model of Personal Computer Utilization
NIST	National Institute of Standards and Technology
NOUN	National Open University of Nigeria
NUC	National Universities Commission
OCLC	Online Computer Library Centre
OPAC	Online Public Access Catalogue
OR	Organizational Readiness
PaaS	Platform as a Service
PDA	Personal Digital Assistants
PLS	Partial Least Square
PLS-SEM	Partial Least Square – Structural Equation Model
RA	Relative Advantage
RFID	Radio Frequency Identification
SaaS	Platform as a Service
SEM	Structural Equation Model
SMEs	Small and Medium Enterprises
SPSS	Statistical Package for Social Science
TAM	Technology Acceptance Model

TAE	Training and Education
TMS	Top Management Support
TPH	Technophobia
TOE	Technological Organizational Environmental
TPB	Theory of Plan Behaviour
TRA	Theory of Reason Action
USM	Universiti Sains Malaysia
UTAUT	Unified Theory of Acceptance and Use of Technology

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MODEL PENERIMAGUNAAN PENGKOMPUTERAN AWAN DENGAN PERANAN PENYEDERHANAAN KEPERCAYAAN ANGGAPAN DI PERPUSTAKAAN AKADEMIK NIGERIA TIMUR UTARA

ABSTRAK

Peranan pengkomputeran awan dalam meningkatkan kecekapan perkhidmatan di perpustakaan akademik telah diakui secara meluas. Walau bagaimanapun, penggunaannya di perpustakaan akademik Nigeria, terutamanya di Timur Laut, kekal rendah atau tidak wujud, yang membawa kepada rasa tidak puas hati dengan penyampaian perkhidmatan maklumat. Kekurangan penggunaan ini telah mengakibatkan perkhidmatan tidak berskala, kehilangan data, perkongsian terhad dan keusangan teknologi, yang semuanya memberi kesan kepada kecekapan perpustakaan dan prestasi akademik pelanggan. Kajian ini menyiasat faktor-faktor yang mempengaruhi penggunaan pengkomputeran awan di perpustakaan akademik Nigeria Utara-Timur, dipandu oleh Teori Penyebaran Teori Inovasi (DOI) dan rangka kerja Teknologi-Organisasi-Persekitaran (TOE). Menggunakan pendekatan kaedah campuran, 192 soal selidik telah dianalisis bersama-sama temu bual dengan 16 responden untuk membuat triangulasi dapatan. Pemodelan Persamaan Struktur Kuasa Dua Terkecil Separa (PLS-SEM) telah digunakan untuk menguji hubungan hipotesis. Keputusan menunjukkan bahawa semua pembolehubah bebas secara signifikan mempengaruhi niat untuk mengguna pakai pengkomputeran awan, dengan peraturan kerajaan memberikan pengaruh tertinggi (nilai-t: 6.725) dan latihan/pendidikan paling rendah (nilai-t: 1.925). Selain itu, kepercayaan yang dirasakan menyederhanakan hanya satu daripada lapan hubungan yang diuji. Dapatan temu bual menguatkan keputusan soal selidik, mengukuhkan kesahan kajian. Kajian itu mengesyorkan agar

pembuat keputusan, penggubal dasar kerajaan dan pihak berkepentingan menangani faktor yang mempengaruhi ini untuk memudahkan penggunaan pengkomputeran awan di perpustakaan akademik.

CLOUD COMPUTING ADOPTION MODEL WITH THE MODERATING ROLE OF PERCEIVED TRUST IN NORTH-ESTHERN NIGERIAN ACADEMIC LIBRARIES

ABSTRACT

The role of cloud computing in enhancing service efficiency in academic libraries has been widely acknowledged. However, its adoption in Nigerian academic libraries, particularly in the North-East, remains low or absent, leading to dissatisfaction with information service delivery. This lack of adoption has resulted in non-scalable services, data loss, limited partnerships, and technological obsolescence, all of which impact library efficiency and clients' academic performance. This study investigates the factors influencing the adoption of cloud computing in North-Eastern Nigerian academic libraries, guided by the Diffusion of Innovation Theory (DOI) and the Technological-Organizational-Environmental (TOE) framework. Using a mixed-methods approach, 192 questionnaires were analyzed alongside interviews with 16 respondents to triangulate findings. Partial Least Square-Structural Equation Modelling (PLS-SEM) was employed to test hypothesized relationships. Results show that all independent variables significantly influence the intention to adopt cloud computing, with government regulation exerting the highest influence (t-value: 6.725) and training/education the lowest (t-value: 1.925). Additionally, perceived trust moderates only one of the eight tested relationships. Interview findings corroborate the questionnaire results, strengthening the study's validity. The study recommends that decision-makers, government policymakers, and stakeholders address these influencing factors to facilitate cloud computing adoption in academic libraries.

