



Intention to Adopt Cloud-based e-Learning in Nigerian Educational Institutions

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ABSTRACTS

Institutions of higher education must utilize innovative information and communication technologies for teaching in Nigeria. Thus, cloud-based e-Learning is essential to curtail educational challenges such as limited infrastructure, funds, and student-to-lecturer ratio. Recently, there has been widespread enthusiasm regarding Cloud computing for e-Learning; adopting and strategically utilizing these technologies remains a significant challenge for higher education institutions. Furthermore, there is a limited understanding of how cloud-based e-learning can transform Nigerian educational establishments. Cloud-based e-Learning systems' technological components have been the subject of numerous study studies, but little is known about how they operate from an organizational perspective. Accordingly, using the Technology-Organization-Environment theory, the goal of this study is to investigate the variables that influence the adoption of cloud-based e-learning. The findings of the research show that relative benefit and competing pressure have a big impact on whether cloud-based e-learning is adopted. However, compatibility, security, and top management commitment do not appear to be significant determinants. These findings will help Nigerian education institutions, the ministry of education, and practitioners to understand the critical factors for adopting this technology for improved education.

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1. INTRODUCTION

In recent years, the advancement of technology has brought about innovations like Cloud Computing, big data, AI, and blockchain (Tom, Virgiyanti, & Rozaini, 2019). These innovations brought more opportunities and challenges to businesses. E-learning is a critical driver for emancipation from poverty (World Bank [WB], 2013). Research has shown that the e-Learning systems of emerging nations are experiencing a similar and severe crisis. This crisis is primarily ascribed to the lack of clear education policies, infrastructure deficiencies, and inadequate investment in the education sector. The danger this scenario poses to the continent's ability to learn and advance generally is limitless. Inadequate allocation of financial resources has been identified as Nigeria's most significant challenge in education (Asiyai, 2013; Edomwonyi & Osarumwense, 2017; Virgiyanti & Rozaini, 2019).

The lack of concrete education policies, infrastructure gaps, and underinvestment in the education sector are mainly to blame for the comparable and pervasive problem in emerging nations' e-Learning systems. The learning process and the continent's development as a whole are constantly threatened by this scenario. The biggest barrier to education in Nigeria has been recognized to be the inadequate supply of money means.

Previous research has demonstrated the prevalence of issues in e-Learning systems in developing countries, which can be attributed to the shortage of feasible and effective educational policies, insufficient infrastructure, and

inadequate investment. The biggest obstacle to education in Nigeria has been recognized as a lack of funding. (Asiyai, 2013; Edomwonyi & Osarumwense, 2017; Virgiyanti & Rozaini, 2019).

Many universities in developing countries currently operate unreliable e-Learning systems. As a solution, cloud computing, with its location independence, can provide staff and students in Nigerian universities with access to highly dependable and efficient systems, similar to those found in developed countries. This would ultimately enhance the competitiveness of Nigerian Higher Education Institutions (HEIs). To examine the usage of cloud-based e-Learning from the managerial viewpoint of HEIs, more actual data is needed. In this research, the opinion of administrators in Nigerian HEIs is investigated using the elements of technology, organization, and environment as well as exterior variables. The results of this research will help understand the critical elements influencing the uptake and usage of cloud-based e-Learning in Nigeria.

2. THEORETICAL AND CONCEPTUAL MODEL

The Technology, Organization, and Environment (TOE) hypothesis, developed by Tornatzky and Fleischer, is used in this research (Tornatzky & Fleischer, 1990). The TOE is an organizational theory that thoroughly explains the likelihood that a company or group will embrace innovation. The TOE proposes that these three variables affect how organizations perceive the need for innovation and adapt/adopt it in order to stay competitive by including both limitations that act as roadblocks and

opportunities that serve as incentives for innovation (Baker, 2012; Virgiyanti & Rozaini, 2019).

