

Cloud ERP and Its Effect on Organizational Performance

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Abstract: Cloud-based ERPs have become a game-changer for a lot of organizations all over the world due to their many benefits. Cloud-based ERPs help organizations run their business better, improving efficiency, providing accuracy in reporting, and improved customer and supplier relationships. Hence the need for adopting cloud ERPs has emerged. The study aimed to examine the effect of cloud ERPs on organizational performance.

The study was conducted in some selected medium enterprises in Lagos State. A total of 120 questionnaires were randomly distributed among the selected medium enterprises. One hundred and seven (107) questionnaires were retrieved representing 89.2% response rate. The result of the reliability analysis, analyzed using Cronbach's Alpha ranged from 0.821 to 0.943 and the data used were also validate using KMO and Bartlett test showing $p < 0.05$. The dataset was analyzed using descriptive and inferential (multiple regression) statistics.

The result of model 1 showed a significant effect of cloud ERPs on service quality ($\text{AdjR}^2 = 0.724$; $F\text{-Statistics}_{(3, 103)} = 41.87$; $P\text{-value} = 0.000$); Model 2 revealed a significant effect of cloud ERPs on competitive advantage ($\text{AdjR}^2 = 0.616$; $F\text{-Statistics}_{(3, 103)} = 49.32$; $P\text{-value} = 0.000$), and Model 3 found that firm size has a moderating effect on the relationship between cloud ERPs and organizational performance ($\text{AdjR}^2 = 0.818$; $F\text{-Statistics}_{(4, 102)} = 52.98$; $P\text{-value} = 0.000$) of the selected companies in Nigeria.

The study concluded that cloud ERPs have a significant effect on service quality, competitive advantage, and organizational performance. The study, therefore, recommended that all organizations should adopt the use of cloud ERPs and every challenge inhibiting the adoption of cloud ERPs should be solved as it increases and have a significant effect on the performance of the organization.

Keywords: Cloud ERPs, Competitive Advantage, Firm Size, Organizational Performance, and Service Quality.

1.0 Introduction

Across the world, many organizations have adopted the use of ERP systems even among small and medium enterprises to increase and improve the performance of an organization. An integration of business processes that helps to manage effective cross-functional operations in a business organization is referred to as cloud enterprise resource planning (cloud ERP) as defined by Yu, Li, Li, Zhao, and Zhao, (2018) and Gupta, Kumar, Singh, Foropon, and Chandra, (2018). Cloud-based ERPs have become a game-changer for a lot of organizations all over the world due to their many benefits. Cloud-based ERPs help organizations run their business better, improving efficiency, providing accuracy in reporting, and improved customer and supplier relationships. The flexibility of access using the internet makes it easier for access of the systems by the users from wherever they are through the use of an internet-enabled device. Cloud-based ERPs are used for internal business operations such as Financial Management, Human resource management, Customer Relationship Management, Inventory and Warehousing Management, and Jobs and Resources Management. All these are common modules accessed through the cloud-based ERPs. This is because it can be accessed over the internet, deployment can be done across regional and global offices of an organization.

Gupta, Meissonier, Drave, and Roubaud, (2020) referred to Cloud ERP as one of the four major pillars used in the industry as part of cloud operations which helps to attain higher levels of organizational performance. Currently, the organization found the use of cloud ERP most effective as they are shifting to its use and its effect of paying less and human resources involvement (Maestrini, Luzzini, Maccarrone, & Caniato, 2017).

Cloud ERPs provide basic information in a modern business environment as well as the typical model of computing in an organization (Bradford, 2010). Laukkanen, Sarpola, and Hallikainen, (2007) identified cost reduction, better customer service, improvement of productivity, better quality, resource management, better planning, decision making, and organization empowerment are the main benefits of adopting ERPs. Many studies have researched the adoption of cloud ERP viewing from small and medium enterprises factors that affect the decision making of whether to move their ERP to the cloud or not. Some of the researchers who have worked on the adoption of cloud ERPs include Duan, Faker, Fesak, and Stuart, (2013); Gheorghe and Lupasc, (2012); Mahara, (2013); Faasen, Seymour, and Schuler, (2013), among others. A researcher from Kenya reported that organizations should adopt an ERP as the major core of their cloud computing system. A study carried out by Elgral and Serafi (2011) shows that many companies have started to adopt ERPs to improve business performance.