CHAPTER 1

INTRODUCTION

1.1 Overview of the Study

This chapter discusses the scenario surrounding the adoption of cloud computing in Nigerian academic libraries which exposes and establishes issues and reasons for this research. Despite the role of cloud computing in improving services of academic libraries, its adoption in North-eastern Nigerian academic libraries seems to be absent which causes serious deficiency in service delivery, hence pointing more reasons to conduct research in that aspect to address the unwanted situation. It is seriously argued by previous researchers (Ajani et al., 2022; Comfort, 2018; Idahosa & Eireyi-Edewede, 2023; Tella et al., 2020) that the adoption of cloud computing by academic libraries in Nigeria is vague thus causing poor service delivery and discomfort on the part of the users. This reflects the assertion of Ango, (2022) who acknowledges that manual operations in the academic libraries in this technological era made the services of the library to be munde, inept and unproductive leading to serious challenges in serving the teeming number of library users.

Therefore, identifying factors that can influence cloud computing adoption, especially in the concern area is essential as it will be used to enhance and boost the adoption of the said technology which in turn provides efficient and better service delivery that can sustain the current needs of library users. Adam et al., (2019) reveal that once the factors that influence the adoption of technology are identified, the adoption rate will be is high, hence making the impact of that technology more visible and significant. Academic libraries can deliver efficient services to users once they employ the use of better technology such as cloud computing. Ango (2022)

acknowledges that knowing the means of integrating technology in service delivery is an important step toward giving out required service to users.

Generally, there is insufficient information on the determinants that influence the intention to determine the adoption of cloud computing in academic libraries, which left doors of research in that aspect open. examining the determinants of cloud computing adoption in academic libraries context are still not completely investigated (Tella et al., 2020). Empirical Investigation of cloud computing adoption intention determinants in Nigerian academic libraries is too scarce compared to developed countries, and even the little ones have revealed inconsistent results. The question of what influences the adoption of cloud computing by North-Eastern Nigerian academic libraries in particular remains unanswered. Disturbingly, previous studies paid more attention to other aspects such as individual user adoption of the cloud technology, awareness of the cloud computing, concept of cloud computing and particular higher educational institutions where the libraries are domiciled. Therefore, to address the associated challenges and fill the identified gaps, carrying out research on this matter is of paramount important.

1.2 Background of the Study

Academic libraries are among the organizations that deal with the acquisition, storage, processing and distribution of vast data and information to its intended clients (Ogwo et al., 2020), hence to get technology means that can facilitate their services more efficiently is of great importance. Academic libraries are libraries that are attached to higher institutions of learning, serving the teaching and research requirements of their clients (Masenya & Chisita, 2022; Oyegunle, 2013). The roles of academic libraries are aligning toward the changes and challenges that libraries are

experiencing. For example, social media like Facebook as a product of cloud computing possesses all the necessary tendencies to be an alternative platform for marketing and enhancing library services (Harrison et al., 2017). With increased digital opportunities and e-resources, it is imperative for academic libraries to examine this new trend of innovativeness and information needs (Sadiku et al., 2017). Therefore, there is a need for academic libraries to continue developing the intention and technical knowledge.

Cloud computing has greatly attracted the attention of people across the globe by its scalable shared service nature which aimed at improving data collection, storage, processing, dissemination among others. Cloud computing is defined by Gartner (2012) in (Senarathna et al., 2016) as "*a style of computing in which massively client scalable and elastic IT-enabled capabilities are delivered as a service to external customers using internet technologie*s". Therefore, cloud computing is understood as a computing system in which scalable data services are provided through the internet on-demand and pay-as-you-use basis. Cloud services providers always supply the services to subscribed users through three basic models as software as a service (SaaS), platform as a service (PaaS) and infrastructure as a service (IaaS) (Odun-Ayo et al., 2022).

Furthermore, cloud computing has improved service delivery of libraries through increased computing capabilities, storage capacities, global information access, and substantial decreased in cost (Ango, 2022). Cost minimization is one of the attributes that attract most organizations to adopt cloud computing (Idahosa & Eireyi-Edewede, 2023). A survey has been conducted by Datometry (2020) among 166 information technology (IT) leaders in advance countries, in which the results

reveal that 61% acknowledge cost reduction as their reasons for adopting cloud computing, 57% mention the desire to have new features and capabilities and 30% highlight that the inadequate space in their premises made them to switch to cloud technologies. Cloud computing ensures increased productivity and efficiency in data management of organizations as well as relieving them from owning and maintaining bunch of hardware and software (Sivankalai, 2021; Yaokumah & Amponsah, 2017).

