

# Adoption of Cloud Computing by IT based Small and Medium Scale Enterprises in Northwestern Nigeria

**Bello A. Buhari**

Department of Mathematics, Computer Science Unit, Usmanu Danfodiyo University, Sokoto, Nigeria  
Email: buhari.bello@udusok.edu.ng

**Bilyaminu S. Muhammad**

MIT Student, Department of Mathematics, Computer Science Unit, Usmanu Danfodiyo University, Sokoto, Nigeria  
Email: bilyaminusabo86@gmail.com

**Bello A. Bodinga**

Department of Mathematics, Computer Science Unit, Usmanu Danfodiyo University, Sokoto, Nigeria  
Email: bello.bodinga@udusok.edu.ng

**Muazu D. Sifawa**

Management Information System Usmanu Danfodiyo University, Sokoto, Nigeria  
Email: mzsifawa@gmail.com

## ABSTRACT

This research has taken a Quantitative, interpretive and cross-sectional designs in the form of a self-administered questionnaire through survey. The aim is to investigate the adoption of Cloud Computing by IT based small and medium scales enterprises in Northwestern Nigeria. About one hundred and fifty (150) questionnaires were distributed among seven states in the North-Western Nigeria and average of one hundred and nine (109) was responded. The result of the survey shown that most of the IT professional in these SMEs are cloud provider's end users, continue to use cloud provider in the future, is part of their strategic effort, recommended Cloud provider to others and they are very satisfied with the cloud providers. Challenges that are preventing them from getting the maximum value out of cloud providers are lack of encouragement, poor training, application is missing and lack of executive sponsorship.

Keywords - Cloud Computing, IT, SMEs. Adoption, Northwestern Nigeria, Nigeria

Date of Submission: Apr 01, 2022

Date of Acceptance: Apr 22, 2022

## I. INTRODUCTION

Recently, the increase in the adoption of Information and Communication Technology (ICT) in enterprises has extensively changed the way in which enterprises communicate and operate. Current advances in ICT together with the need for improved business processes, better efficiency and the need for extra access to information have continued to encourage companies, including SMEs, to adopt and use various ICT solutions [1]. Also, the capability to access computing resources or develop a strong IT infrastructure by small and medium scale enterprises has been difficult. These difficulties can be resolved by the deployment of cloud computing. Cloud computing is the delivery of ICT services to end-users over a network not minding the devices or location of the user. This can be shown in figure 1. There are a lot of challenges of cloud computing adoption in Nigeria [2]. These include both feasibility and gain/benefit challenges.

Considering the history of providing IT resources, cloud computing has been acknowledged as the freshest and most flexible deliverance model of providing IT [3]. Cloud computing is a technology used for rising the ability or add capabilities gradually without putting resources in new infrastructure, training new human resources, or licensing

new software. It consists of services and deployment models, and various characteristics of concern.

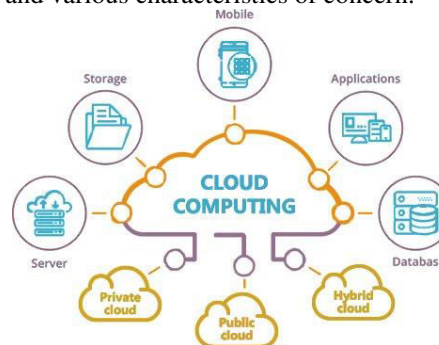


Fig. 1: The concept of cloud computing [4]

Cloud computing consists of three principal services which the Software as a Service (SaaS), the Platform as a Services (PaaS) and the Infrastructure as a Service (IaaS) [5][6]. The service adopted based on service application requirements - Customer Relationship Management (CRM) application and Storage application is SaaS, in situations where a business is concerned in the improvement of other applications on top of it - Google App Engine is PaaS and as a setting for the employment, running and supervision of virtual machines and storages is IaaS [7].

Cloud computing consists of four cloud deployment models namely: public cloud – where cloud infrastructure is made available to the general public or a large industry group and is owned by an organization selling cloud services, private cloud – where cloud infrastructure is operated only for a particular organization, community cloud – where cloud infrastructure is shared by many organizations and supports a exact community that has shared concerns and hybrid cloud - where cloud infrastructure is a composition of two or more clouds that remain single entities, but are bound together by homogeneous or proprietary technology that enables data and application portability [8].

