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Enhancing Cybersecurity: Smart Intrusion Detection in File Server SYSTEMS

Influence of Cloud Computing Technology on Performance at International Business Machines Africa

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Abstract
Studies have been carried out regarding emerging technologies and performance, but few have been conducted in the IT industry, hence the need to fill the gap within IBM Africa which is an IT firm. Specifically, cloud computing has not been studied within an IT firm. The purpose of the study was to determine the influence of cloud computing technology on performance at IBM Africa. The study adopted a descriptive research design. The study targeted 184 employees from IBM Africa, and a stratified random sampling technique was used. Analysis was done quantitatively by employing inferential and descriptive statistics. Inferential statistics were in the form of linear regression, correlation, ANOVA, and T-test. The study found a weak positive correlation of 0.343 between cloud computing technology and performance. The results of the model summary indicated 10.9% of the variance in performance. The regression coefficient results indicated that cloud computing technology significantly predicted performance indicated by β of 0.348. The ANOVA results indicated that cloud computing technology significantly affected performance indicated by an F-value of 13.827. Perceived benefits that come with cloud computing led to the adoption of cloud computing indicated by a mean of 4.24. Cloud computing enhanced the efficiency of operations indicated by a mean of 4.22 and improved customer relationships indicated by a mean of 4.2. The study concluded that, a positive correlation between cloud computing technology and performance. The top management supported the adoption of cloud computing. There exists a positive correlation between data analytics technology and performance. Big data analytics led to better customer-driven business. There exists a positive correlation between AI technology and performance. The study recommends that the management should continually use cloud computing technology, train all its staff on the use, and come up with measures that may hinder effective use of the technology.

Introduction

Performance serves as a reflection of an organization's business outcomes and results, providing an overall assessment of the organization's well-being during a specific period (Zhang, Khan, Lee & Salik, 2019). Many firms around the world prioritize performance as a primary objective, recognizing its pivotal role in determining the organization's development and growth. International Business Machines Corporation (IBM) is one of the biggest technology companies in the world, with operations in more than 170 countries and over 345,000 employees worldwide. IBM is best known for producing and selling computer hardware and software, as well as cloud computing and data analytics. The company has also served as a major research and development corporation over the years, with significant inventions like the floppy disk, the hard disk drive, and the UPC barcode. IBM attributes

this survival feat to its mastery of enterprise change management as a core requirement of successful transformation and disruption. Founded in 2013, IBM – Africa Research Laboratories develops new technologies to transform lives and spark new business opportunities. In the year 2022 IBM generated $60.5 billion of revenue, a decline of 15 percent from the previous year and much of this reflects the broader uncertainty of the macro environment (IBM Annual Report, 2022). Edeh, Sharma and Edeh (2020) studied the impact of emerging technologies on the job performance of educators in selected tertiary institutions in Nigeria and concluded that emerging technologies are essential tools to improve educator's efficiency and productivity. The purpose of the study was to determine the influence of cloud computing technology on performance at IBM Africa.

Firms are increasingly utilizing the most effective strategic policies which are aimed at improving service delivery to their clients, maximize profits, enhance growth, and remain competitive in the industry (Smith, 2018). The rapid developments in technology innovations have revolutionized the business methods and publishing of accounting information. Technology has revolutionized the world hence affecting corporates decisions and ways of doing business (Chiang, Chen & Hsu, 2019). Considering that technology keeps on evolving, every firm need to come to terms with this reality. The IT industry has been recognized as a sector where digitalization is likely to accelerate, necessitating the use of technology advancements (Mohammed & Ebo, 2019). The business environment within which the IT firms operate has been very volatile due to competition from new entrants and technological advancement (Moll & Yigitbasioglu, 2019).