Similarly, cloud computing plays a vital roles to information services providers such as academic libraries in terms of cost minimization, improved service scalability, improved work collaboration, increased accessibility and increased mobility (Aviamu et al., 2019; Carcary et al. 2014; Ogwo et al., 2020; Romero., 2012). It has been predicted that by the year 2020, 80% of enterprises workloads will be accommodated on a cloud platform, leaving only 27% on-premises (Louis, 2018). Correspondingly, GrantViewResearch (2020) has forecasted that by 2022, about 60% of enterprises will opt to an external service provider's cloud -managed service offering, which is twice that of 2018. The same report reveals that by 2022 more computing power will be offered by cloud services providers than enterprises data centres. Increase in use of edge computing, 5G, real time analytics and machine learning are likely to boost the utility of this cloud computing technology among organizations (GrantViewResearch, 2020).

Furthermore, it has been forecasted that the global market of cloud computing will grow up to more than $241 billion by 2020 (Forrester, 2020). Additionally, it has been reported that around $1.2 million to $2.4 million are spent by 50% of enterprises per year in developed countries with 38% of that spending above $2.4 million yearly (Flexere, 2019). This indicates that cloud computing is undergoing an increase in the

rate of adoption within the global context. In a single study conducted in China, 81% of respondents surveyed, believed that the cloud technology will be more popular in the following year (Khayer et al., 2020).

In spite of its benefits and potentiality, cloud computing also has many challenges such as incompatibility issues, complexity, cost, hidden benefits nature, latency, inadequate user experience, security and privacy (Odun-Ayo et al., 2022). These challenges cause hesitant to its adoption hence there is a need to tackle them to inspire its adoption and usage. Moreover, it is revealed that other challenges associated with the adoption of cloud computing by academic libraries in African countries and Nigeria specifically include fear of new technology, lack of enabling rules for its usage, poor staff training, poor network connectivity and bandwidth, cost, lack of support from superior officials, inadequate skills and acceptability by many users (Odun-Ayo et al., 2022; Ogwo et al., 2020). It is evident that if these challenges are not addressed, they will continue to deter the adoption of cloud computing and enforce continued underperformance in service delivery, hence dwindling students' academic performance.

Non-adoption of novel technology such as cloud computing and its allied has changed the narration of Nigerian academic libraries from where the information seekers will satisfy their information needs to where they can suffer and be unsatisfied with their information needs (Ogwo et al., 2020). Furthermore, the non-adoption of cloud computing by academic libraries lead to poor academic performance and affect the general well-being of the library clients (Sivankalai, 2021). If this situation is left unchecked, as claim by Olukayode et al. (2022) the problem may persist and create

total inefficiency in service delivery and dissatisfaction in seeking knowledge-based information by the library clients.

Edwin (2018) has recommended that Nigerian academic libraries should adopt cloud computing in their operations as it improves their service delivery to their library clients seamlessly. Despite the recommendations made to adopt cloud computing services and the initial understanding of its importance to academic libraries, the intention to adopt cloud computing by Nigerian academic libraries seems to be limited. Likewise, the adoption rate is still very low in developing countries (Odun-Ayo et al., 2022), the same narration in African countries which are all attributed to several factors such as environmental issues, perceived trust, compatibility issues, poor backing from the top management, security and lack of institutional policy issues (Aviamu et al., 2019; Masenya & Chisita, 2022; Telukdarie & Shisane, 2018).

There are serious concerns related to cloud computing adoption across organizations and countries. Specifically, results from EU study provide evidence of these concerns where a survey of 158,000 enterprises in the EU-28 shows that only 26% of organizations have adopted cloud computing as of 2018, a relatively modest increase from 19% in 2014 (Vu et al., 2020). In addition, the study has found that cloud computing adoption is uneven across different countries and business sectors. The adoption rates have exceeded 50% for Finland, Sweden, and Denmark, but is below 15% for other countries such as Greece, Latvia, and Poland. The situation in Romania and Bulgaria is even worst by having only 10% adoption rate. Among business sectors, the adoption rate is highest within the information and communications sector (64%), but below 25% within the construction, retail, education and manufacturing sectors (Vu et al., 2020). This highlights that academic libraries which are part of the

educational sector has very low adoption rates. This issue is further intensified in developing countries, which lack an enabling environment for organizations to migrate to cloud platforms (Odun-Ayo et al., 2022; Senyo et al., 2016; Vu et al., 2020).

In the same vein, Muhammad (2021) acknowledges that Nigeria, like many other countries, is facing challenges in adopting cloud computing in various sectors, including academic libraries. Several factors seem to likely hinder its widespread adoption in Nigeria. Statistics from previous research have revealed that an aggregate Mean of 1.09 as against the criterion Mean of 1.50, of librarians who are aware of cloud computing indicates that the majority of them do not even have much awareness of cloud computing (Idahosa & Eireyi-Edewede, 2023). Similarly, 80% of academic libraries have been reported that they still operate manually, likewise 96% of academic libraries in North-Eastern Nigeria do not utilize cloud computing technologies in their service delivery which brings about unsatisfactory information services delivery, thus leading to poor academic performance by members of the academic community (Adamu et al., 2021). Therefore, the need to arrest this menace is very important in order to have maximum efficiency in library service delivery for better academic performance.

