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Cloud Computing Architecture and Organizational Excellence in Broadcast Media Houses in Rivers State

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ABSTRACT

This paper examined how cloud computing architecture impacts on organisational excellence in broadcast media houses in Rivers State, Nigeria. The study was operationalized with the dimensions of cloud computing architecture as Infrastructure-as-a-Service. The study used cross-sectional survey design. The target population comprised of 24 broadcast media houses in Rivers State, Nigeria. The Taro-Yamene sample size determination formula was used to determine the sample size. A sample size of 158 managers and heads of department was used for the study. The reliability of the instrument was achieved by the use of the Cronbach Alpha coefficient with all the items scoring above 0.70. The hypotheses were tested using the Spearman's Rank Order Correlation Coefficient with the aid of Statistical Package for Social Sciences version 23.0. The tests were carried out at a 95% confidence interval and a 0.05 level of significance. The study found that cloud computing architecture can achieve improvement along the terms of organisational excellence if the broadcast media houses are able to acquire better software, infrastructure and platforms for the better operations of the media houses across Rivers State. The study recommends that in order for media houses to maintain their hedge in this high rivalry economy, they should be cloud computing architecturally concern.

Keywords: Cloud Computing Architecture, Organisational Excellence Infrastructure-As-A-Service. Employee's Proficiency and Competitive Edge

INTRODUCTION

Cloud Computing is a model for enabling universal, on-demand and convenient network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction (Mell & Grance,2011). Cloud Computing allows for sharing of resources over the Internet. These resources are shared using infrastructure provided by a cloud service provider (CSP). The cloud consumer accesses the resources, which are scalable, and ubiquitous, on-demand as–you–use and pay–as–you–go basis. Cloud computing also enables a level of abstraction between the required computing resource and the underlying architecture such as storage, network and services (Hu et al., 2011).

Cloud computing encompasses the client and server, and the three primary service delivery models. The cloud client comprises the software or hardware abstraction layer used for connection to the cloud services. Servers are used by the Cloud Service Providers (CSPs) to provide the three primary services delivery types. There are several service delivery types, but the primary ones are Platform–as–a–Services (PaaS), Infrastructure–as–a–Service (IaaS), and Software–as–a–Service (SaaS). PaaS provides a computing platform for use by the consumer through the infrastructure provided by a cloud service provider (Ali, Khan &Vasilakos, 2015). The user can develop, test and deploy an application using a CSP's platform. The user does not have to install software required for this purpose. In IaaS, the CSP provides infrastructure in the form of servers, storage and computing resources for the consumer.

In Davidovic, Ilijevic, Luk, & Pogarcic, (2015), private cloud computing and delegation of control was proposed. The aim was to examine issues in private clouds. The areas of pricing, regulations and data protection in terms of private cloud were discussed. This ensures an optimum benefit of such an investment in the long run. In Ali, Khan, and Vasilakos (2015), security in cloud computing: opportunities and challenges were presented. The approach examined several security issues. In addition, there was a brief discussion on cloud computing architectural framework. In F. Hu *et al* (2011) a review on cloud computing: design challenges in architecture and security was proposed. Various concepts relating to cloud computing architecture were examined in some details. Security concerns were also discussed with some solutions suggested. In Jadeja & Modi, (2012) cloud computing - concepts, architecture and challenges were presented. The characteristics, benefits and issues in cloud computing were discussed. In Bhardwaj, Jain, & Jain (2010), cloud computing: a study of Infrastructure–as–a–Service is postulated. The papers provide an understanding of IaaS in cloud computing. The roles of the provider and what is available to the consumer was also discussed. In Lui et al, (2011), NIST cloud computing reference architecture provides a simple but detailed classification of most aspects of cloud computing. Almost everything about cloud computing is summarised in a crisp form. In Dhakar, Gupta, and Vijay, (2009), Cloud computing architecture is presented. The architecture is presented in terms of front end and back end. The front end involves the consumers, while the back end comprises the service providers.