The paper aims to find the effects of cloud ERPs (represented by inventory and warehousing management; online backup, and human resource management) on organization performance (represented by service quality and competitive advantage). Findings from this study cloud contribute to the literature by confirming results from previous research.

However, the paper has the following parts: the next section of the study is reviewed from the previous study (literature review), followed by the research methodology, empirical results, discussion, and conclusion and recommendation remarks.

2.0 Literature Review.

The research of Gupta et. al., (2020) researched cloud ERP and sustainable performance. The study investigated the hidden linkage between the four pillars of Industry 4.0 and attributes of sustainable organizational performance. In the study, firm size, offering, and cloud service type were used as a moderating variable to determine the significance of the sustainable performance. The study used primary cross-sectional data, analyzed using partial least square structural equation modeling. The study was further suggested to managers and provide further guidance. Similarly, the research of Asiimwe and De Kock, (2019) was based on the analysis and evaluation of industry 4.0. The study presented a bibliometric analysis of literature that jointly considers the concepts of sustainability, sustainable development, socio-technical systems, and transitions with industry 4.0.

Chandrakumar and Parthasarathy, (2014) worked on the cloud enterprise resource planning systems by exploring available literature or journals on cloud ERP systems. The main purpose of the study was to suggest the factors accounting for cloud ERP, and the developed a framework for evaluating ERP systems using a grounded software engineering parameter in the development of cloud ERP. Parthasarathy, (2013) mainly researched the benefits an enterprise can reap if they chose to stay with cloud ERP. The study also addressed the minimize the risks leading to a low-cost and effortless implementation of a completely cloud-based ERP software solution. Scholtz and Atukwase, (2016) identified security and strategic risks as the most frequent variables used in adopting a cloud ERP system.

Johansson, Alajbegovic, Alexopoulos, and Desalermos, (2014) investigated the comparison between SMEs and large companies on cloud ERP adoption opportunities and concerns. The study found that SMEs, especially small companies, can best exploit cloud ERPs as many of the benefits are more relevant for them. The result also showed that many of the concerns associated with cloud ERPs are not seen as important for SMEs. Further findings showed that large companies have severe concerns that are related to their size, complexity, and demands. Wailgum, (2008) and Forrest, (2009) argued that cloud ERPs comprise a viable solution only for SMEs and Arnesen, (2013) strengthens this assumption arguing that the majority of the current cloud ERP adopters are SMEs. However, Arnesen, (2013) added that large companies also recognize and appreciate the advantages of cloud ERPs, such as the IT efficiency and business agility that cloud computing provides, and increasingly move their mission-critical enterprise systems to the cloud.

Prior to the previous studies related to cloud ERPs and organization or sustainable performance, most studies have been conducted on the adoption of cloud ERPs, comparison on SMEs and large companies on cloud ERPs, benefits, and disadvantages of cloud ERPs. Researchers like Johansson et. al., (2014); Alajbegovic, Alexopoulos, and Desalermos, (2013) used a qualitative method of data analysis to compared the difference between SMEs and large companies on cloud ERPs while other researchers such as Scholtz and Atukwase, (2016); Singh and Nagpal, (2014); Parthasarathy (2013) have researched on the implementation and benefit of cloud ERPs. The study used both systematic literature review and qualitative method of data analysis

to identify and explained how cloud ERPs are being Implemented and benefit from. Likewise, a study if Gupta et. al., (2020) used a partial least square structural equation model to explain the role of cloud ERPs on organizations. Despite the study conducted on the benefit, implementation, comparison, and role of cloud ERPs, this survey reported that limited study has been done on the effect of cloud ERPs and their organization. Therefore, this study used a quantitative research design to analyze the effect of cloud ERPs on the performance of the organization.