The above scenario indicates that realizing the transformative potential of cloud computing technology requires actions by IT policymakers based on their knowledge of macro-level drivers (determinants) for cloud computing adoption, especially in developing countries. This coupled with the fact that empirical studies in African countries such as Nigeria's academic libraries are still very scarce especially using an appropriate framework or theory to better build an understanding of cloud computing adoption (Ansalem Ez & Igbekele, 2019; Odun-Ayo et al., 2022; Ogwo et

al., 2020). Disturbingly, the question of what influences the adoption of cloud computing by North-Eastern Nigerian academic libraries in particular remains unanswered. Equally, examining the determinants of cloud computing adoption in academic libraries context are still not completely investigated (Tella et al., 2020).

Moreover, previous studies paid more attention to other aspects such as individual user adoption of the cloud technology, awareness of cloud computing, concept of cloud computing and particular higher educational institutions where the libraries are domiciled (Masenya & Chisita, 2022).

Based on these gaps as well as realizing its practical implication for the educational industry, this study intends to investigate the factors that influence cloud computing adoption among North-Eastern Nigerian academic librarians using the Technological Organizational Environmental (TOE) framework by Tornatzky and Fleischer (1990) and Diffusion of Innovation Theory (DOI) by Rogers (1995) which are to be moderated by the perceived trust factor. This is because of the significant role that trust plays in technology adoption. Trust is an essential factor that seriously champions the attention of users with regard to adopting a given technology like cloud computing (Iyal, 2018). Similarly, TOE and DOI have been widely tested, validated and adopted as reliable theories for determining technology adoption at organizational levels (Low et al., 2011), even though Kandil et al. (2018) confirmed that only few researches are conducted using these theories in most developing countries.

1.3 Problem Statement

Several information and communication technology (ICT) initiatives such as library computerization and automation, have been deployed by relevant authorities in Nigeria in an attempt to modernize academic library service delivery around 70s and

80s, but they all suffered and some eventually failed due to some number of factors that include inadequate fund allocations, technophobia, epileptic electricity, in adequate technical skill of librarians, maintenance culture and cost of maintenance (Comfort, 2018; Komolafe-Opadeji & Ojo, 2019; Mshelia et al., 2019). Similarly, hardware and software issues, and system breakdowns due to heavy transactions have constituted an issue and source of their failure. Furthermore, on-premises ICT facilities cannot accommodate the information need style of clients as most of the clients nowadays prepare satisfying their information need through anywhere-anytime mode with great ease and convenience (Kennith et al., 2018). Under this circumstances, Zubairu et al. (2021) have submitted that adopting of new and better technology by librarians remains the only alternative in order to salvage the situation.

Therefore, cloud computing as a technology that works on the principle of resources and infrastructure sharing with full potential for providing efficient, seamless and cost-effective service delivery (Adegbilero-iwari & Hamzat, 2017) became the next alternative and solution to all the issues affecting service efficiency (Adegbilero-iwari & Hamzat, 2017; Comfort, 2018; Edwin, 2018). Cloud technologies enable libraries to enhance their information resources management, access and dissemination which has significantly revolutionized educational sector and enriched the worthiness of services rendered (Ogwo et al., 2020).

In 2019 the global cloud computing market was valued at $266.0 and by 2020-2027, it is expected to experience expansion at a Compound Annual Growth Rate (CAGR) of 14.9% (GrantViewResearch, 2020). In their 2023 report, Grant View Research also revealed that in 2022 the global cloud computing market was valued at USD 483.89 billion and it is expected to grow at a CAGR of 14.1% from 2023 to 2030.

Similarly, Hostingtribunal.com, (2020) has revealed that by 2023, the global market of cloud computing is anticipated to hit $ 623.3 billion. Equally, Reportlinker (2020) has reported that by 2025, the cloud computing market growth worldwide is forecasted to reach $832.1billion which reveals a rapid increase compare to previous years thus citing COVID 19 that necessitate Work From Home as a reason.

Disturbingly, despite the numerous advantages cloud computing gives and its wide adoption in advanced countries, it has been revealed that the rate of its adoption in most African countries is very low and discouraging, as there are no clear guiding policies, encouragement from the relevant authorities and other related factors, hence resulted in unsatisfactory services delivery (Odun-Ayo et al., 2022; Senarathna et al., 2016). Additionally, Idahosa and Eireyi-Edewede (2023) have found the adoption rate of cloud computing in educational context especially in developing countries as very low. In the same vein, Academic libraries' adoption and use of cloud computing is reported as low and discouraging (Comfort, 2018; Edwin, 2018). Moreover, empirical investigations into the determinants that affect the adoption of cloud computing by academic libraries are still at the preliminary stage (Ansalem & Igbekele, 2019).