Cloud computing consists of five key characteristics namely: On-demand self-service through a secure portal, Scalability and Elasticity, Pay per use, Ubiquitous access and Location-independent resource pooling [9]. In on-demand self-service through a secure portal the cloud service user does on-demand self-service provisioning for server, network, and storage capabilities, without interacting with the service providers [10]. In scalability and elasticity the computing capabilities is rapidly scale up or down, always elastically to maintain cost efficiencies [10]. In pay per use the capabilities are charged using a metered, fee-for-service or advertising-based billing model to promote optimization of resource use [10]. In ubiquitous access the capabilities are available over the network and accessed through standard mechanisms that encourage use by heterogeneous thick, thin, or mobile client platforms [10]. In location-independent resource pooling the computing resources of the providers are pooled to serve all users using a multitenancy model, with different physical and virtual resources dynamically assigned and reassigned according to user demand [10].

Cloud computing, which is a challenging new technology, is peculiar to the African continent and Nigeria in particular. This is borne out of the fact that Nigeria falls short of the basic IT infrastructure requirements (such as steady electricity, and poor internet connectivity) for the effective adoption of the technology.

This research has taken a Quantitative, interpretive and cross-sectional designs in the form of a self-administered questionnaire through survey. The aim is to investigate the adoption of Cloud Computing by IT based small and medium scales enterprises in Northwestern Nigeria. About one hundred and fifty (150) questionnaires were distributed among seven states in the North-Western Nigeria and average of one hundred and nine (109) was responded. The result of the survey shown that most of the IT professional in these SMEs are cloud provider's end users, continue to use cloud provider in the future, is part of their strategic effort, recommended Cloud provider to others and they are very satisfied with the cloud providers. Challenges that are preventing them from getting the maximum value out of cloud providers are lack of encouragement, poor training, application is missing and lack of executive sponsorship.

## II. RELATED WORKS

Abubakar et al. [11] explores the emergence and adoption of cloud computing by small and medium sized enterprises (SMEs) and points towards its implications for developing countries in sub-Saharan Africa. They used qualitative techniques to obtained and analysed data from ten SMEs that have adopted cloud computing as an IT strategy. These SMEs cross across a variety of sectors including finance, information and communication technology (ICT), and manufacturing in Nigeria. They establish that these SMEs are less concerned with challenges similar to security, privacy and data loss. They predict that as cloud computing evolves, more SMEs in sub-Saharan Africa will adopt it as an IT Strategy.

Ibrahim in [12] discussed the potentials of using cloud computing as a solution to increase work efficiency at Taiz University (TU) Computer Center and Information Technology (CCIT) labs. He proposed solutions, architecture and cloud computing requirements for the University and information technology lab.

Omotunde et al. [13] investigate the level of awareness and adoption of Cloud Computing in Nigeria and explicate why it is so. They used both qualitative and quantitative method to collect data for analysis. The responses of the participants were analyzed using SPSS. Their result indicates that even though SMBs are adopting Cloud Computing services but there is still need for massive awareness to be provided by service providers and other recognized Information Technology bodies to enable SMBs to better exploit the benefits that Cloud Computing offers. Therefore the major concern of users in the cloud environment is data security and privacy and this is what prevents those who have not adopted the technology yet.

Bashir et al. [14] examined the awareness of the Nigerian business enterprises and their willingness in adopting cloud computing. They used both qualitative and quantitative method to collect data for analysis. They found that the trend of awareness and adoption were very negligible with many being afraid although few businesses were aware of the cloud technology. It also revealed that the stakeholders were precarious of the security-level of the cloud-based computing.

Amirian et al [15] identify the barriers against the implementation of cloud computing in smart schools by extensive studying of cloud computing. They used the method of questionnaire for gathering the data. A sample consisted of 70 questions gathered from a 85 persons society according to Morgan sampling table and then we used the single sample t- test for testing the hypothesizes and also we used the Freedman trial for grading the barriers. Their results show that some barriers such as security, economical, management problems, infrastructural factors, cloud service conditions , literacy and awareness of employees of cloud computing affect the application of cloud computing in the smart schools.

Hassan et al. [16] study the factors that influence cloud computing adoption by the SMEs. They performed a quantitative survey-based study to inspect the relationship between perceived benefits, top management support, IT resources, external pressure, and cloud computing adoption in Malaysian SMEs. They found that IT resources and external pressure extensively influence cloud computing adoption. Even so, there is not sufficient proof to support perceived benefits and top management support as major factors of cloud computing adoption.

Wambugu & Ndiege [17] attempts to study the level of cloud computing adoption by SMEs within Nairobi County in Kenya. A quantitative method of data collection was conducted with a convenience sample of 45 SMEs in Nairobi County. Data were analyzed using IBM SPSS with descriptive and correlation method of analysis. Their results prove that email and website services are widespread. Therefore, cloud-based business applications implementation is particularly low.