From the above, the effect of cloud ERPs on organizational performance has been investigated by many scholars from both developed and developing countries and the result are not consistent. Some researchers believe that the adoption in the adoption of cloud ERPs. Some believe that cloud ERPs affect an organization's performance significantly and positively, while others show the reversed results, and some scholars indicate that there is no relationship between cloud ERPs and organizational performance.

From theories and literature review, three different research hypotheses were proposed as followed:

Hypothesis 1 (H₀₁): Cloud ERPs have no effect on service quality.

Hypothesis 2 (H₀₂): Cloud ERPs have no effect on competitive advantage.

Hypothesis 3 (H₀₃): Firm size has no moderating effect on the relationship between cloud ERPs and organizational performance.

3.0 Research Methodology

3.1 Research Model

From the previous study, most studies have measured the effect of cloud ERPs on organization performance. In this study, the research model is built on service quality and competitive advantage as a proxy for organizational performance and three proxies such as inventory and warehousing management, online backup, and human resources management as the explanatory or the independent variables.

Conceptual Model

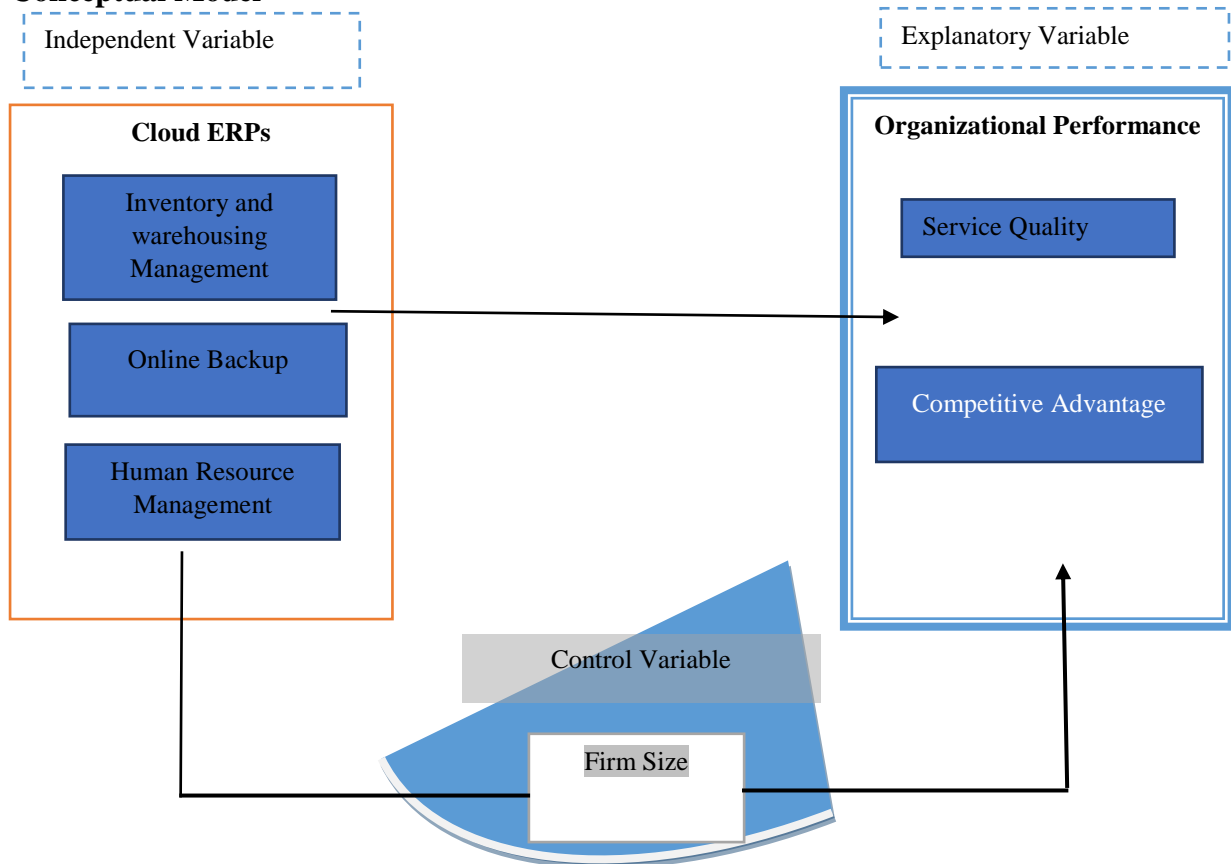


Figure 1: Researcher's Conceptual Model, 2021.