Considering that IBM Africa is an important part in our economy, the aforementioned concerns in the sector cannot be overlooked. The IT industry is expected to become increasingly automated, and firms in the sector must prepare for this transition and understand what is required for their businesses to survive in the increasingly competitive climate (Amirul, Mail, Bakar & Ripain (2017)). Because of its widespread use in the corporate sector, technology is essential for IT firms such as IBM Africa. Almost every element of the IT profession is now influenced by technological advancements (Moll & Yigitbasioglu, 2019). In the year 2022, IBM generated $60.5 billion of revenue, a decline of 15 percent from the previous year and much of this reflects the broader uncertainty of the macro environment (IBM Annual Report, 2022). Hybrid cloud, big data analytic and artificial intelligence are the greatest shifts in the technology landscape and IBM is positioning itself to play a key role in this swift and massive transformation. The understanding of the effects of emerging technologies to disruptive business models at IBM Africa is therefore of utmost importance (IBM Annual Report, 2022).

Studies have been carried out regarding emerging technologies and performance, but few have been conducted in the IT industry, hence the need to fill the gap. Edeh, Sharma and Edeh (2020) studied the impact of emerging technologies on the job performance of educators in selected tertiary institutions in Nigeria and concluded that emerging technologies are essential tools to improve educator's efficiency and productivity. However, a conceptual gap exists as the study focus was on job performance of employees and not on organization performance while a contextual gap exists as the focus was in Nigeria and on tertiary institutions and not on IT firms. This study is thus timely in seeking to fill the gap by focusing on influence of emerging technologies on performance at IBM Africa.

The study is relevant to the employees and management at IBM Africa. It is also important to other IT firms as they can understand the role that technological innovations play in enhancement of their performance. The ICT sector is critical as it offers employment to young people, a key contributor the country's GDP and in achieving Vision 2030. The research holds considerable importance for upcoming academicians and scholars as a valuable reference for future studies on the impact of emerging technologies on performance.

Research Methodology

Research Design

In this study, a descriptive research design was employed, which aims to describe the characteristics of the population or phenomenon under investigation. Given that the study involved collecting quantitative data from a sample of 126 participants, the descriptive research design was well-suited for the research objectives.

Population and Sampling Design

Population

In this study, the target population consisted of 184 employees from IBM Africa, specifically focusing on individuals working in various departments within the organization, such as finance, human resources, Information Communication Technology (ICT), administration, operations, sales and marketing, procurement, and research and development.

Table 1: *Study Population*

Departments	**Population Frequency**	**Percentage**
Finance department	26	14.1%
Human resource department	9	4.9%
ICT department	54	29.3%
Administration department	13	7.1%
Operations department	16	8.7%
Sales and marketing department	29	15.8%
Procurement department	15	8.2%
Research and development department	22	12.0%
Total	**184**	**100.0%**

Source: IBM Africa Human Resource Department (2023)

Sampling Design

Sampling Frame

A sampling frame, as defined by Mishra and Alok (2022), refers to the list or description of units from which the sample is drawn. It provides a method for selecting specific members from the target population (Mishra & Alok, 2022).). In the present study, the sampling frame was derived from employees belonging to various departments within the organization, including finance, human resources, Information Communication Technology (ICT), administration, operations, sales and marketing, procurement, and research and development.

Sampling Technique

According to Erik and Marko (2019), the sample selection technique is utilized to ensure that study participants are a true representation of the population they were drawn from. This technique involves the method by which researchers gather subjects, sites, or objects for examination, as explained by Gupta and Kapoor (2020). The stratified sampling approach was utilized to sample employees from various departments. Because the population is not homogeneous, this sampling strategy is suited for the study. According to Mugenda and Mugenda (2012), this sampling approach can produce samples of large non-homogenous populations that are typical of the overall population. The approach was also utilized since it lessens the potential for bias and gives each option an equal shot at being chosen.