Oyoyo & Baguma [18] inspect how the uptake of cloud computing can be improved in government institutions in developing countries like Nigeria. They found that in Nigeria, the communication infrastructure is a major challenge which hinders the expansion of the technology. Lack of steady power, wreckage of infrastructure, insecurity and lack of knowledge are among the challenges that were highlighted as the major problems. These problems can be addressed by having qualified personnel to handle security challenges, investing more on communication infrastructure and awareness on what the technology is about among others.

Mallo & Ogwueleka [19] investigate the impacts and challenges of cloud computing for small and medium scale businesses in Nigeria. The impacts recognized ranges from provisioning IT infrastructures, reshaping and extending business values and outreach to giving competitive edge to businesses subscribed to it. They admitted questionnaires to managers and employees of about fifty SMEs that have deployed cloud. The data collected were analyzed using SPSS. They show that cloud computing platform has a lot to offer SMEs.

Usman et al. [20] explored and achieved an understanding of the determinants of adoption factors for cloud ERP and its relative benefit to small and medium enterprises (SME) organisations. The manufacturing SMEs in Nigeria are in particular targeted. Their also developed a research model that integrates the innovation characteristics and technology-organisation-environment (TOE) perspectives that lie behind its adoption.

Khayer et al. [21] investigates the key predictors of cloud computing adoption, and assesses how cloud computing adoption affects small and medium enterprises' (SMEs') performance. They applied a dual-stage analytical approach by combining structural equation modeling (SEM) and neural network to test the proposed model. Their results reveal that relative advantage, service quality, perceived risks, top management supports, facilitating

conditions, cloud providers influence, server location, computer self-efficacy, and resistance to change have a significant effect on the adoption of cloud computing. They explores the border that subsists between the level of cloud computing adoption in SMEs of these two countries and specifies challenges particular to each country intercepting the complete cloud computing adoption and proposes solutions for Nigerian SMEs to beat these challenges.

Adeleke et al. [22] investigates the use of cloud computing technology for successful administration in Nigerian universities. Their research result reveals the strengths, weaknesses, opportunities and threats in the adoption of cloud technology and highlighted the concerns and challenges slowing its adoption. They further explore the enormous repayment the universities stand to gain for adopting the cloud technology and proffers risk mitigation techniques to stop the happening of the impediment towards the cloud adoption. They also recommend some cloud platforms as a means of IT delivery services for effective university administration.

Saidu & Kwadan [23] find out factors that are in charge of the challenges of adopting cloud computing application in e-learning system among Polytechnics in the North East, Nigeria. They used sampling techniques to gather data and average coded total was used in data analysis. The found that cloud computing application is coupled with challenges such as: delay/denial of service, compatibility issue, ICT infrastructure, lack of trained personnel, breach of trust, poor policy, managerial issue, confidentiality, integrity, inadequate user access and technological bottlenecks.

Neicu et al. [24] find out the perception of small and medium-sized enterprises (SMEs) employees about the usage of cloud computing services in their activities. They use quantitative method on a sample of 315 respondents employed in Romanian SMEs. They tested their conceptual model using WarpPLS 3.0 software. They concluded that the alleged benefits and disadvantages of cloud computing service usage, the perception of both the communication process and users' experience about cloud computing service use, empathy, and cloud computing service image confidently influence the perceived quality of the cloud computing service usage in SMEs. They did not discover proof that the perceived risks significantly influence the perceived quality of cloud computing services.

Sithole & Ruhode [25] find out the opportunities and challenges that lead to cloud computing adoption by SMMEs in South Africa. They look at the factors that influence adoption. TOE framework is used to contextualize the factors that influence cloud computing adoption and evaluate the opportunities and challenges that are presented by cloud computing to SMMEs in South Africa. An online survey questionnaire was used to collect data from leaders of SMMEs from all geographical regions and business industries in South Africa. A quantitative research approach was adopted to examine the

objectives, and descriptive analysis was used to evaluate the relationships and present the results. Their findings show that relative advantage is an important factor in the consideration of cloud computing adoption by SMMEs, while government and regulatory support is perceived as a barrier.

Awan et al. [26] investigate the challenges faced by Pakistani SMEs. They used qualitative approach along with unstructured interviews. The interview methods are used to extract understanding, opinions, and challenges faced by SMEs on their way to adopt the cloud-based ERP system. Data were collected from eight well-reputed organizations, directly involved in the adoption. The main benefit of these themes is to provide results that can be easily accessible to enterprises who want to adopt a cloud-based ERP. This is contributed to the lack of the literature of cloud ERP and they delivered insight for future study by practitioners and researchers.

### III. MATERIALS AND METHODS

Based on the nature of the research and taking research objectives into consideration, quantitative research method is adopted. Self-structured questionnaire is used to gather primary data. The questionnaire forms the major medium of obtaining data for this research.

