Effect of E-Governance on the Public Health Sector in Nigeria
By

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Abstract
The study examined the effect of E-government on public health sector performance in Nigeria. The specific objectives were to investigate the relationship and effect of telehealth, health information system and e-training on public health sector performance. Government owned hospitals in Nigeria were used as the case study. The study administered a well-structured questionnaire to obtain data from health workers in the General Hospital Abeokuta. Only one hundred and five (105) questionnaires were found useful for the study out of one hundred and twenty-five (125) questionnaires that were administered. Both correlation and regression techniques were used in order to test the hypotheses that were raised in the study. The findings revealed that telehealth has a significant impact on public health sector performance (R^2=0.620, Adjusted R^2= 0.134, P=0.000), it also showed that health information system has a significant effect on public health. (R^2=0.084, Adjusted R^2= 0.079, P=0.000) and finally revealed a positive relationship between e-training and public health sector (r=0.107; $P < 0.05$). The study concludes that e-government is a veritable tool that can be used to improve public health sector performance. It was therefore recommended that government should invest in technology in order to improve health sector performance in the country and also both health workers and the general public should be orientated on the need to embrace e-government in the health sector of the country in order to improve their performance.
Keywords: Telehealth, ICT, Health, Healthcare, Public, Government

Introduction

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One of the essential services any government must seek to provide for its citizens is healthcare or public health care and the public health sector is to be treated with utmost importance. To show the importance of healthcare, goal 3 of the 2030 Agenda for Sustainable Development Goals (SDGs) highlights the importance of good health for every citizen. Nigeria is categorized as a developing nation and most developing nations are characterized by a greatly under-financed public health sector, inefficient allocation of scarce resources, resource wastage, to mention but a few (Lule, Ramana, Epp, Huntington and Rosen 2005).

E-governance or electronic governance can simply be described as the application of Information Technology (IT) for the effective delivery of government services (in this context public health services), exchange of information and communication within the whole public health care framework (Saugata and Masud, 2007). Health care is basically provided by private providers or the government through its three tiers (Akhtar, 1991). The public health sector in Nigeria is a collection of all organized activities which is set up by the government to prevent diseases, increase life span, and advance health and wellbeing of its citizenry.

As stated by World Health Organization (WHO) in 2004, the health sector hadoften depended on technologies, they form the bedrock for the conveyance of healthcare services to prevent, diagnose, treat and heal diseases. E-governance can be used as a tool in the hands of any government working to improve healthcare and healthcare services (Daly, 2003). Through the application of e-governance to the Nigerian public health sector, healthcare services will become accessible to all and sundry in a fast, efficient and transparent way. In Nigeria, the absence of quality or A-grade infrastructure has limited the well-timed delivery of quality healthcare services by the public healthcare sector (Okuboyejo, 2013). It has also been identified that the reason for improvements in the delivery of healthcare services in developed countries is communication technology (Agbala, 2013). Health and healthcare are germane to human daily living just as technology which drives most human daily activities hence the importance of e-governance to healthcare (Nakamura, 2003).

Hence, in a bid to improving the public health service sector and delivery in Nigeria, a great consideration is attached to e-governance as this will enhance the overall efficiency and effectiveness of the public health sector in Nigeria and meet the ever-increasing health needs of its population.

According to Umar, Oche and Umar (2011), healthcare in Nigeria is often characterized with a long queue because of the imbalances between patient-doctors' ratio which could be traced to drastic increase in the population over the years without complimentary growth in the number of medical practitioners in the country, this has reduced the level of health care performance in the country. Mwantimwa(2019)believes that introduction of ICT to organizations can influence organizational level. It is expedient to empirically validate Mwantimwa's (2019) above claim in the health sector of the country.