Sample Size

The sample size was calculated using Yamane's formula (1967), which is as follows.

$$n = \frac{N}{1+N(e)^2}$$

Where n denotes the sample size, N indicates the population size, and *e* represents the accuracy level (0.05).

$$n = 184/\ 1+ 184\ (0.05)^2$$
$$= 184/1 + 184(0.0025)$$
$$= 184/1.46$$
$$= 126$$

Table 2: ***Sample Size***

Departments	Sample Size	Percentage (%)
Finance department	18	14.1
Human resource department	6	4.9
ICT department	37	29.3
Administration department	9	7.1
Operations department	11	8.7
Sales and marketing department	20	15.8
Procurement department	10	8.2
Research and development department	15	12.0
Total	**126**	**100.0**

Data Collection Methods

A pilot study involving 13 respondents from Crystal Technologies Limited was conducted to validate and pre-test the questionnaire, as suggested by Erik and Marko (2019), who recommend a test group comprising 10 percent of the sample size. This process aimed to enhance the questionnaire's validity and familiarize the researcher with the study's administration procedure, facilitating identification of items requiring modification. Reliability, measured using Cronbach's Alpha, assessed internal consistency among responses. A Cronbach's Alpha value above 0.70 ensures reliability. To enhance reliability, the time between test and retest was increased to mitigate memory effects. Content validity, crucial in ensuring data collected aligns with the research concept, was achieved through proofreading to eliminate errors and ensure clarity. Pre-testing the questionnaire validated its ability to measure intended concepts, as suggested by Surucu and Maslakci (2020). Validity was further enhanced by ensuring questions are clear, unambiguous, and reflective of the research idea. The questionnaire was chosen due to its cost-effectiveness and efficiency, particularly when dealing with a large sample size. To streamline the analysis process, closed-ended questions were utilized (Erik & Marko, 2019), enabling faster responses and straightforward data interpretation (Grassini & Laumann, 2020).

Ethical Considerations

After approval of the research proposal by the supervisor, the researcher sought ethical clearance from the Institutional Review Board (IRB) at USIU Africa, preceded by formal approval from the National Commission for Science, Technology & Innovation (NACOSTI). Additionally, a letter of introduction from United States International University was obtained to support the study's legitimacy. In line

with ethical principles, informed consent was obtained from all respondents before administering the questionnaires, ensuring respect for their autonomy and rights throughout the research process.

Data Analysis Methods

Prior to analysis, the data was cleansed so as to ensure that all questionnaires are duly filled and then coded in the SPSS Version 25 software. Data analysis was conducted using the SPSS Version 25 software, employing both inferential and descriptive statistics for the quantitative analysis.

Inferential statistics were applied through correlation analysis and linear regression. The study used correlation analysis to examine the strength of relationships among variables, with correlation coefficients measuring the extent of the relationship between two variables (Gupta & Kapoor, 2020).

The model of regression was presented as follows:

$Y = \beta 0 + \beta 1X1 + \beta 2X2 + \beta 3X3 + \varepsilon$

Where: Y = Performance

β_0 = Constant Term; β_1, β_2, β_3 and β_4 = Beta coefficients

X_1= Cloud computing technology

X_2= Big data analytics technology

X_3= Artificial intelligence technology

ε = Error term

Results

Response Rate

Out of the total sample of 126 respondents, 106 participants successfully completed the questionnaires, resulting in a response rate of 84.1%. This response rate was deemed satisfactory and representative enough to draw conclusions for the study.

Demographic Information

Distribution of Respondents by Gender

Participants in this study were requested to disclose their gender as a means of assessing gender balance within the study's population. Majority of study participants (51.9%) were males, while 48.1% were females. These results demonstrate a balanced representation of both gender groups, ensuring that there is no possibility of gender bias influencing the outcomes.

Age Bracket

To ensure that the information collected in this study encompasses the perspectives of diverse age groups, participants were asked to provide their age. The study revealed that the majority of respondents (41.5%) were between the ages of 31 to 40 years, while 24.5% fell into the age group of 41 to 50 years. Additionally, 17.9% of respondents were above 50 years of age, and 16.0% were between the ages of 21 to 30 years. These findings indicate that participants from various age groups were involved in the study, ensuring that opinions from diverse age categories were adequately represented in this research.