Convenience sampling was the preferred sampling strategy since it is recommended for research studies where there is a limited budget or limited time. The convenience sample consisted of 109 ICT based SMEs staff of North Western zone of Nigeria.

This research used a Questionnaire on use of on the adoption of cloud computing for data collection. It consists of 5 sections, the first for gender of the SMEs participant, the second for the age, the third for place or state, the fourth for job position of the participant, while the last section for cloud usage and experience related questions.

After data has been collected using questionnaire, frequencies and percentiles are used analyzed the data for interpretation.

### IV. RESULTS AND DISCUSSION

About one hundred and fifty (150) questionnaires were distributed among seven states in the North-Western Nigeria and average of one hundred and nine (109) was responded.

**TABLE 1: GENDER OF THE RESPONDENTS**

	FREQUENCY	PERCENT
MALE	82	75
FEMALE	27	24.78
TOTAL	109	

Out of the 109 participants in the survey, 82 were male and 27 were female. The researcher observed that the all the participants were straightforward and honest and they actively participated in the survey.

**TABLE 2: AGES**

	FREQUENCY	PERCENT
20-30 YEARS	42	38.53
31-40 YEARS	33	30.27
ABOVE 40 YEARS	24	22.01
TOTAL	109	

Table 2 shows that most of the participants were young professional between 20-30 years old. Young people actively participated in the survey. There were 33 respondents within the age limit of 31-40. 24 of the respondents were above 40 years old. . Fortunately, the researcher was able to collect data from the old generation and new generation which gave him a scope in differentiating the customers' expectations.

**TABLE 3: PLACES / STATES**

	FREQUENCY	PERCENT
JIGAWA	12	11
KANO	22	20.17
KADUNA	21	19.25
KATSINA	19	17.42
ZAMFARA	8	7.3
SOKOTO	21	19.23
KEBBI	6	5.5
TOTAL	109	

The researcher has conducted the survey in Northwest region of Nigeria . All these cities are the fastest growing cities in the region. Among them, Kano, Kaduna, and Sokoto are the IT hub of Northwest region. The maximum participants were from Kano State.

**TABLE 4: JOB POSITIONS IN ICT SMES**

	FREQUENCY	PERCENT
IT MANAGER	20	29.34
SOFTWARE ENGINEER	13	11.92
BUSINESS ANALYST	9	7.3
TELECOM	14	12.83
MAINTAINERS	6	5.5
PROGRAMMER	28	16.50
SYSTEM ADMIN	19	15.58
TOTAL	109	

Table 4 shows that the research has been conducted among people holding various positions in ICT SMEs. It includes IT Managers, Software Engineers, Business Analysts, Telecommunication engineers, maintainer employees, Programmers and System administrators. Since, the research is conducted with a specific focus in ICT SMEs, it was essential to pick up ICT related occupations. Out of the 109 participants, 20 were IT managers, 13 were software engineers, 9 were business analysts, and 14 were telecommunication engineers. Besides, there were few maintainers' employees, programmers and System administrators.

**TABLE 5: WHICH BEST DESCRIBES YOUR PRIMARY INVOLVEMENT WITH CLOUD COMPUTING?**

	FREQUENCY	PERCENT
CLOUD PROVIDER END USER	55	50.43
CLOUD PROVIDER ADMINISTRATOR	19	17.42
IT/DEVELOPER	24	22.08
PARTNER	11	10.08
<b>TOTAL</b>	<b>109</b>	

Table 5 suggests how IT SMEs are involved with cloud computing providers such as Cloud Provider end users and Cloud Administrators. Out of 109 participants, 55 of where end users. 19 of them were administrator wherein 24 were related to information technology. 11 of them were partners. The results of data finding show that all of the participants were related to Cloud provider directly and indirectly.

**TABLE 6: HOW LIKELY IS YOUR COMPANY TO CONTINUE TO USE CLOUD PROVIDER IN THE FUTURE?**

	FREQUENCY	PERCENT
DEFINITELY WILL	73	66.94
PROBABLY WILL	17	15.58
PROBABLY WILL NOT	6	5.5
DEFINITELY WILL NOT	7	6.4
DON'T KNOW	6	5.5
<b>TOTAL</b>	<b>109</b>	

Table 6 clearly says that the most of the participants are willing to use Cloud provider in future. 73 of participants will definitely use Cloud provider. On the other hand, only 7 participants will not use Cloud provider in the future. 6 participants replied they don't know.