Hence the need for this study. Also, different studies have considered ICT and health sector in Nigeria. Baridam and Govender (2019) examined the influence of ICT on the healthcare sector in the Niger Delta in Nigeria but the study only focused on determining central areas of health sector that require the application of ICT, the study discovered that e-health and staff training requires the introduction of ICT in order to perform better but failed to valid the

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degree of impact of these variable on health sector in Nigeria. Salem (2015) also examined the impact of ICT in hospital management system, and discovered that ICT will have a significant impact on health sector performance if introduced but the study failed to point to a particular ICT tool that will be of benefit to healthcare in Nigeria, this will leave policy makers confused on which ICT tools to adopt.

It is against the above background that this study seeks to analyze the effects of e-governance in the public health sector and as well test the impact of ICT variables relevant to the development of the health care sector in Nigeria.

Research Hypotheses
  i. Telehealth has no significant impact on public health sector performance
  ii. Health information system, has no significant effect on public health sector performance
  iii. There is no significant relationship between E-training and public health sector performance.

Literature Review
Concept of Telehealth
Telehealth is a growing area and can simply be defined as the distribution of services and information related to health through the use of electronic information and telecommunication technologies and is synonymously referred to as telemedicine. A typical example of telehealth is two clinicians discussing a health case via video conferencing, using digital monitoring instruments for physical therapy, forwarding tests betwixt facilities for interpretation by an experienced specialist, videophone interpretation while consulting, having a robotic surgery through remote access, to mention but a few (Shaw, 2009).

Telehealth is of great benefit to patients situated in secluded communities and outlying areas, whereby patients can receive care from specialists or doctors who are far away without traveling a mile to see them (Berman and Fenaughty,2005). With the recent improvements in mobile collaboration, healthcare specialist in varying locations can now use technology to pass across information and converse with patients like they were in the same location (Van't, 2009). Mobile technology enables remote patient monitoring and this in turn reduces the need for outpatients visits and oversight drug administration as well as the overall cost of medical care significantly (Saylor, 2012). Other benefits include; reduction in the possible rate of transmission of diseases from patients to doctors and nurses, comfortability to patients who feel shy to talk to a health practitioner physically, to mention but a few.

Despite the numerous benefits of telehealth, there are some stumbling blocks to the full actualization of bringing telehealth into the health sector in Nigeria. First, health practitioners may not be willing to adapt to the change in the system and leave the old hands-on way behind (Umefjord, 2006). Also, despite the prediction that telehealth will be used in place of consultations and health interactions, telehealth cannot be fully used in place of physical examination, diagnostics, rehabilitation or mental health (Umefjord, 2006).

Concept of Health Information System (HIS)

HIS also known as Health Management System is a part of health informatics which majors on the administrational demands of hospitals which is all-encompassing and consolidated designed to manage the various facets of a hospital's operation. Such operations include medical, administrative, financial and legal issues in a hospital with their corresponding processes of services. The information systems of hospitals givea basic origin of information about the health history of each patient and this improves the ability of health care professionals to coordinate care by having access to various patient's health information and history as at when needed. HIS also makes room for internal and external communication among health care providers.

The advantages of HIS to the public health sector includes data analytics which will help the health sector gather, compile and analyze health data to help manage the cost of healthcare and population health.Collaborative care which will help health care providers exchange health information and enable healthcare facilities access common healthcare records. This is due to the fact that patients most times need treatment from different health care providers at different times.Cost control and population management which will create efficiency and save cost of the health sector due to the use of digital networksand electronic health records. There are numerous patients using health care services and HIS can help in aggregating and analyzing patients' data and identifying trends in population. Disadvantages of adopting HIS in the Nigerian health sector include; high cost of implementation, requires time to adapt, leads to overdependence on technology and susceptibility to hackers which may allow aggregate patients data to be lost.

Concept of E-training

To have seasoned healthcare workers and practitioners, trainings must be carried out often to keep them updated on the new health care processes. The health industry is key to helping patients recover from diseases and also preventing them. The best solution to this is by making available platforms for trainings as much as possible about the causes, symptoms and prognosis of diseases. E training is of benefit to healthcare professionals as it helps them stay abreast of recent developments in diagnosis and treatment virtually without having to attendthe trainings physically. E trainings are convenient as they can be attended anywhere by simply having access to a laptop or smart phone, it is more effective than the traditional learning, less expensive as health practitioners just need to have internet access and electricity. Finally, it is conducive to all learners

E-Government in Nigeria

E-governance can be briefly described as the two-way communication process which involves the use of information and communication technology to provide various government services and making sure that the services are made accessible to the citizens.