In Niharika and Ritu, V (2015), cloud architecture for the logistics business is proposed. The focus is on a cloud architecture to support logistics services. Various layers were proposed with the overall objective of cost reduction in logistics operations. In Rani, Rani and Babu (2015), cloud computing and inter-clouds types, topologies and research issues were presented. The types of cloud services and deployment models were discussed. Thereafter, the need for inter-cloud and services that could be offered were examined. In Verma and Kaushal, (2011), cloud computing security issues and challenges is presented. A survey of cloud services was carried out including deployment models. Thereafter, a taxonomy of cloud challenges was carried out. Meena, Singh, & Bharadi (2016) proposed the use of Microsoft Azure hybrid cloud to implement an architecture for Software-as-a-Service (SaaS) model of content based image retrieval (CBIR). The focus is on digital images and CBIR in particular. The architecture allows a large set of images to be accessed and processed using the Microsoft Azure which is suitable for hybrid purposes. 1n Toy, (2015) ,Cloud Services Architectures is proposed. The main focus is on the open cloud connect architecture. Various cloud interfaces were also described. In Bou and Demerjian, (2017), Evaluation of mobile cloud architectures is proposed. The main focus of the work was to compare mobile architecture based on mobile cloud applications. In Ferrer, Pérez, and González (2016), multi-cloud Platform-as-a-Service model, functionalities and approaches is presented. The main focus is on multi-cloud architecture in terms of PaaS. Two models were proposed and discussed in the paper.

The advantage of this is that the user does not have to invest in expensive IT infrastructure. Services are scalable and on–demand. Also, the customer utilizes and pays for what is consumed. In SaaS, a CSP provides an application over the Internet for use by a customer Ali., Khan, and Vasilakos, (2015), In effect, the user does not have to purchase or install such applications. This provides a network–based access to software that is managed from a centralised location, and the customer has remote access (Ali., Khan, and Vasilakos, (2015). There are basically four types of cloud development models: private, public, community and hybrid clouds. Private clouds are provided within an enterprise data centre. The organization has control over the cloud infrastructure and it is secure. Public clouds are services provided over the Internet by CSP using their own infrastructure. Scalable services are accessed on a pay-as-you-go (PAYG) payment model. Public clouds are considered less secured. Community cloud is cloud operated by several organizations possibly engaged in similar activities. The infrastructure could be hosted by a third party with an agreed policy in place for usage (Ali, Khan and Vasilakos, 2015). In recent times, cloud, edge and fog computing seem to be complimenting activities. Edge computing allows optimization of the cloud by processing data at the edge of a network instead of doing it in a cloud or a central data

warehouse. Also known as fog computing or fogging, facilitates the operation of compute, storage and networking services between end devices and cloud computing data centers.

Successful organizations have many advantages because they are highly performing because they outperform the results of the strategies they have adopted and outperform their structure, processes and systems. Excellent organizations are characterized by a high understanding of their work, their commitment to achieve the results assigned to them, their regular work in the form of teams, low levels of conflict and responsibility, their ability to solve problems away from underlying conflicts, and their continued efforts to improve their work performance (Englbrt, 2003). Organizational excellence is the organization's ability to achieve its objectives in the light of customer focus, continuous learning, results orientation and employee development (Al-Dhaafri *et al.*, 2017), for the purpose of excellence in business which includes both distinct human resources, and distinct products (Qawasmeh *et al.*, 2013). This is in to developing and supporting the Organization's processes and management systems to improve performance and create value for stakeholders (Mann et al., 2012). This is in addition to achieving balanced satisfaction for all customers; thus, increasing the long-term success (Breyfogle, 2008) and achieving competitive advantage in the sense of being better than competitors in one or more areas of strategic performance through quality improvement and access, on higher returns with minimal cost (Kandula, 2003).

Furthermore**,** this study was guided by the following research questions:

i. To what extent does Infrastructure–as-a–Service influence employee proficiency in broadcast media houses in Rivers State?
ii. To what extent does Infrastructure–as-a–Service influence competitive edge in broadcast media houses in Rivers State?