Relative Advantage (RA) and Compatibility are technical factors when implementing cloud computing, including cloud-based e-Learning platforms. (COM). Information and communication technology (ICT) is used by universities all over the globe to create efficient and effective learning environments for both employees and pupils. As a result, when implementing innovation, implementers must weigh the advantages and disadvantages of the technology.

Relative Advantage (RA) is the expectation of an organization's gain from technical factors. Hence, institutions consider adopting innovation and its advantages over their existing systems. Cloud computing has the edge over traditional server-based systems due to its flexibility, mobility, and scalability. Adopting the cloud in academia opens up numerous avenues such as collaboration, discussion, availability of resources, and cost savings due to its pay-per-use model (Tom, Virgiyanti, & Osman, 2019). We, therefore, posit that:

2.1. H1: Relative advantage will positively influence the adoption of Cloud-based e-Learning in Nigerian HEIs.

Due to a lack of resources, developing nations, especially those in Africa, face difficulties in enhancing their educational facilities and need assistance to fix their outdated, ineffective systems. The degree to which an invention is viewed as compatible with the users' established beliefs, standards, and experiences is also referred to as compatibility (Rogers, 1995). As in developed countries, cloud

computing supports a variety of apps and computer languages that can be easily incorporated into Nigerian e-learning systems, giving users an edge in terms of freedom and productivity. Hence, we posit that:

2.2. H2: Compatibility will positively influence the adoption of Cloud-based e-Learning in Nigerian HEIs.

Regarding organizations considering implementing cloud computing, security is a top worry because it could present challenges. Since data proprietorship is still a contentious topic in the context of cloud computing, the secrecy, stability, and accessibility of an organization's data are extremely important.

2.3. H3: Security will positively influence the adoption of Cloud-based e-Learning in Nigerian HEIs.

The security of cloud computing is a major factor that deters its adoption, as it plays a crucial role in protecting an organization's information and data.

This study emphasizes the significance of the organizational perspective in innovation adoption, particularly the importance of Top Management Commitment (TMC). Tornatzky also recognized TMC as a crucial factor in the innovation adoption process (Tornatzky, 1990). Hence, the involvement of the top managers increases the chances of technology adoption. Hence, it is especially true for developing countries like Nigeria, with limited resources. So, strategically using limited resources and adopting cloud-based e-Learning will considerably improve the over-stretched learning systems. Therefore, we posit that:

2.4. H4: Top Management Commitment will positively influence the adoption of Cloud-based e-Learning in Nigerian HEIs.

The natural viewpoint has an impact on how innovation is adopted in companies. Cloud computing can offer a competitive edge to Nigerian HEIs, but external factors like government regulations, policies, and peer pressure from global competitors can either support or hinder the adoption of new technology for learning systems. Competitive Pressure (CP) refers to the level of competition that an organization faces from other institutions within the academia. Competition can drive HEIs to innovate and enhance the quality of their systems. Therefore, the adoption of cloud-based e-Learning can help Nigerian HEIs to restructure and create new opportunities for higher education.

2.5. H5: Competitive Pressure will positively influence the adoption of Cloud-based e-Learning in Nigerian HEIs.

This research also makes use of the TOE and DOI theories to forecast Nigeria's

propensity to embrace cloud-based e-Learning. The study uses poll questions to determine the critical TOE-DOI factors, which are shown in Fig. 1. A seven-point Likert measure was used to capture every answer.

3. RESEARCH METHODOLOGY

Deductive research technique, which includes the creation of quantifiable research queries, was used in this work. The study's element of research is the ICT directorates' senior managerial employees. An easy random selection method was used to choose the group of colleges. The two parts of the poll items used in the research were modified from earlier studies. The subjects' personal data was collected in the first segment, and acceptance concerns for cloud-based e-Learning were addressed in the second. Responses were gathered using a 7-point Likert scale, and the surveys received a topic validity assessment. A total of 248 responses were obtained from the 454 questionnaires distributed to the target respondents.