**TABLE 7: WHAT ARE YOUR CURRENT PLANS FOR YOUR CLOUD PROVIDER DEPLOYMENT OVER THE NEXT 12 MONTHS?**

	FREQUENCY	PERCENT
INCREASE USERS BY OVER 50 PERCENT	51	46.76
INCREASE USERS BY 1 TO 50 PERCENT	23	21.09
ABOUT THE SAME	11	10.08
DECREASE USERS BY OVER 50 PERCENT	6	5.5
DECREASE USERS BY 1 TO 50 PERCENT	9	8.2
DON'T KNOW	9	8.2
<b>TOTAL</b>	<b>109</b>	

Table 7 clearly says that participants were asked about their intention in increase or decrease the number of users for the next 12 months. Out of 109 participants, 51 of them said yes, they plan to increase the users of Cloud provider in their business over 50 percent whereas 23 participants have intention to increase the users by 1 to 50 percent. There are 11 participants who have no intention to increase the users but to continue the same for the next 12 months. There were few participants who said they would decrease the users by over 50 percent and 1 to 50 percent, they were 6 and 9 respectively.

**TABLE 8: IS YOUR CLOUD PROVIDER IMPLEMENTATION A STANDALONE APPLICATION TO SUPPORT A SPECIFIC NEED OR PART OF A STRATEGIC EFFORT IN YOUR BUSINESS?**

	FREQUENCY	PERCENT
STANDALONE APPLICATION	31	28.42
PART OF A STRATEGIC EFFORT	74	71.85
DON'T KNOW	4	3.66
<b>TOTAL</b>	<b>109</b>	

74 of them said that Cloud provider solution is part of a strategic alignment for the company. On the other hand, 31 of them said that Cloud provider is a standalone solution for a specific need. 4 of them said they don't know. So, it is part of a strategic effort in northwestern part of Nigeria.

**TABLE 9: HOW LIKELY ARE YOU TO RECOMMEND CLOUD PROVIDER TO OTHERS?**

	FREQUENCY	PERCENT
DEFINITELY WILL	59	54.10
PROBABLY WILL	26	23.84
PROBABLY WILL NOT	20	18.34
DEFINITELY WILL NOT	4	3.66
<b>TOTAL</b>	<b>109</b>	

Table 9 shows that participants were asked if they like to recommend Cloud provider to others. 59 of them will definitely recommend Cloud provider to others wherein 26 participants probably will recommend Cloud provider to others. On the contrary, 20 participants may not recommend Cloud provider to others and 4 participants clearly said that they will not recommend Cloud provider to others.

**TABLE 10: HAVE YOU EVER RECOMMENDED CLOUD PROVIDER TO OTHERS?**

	FREQUENCY	PERCENT
YES	65	59.60
NO	44	40.34
<b>TOTAL</b>	<b>109</b>	

Table 10 clearly says that out of 109 participants, 65 participants have already recommended Cloud provider to others. On the other hand, only 44 participants have not recommended Cloud provider to others.

**TABLE 11: WERE YOU INVOLVED IN THE CLOUD PROVIDER CRM PURCHASE DECISION?**

	FREQUENCY	PERCENT
YES	67	61.43
NO	42	38.51
TOTAL	109	

Out of 109 participants, 67 participants were involved in decision making process whereas 42 participants were not involved in the purchase decision process.

**TABLE 12: PLEASE RATE THE CLOUD PROVIDER USER INTERFACE. TICK EITHER UNACCEPTABLE OR OUTSTANDING.**

	FREQUENCY	PERCENT
OUTSTANDING	74	67.85
UNACCEPTABLE	35	32.09
TOTAL	109	

Out of 109 respondents, 74 of them said that Cloud provider user interface is easy to use. On the other hand, 35 respondents clearly said Cloud provider user interface is not acceptable which means it is not easy to use for them.

**TABLE 13: PLEASE RATE YOUR OVERALL SATISFACTION WITH CLOUD PROVIDER. USING A SCALE FROM 1 TO 6 WHERE 1 IS COMPLETELY DISSATISFIED AND 6 IS COMPLETELY SATISFIED.**

	FREQUENCY	PERCENT
COMPLETELY SATISFIED	83	76.11
COMPLETELY DISSATISFIED	26	23.84
TOTAL	109	

Table 13 depicts the number of participants who were completely satisfied and completely dissatisfied with the overall performance of Cloud provider. According to the table, 83 participants were completely satisfied with Cloud provider. On the contrary, 26 participants were completely dissatisfied with Cloud provider.

**TABLE 14: PLEASE RATE THE PERFORMANCE OF THE CLOUD PROVIDER SALES TEAM.**

	FREQUENCY	PERCENT
VERY SATISFIED	42	38.51
SOMEWHAT SATISFIED	21	19.25
NEITHER SATISFIED NOR DISSATISFIED	20	18.34
SOMEWHAT DISSATISFIED	20	18.34
VERY DISSATISFIED	6	5.5
TOTAL	109	

All the participants were asked to rate the performance of the Cloud provider sales team thinking of the support they received. Table 14 depicts that 42 participants are extremely satisfied with the sales team of Cloud provider. 21 participants are somewhat satisfied. On the other hand, 6 participants were extremely dissatisfied due to the bad experience and 20 participants were somewhat dissatisfied due to one or other reasons. 20 participants remained neutral by saying that they were neither satisfied nor dissatisfied.