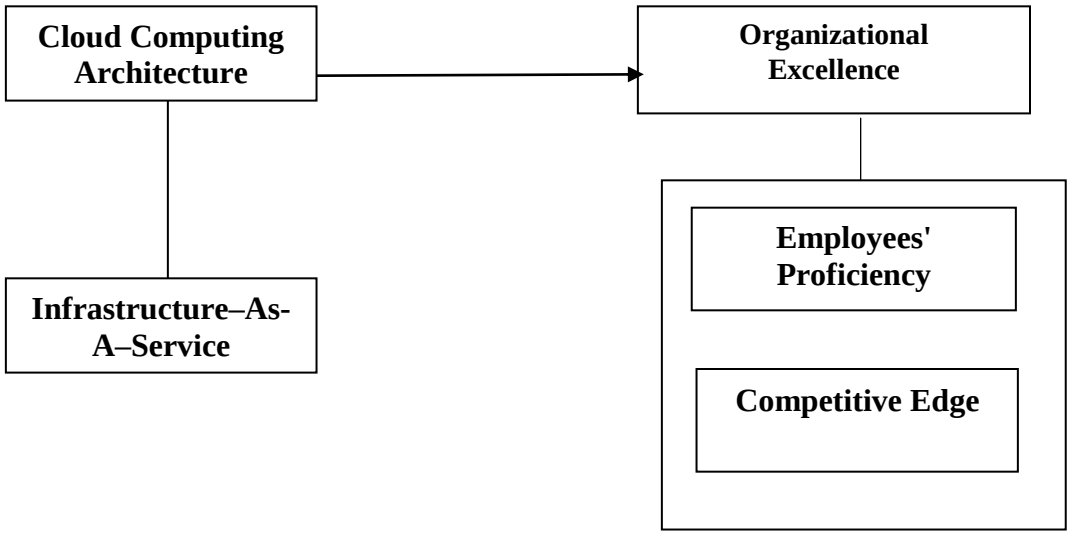

Fig.1 Conceptual Framework for the relationship between cloud computing architecture and organizational excellence
Source: Desk Research (2021)

LITERATURE REVIEW

Theoretical Foundation

Actor Network Theory

Actor Network Theory (ANT) is a sociological theory developed by Callon and Latour (1981), to recognize the processes of technological innovation in a heterogeneous network. The heterogeneous network is a coextensive network comprising a range of dissimilar elements called actors/actants (Tantnall and Burgess 2002). They believe that by employing ANT in a socio-technical situation involving technological innovation, believe that human actors (e g. customers, programmers, and

development managers) and non-human actors (e.g. computers, modems, telephone lines, and web development tools) are equally important to implement a business-to-business e-commerce portal for regional institutions in the area. This implies that for staff of broadcast houses to be successful in carrying out their daily operations and satisfy customers, human and non-human are to be used.

Concept of Cloud Computing Architecture

Cloud Computing Architecture refers to the components and subcomponents required for cloud computing. These components consist of a front-end-platform, back-end-platform, a cloud-based delivery, and a network. Combined, these components make up cloud computing architecture (Wikipedia). Cloud computing is the delivery of computing services - software, storage, analytics, networking, servers, databases and more – over the internet´ (Gonzalez & et al, 2012). According to Hayes (2008), Cloud Computing is the term assigned to the recent trend in computing service deployment. This trend has seen the cultural and technological shift of computing service deployment from being provided locally to being provided remotely and en masse, by third-party service providers. The different benefits include; Speed – since it is on demand and a self-service technology, huge amounts of computer resources can be provided in minutes; thus removing impact on capacity planning and enabling businesses to have flexibility; Cost – The business does not have to worry about expending huge capital on purchasing hardware and software or setting up round the clock electricity (to deal with on-site data centers); Global Scale – Being able to scale elastically is another nice benefit of Cloud computing. The right amount of IT resources is assigned to the business; this included bandwidth, storage, computer power and this is done from the right geographic location; Reliability –Less downtime is always great for the business. Cloud computing makes disaster recovery, data backup a less expensive issue because data can be retrieved from multiple sites from the cloud service provider´s network; productivity – Maintaining data centers on-site, typically, require time-consuming IT management and maintenance; software patching, hardware setup, just to name a few. With cloud computing, these tasks are simply eliminated thereby ensuring the business spends time on more relevant business goals and Performance – Some of the largest Cloud computing services operate on worldwide network of data centers that are constantly updated to their current versions. This offers good benefits like reduced network latency and greater economies of scale.