The situation with regard to Nigerian academic libraries context is even worst. Existing evidences have indicated that cloud computing adoption by Nigerian academic libraries are either still very low, dormant or even absent which has resulted in poor services delivery to library clients (Idahosa & Eireyi-Edewede, 2023; Kennith et al., 2018; Muthanna & Sang, 2019). Moreover, another research by Edwin (2018) also confirms that the adoption of cloud computing by academic libraries in the South-South Nigeria is inadequate. This could be due to the lack of cloud-based technology awareness among Nigerian academic librarians as highlighted by Ajibola (2016). In

their study finding, Zubairu et al. (2021) reveals that 76% of academic libraries have not adopted cloud computing officially for services delivery, 31% are looking into the possibility of adopting it while only 6% have started the adoption process.

Similarly, Al-Ramahi et al. (2022) have reported that out of 100 respondents surveyed, only 19 start using cloud computing applications for more than one year, 12 have just started using it, 18 have recently installed it on their phone and a larger portion of them amounting to 43 have never used cloud computing. In another study by Loghmani et al.(2022), results have revealed that some librarians are aware of cloud computing but they are not using it officially for service delivery. The hesitant to patronize cloud computing by libraries has resulted in issues that need to be addressed. Idahosa & Eireyi-Edewede (2023) have revealed that non-adoption of cloud computing affects the smooth information services delivery of the libraries which in turn make knowledge-based information accessibility and utilization at all the time impossible.

The non-adoption of cloud computing by academic libraries in Nigeria has led to several challenges, including limited storage capacity, high infrastructure investment, restricted access to library resources, non-scalable service delivery, data loss due to fire, termites, and other environmental factors, limited collaboration among sister libraries, and technological obsolescence (Masenya & Chisita, 2022) which greatly brings poor service delivery by libraries, thus leading to poor academic performance on the part of the students.

Several complaints have been advanced by users regarding library service dissatisfaction. Library users are constantly expressing dismay with regard to the untimely services, frequent server downtime due to electricity outages, un- even

services to users, in ability to access the library contents remotely using current on - premises ICT facilities (Kayode et al., 2020). These issues can only be solved if the librarians can adopt cloud computing which can offer them scalable, timely, anytime and everywhere services at a much subsidised price when compared with on-premises computing and storage capabilities (Edwin, 2018). Moreover, Sivankalai (2021) has stated that library users are not getting what they want and when they want, thus have started considering the libraries as other things than houses of information acquisition, processing and provision to the members of the academic community. Embracing cloud computing can help overcome these challenges and enhance the efficiency, effectiveness, and reach of library services in this digital age (Olukayode et al., 2022).

However, there are other potential risks and challenges that seem to constraint cloud computing adoption among organizations (Sabi et al., 2018; Sivankalai, 2021). These risks and challenges are associated with the technological, environmental and organizational aspects of the organizations in relation to the technology (Gangwar et al., 2015; Yogesh et al., 2012). Idahosa and Eireyi-Edewede (2023) have reported that finding of their study reveals that 86.3% of respondents cited poor internet connectivity, 85.3% and 80% of them cite electricity supply and data security respectively as the challenges affecting the adoption of cloud computing by academic libraries.

Several researchers (Al-Hujran et al., 2018; Hassan et al., 2017; Odun-Ayo et al., 2022; Oliveira et al., 2014) have also stated that the challenges associated with cloud computing vary across the countries, domains and contexts. Despite the variances, Yoo and Kim (2018) have clarified that assessing the factors of cloud computing adoption by organizations can best be based on technological,

organizational and environmental contexts. Correspondingly, cloud computing adoption by some Nigerian academic libraries is apparently affected by several potential technological, organizational and environmental issues (Aviamu et al 2019).

Various studies have been carried out at global, regional and national levelss concerning cloud computing adoption by libraries (Adegbilero-iwari & Hamzat, 2017; Ananthi Claral Mary & Arul Leena Rose, 2019; Ango, 2022; Edwin, 2018; Gowda et al., 2019; Hussaini et al., 2017; Joshi, 2013; Masenya & Chisita, 2022; Odun-Ayo et al., 2022; Ogwo et al., 2020; Olukayode et al., 2022; Zubairu et al., 2021) but they all focus on other aspects of cloud computing, neglecting the importance and effectiveness of factors that influence the adoption processes and intention; which in turn lead to insufficient information regarding the factors affecting cloud computing adoption that supposed to guide decision-makers in their intention to adopt the cloud technology (Gambo, 2017).