Source: Researcher's Compilation, 2021.

From the model, three equations are formed from the conceptual model developed above:

$$SQ_i = \beta_0 + \beta_1 IWM_i + \beta_2 ONB_i + \beta_3 HRM_i + \mu_i \text{----- (Model 1)}$$

$$CA_i = \beta_0 + \beta_1 IWM_i + \beta_2 ONB_i + \beta_3 HRM_i + \mu_i \text{----- (Model 2)}$$

$$OP_i = \beta_0 + \beta_1 IWM_i + \beta_2 ONB_i + \beta_3 HRM_i + \beta_4 FS_i + \mu_i \text{----- (Model 3)}$$

Where:

SQ_i: Service quality;

CA_i: Competitive advantage;

OP_i: organizational performance;

IWM_i: Inventory and warehousing management;

ONB_i: Online backup;

HRM_i: Human resource management;

FS_i: Firm Size;

β₀ = intercept or constant;

β₁, β₂, β₃ = the coefficient of the explanatory variables (inventory and warehousing management (IWM), Online Backup (ONB), and Human Resources Management (HRM))

μ is the error term of the model

i = cross-sectional variable

3.2 Data Source and Data Collection

As mentioned above, the main aim of this paper is to examine the effect of cloud ERPs (measured by inventory and warehousing management; online backup, and human resource management) on the organizational performance of listed medium enterprises companies in Lagos State, Nigeria. The study adopted the use of primary data (questionnaires) distributed among medium enterprises companies in Lagos State, Nigeria. The respondents were staff of medium companies who could give more details or information about the company. A total of 120 questionnaires were distributed to the staff but only 107 questionnaires were retrieved and accounted for the analysis. The validity and the reliability test of the instrument used for the analysis were consistent for the analysis and Bartlett's test of sphericity for all the variables showed $p < 0.05$ for the validity test. The result of the Cronbach's Alpha test for the reliability test ranging from 0.821 to 0.943. Therefore, the instrument used for the analysis is consistent and showed a need to proceed with the analysis.

3.3 Method of Data Analysis

Due to the use of regression analysis, the paper analyzed the socio-demographic characteristics of the respondents using frequency and percentage distribution. The study furthered by using a correlation test to check the relationship between the variables. It is noteworthy that if two variables are strongly correlated such that the correlation value is greater or equal to 0.75, there might be a problem of multicollinearity. In such a case, the independent variable is removed. If the correlation coefficient between the organizational performance and cloud ERPs is zero "0", this implies that no correlation between them. Also, if the correlation coefficient is less than 0.5, it implies that a weak correlation occurs, and a correlation coefficient greater than 0.5, implies a strong correlation. The next analysis was conducted on the multicollinearity test. This occurs when the proxies for cloud ERPs (explanatory or the independent variables) are highly correlated with one or more independent variables in a multiple regression equation. Hoang and Chu, (2013) opined that if the VIF is greater than 5, then the problem of multicollinearity exists. The last analysis is on multiple regression of the three models developed above. The results displayed the model summary of each of the models as well as the F-statistics and the p-value determined by the F-statistics. Finally, the beta for the explanatory variables in the model is tested based on the statistical significance level. The beta value determined whether it is a positive or negative contribution based on the significance level. The result of the analysis is therefore shown in 4.0 below.

4.0 Empirical Results

4.1 Socio-demographic Characteristics of the Participants

The expressed primary motivates on the cloud ERPs and their effect on organizational performance among medium enterprises in Lagos State, Nigeria were reported from the individual perspectives. A total of 120 questionnaires were distributed among the selected companies with 107 (89.2%) eligible for use. The detailed socio-demographic characteristics of the entire participants were summarized in Table 1 below.