Obviously, lots of organizations are enjoying great value from using cloud computing; however, the service comes with special responsibilities – one of them being security. This section aims to explore and classify the security challenges that come with Cloud computing services. According to the Virginia Technology Institute, Cloud describes the use of a collection of services, information, applications, and infrastructure comprised of pools of computer, network, information and storage resources. These components can be rapidly implemented and decommissioned, and scaled up or down providing for an on-demand utility-like model of allocations and use.

According to NIST, five major actors have been identified in cloud computing (Lui. et *al.*, 2011) The NIST Conceptual Reference Model diagram in Lui. et *al.*, (2011) shows the actors which are: Cloud Consumer: A person or organization that starts and keeps a business association with and requires services from suppliers of cloud services Bohn., Messina, Liu., Tong., & Mao,(2011) ;Cloud Provider: A person, organization engaged in supplying cloud computing services to interested persons or organizations; Cloud Auditor: An organisation in charge of conducting independent evaluation of cloud computing, and determining the systems effectiveness and security; Cloud Broker: A third-party organization or individual that serves as an intermediary between cloud consumers and cloud providers. He/she is useful for negotiating terms and conditions of the contract for the purchase of cloud services and cloud carrier: An intermediary person, organization or entity that provides connectivity and transport of cloud services from cloud provider to cloud consumers.

Infrastructure–as-a–Service (IaaS)

This is delivery of servers, storage, network and operating system, as a service (Hu. et *al.*,2011). IaaS provides an abstract machine with operating system already installed and configured (Verma and Kaushal, 2011). IaaS enables data to be stored in different geographical locations. IaaS providers control activities in the cloud data centres while allowing users the flexibility to deploy and manage software services themselves (Hu. et *al.*, 2011). The user has access to a virtual computer, storage, network

infrastructure, computing resources for deploying and running software Bhardwaj, Jain, and Jain, (2010). The cloud provider only manages the software and hardware, such as servers, storage devices, host OS and hypervisor for virtualization (Jadeja and Modi, 2012). A typical cloud architecture diagram services available to cloud users is shown in (Jadeja and Modi, 2012).

Examples of IaaS: Content Delivery Networks (CDNs): CDNs record user content and files to improve the system performance such as speed and the cost associated with the delivery content for web-based systems. This is useful for handling diverse kinds of content for delivery to any website or mobile app. Backup and Recovery: This provides ability for seamless backup and restoration of files. Compute: This involves server requirements for maintaining cloud systems that can be configured and provisioned dynamically. Storage: Highly scalable storage ability useful for recording activities of applications, file backups and recovery and storing files are also available.

Concept of Organizational Excellence

Organizational Excellence (OE) Concept is the ability of the organization to achieve its objectives by using available resources efficiently and effectively (Al Hila & Al Shobaki, 2017). OE is the unique practice of the organization to achieve a set of key concepts: customer focus, management through processes and facts, continuous learning, partnership development and social responsibility, results orientation, leadership and goal setting, individual development and participation, innovation, and improvement (Al-Dhaafri et al., 2017). OE is the ongoing effort to establish an internal framework for standards and processes that aim to engage and motivate employees to deliver products and services that meet customer needs and expectations (Saleh & Watson, 2017). OE is excellence in business, which includes distinct human resources, distinct partnerships, distinct operations, and outstanding products (Qawasmeh et al., 2013).