Highest Academic Qualification

Research studies have demonstrated that literacy levels are linked to how individuals perceive, interpret, and approach various issues. To determine the participants' capability to respond to the study questions, the research required them to indicate their age group. Based on the study results, the highest educational qualification for the majority of respondents (38.7%) was a master's degree, followed by 32.1% having a degree, 13.2% with a diploma, and 16.0% with a postgraduate qualification. These findings indicate that a significant proportion of the participants in this study were well-educated, enabling them to respond to the research questions effectively.

Duration of Work Service

Participants in the study were requested to specify the duration of their employment with telecommunication companies in Kenya. The findings regarding the period of service are provided in Based on the results, the majority of respondents (51.9%) reported having served for a duration of 6-10 years, while 35% indicated having worked for more than 10 years. Additionally, 16% of respondents stated a period of 1-5 years of service. These findings highlight that a significant proportion of participants had considerable experience at IBM Africa, indicating their ability to provide valuable and detailed information related to the study subject.

Effects of Cloud Computing Technology

This section sought to investigates the effect of cloud computing technology on performance at IBM Africa. Cloud computing is the delivery of different services through the Internet. These resources include tools and applications like data storage, servers, databases, networking and software. The areas that will be considered include drivers affecting adoption of cloud computing, importance of cloud computing in businesses and cloud computing challenges.

Drivers Affecting Adoption of Cloud Computing

The study established that the perceived benefits that come with cloud computing has led to adoption of cloud computing at IBM Africa (mean = 4.24 std dev = 0.58) and the employees at IBM Africa organization have the right attitudes and skills to support adoption of cloud computing (mean =4.20 std dev = 0.58). Top management at IBM Africa supports the adoption of cloud (mean =4.19 std dev = 0.55). Also, results show that business risks have led to adoption of cloud computing at IBM Africa (mean = 4.13 std dev = 0.57) and that industry competition has led to adoption of cloud computing at IBM Africa (mean = 4.06 std dev = 0.57).

Importance of Cloud Computing in Businesses

The study found that cloud computing has enhanced efficiency of operations, (mean = 4.22 std dev = 0.62), cloud computing has improved customer relationships at IBM Africa (mean = 4.20 std dev = 0.58) and that cloud computing has led to cost savings in the organization (mean = 4.18 std dev = 0.60). Also, it was established that cloud computing has improved supplier relationships in the organization (mean = 4.10 std dev = 0.63) and cloud computing has enhanced accuracy and timely reporting in at IBM Africa (mean = 4.08 std dev = 0.63).

Cloud Computing Challenges

The study established that security and privacy of data is a major challenge affecting cloud computing in organizations (mean = 4.19 std dev = 0.55) and deletion of data is a major challenge affecting cloud computing in organizations (mean = 4.18 std dev = 0.64). It was noted that data privacy and confidentiality is a major challenge affecting cloud computing in organizations (mean = 4.17 std dev =0.62). Also, results show that data segregation is a major challenge affecting cloud computing in organizations (mean = 4.13 std dev = 0.62) and lack of speed and high bandwidth is a major challenge affecting cloud computing in organizations (mean = 4.08 std dev = 0.66).

Pearson Correlations

Pearson's correlation is a measure of the strength of the association between the independent and the dependent variables. The study found a positive correlation between cloud computing technology and performance at IBM Africa as shown by the 0.343 factor of correlation. This positive relation was identified as statistically significant because the significant value as indicated in the table below was 0.000 and was below the recommended 0.05 p value.