**TABLE 15: WHAT ARE THE CHALLENGES PREVENTING YOU FROM GETTING THE MAXIMUM VALUE OUT OF AMAZON.COM?**

	FREQUENCY	PERCENT
LACK OF ENCOURAGEMENT	21	19.25
LACK OF RESOURCES	6	5.5
LACK OF EXECUTIVE SPONSORSHIP	11	10.08
MANAGES DON'T SEE VALUE	10	9.17
END USERS DON'T SEE VALUE	9	8.25
APPLICATION IS MISSING	14	12.83
POOR TRAINING	19	17.42
POOR SUPPORT	9	8.25
OTHERS	10	9.17
TOTAL	109	

Table 15 shows the various challenges preventing participants from getting the maximum value out of Cloud provider. The major challenge is a lack of encouragement. In other words, there are no monetary or non-monetary incentives to encourage the staff to put their best efforts. Secondly, poor training is another challenge for the participants. Besides this, 10 participants said managers do not see value in the business wherein 9 participants said end users do not see value in the business. Other major reasons were poor support, missing application, lack of resources and lack of executive sponsorship. 10 participants said there are various other challenges which are not in the list but they are preventing them from getting the maximum out of Amazon.com.

**TABLE 16: WHAT IS THE ESTIMATED TIME IT TOOK YOU TO ACHIEVE RETURN ON INVESTMENT FROM YOUR CLOUD PROVIDER INVESTMENT?**

	FREQUENCY	PERCENT
6 MONTHS OR LESS	41	37.59
6 MONTHS TO 11 MONTHS	23	21.09
12 MONTHS TO 17 MONTHS	22	20.17
18 MONTHS TO 24 MONTHS	15	13.75
24 MONTHS OR MORE	8	7.3
TOTAL	109	

All the participants were asked about the estimate time it took them to achieve return on investment from your Cloud provider investment. The data finding shows that 41 participants said it took them 6 months or less to achieve return on investment from their investment on Cloud provider. There were 23 and 22 participants who said it took them to 6 months to 11 months and 12 months to 17 months to achieve return on investment respectively. Only 8 participants said it took them longer than they expected which is more than 2 years to achieve return on investment.

**TABLE 17: WHAT IS THE ESTIMATED RETURN ON INVESTMENT HAS YOUR COMPANY RECEIVED FROM CLOUD PROVIDER?**

	FREQUENCY	PERCENT
24% OR LESS	53	58.60
25% TO 49%	31	28.42
50% TO 74%	10	9.17
75% TO 99%	7	6.4
100% OR MORE	3	2.7
DON'T KNOW	5	4.5
<b>TOTAL</b>	<b>109</b>	

Table 17 suggests that out of 109 participants, 53 participants have received 24% or less return on investment from Cloud provider. 31 participants have received 25% to 49% whereas 10 participants have received 50% to 74% return on investment from Cloud provider. Only 3 participants said they have received 100% or more. Surprisingly, 5 participants said they don't know. This shows that almost everyone has been benefited from Cloud provider. Slowly but surely it will make a huge impact in SMEs sector in Nigeria.

**TABLE 18: WHAT ARE THE BUSINESS OBJECTIVES THAT LED YOU TO CONSIDER THE CLOUD PROVIDER SOLUTION?**

	STRONGLY AGREE	MODERATELY AGREE	MODERATELY DISAGREE	STRONGLY DISAGREE
ENHANCE SALES REVENUE	56	49	4	0
ENHANCE CUSTOMER SATISFACTION	86	22	1	0
INCREASE CUSTOMER LOYALTY	41	33	20	15
WIN NEW CUSTOMERS	91	18	0	0
IMPROVE CUSTOMER RETENTION	56	36	8	9

IMPROVE CUSTOMER SERVICE	76	20	10	3
REDUCE OPERATIONAL COSTS	32	43	25	9
IMPROVE DATA QUALITY	21	16	50	22
INCREASE UP-SELL OPPORTUNITIES	61	21	16	11
INCREASE MARKETING EFFECTIVES	31	41	23	14

Table 18 depicts the various business objectives that led them to consider Cloud provider solution. As per the data finding, the major business objectives is to enhance sales revenue. Nearly 50 percent of the participants said they moved to Cloud provider with a primary aim to increase sales revenue. Besides this, 86 participants said their primary objective is to enhance customer satisfaction. Acquiring new customers and increasing up-sell opportunities are the business objectives that led 91 and 61 participants to move into Cloud provider solution respectively. Out of the 109 participants, only 21 participants said they moved into Cloud provider with a prime focus to improve data quality. Nearly 50 percent said their aim is to improve customer retention.