OE is the development and support of organizational processes and systems to improve performance and create value for stakeholders. OE is much more than a quality system, which means achieving excellence in everything the organization does (Mann et al., 2012). OE is the unique practice of managing organizations and delivering values to customers and other stakeholders (Antony & Bhattacharyya, 2010). OE is the investment of organizations by the critical opportunities ahead of effective strategic planning and the commitment to a common vision that is clear of purpose, resource adequacy, and performance (Pinar & Girard, 2008). OE is the overall method of work that leads to balanced satisfaction of all stakeholders; thus, increasing the likelihood of success in the long run (Breyfogle, 2008). Excellence not only means success but includes success, excellence and uniqueness for survival and growth. Growth and excellence are two sides of a single coin (Seymour & Barker, 2004). OE is the achievement of a sustainable competitive advantage in the sense that it is better than competitors in one or more areas of strategic performance by improving quality and achieving higher returns at the lowest cost (Kandula, 2003). OE is the ability of the organization to provide opportunities, and the appropriate environment that seeks to stimulate, correct and effectively address problems (Grote, 2002).

Employees' Proficiency

Employees' Proficiency is the ability of an employee to perform the tasks required in doing the job, with the right skill-set. Having the skills and completing tasks as well, helps measure the level of an employee's proficiency. Companies have realized that cloud computing helps improve employee proficiency in so many ways. Holley Dowden (2020), highlights 9 ways cloud computing improves employees proficiency.

Competitive Edge

Competitive Edge is the attribute that allows an organization to outperform its competitors. Competitive Advantage may include access to natural resources, such as high-grade ores or a low-cost power source, highly skilled labor, geographical location, high entry barriers and access to new technology. The goals of gaining competitive advantage from cloud computing are realized in unexpected areas including advanced customer relationships driven by big data analytics, precise business decision making from cloud decision support system, and enhanced business collaborations. (Alan, 2020). According to IBM study, companies that have deployed cloud computing are gaining a competitive advantage over firms that don't have cloud computing (Alan, 2020).

Relationship between Infrastructure–as-a–Service and Organizational Excellence

Moullin (2007) defined organizational excellence as outstanding management Employee Performance (EPF): The elements of creativity, practices of managers in managing their organizations and innovation, productivity, competitiveness, financial excellence, the delivery of value to their stakeholders. Whereas effectiveness and efficiency exist at all levels at which Anonymous (2016) defined organizational excellence as performance; an ongoing effort to establish an internal framework of level, process level or employee/work unit level standards and processes intended to engage these dimensions and motivate employees to deliver products and services that constituents of performance are not essentially to fulfill customer requirements within business applicable to all business processes and work unit expectations (Anthony and Bhattacharyya, 2010).

The combined terms of organizational measurement of performance, nonetheless, they excellence" have taken over numerous concepts and represent lagging indicators that can be considered as the applications of quality systems, creating the foundation output of any action performed within the work for organizational participation in continuous environment. Spady (1986) signal the performance is evaluated from this perspective of these commencement of organizational excellence literature as seven main items as adopted by Antony and a major paradigm shift; key aspects of this paradigm were Bhattacharyya (2010) including creativity, productivity, discussed as: removal of bias for action through tests and financial excellence, effectiveness, efficiency, innovation and retests drawing closer to consumers, entrepreneurship competitiveness.

Consequently, the following through innovation and adaptation, productivity through hypotheses are proposed: people, hands-on, value-driven, sticking to the knotting, simple form, lean staff, simultaneous loose-tight employee performance has a positive effect on properties. After close to four decades, the main aspects organizational excellence model has not changed much as most of these qualities are in line with popular models of Organizational excellence. In organizational excellence, (European Bhattacharyya (2010) defined organizational excellence Foundation for Quality Management (Anonymous, 2012). as the rate at which goods and services are produced by Organizations has remained an output that can improve standard population of workers. Others such as best be achieved through collaboration and teamwork.

The study postulates the following hypotheses to be tested:

Ho_1: There is no significant relationship between Infrastructure–as-a–Service and employee's proficiency in broadcast media houses in Rivers State.

Ho_2: There is no significant relationship between Infrastructure–as-a–Service and competitive edge in broadcast media houses in Rivers State.