Additionally, non-application of a particular framework or theory to measure the results which eventually reveals varying and inconsistent outcomes (Dahiru et al., 2014a; Kshetri, 2010) also exist. Similarly, there are virtually inadequate number of empirical research conducted in North-Eastern Nigerian academic libraries, particularly on the factors that influence the adoption of cloud computing in academic libraries context (Aviamu et al., 2019). All these accounts for the extreme hesitant of cloud computing adoption by academic libraries which leads to serious inefficient service delivery and consequently resulted in to poor academic performance of the library clients. To address the afore mentioned issues and also to fill these important gaps, the need to empirically investigate the real determinants of cloud computing adoption moderated by perceived trust in North-Eastern Nigerian academic libraries is

necessary in order to accelerate the level at which it will be adopted hence facilitate efficient services delivery to clients.

1.4 Research Questions

The following research questions are used in this study.

1. What is the level of North-Eastern Nigerian academic libraries' intention to adopt cloud computing in their service delivery?
2. What are the contributing factors influencing cloud computing adoption intention by North-Eastern Nigerian academic libraries?
3. How perceived trust factor moderates the relationship between contributing variables and cloud computing adoption intention by North-Eastern Nigerian academic libraries?
4. What are the appropriate strategies and guidelines of improving cloud computing adoption by North-Eastern Nigerian academic libraries?

1.5 Objectives of the Study

The main objective of this study is to explore the determinants influencing the intention to adopt cloud computing in North-Eastern Nigerian academic libraries and to examine the moderating role of trust in this relationship. While the specific objectives are:

1. To examine the level of North-Eastern Nigerian academic libraries' intention to adopt cloud computing in their service delivery.
2. To examine the contributing factors influencing cloud computing adoption intention by North-Eastern Nigerian academic libraries.

3. To evaluate the moderating roles of perceived trust factor on the relationship between contributing variables and cloud computing adoption intention by North-Eastern Nigerian academic libraries.
4. To develop strategies and identify guidelines of improving cloud computing adoption by North-Eastern Nigerian academic libraries.

1.6 Significance of the Study

The main contribution of this study is identifying relevant factors that influence and enhance the adoption of clod computing by academic libraries thereby addressing unsatisfactory service delivery. The study validates informed substances to relevant decision-making bodies in academic libraries about factors to be considered when making an intention to adopt cloud computing services; by identifying which factors can significantly influence cloud computing services adoption, in an attempt to improve service delivery to library clients. The outcome of this study will also draw the attention of cloud services providers to the factors that influence cloud computing subscriptions which in turn enable them to make necessary solutions to that, in order to increase the rate of cloud services adoption by both potential and current subscribers, hence improve efficient services delivery to library clients. Though the factors have been tested in other countries and contexts, now been tested and validated again in Nigeria and in the context of academic libraries.

Furthermore, findings of this study contribute by guiding the government to formulate and strategize policies, rules and regulations that can facilitate the successful adoption and smooth implementation of cloud computing services in academic libraries not only in North-Eastern Nigeria, but other parts of its regions. In the same vein, this study's finding could help higher educational institutions to generate more

ideas about the adoption of cloud-based services and strategically allocate the needed resources in the best way for the adoption of such services to other units of the institutions that have not adopted it.

This study also has contributed to the body of literature globally by supplying empirical evidence about the factors that influence cloud computing adoption intention in North-East Nigerian academic libraries in particular and probably rest of the world at large. Integrating the new variables (technophobia and training and education) in TOE and DOI and examine the moderating effect of trust on the relationship between independent variables and cloud computing adoption intention is equally of great significance.

1.7 Scope of the Study

Upon successfully investigating relevant and related literature, this study has discovered that there are insufficient investigations of cloud computing adoption in Nigerian academic libraries, especially from the North-Eastern region, hence earmarks the context and the region to be considered in this study. Investigation of the cloud computing adoption by the academic libraries covered adoption of SaaS, PaaS and IaaS as a whole which make up a complete cloud computing.

Furthermore, this study has covered all libraries of higher institutions of learning in North-Eastern Nigeria which comprises libraries in Universities, Polytechnics and Colleges. 13 Universities, 18 Polytechnics and 47 Colleges in North-Eastern Nigeria are identified for coverage. Similarly, the study has considered Librarians, Deputy Librarians and Heads of ICT units in the selected academic libraries as participants of this study. This is because they constitute the technology adoption decision-making body in academic libraries.

Moreover, the study has also covered important variables such as relative advantage, compatibility, top management support, organizational readiness, training and education, government regulation, trading partner pressure, and technophobia as independent variables. While the adoption of cloud computing intention served as the dependent variable to be measured by independent variables. All other types of libraries such as school libraries, public libraries, special libraries and so on are not covered in this study; likewise, other regions of Nigeria are excluded.