**TABLE 19: HAS THE CLOUD PROVIDER SERVICE HELPED YOU TO ACHIEVE YOUR BUSINESS OBJECTIVES? PLEASE SELECT YES OR NO.**

	YES	NO	TOTAL
ENHANCE SALES REVENUE	72	37	109
ENHANCE CUSTOMER SATISFACTION	93	16	109
INCREASE CUSTOMER LOYALTY	63	46	109
WIN NEW CUSTOMERS	71	38	109
IMPROVE CUSTOMER RETENTION	56	53	109
IMPROVE CUSTOMER SERVICE	81	28	109
REDUCE OPERATIONAL COSTS	66	43	109
IMPROVE DATA QUALITY	39	70	109

INCREASE UP-SELL OPPORTUNITIES	67	42	109
INCREASE MARKETING EFFECTIVES	51	58	109

All the participants were asked if Cloud provider service helped them to achieve their business objectives. According to table 17, 93 participants said that moving to Cloud provider was the right decision as they could enhance customer satisfaction. 73 participants could enhance the sales revenue with the help of Cloud provider service. Most of the participants seem to be happy and satisfied with the service of Cloud provider as they were able to achieve their business objectives. Only few participants were not able to achieve their business objectives. For instance, 39 participants said they were not able to improve their data quality and data management. At the same time, 51 participants said they were not able to increase marketing campaign effectiveness. But in nutshell, most of the participants were able to achieve their business objectives by moving to Cloud provider solution.

## V. CONCLUSION

Cloud computing is a blessing to the mankind. It has the potential to deliver benefits to Nigeria especially in ICT based SMEs sector. Nigeria is currently facing many economic challenges and there is a lack of infrastructure, but they have been trying to prove their mettle and ability to place her in global cloud computing map. It can also be seen from the primary and secondary research that the successful adoption of cloud computing is possible if there is a proper training, rewards and recognition among the employees. It is crucial for organizations and providers do what is necessary to help users to adapt, give them training and support and in return make the employees use the system. Companies need to make it a part of their business, not just a standalone solution. It is evident from the survey that cloud solutions are low-risky, highly innovative with a quick return on investment solution. One of the noticeable benefits is that there is no need of installation of software or hardware with any lengthy training. Organizations can build their own applications without the need of technology and infrastructure.

This research has taken a Quantitative, interpretive and cross-sectional designs in the form of a self-administered questionnaire through survey. The aim is to investigate the adoption of Cloud Computing by IT based small and medium scales enterprises in Northwestern Nigeria. About one hundred and fifty (150) questionnaires were distributed among seven states in the North-Western Nigeria and average of one hundred and nine (109) was responded. The result of the survey shown that most of the IT professional in these SMEs are cloud provider's end users, continue to use cloud provider in the future, is part of their strategic effort, recommended Cloud provider to others and they are very satisfied with the cloud providers.

Challenges that are preventing them from getting the maximum value out of cloud providers are lack of encouragement, poor training, and application is missing and lack of executive sponsorship. An empirical evaluation research can be performed on this domain to get more real evaluation of the adoption of cloud computing by IT based small and medium scale enterprises in Northwestern Nigeria.