Table 3: *Pearson Correlations*

		Performance at IBM Africa	Cloud Computing Technology (X1)
Performance at IBM Africa.	Pearson Correlation	1	.343**
	Sig. (2-tailed)		.000
	N	106	106
Cloud Computing Technology (X1).	Pearson Correlation	.343**	1
	Sig. (2-tailed)	.000	
	N	106	106

Regression Test

Model Summary

The R Squared which is the coefficient of determination (R^2) was 0.109 which means 10.9 percent of the variance in performance at IBM Africa is explained by cloud computing technology.

Analysis of Variance

Based on the statistics of the ANOVA, the research showed that the computed F-value was 13.827 while F-critical value which was 3.93. Given that calculated value of F was greater than the critical value an indication that, cloud computing technology had a significant impact on performance at IBM Africa. The value of significance was below 0.05 pointing out the significance of the model in predicting the results.

Table 4: *Analysis of Variance*

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	2.300	1	2.300	13.827	.000[b]
Residual	17.304	104	.166		
Total	19.604	105			

Regression Coefficient

The regression coefficient represents estimates of the unknown population parameters and illustrates the relationship between an independent variable and the dependent variable. Based on the regression model obtained in the analysis, increasing investment in cloud computing technology while keeping other factors constant would lead to a performance enhancement at IBM Africa (Y) by a factor of 0.397.

Table 5: *Regression Coefficient*

Model	Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t
(Constant)	4.624	.226		20.424
Cloud Computing Technology X1)	.397	.107	.343	3.718

Effect of Big Data Analytics Technology on Performance

This section sought to establish the effect of big data analytics technology on performance at IBM Africa. Big data analytics is the process of collecting, examining, and analysing large amounts of data to discover market trends, insights, and patterns that can help companies make better business decisions. The areas that were considered include product development, market development and sales growth.

Performance

The study established that there has been an increase in customers in the organization over the years (mean = 4.14 std dev =0.75) and there has been an increase in market share at IBM Africa over the years (mean = 4.10 std dev = 0.78). It was revealed that there has been a new product development at IBM Africa over the years (mean = 4.04 std dev = 0.72). The results showed that there has been increase in revenue at IBM Africa over the years (mean = 4.03 std dev = 0.76) and that there have been new branches in our organization over the years (mean = 3.94 std dev = 0.75).

Discussion

The study found a positive correlation between cloud computing technology and performance at IBM Africa as shown by the 0.343 factor of correlation. The positive relation was identified as significant statistically because the significant value as indicated in the table below was 0.000 and was below the recommended 0.05 p value. With cloud computing businesses finds this as a big opportunity for saving operating cost, improving on customer relationship and timely reporting (Chiregi & Navimipour, 2017). From the regression model, further investment on cloud computing technology while holding the other factors constant would enhance performance at IBM Africa by a factor of 0.397. The findings supported Sunyaev and Sunyaev (2020) findings that cloud computing 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 via an internet enabled device.

The study established that the perceived benefits that come with cloud computing has led to adoption of cloud computing at IBM Africa (mean = 4.24 std dev = 0.58) and the employees at IBM Africa organization have the right attitudes and skills to support adoption of cloud computing (mean =4.20 std dev = 0.58). Cloud computing has evolved to become a very important tool for many organizations to obtain IT resources in order to improve organization performance. Many organizations outsource their IT instead of having it internal (Sadeeq et al., 2021). Top management at IBM Africa supports the

adoption of cloud (mean =4.19 std dev = 0.55). The finding goes hand in hand with research conclusion by to Mwaurah (2021) that cloud computing offers a lot to companies that do not have the resources to buy servers and host them within their offices.

The results show that business risks have led to adoption of cloud computing at IBM Africa (mean = 4.13 std dev = 0.57). The risk of data breaches, unauthorized access, or loss of sensitive information is a significant concern for businesses. Cloud computing offers advanced security measures and dedicated teams focused on data protection. Adopting cloud solutions can help mitigate the risks associated with data security and enhance overall data protection (Joia & Marchisotti, 2020). It was revealed that industry competition has led to adoption of cloud computing in at IBM Africa (mean = 4.06 std dev = 0.57). The finding supports research conclusion by Tabrizchi and Rafsanjani, (2020) that cloud computing a major trend in the business industry and a business strategy for organizations that want to improve their performance.