1.7.1 Justification for Conducting the Current Study in North-Eastern Nigeria

As highlighted in Section 2.5, all the examined studies conducted on cloud computing in Nigerian academic libraries are from the other 5 regions of Nigeria, none has been discovered from the North-Eastern region of Nigeria to the best of researcher's investigation. For example, from the South-West (Bakrin et al., 2020; Christopher et al., 2014; Tella et al., 2020; Zubairu et al., 2021), South-East (Njoku & Ken-Agbiriogu, 2021), South-South (Aiyebelehin et al., 2020; Edwin, 2018), North-central (Bakrin et al., 2020; Kayode et al., 2020) and North-West (Bakrin et al., 2020; Iyal, 2018; Muhammad, 2021). This reveals that most of the studies have been carried out at the Southern regions of Nigeria followed by 2 other regions from the Northern part (North-west and North-central) and neglects North-Eastern region leading to the absence or extreme scarcity of such study in the region. This necessitates this present study to concentrate on the North-Eastern region of Nigeria and to begin the investigation from the intention level not the implementation level.

Similarly, other possible reasons why this type of study has not been conducted in North-Eastern Nigeria is because the region has recorded the worst development indicators for education and its population is among the poorest in the country

(UNICEF, 2019). Western education has been in the Southern region of Nigeria for over 50 years before it gets its way to the Northern region (Okobiah, 2002; Peter, 1983). Therefore, there has been an imbalance of educational status between the 2 regions which classifies specifically the North-Eastern region as an educationally backward region.

Several national policies on education have been put in place to correct the educational imbalance between the Northern and Southern parts of the country, but the imbalance still exists and even persists steadily. For instance, In 1999, the 6 states that form the North-East region has a total of 976 students enrolled for polytechnic programmes as against the 73,916 students enrol for that same programme from the 6 states of the Southern region (Onwuka, 2019). Moreover, in 2016, the total number of candidates who have applied for university admission from the North-Eastern region are 96,220, as against 104, 383 candidates from only one State (Imo State) in the South-Eastern region (Daily Trust, 2020). Unfortunately, the narration is even worse in primary and secondary school levels. Factors such as poverty, socio-economic status and culture have attributed to the deprivation of education in the North and specifically North-Eastern part.

Additionally, the North-Eastern region remains one of the educationally less developed in the country. The insurgency created by a terrorist group called Boko Haram (western education is forbidden) has significantly deterred the level of education in the region. These terrorists adopt several approaches including slaughtering, abducting students, bombing schools and government-related buildings (Muhammad & Mohammed, 2019), which to some extent undermined the progress of the region, especially in the area of education, thus, further widening the educational

disparity between it and the other 5 regions. This and many more have made North-Eastern Nigeria to be identified as educationally underdeveloped hence experiencing inadequate research, especially in new technology adoption such as cloud computing. Thus, another reason for this study to be conducted there.

1.8 Definition of Terms

The following are some of the important terms used in this study:

Cloud Computing: refers to on-demand renting of storage space, processing capabilities and application services through the internet from cloud services providers based on pay-per- use and anytime - anywhere mode (Adam et al., 2019)

Academic Libraries: refers to libraries that are found in higher institutions of learning such as Universities, Colleges and Polytechnics in order to support learning, teaching and research activities (Ogwo et al., 2020).

Cloud Computing Adoption: refers to the acceptance and utilization of cloud computing services (software, infrastructure and platform as a service) by academic libraries for their service delivery to library clients (Comfort, 2018).

Relative Advantage: refers to the users' belief that the new technology to be adopted is more advantageous than the present one or rather will provide more benefits than the current situation (Hiran & Henten, 2020).

Compatibility: refers to the extent to which an innovation is relatively consistent with the existing systems, values and needs of the organization (Rogers, 1995)

Top Management Support: is defined as the degree to which senior officials understand the importance of the cloud computing function and are personally involved in cloud computing initiatives and activities (Zabadi, 2016).

Organizational Readiness: refers to the degree of preparedness that organizations have on the ground in terms of technological, financial and human resources to develop, accept and or integrate new technology (Ngah et al., 2017).

Training and Education: refers to the formal knowledge given to the library staff in order to be conversant, skilful and up-to-date with the cloud computing operations for easy implementation in libraries (Komolafe-Opadeji & Ojo, 2019).

Government Regulation: refers to the existing laws, rules and regulations that are critical to the adoption of novel technology (Oliveira et al., 2014).

Competitive Pressure: refers to the intensity of pressure experienced by an organization from its counterpart that they operate within the same industry (Gutierrez et al., 2015).

Technophobia: encompasses a range of negative emotions and reactions, including fear, aversion, anxiety, or discomfort when dealing with or using various forms of technology (Nimrod, 2018).

Perceive Trust: is the degree of preparedness to take susceptible circumstances based on the optimistic anticipation concerning the actions of others (S. E. Chang et al., 2017)

Cloud-Based Services: refers to the services given to library clients/patrons using the full package of cloud computing services model that includes software as a service, platform as a service and infrastructure as a service (Ogwo et al., 2020).