## REFERENCES

- [1] Apulu, I. (2012). Developing a framework for successful adoption and effective utilisation of ICT by SMEs in developing countries: A case study of Nigeria.
- [2] Nnadozie, C. E. (2016). The Challenges of Cloud Computing Adoption in Nigeria. *International Journal of Computer and Information Engineering*, 10(11), 1970-1975.
- [3] Diaby, T., & Rad, B. B. (2017). Cloud computing: a review of the concepts and deployment models. *International Journal of Information Technology and Computer Science*, 9(6), 50-58.
- [4] Networks Unlimited, Cloud Computing Trends for 2019, Colorado, 2019. <https://www.networksunlimited.com/cloud-computing-trends-for-2019/> [accessed Nov 07 2021].
- [5] Buyya, R., Ranjan, R., & Calheiros, R. N. (2010, May). Intercloud: Utility-oriented federation of cloud computing environments for scaling of application services. In *International Conference on Algorithms and Architectures for Parallel Processing* (pp. 13-31). Springer, Berlin, Heidelberg.
- [6] Mell, P., & Grance, T. (2011). The NIST definition of cloud computing.
- [7] Otuka, R. (2017). *SMEs Adoption of SaaS Cloud Services: A Novel Ontological Framework (Nigeria as a case Study)* (Doctoral dissertation, University of East London).
- [8] Brunette, G., & Mogull, R. (2009). Security guidance for critical areas of focus in cloud computing v2. 1. *Cloud Security Alliance*, 1-76.
- [9] Mazumdar, A. (2018). *Adoption of Cloud Computing in the SMEs: An exploration of the issues and challenges for adoption of Cloud Computing by SMEs in Bangladesh in the context of "Digital Bangladesh"*. University of Wales Trinity Saint David (United Kingdom).
- [10] Josyula, V., Orr, M., & Page, G. (2011). *Cloud computing: Automating the virtualized data center*. Cisco Press.
- [11] Abubakar, A. D., Bass, J. M., & Allison, I. (2014). Cloud computing: Adoption issues for sub-saharan African SMEs. *The Electronic Journal of Information Systems in Developing Countries*, 62(1), 1-17.
- [12] Ibrahim, M. A. (2015). Exploring the Feasibility of Adopting Cloud Computing in Computer Center Taiz University. *International Journal of Advanced Networking and Applications*, 6(4), 2359.
- [13] Omotunde, A. A., Izang, A. A., Awoniyi, O. C., Omotunde, B. K., & Mensah Yaw, A. (2015). Cloud



- computing awareness and adoption among small and medium scale businesses (SMB) in Nigeria. *International Journal Of Multidisciplinary Sciences And Engineering*, 6(6), 32-38.
- [14] Bashir, S. A., Adebayo, O. S., Abdulsalam, S. O., Sadiku, J. S., & Mabayoje, M. A. (2015). A Survey of Cloud Computing Awareness, Security Implication and Adoption in Nigeria IT Based Enterprises.
- [15] Amirian, F., Hojjati, S. N., & Roozbahani, F. S. (2016). Investigating the barriers of application of cloud computing in the smart schools of Iran. *International Journal of Advanced Networking and Applications*, 7(6), 2904.
- [16] Hassan, H., Nasir, M. H. M., Khairudin, N., & Adon, I. (2017). Factors influencing cloud computing adoption in small medium enterprises. *Journal of Information and Communication Technology*, 16(1), 21-41.
- [17] Wambugu, A. W., & Ndiege, J. R. (2018). Adoption of Cloud Computing By Small and Medium Enterprises in Nairobi County, Kenya.
- [18] Oyoyo, Y. J. & Baguma, B. (2019). Adoption of Cloud Computing in Government Institutions in Nigeria. *International Journal of Scientific and Research Publications*, 9(8), 709-744.
- [19] Mallo, S. N., & Ogwueleka, F. N. (2019). Impacts and Challenges of Cloud Computing for Small and Medium Scale Businesses in Nigeria. *Journal of Advances in Computer Engineering and Technology*, 5(3), 169-180.
- [20] Usman, U. M. Z., Ahmad, M. N., & Zakaria, N. H. (2019). The Determinants of Adoption of Cloud-Based ERP of Nigerian's SMES Manufacturing Sector Using Toe Framework and Doi Theory. *International Journal of Enterprise Information Systems (IJEIS)*, 15(3), 27-43.
- [21] Khayer, A., Talukder, M. S., Bao, Y., & Hossain, M. N. (2020). Cloud computing adoption and its impact on SMEs' performance for cloud supported operations: A dual-stage analytical approach. *Technology in Society*, 60, 101225.
- [22] Adeleke, I. A., Muraina, I. O., & Adegbuyi, K. K. (2020) Adoption of Cloud Computing Technology for Effective University Administration in Nigeria.
- [23] Saidu, A. & Kwadan, S. M. (2020) FACTORS CHALLENGING THE ADOPTION OF CLOUD COMPUTING APPLICATION IN E-LEARNING AMONG POLYTECHNICS IN NORTHEASTERN NIGERIA. *European Journal of Computer Science and Information Technology, ECRTD- UK*, 8(2):38-49.
- [24] Neicu, A. I., Radu, A. C., Zaman, G., Stoica, I., & Răpan, F. (2020). Cloud Computing Usage in SMEs. An Empirical Study Based on SMEs Employees Perceptions. *Sustainability*, 12(12), 4960.
- [25] Sithole, S. S., & Ruhode, E. (2021). Cloud Computing Adoption: Opportunities and Challenges for Small, Medium and Micro Enterprises in South Africa. *arXiv preprint arXiv:2108.10079*.
- [26] Awan, M., Ullah, N., Ali, S., Abbasi, I. A., Hassan, M. S., Khattak, H., & Huang, J. (2021). An Empirical Investigation of the Challenges of Cloud-Based ERP Adoption in Pakistani SMEs. *Scientific Programming*, 2021.