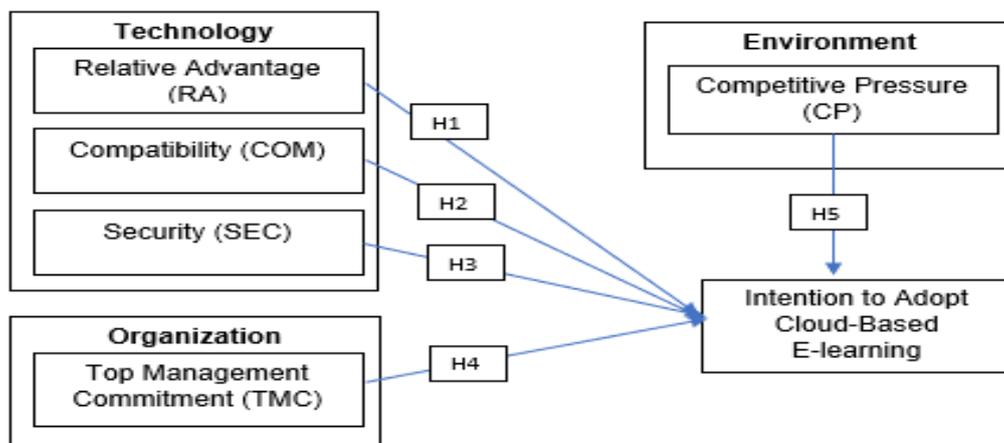


Fig. 1. The Theoretical framework and hypothesis of the study

4. MEASUREMENT MODEL

In order to evaluate different parts of the data, including the content validity, internal consistency dependability, convergent validity, and discriminant validity, it is essential to evaluate the measurement model. These assessments assist in ensuring that the data gathered is precise and trustworthy as well as that the poll queries used are tracking the intended outcomes (Henseler et al., 2009; Hair et al., 2011; Hair et al., 2014).

4.1. Individual Item Reliability and Internal consistency

The internal consistency is a measurement of how closely various scale elements reflect the same fundamental entity. (Bijttebier et al., 2000; Sun et al., 2007). In most cases, the Cronbach's alpha statistic is used to assess this. Composite reliability factors are frequently used to calculate an instrument's internal consistency reliability. (Bacon et al., 1995; McCrae et al., 2011; Peterson & Kim, 2013). In order to ensure the truth and dependability of a

measurement tool, it is crucial to evaluate its internal coherence.

4.2. Discriminant Validity

The degree to which two conceptually comparable conceptions differ from one another is referred to as discriminant validity (Hair et al., 2010). It is assessed using the Fornell and Larcker-proposed Average Variance Extracted (AVE) technique (Fornell & Larcker, 1981). The common variation between the components should be less than the AVE numbers. The entities are shown to be considerably distinct from one another if the AVE values are greater than the common variation. The research data satisfies the requirement for discriminant validity, as shown in Table 2.

The HTMT (Heterotrait-Monotrait Ratio of correlations) is an additional method used to assess the discriminant validity of the data. Table 3 shows the results of this analysis, indicating that the HTMT is also not a concern, meaning that no items needed to be deleted in this phase.

Table 1. Construct Reliability and Validity

Factors	Cronbach's Alpha	rho_A	Composite Reliability	AVE
COM	0.843	0.858	0.883	0.557
CP	0.899	0.913	0.92	0.624
INT	0.791	0.801	0.877	0.703
RA	0.816	0.843	0.86	0.508
SEC	0.828	0.859	0.883	0.655
TMC	0.886	0.887	0.914	0.639

Table 2. Fornell-Lacker Criterion

Variables	COM	CP	INT	RA	SEC	TMC
COM	.746					
CP	.576	.79				
INT	.422	.564	.839			
RA	.399	.344	.44	.712		
SEC	.466	.435	.402	.462	.809	
TMC	.569	.599	.438	.398	.623	.799

Table 3. Heterotrait-Monotrait Ratio (HTMT)