The study found that cloud computing has enhanced efficiency of operations (mean = 4.22 std dev = 0.62). Sunyaev and Sunyaev (2020) indicated that cloud computing allows businesses to scale their IT resources up or down based on their needs. This scalability enables organizations to efficiently allocate resources and handle fluctuations in demand without overprovisioning or underutilizing infrastructure. It provides the flexibility to quickly adapt to changing business requirements, ensuring optimal resource utilization and cost efficiency. Cloud computing has improved customer relationships at IBM Africa (mean = 4.20 std dev = 0.58). Tabrizchi and Kuchaki (2020) indicated that cloud computing has significantly improved customer relationships for businesses by providing enhanced communication, personalized experiences, and improved service delivery.

Cloud computing has led to cost savings in the organization (mean = 4.18 std dev = 0.60). Similar research deduction by Diaby and Rad, (2017) also confirm that; with cloud computing businesses finds this as a big opportunity for saving operating cost, improving on customer relationship and timely reporting. It was established that cloud computing has improved supplier relationships in the organization (mean = 4.10 std dev = 0.63). Diaby and Rad (2017) indicated that cloud computing enhances supplier relationships by improving collaboration, data sharing, supply chain integration, and decision-making. These capabilities enable businesses to establish more efficient and mutually beneficial relationships with their suppliers, leading to enhanced operational efficiency, cost savings, and improved supply chain performance.

Cloud computing has enhanced accuracy and timely reporting in at IBM Africa (mean = 4.08 std dev = 0.63). These conclusions support research inferences by Elragal and Serafi (2018) that many companies have started to adopt cloud computing with the aim of improving organization performance. The study established that security and privacy of data is a major challenge affecting cloud computing in organizations (mean = 4.19 std dev = 0.55). Wei and Blake (2020) indicated that cloud computing involves storing and processing data on remote servers owned and managed by cloud service providers. The risk of data breaches and unauthorized access to sensitive information is a major concern. If the cloud provider's security measures are inadequate or if proper security controls are not implemented by organizations, it can lead to unauthorized access, data leaks, or cyber-attacks.

Deletion of data is a major challenge affecting cloud computing in organizations (mean = 4.18 std dev = 0.64). Choo (2018) indicated that establishing clear contractual agreements regarding data deletion, including specific requirements and timelines, is crucial. Organizations should also consider implementing additional data encryption or anonymization measures to enhance data protection and facilitate secure data deletion. It was noted that data confidentiality is a major challenge affecting cloud computing in organizations (mean = 4.17 std dev =0.62). Similar research conclusion by Reiners and Wood (2018) also showed that despite having several strategic and operational advantages adoption rate of Big Data analytics within industries and sectors at large has not been impressive.

The results show that data segregation is a major challenge affecting cloud computing in organizations (mean = 4.13 std dev = 0.62). Moghaddam et al. (2019) indicated that cloud providers employ distributed storage systems and data replication techniques to ensure data availability and redundancy. However, the storage and replication mechanisms can complicate data segregation efforts. Organizations may require strict separation of their data based on regulatory or compliance requirements, but the distributed nature of cloud storage always makes it challenging to physically isolate data. Lack of speed and high bandwidth is a major challenge affecting cloud computing in organizations (mean = 4.08 std dev = 0.66). The finding tally with research deductions by Wei and Blake (2020) that network breakdown can upshot in loss to the firm by creating wide time setback.

Conclusion

The study concludes that there exists a positive correlation between cloud computing technology and performance at IBM Africa. Further enhancements on cloud computing technology while holding the other factors constant would enhance performance at IBM Africa. The study concludes that top management at IBM Africa supported the adoption of cloud computing and the perceived benefits that come with cloud computing has led to adoption of cloud computing at IBM Africa. Cloud computing has improved supplier relationships, has also led to cost savings in the organization, however security and privacy of data is a major challenge affecting cloud computing in organizations and that lack of speed and high bandwidth is a major challenge affecting cloud computing in organizations.