Software as a service (SaaS): is a set of programs that are designed and offered for use by cloud computing services providers on demand basis, which ideally eliminates the need for software installation, maintenance, licenses and upgrades by the users (Olukayode et al., 2022).

Platform as a Service (PaaS): is a complete development and deployment environment in the cloud, with resources that enable you to deliver everything from simple cloud-based apps to sophisticated, cloud-enabled enterprise applications (Ahmed, 2019).

Infrastructure as a Service (IaaS): is a cloud computing service that provides on-demand access to computing resources such as servers, storage, networking, and virtualization (Bhardwaj, 2018).

1.9 Organization of the Thesis

This thesis is organized into 6 chapters. Chapter 1 begins by highlighting the background of the study, the problem statement, the research questions and their corresponding objectives, the significance of the study and the definition of some useful terms. Chapter 2 encompasses the literature that supports this study, where more emphasis is given to reviewing the basic concept of cloud computing and academic libraries, previous authors' perceptions and explanations about all the variables used in this study among others. Additionally, the chapter examines previously existing studies of cloud computing in Nigerian academic libraries to find reasons for any need to conduct further research.

Chapter 3 begins by reviewing the theoretical frameworks that are used to develop this study model. All the necessary aspects of the theories and how they are selected to form part of this study model are explained, hence hypotheses are formulated. Thereafter, the model for this study mean to determine the intention to adopt cloud computing in Nigerian academic libraries and their allies is graphically presented.

Chapter 4 highlights the methodology employed for this study where the necessary steps used to conduct this study were explicitly mentioned. This

encompasses the study paradigm, population of the study, data collection and interview procedure. Furthermore, the chapter explains how items of the questionnaire have been adapted and used to develop the questionnaire for this study. This study adopts a triangular approach, where interview data are used to support and validate the questionnaire data first collected. Thereafter statistical packages used are all explained.

Furthermore, Chapter 5 presents the study's findings and discussion of the findings where all variables used are explained on how significant/insignificant they are in influencing cloud computing adoption in academic libraries. Finally, Chapter 6 provides a recap, implications and limitations of the study hence made conclusions and appropriate recommendations based on the findings outlined in Chapter 5.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Relevant literature that can support this study has been rigorously reviewed in this chapter. The literature discussion primarily focuses on the conceptualization and stated objectives of the study. Section 2.2 stresses the definitions and relevant information on cloud computing in general, Section 2.3 overviews the existing academic libraries and their services, and Section 2.4 highlights how cloud computing will be applied and used in academic libraries context. Furthermore, Section 2.5 reviews existing studies of cloud computing adoption within Nigerian academic libraries, and Section 2.6 discusses theories, relevant variables and their suitability to this present study. Section 7 and 8 also discuss the justification for using TOE-DOI as well as the underpinning variables employed in this study. Existing literature gaps in the intention to adopt cloud computing by academic libraries have been equally highlighted in the last section. At the end of this chapter, a summary of the reviewed literature is presented.

2.2 Background on Cloud Computing

Different conceptualizations have been given to cloud computing by different authors based on different perspective (Hassan, 2017). Adam et al. (2019) defined cloud computing as: "*the provision of computing as a service based on request, whereby shared resources such as software, hardware, computing capabilities and information are made available to subscribed computers and other devices as a metered service through the Internet*". Correspondingly, cloud computing is defined by National Institute of Standards and Technology (NIST) "*as a model for enabling,*

ubiquitous, convenient, on demand network access to a shared pool of configurable computing resources (e.g. networks, servers, storage, applications and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction"(Bhardwaj, 2018) . Ruhela and Hasan (2018) stated that virtualization of library collections and services now exist more as a result of innovative nature of cloud computing.

Similarly, cloud computing has five unique characteristics that include measured service, on-demand self-service, rapid elasticity, resource pooling and broad network access; three services models, which are software as a service (SaaS), platform as a service (PaaS) and infrastructure as a service (IaaS) (Gutierrez et al., 2015) and deployment models which comprises public cloud, private cloud, community cloud and hybrid cloud (Gutierrez et al., 2015; Yoo & Kim, 2018).

Organizations and countries have different rates at which they adopt cloud computing. Al-Ruithe et al. (2017) while revealing that majority of respondents surveyed in their study have not adopted cloud computing in delivering their services to public, have also acknowledged that some people do not even know much about the cloud computing. Surprisingly, Nigeria and specifically North-Eastern part of it have very little to be mention with regard to cloud computing adoption especially in their academic libraries (Edwin, 2018). Though, Al-Ruithe et al. (2017) have stressed that cloud computing is still an emerging technology for rendering IT services as utility services through internet medium especially in developing countries.

Therefore, Onu et al. (2019) acknowledge that the way and manner in which cloud computing diffuses especially in organizations still remains a topic of discussion in the pipeline of research. Based on the aforementioned definitions of cloud