Factors	COM	CP	INT	RA	SEC	TMC
COM						
CP	0.661					
INT	0.475	0.633				
RA	0.425	0.365	0.501			
SEC	0.53	0.48	0.471	0.515		
TMC	0.653	0.659	0.499	0.417	0.704	

4.3. Assessment of Structural Model

The structural model in this research was assessed using PLS-SEM (Partial Least Squares Structural Equation Modeling), as suggested by the conceptual model, which contained five assumptions (see Fig. 2) (Hair et al., 2017). Following the recommendations made by Hair et al., the importance of route coefficients was assessed using the conventional bootstrapping technique with 5,000 data. (2010, 2014, 2017). The normalcy of the data was estimated using the bootstrap findings. The structural model is shown in Table 4, and the mediator variable is government support.

According to the study's findings, there is a connection between competitive pressure (CP) and the desire of Nigerian HEIs to embrace cloud-based e-Learning. Compatibility, security, and top management commitment, however, did not significantly influence whether cloud-based e-Learning was adopted in HEIs. Relative Advantage (RA) and the desire to implement a cloud-based e-Learning system in Nigeria were found to be significantly correlated in the research. In conclusion, these results shed important light on the importance of Nigerian HEIs' plans to implement cloud-based e-Learning technology. Table 5 presents the findings.

Table 4. Structural model with Government Support as the moderator variable

Factors	Sample Mean (M)	T Statistics (O/STDEV)	P Values
COM -> INT	0.048	0.564	0.286
CP -> INT	0.398	5.157	0.000
RA -> INT	0.243	3.833	0.000
SEC -> INT	0.085	1.012	0.156
TMC -> INT	0.029	0.306	0.380

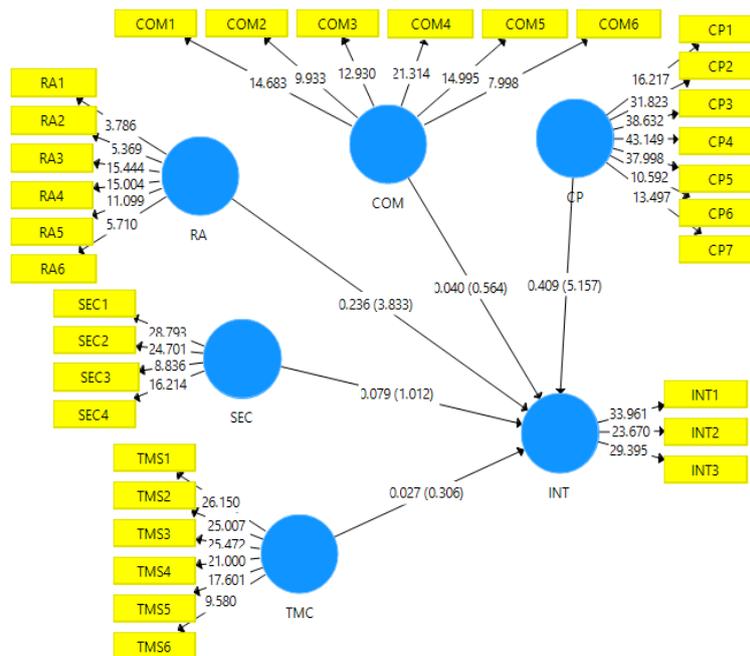


Fig. 2. The Structural Model

Table 5. Bootstrapping Findings

Hypothesis		Result
H1	There will be a positive relationship between Relative Advantage (RA) and Intention to adopt cloud-based e-Learning.	Supported
H2	There will be a positive relationship between Compatibility (COM) and Intention to adopt cloud-based e-Learning.	Not supported
H3	There will be a positive relationship between Security (SEC) and Intention to adopt cloud-based e-Learning.	Not supported
H4	There will be a positive relationship between Top Management Commitment (TMC) and intention to adopt cloud-based e-Learning.	Not Supported
H5	There will be a positive relationship between Competitive Pressure (CP) and Intention to adopt cloud-based e-Learning.	Supported