The participants who had responded to the survey were predominantly male (57.9%) and aged between 30 – 34 years (41.1%). The majority of the respondents had received HND/BSc/BTech (68.2%) with 0 – 2 years of working experience (43.9%). About 91.6% of the medium enterprises' companies have been established for more than 5 years with employees between 51 – 100 showing that the majority of the medium enterprises' companies used cloud ERPs. Among the medium enterprises' companies, the types of cloud ERPs mostly used are salesforce (34.6%); followed by others (23.3%); SAP (21.5%), and Microsoft Dynamics NAV with the percentage of 20.6%.

Table 1: Socio-demographic Characteristics of the Participants

Socio-demographic Characteristics	Frequency Distribution	Percentage Distribution
Gender		
Male	62	57.9
Female	45	42.1
Total	107	100.0
Age of the Respondents		
18 – 24	4	3.7
25 – 29	13	12.1
30 – 34	44	41.1
35 – 39	29	27.2
40 – 44	16	15.0
45 years and above	1	0.9
Total	107	100.0
Highest Level of Education		
Secondary	0	
NCE/OND	29	27.1
HND/BSc/BTech	73	68.2
Masters and PhD	5	4.7
Total	107	100.0
Years of Working Experience		
0 – 2 years	47	43.9
3 – 5 years	33	30.8
5 years and above	27	25.3
Total	107	100.0
Years of Establishment		
0 – 2 years	0	
3 – 5 years	9	8.4
5 years and above	98	91.6
Total	107	100.0
Size of the Firm by Employees		
0 – 50 Employees	17	15.9
51 – 100 Employees	78	72.9
101 – 250 Employees	12	11.2
250 Employees and above	0	0.0
Total	107	100.0
Organisation used Cloud ERPs		
Yes	88	82.2
No	19	17.8
Total	107	100.0

Types of Cloud ERPs used		
Salesforce	37	34.6
SAP	23	21.5
Microsoft Dynamics NAV	22	20.6
Others	25	23.3
Total	107	100.0

Source: Researcher's Field Survey, 2021.

4.2 Correlation analysis and Multicollinearity Test

The correlation analysis was used to determine the degree and the strength of the relationship between the two variables. The relationship was determined between the dimension of cloud ERPs and the performance of organizations ranging from -1 to 1. The correlation value greater than 0.5 indicates a strong correlation; the values less than 0.5 indicate weak correlation, and the correlation value equals 0.5 indicates moderate correlation. Table 2 shows that a weak positive correlation occurs between SA and cloud ERPs (IWM; ONB, and HRM). Also, between CA and cloud, ERPs indicate weak positive correlation analysis. This was an indication that as the cloud ERPs (IWM, ONB, and HRM) increase, the performance of the organization increase (SQ and CA) but in a minimal way. Further explanation deduced from the correlation value shows that there was no problem of multicollinearity since the correlation value obtained for each variable of cloud ERPs was not greater than 0.75.

The multicollinearity problem was determined using the VIF indicator. The result displayed in Table 2 above shows that the VIF is less than 5. As stated by Hong and Chu, (2013), if VIF is smaller than 5, no problem of multicollinearity occurs. Therefore, there was no problem of multicollinearity and a need to proceed to the regression analysis.

Table 2: Correlation Analysis and Multicollinearity Test

	SQ	CA	IWM	ONB	HRM	VIF	1/VIF
SA	1.000					N/A	N/A
CA	0.578	1.000				N/A	N/A
IWM	0.432	0.237	1.000			2.03	0.493
ONB	0.318	0.375	0.520	1.000		1.17	0.855
HRM	0.411	0.454	0.643	0.486	1.000	1.94	0.515
Mean VIF						1.71	

Where SQ indicates service quality, CA indicates competitive advantage, IWM – inventory and warehousing management, ONB – online backups, and HRM – human resources management.

Source: Researcher's Field Survey, 2021.