References

Amirul, S. M., Mail, R., Bakar, M. A., & Ripain, N. (2017). Information technology knowledge and skills for accounting graduates: An insight from public accounting firms. *Indian Journal of Science and Technology*, *10*(12), 1-6.

Chiang, C. F., Chen, W. Y., & Hsu, C. Y. (2019). Classifying technological innovation attributes for hotels: an application of the Kano model. *Journal of Travel & Tourism Marketing*, *36*(7), 796-807.

Edeh, M. O., Sharma, A., & Edeh, E. C. (2020). Impact of Emerging Technologies on the Job Performance of Educators in Selected Tertiary Institutions in Nigeria. *Journal of Computer Science and Its Application*, *27*(1), 26-41.

Grassini, S., & Laumann, K. (2020). Questionnaire measures and physiological correlates of presence: A systematic review. *Frontiers in psychology*, *11*, 349.

Gupta, S. C., & Kapoor, V. K. (2020). *Fundamentals of mathematical statistics*. Sultan Chand & Sons.

Joia, L. A., & Marchisotti, G. (2020). It is so! (if you think so!)–IT professionals' social representation of cloud computing. *Internet Research*.

Kayanda, L. K. (2019). *Cloud Computing and Organization Performance of Manufacturing Firms in Nairobi* (Doctoral dissertation, University of Nairobi).

Khan, M. W., Khan, M. A., Alam, M., & Ali, W. (2016). Impact of Big Data over Telecom Industry. *Pakistan Journal of Engineering Technology and Science, 6*(2), 116 -126.

Lim, H. C., Babu, S., Chase, J. S., & Parekh, S. S. (2019, June). Automated control in cloud computing: challenges and opportunities. In *Proceedings of the 1st workshop on Automated control for datacenters and clouds* (pp. 13-18).

Mohammed, S. R., & Ebo, B. O. (2019). The Impact of Accountek on the Performance of the Top Ten Accounting Firms in Nigeria.

Moll, J., & Yigitbasioglu, O. (2019). The role of internet-related technologies in shaping the work of accountants: New directions for accounting research. *The British Accounting Review*, *51*(6), 92-103.

Mugenda, O. M., & Mugenda, A.G. (2012). *Research Methods; Quantitative & Qualitative approaches*, 5 (9), 63-72. Nairobi: Acts Press.

Quinn, M., & Strauss, E. (2017). The cloud and management accounting and control. In *The Routledge Companion to Performance Management and Control* (pp. 124-138). Routledge.

Sadeeq, M. M., Abdulkareem, N. M., Zeebaree, S. R., Ahmed, D. M., Sami, A. S., & Zebari, R. R. (2021). IoT and Cloud computing issues, challenges and opportunities: A review. *Qubahan Academic Journal*, *1*(2), 1-7.

Smith, S. S. (2018). Digitization and financial reporting–how technology innovation may drive the shift toward continuous accounting. *Accounting and Finance Research*, *7*(3), 240-250.

Sniukas, M., & Sniukas, M. (2020). Research Design and Methodology. *Business Model Innovation as a Dynamic Capability: Micro-Foundations and Case Studies*, 45-65.

Sunyaev, A., & Sunyaev, A. (2020). Cloud computing. *Internet Computing: Principles of Distributed Systems and Emerging Internet-Based Technologies*, 195-236.

Surucu, L., & Maslakci, A. (2020). Validity and reliability in quantitative research. *Business & Management Studies: An International Journal*, *8*(3), 2694-2726.

Zhang, Y., Khan, U., Lee, S., & Salik, M. (2019). The influence of management innovation and technological innovation on organization performance. a mediating role of sustainability. *Sustainability*, *11*(2), 495.