5. DISCUSSION

This research set out to determine how eager Nigerian HEI administration was to implement cloud-based e-learning within their organizations. The research suggested an adaptation model based on

the Technology-Organization-Environment (TOE) theory and other pertinent environmental factors to accomplish this objective. Studies on cloud computing usage in HEIs around the globe are numerous, and the technology has many benefits over

conventional e-Learning platforms. Therefore, incorporating cloud computing into Nigerian HEIs is crucial. The results of the research show that the TOE theory elements are extremely important for comprehending and affecting the desire to embrace cloud-based e-learning.

Relative Advantage, a technical component, had a substantial effect on the desire to embrace cloud-based e-Learning, according to the Structural Equation Modeling (SEM) study, with β -value = 0.062, t-value = 3.833, and p-value = 0.000. The upper management views the impact of this technology as vital, in line with Roger's Diffusion of Innovation (DOI) theory. (Rogers, 2003). According to them, adopting cloud-based e-Learning will enhance the standard of procedures and employee performance in their institutions, which is consistent with Tashkandi and Al-Jabri's results. (Tashkandi & Al-Jabri, 2015). On the other hand, with a p-value of 0.286 and a β -value of 0.072, compatibility is not a major factor. This suggests that HEIs in Nigeria are still adopting cloud-based e-Learning in its early phases and have not yet concentrated on interoperability with their existing operational systems (Rogers, 2003). and others, however, contend that compatibility is a crucial aspect of technology usage in HEIs (Hiran & Henten, 2020).

The study's findings also demonstrated that Top Management Commitment (TMC), as an organizational component, had little bearing on Nigerian HEIs' uptake of cloud-based e-Learning. This result emphasizes the difficulties and opposition that HEIs encounter when implementing innovation and change, and it implies that senior administrators

should be more knowledgeable about cloud technology. On the other hand, the Security factor was also found to be statistically insignificant. Despite being a major concern for many HEIs, managers are still cautious about cloud computing due to issues such as data ownership, location, privacy, confidentiality, and data availability. Data ownership, in particular, remains a major challenge for cloud computing as the policies of the country where the data centres are located may require them to make the data available to them.

6. CONCLUSION

The purpose of this research was to investigate how university senior management in Northern Nigeria perceived the usage of cloud-based e-learning and the variables that might have an effect on that goal. Based on the work of Tornatzky and Fleischer, the Technology-Organization-Environment theory was applied and extended to include additional pertinent factors for the research (Tornatzky & Fleischer's, 1990). The PLS-SEM method was used to evaluate the interviewees' data, and the results showed that Relative Advantage had a substantial impact on the management's decision to implement cloud-based e-learning in Nigerian HEIs. The desire to embrace cloud-based e-learning was also found to be significantly impacted by competitive pressure. However, it was discovered that crucial elements like compatibility, security, and top management commitment were negligible in Nigeria.

To enhance their competitiveness with global peers, Nigerian HEIs must gain an understanding of cloud computing and make informed decisions about adopting

Cloud-based e-Learning. Financial support is crucial for implementing this technology, which is widely used by developed nations to provide efficient and effective learning experiences. Although more research is required, this survey provides insightful information about the desire to implement cloud-based e-learning in Nigerian HEIs. Future studies could concentrate on cloud-based e-Learning in Nigeria and make use of mixed-methods or qualitative techniques to give participants' views of implementing this technology in Nigerian HEIs a more thorough grasp.

Due to financial and organizational limitations, this research was only able to encompass a small number of colleges in a particular area of Nigeria. Future studies could use a larger sample size and responses from staff and other managerial levels to get a more thorough grasp of the usage of cloud-based e-Learning in Nigerian HEIs. Future study could use online surveys and conversations to collect information on the crucial factors influencing the uptake of cloud-based e-Learning in Nigerian HEIs.

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