4.3 Test of Hypothesis

Multiple linear regression analysis is used to check the significance of the variable and the level of contribution cloud ERPs have with the organizational performance. Also, the effect and the significance of the variable in the result are explained below. Three different hypotheses were developed and explained accordingly.

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Table 3 shows the regression analysis and the model summary of the effect of cloud ERPs and service quality. The adjusted R² of 72.4% shows the composition of cloud ERPs on service quality while the remaining 27.6% constitutes factors not considered in this study.

From the result of the analysis displayed in Table 3, the coefficient of cloud ERPs shows a positive contribution to service quality. All the dimensions of cloud ERPs are significant with service quality ($p < 0.05$). Cloud ERPs contributed positively to the service quality. This indicated that as cloud ERPs increases, the organization's performance also increases. It is further explained that cloud ERPs have a significant effect on organizational performance. At a level of significance, the F statistics was 41.87, while the p-value of the F statistics is 0.000 which is lower than the 0.05 significance level adopted. Therefore, the null hypothesis was rejected and thereby conclude that cloud ERPs have a significant effect on service quality.

The adjusted R^2 of 61.6% shows the composition of cloud ERPs on competitive advantage while the remaining 38.4% constitutes factors not considered in this study as displayed in Table 4. The result of the regression analysis revealed that IWM and HRM were significant at $p < 0.05$ (5% significance level) while ONB was significant at $p < 0.1$. These variables contributed positively to the effect of organizational performance. The result explained furthered that as cloud ERPs increases, the competitive advantage also increases. The level of significance of the result showed that the F statistics was 49.32, while the p-value of the F-statistics is 0.000 which is lower than the 0.05 significance level adopted. It can be concluded that the null hypothesis was rejected at $p < 0.05$, indicating that cloud ERPs have a significant effect on competitive advantage.

In Table 5, the explanatory variables used include IWM, ONB, and HRM while FS was represented by control or the moderator variable, and organizational performance was the dependent variable used to regress the independent or the explanatory variable and the moderating variable. The adjusted R^2 shows the composition of cloud ERPs on organization performance while the remaining 18.2% constitutes factors not considered in this study. IWM, HRM, and FS were significant at $p < 0.05$ while ONB was not significant at $p < 0.05$. Further analysis indicated that IWM, ONB, HRM, and FS contributed positively to organizational performance. It was deduced from the result that cloud ERPs have an effect on organizational performance. This was a result of the findings from Table 5 indicating that F-statistics was 52.98, and the p-value of the F-statistics is 0.00 which is lower than the decision rule of 0.05 level of significance adopted. From the result, it was therefore concluded that the null hypothesis was rejected at $p < 0.05$, indicating that cloud ERPs have a significant effect on organizational performance.

Table 3: Cloud ERPs and Service Quality

SQ	Coeff.	Std. Error	T-value	P-value
Constant	0.499	0.197	2.53	0.018**
IWM	0.249	0.056	4.46	0.000***
ONB	0.102	0.035	2.90	0.001***
HRM	0.292	0.045	6.55	0.004***
Model Summary				
	SS	DF	MS	
Model	54.337	3	18.112	
Error	62.148	103	0.603	F (3, 103) = 41.87
Adj. R square	0.724	R square	0.731	Prob > F = 0.000

Where SQ indicates service quality, IWM – inventory and warehousing management, ONB – online backups, and HRM – human resources management. Also, ** and *** indicate P-value < 0.05 (5% significance level); SS – sum of square, df – degree of freedom, and MS – Mean Square.

Source: Researcher's Field Survey, 2021.

Table 4: Cloud ERPs and Competitive Advantage

CA	Coeff.	Std. Error	T-value	P-value
Constant	0.409	0.199	2.06	0.001**
IWM	0.521	0.057	9.26	0.020***
ONB	0.467	0.035	1.88	0.079*
HRM	0.262	0.045	3.60	0.004***
Model Summary				
	SS	DF	MS	
Model	33.181	3	11.060	
Error	48.480	103	0.471	F (3, 103) = 49.32
Adj. R square	0.616	R square	0.622	Prob > F = 0.000

Where CA indicates competitive advantage, IWM – inventory and warehousing management, ONB – online backups, and HRM – human resources management. Also, ** and *** indicate P-value < 0.05 (5% significance level); SS – sum of square, df – degree of freedom, and MS – Mean Square.