METHODOLOGY

The study adopted the cross-sectional survey in its investigation of the variables. Primary data was sourced through structured questionnaire. The target population comprised of 24 broadcast media houses in Rivers State, Nigeria.The study used cross-sectional survey approach and descriptive research design, The Taro-Yamene sample size determination formula was used to determine the sample size. A sample size of 158 managers and heads of department was used for the study. The research instrument was validated through by experts as provided by supervisors vetting and approval while the reliability of the instrument was achieved by the use of the Cronbach Alpha coefficient with all the items scoring coefficients above 0.70. The hypotheses were tested using the Spearman's Rank Order Correlation Statistics. The tests were carried out at a 95% confidence interval and a 0.05 level of significance.

DATA ANALYSIS AND RESULTS

Bivariate Analysis

The Spearman Rank Order Correlation coefficient is calculated using the SPSS 21.0 version to establish the relationship among the empirical referents of the predictor variable and the measures of the criterion variable.

Table 1 Correlation Matrix for Infrastructure–as-a–Service and Organizational excellence

			Infrastructure–as-a–Service	Employee's proficiency	Competitive Edge
Spearman's rho	for Infrastructure–as-a–Service	Correlation Coefficient	1.000	.926**	.969**
		Sig. (2-tailed)	.	.000	.000
		N	120	120	120
	Employee's Proficiency	Correlation Coefficient	.926**	1.000	.968**
		Sig. (2-tailed)	.000	.	.000
		N	120	120	120
	Competitive Edge	Correlation Coefficient	.969**	.968**	1.000
		Sig. (2-tailed)	.000	.000	.
		N	120	120	120
		Correlation Coefficient	.828**	.882**	.851**
		Sig. (2-tailed)	.000	.000	.000
		N	120	120	120

**. Correlation is significant at the 0.01 level (2-tailed).

SPSS 21.0 data Output, 2021

Table 1 illustrates the test for the three previously postulated bivariate hypothetical statements. The results show that for hypothesis one; there is no significant relationship Infrastructure–as-a–Service and Employee's proficiency($r = 0.926$, $p = 0.000 < 0.01$), hypothesis two; There is no significant relationship between Infrastructure–as-a–Service and competitive edge ($r = 0.969$, $p = 0.000 < 0.01$).

Therefore based on the results illustrated, all previous bivariate null hypothetical statements are hereby rejected as the study finds that:

- There is a significant relationship between Infrastructure–as-a–Service and Employee's proficiency in broadcast media houses in Rivers state.
- There is a significant relationship between Infrastructure–as-a–Service and competitive edge of broadcast media houses in Rivers state.

DISCUSSION OF FINDINGS

The results from the test of hypotheses revealed that there is a significant positive relationship between cloud computing architecture and organizational excellence in broadcast media houses in Rivers State. The finding is corroborated in Zipporah (2017) who found that there is a significant relationship between cloud computing services and organization performance, as it relates in the improved organizational performance especially in accuracy of data processing, timely reporting and overall improvement in efficiency of the organization. The study further revealed the significant value of platform service, hardware services and application service have the highest adoption rates and contribute greatly to the improved organizational performance, accuracy of data processing and timely reporting on the extent of adoption of cloud computing.

The result of this study agrees with research carried out by Saini, Heistand, Jin, Chang, Hood, Mehrotra and Biswas (2015) that similarly revealed that increased interest in cloud computing adoption with platform service, hardware services and application service are the commonest adopted function same as

other function listed. The study also revealed that users considers speed of access and connectivity to the system a high factor in their adoption and use of cloud computing. This is consistent with research that was carried out by Khisa (2015) where he listed some of the concerns that may cause SMEs not to readily adopt cloud computing such as bandwidth limitation which affects speed of access and connectivity.

CONCLUSION AND RECOMMENDATIONS

The findings of the study made it clear that various broadcast media houses are more skill-based and involving strategic thinking and hence, the best computing services should be made available for staff to work with. The study concludes that cloud computing architecture significantly influences organizational excellence in broadcast media houses in Rivers State. Based on the foregoing conclusions, the following recommendations are suggested.

The study recommends that broadcast media houses should ensure the right software is used in storing data securely in order to prevent hackers gaining access to the organizations vital information. This will help the organization become outstanding giving them an edge above their competitors.

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