Source: Researcher's Field Survey, 2021.

Table 5: Cloud ERPs and Organisational Performance

OP	Coeff.	Std. Error	T-value	P-value
Constant	0.233	0.013	3.84	0.000***
IWM	0.473	0.034	5.11	0.000***
ONB	0.009	0.020	0.14	0.969
HRM	0.068	0.025	4.32	0.000***
FS	0.032	0.030	2.24	0.001***
Model Summary				
	SS	DF	MS	
Model	24.611	4	6.153	
Error	38.641	102	0.379	F (4, 102) = 52.98
Adj. R square	0.818	R square	0.823	Prob > F = 0.000

Where *OP* indicates organizational performance, *IWM* – inventory and warehousing management, *ONB* – online backups, and *HRM* – human resources management. Also, ** and *** indicate *P*-value < 0.05 (5% significance level); *SS* – sum of square, *df* – degree of freedom, and *MS* – Mean Square.

Source: Researcher’s Field Survey, 2021.

5.0 Discussion of Findings

This study provides an explicit comprehension analysis on the effect of cloud ERPs and organizational performance with the view that almost all the respondents explained that their company used cloud ERPs. Despite being a medium enterprises company, the type of cloud ERPs used varied. Research had also indicated that most of the respondents who participated in the study were between the age group of 30 – 34 years. Conversely, it should be noted that more than half of the participants were having either HND or BSc, or BTech. The scenario on the educational background helped the researcher because the participants were educated and know what cloud ERPs were detailed about. The study of Elgral and Serafi (2011) shows that many companies have started to adopt ERPs to improve business performance, this is consistent with the result obtained in Table 1 where a question was asked whether the company of the participant used cloud ERPs.

Following other researchers who have studied Cloud ERPs and organizational performance, the findings spotlighted that cloud ERPs (inventory warehousing and management, online backup, and human resource management) affected organizational performance (service quality and competitive advantage). The findings showed the significant values of IWM, ONB, and HRM. They have the highest contribution which greatly improved the service quality. This is consistent with the research carried out by Saini et al. (2012) where they cited increased interest in cloud-based ERP adoption with the IWM, ONB, and Human Resources as the commonly adopted functions as well as the other functions listed. The findings also show that users consider the speed of access and connectivity to the system a high factor in their adoption and use of cloud-based ERPs. The result obtained in Tables 3, 4, and 5 was also consistent with research carried out by Kagwe (2012) where he listed some of the concerns that may cause SMEs not to readily adopt cloud-based ERPs such as bandwidth limitation which affects the speed of access and connectivity. Bois (2010) showed that SMEs improve their operations and can focus on their core functions when they adopt cloud-based ERPs. This is consistent with the results showing improved overall organizational performance, accuracy in data processing, timely and accurate data processing, and reduced operation cost. Gupta et. al., (2020), however, research the effect of cloud ERPs and their organizational performance. The study of Gupta et. al., (2020) was also in line with our findings since the result obtained indicated that the cloud effect had a significant effect on organizational performance.

6.0 Conclusion and Recommendations

The study aimed at investigating the effect of cloud ERPs on organizational performance among medium enterprises in Nigeria. The study contributed to the adoption of cloud ERPs among medium organizations in Nigeria. The empirical evidence from this research inferred that cloud ERPs including inventory warehousing and management; online backup and human resource management have a significant effect on the performance of organizational performance (service quality and competitive advantage) in Nigeria. The overall result of the analysis showed that the outcomes of this study revealed that cloud ERPs have a significant effect on the performance of the organization. Therefore, the study recommended that all organizations should adopt the use

of cloud ERPs and every challenge inhibiting the adoption of cloud ERPs should be solved as it increases and have a significant effect on the performance of the organization.

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