Nigeria is a developing nation and is trying like every other country in the global community to create a platform where e-governance is available. Aneke (2013) found that Nigeria has employed different methods to enhance its ICT sector to the sprightly growing market in Africa. He opined further that the government need to introduce e-government in the various parts ofthe society so as to make sure that there is efficiency in the delivery of public services and non-interrupted flow of information within and among sectors in Nigeria. The survey of United Nations on e-governance showed that Nigeria mainly delivers e-governance

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services through the use of mobile applications. Nduke (2012) also found out that Nigeria's telecommunication and ICT sector has ameliorated greatly in the endeavor to make available boundless internet access to its citizens.

E-governance in Nigeria would provide an avenue for telehealth, e-training and health information system which will enable the public health sector in Nigeria to match up with that of developed nations in the long run. Limiting factors in e-governance in the Nigerian public health sector may include erratic power supply, inadequate funding, lack of infrastructural facilities, to mention but a few, which have greatly endangered the sector over the years.

Theoretical Framework

The theoretical framework used in this paper is the Diffusion of Innovation Theory by Everett Rogers which goes beyond the two-step flow theory. Rogers (2003) opined that diffusion is the process in which an innovation is passed on with time among the individuals involved in a social system. It is basically a hypothesis that outlines how new technologies and advancements spreads across societies and cultures through the introduction to wider adoption. It seeks to expatiate on the reasons new ideas and practices are adopted with timelines which are spread across a long period.

Rogers (2003) opined that the steps of taking on an innovation shows the mental process a person goes through from the awareness about the innovation to the last application or use of such innovation. There are four stages between the time a person gets to know about aninnovation and the time he or she adopts it. The stages as listed by Rogers are; innovation decision process, individual innovativeness, rate of adoption and perceived attitude. In the first stage, diffusion of an innovation or technological breakthrough takes a longer process and it can be grouped into 5 parts which are; knowledge, decision, persuasion, implementation and confirmation. This implies that potential adopters of the innovation must know or acquaint themselves with the innovation, be convinced as to the benefit of such innovation, make a decision to adopt it and finally implement the innovation and vet the decision to utilize the new innovation.

The second stage according to Rogers (2003) is known as individual innovativeness. Roger (2003) stated that individuals who areopened to being innovative will tend to adopt a new technology or innovation earlier and faster than individuals who are less susceptible. This was further exemplified by guiding a bell-shaped distribution model of individual innovativeness and the percentage of potential adopters theorized to be sectioned into each group. The rate of adoption of the innovation is the next stage in this theory which identifies that overtime, a new technology or innovation is diffused in a manner that bear a resemblance to a s-shaped curve.

The concept of rate of adoption of an innovation simply implies that a new technology passes through a stage of slow development before moving to a phase of rapid and fast growth. In the perceived attitude stage, which is the last stage according to Roger (2003), potential adopters of an innovation are seen to judge the innovation grounded on their perception with regards to the five attributes of innovation which are; tribality, observability, relative advantage, complexity and compatibility.

Hence, diffusing e-governance in the public health sector in Nigeria will enable improvement in the existing public health sector, rectify the known inefficiency in the public healthcare system while improving service delivery of the sector in Nigeria.

Methodology

The focus of this study is on the health sector in Nigeria. A descriptive design was adopted; this assists to facilitate the collection of primary data through the design of questionnaires that was used to elicit data from the respondents. However, one hundred and twenty-five (125) close ended questionnaires were administered to health workers of General hospital in Abeokuta, Ogun State Nigeria out of which one hundred and five (105) were found useful for the analysis. The questionnaire was structured in two sections. The first section focused on demographical characteristics of the respondents with six questions, while the second section focused on e-government in health sector variables such as; telehealth, health information system and E-training and questions on health sector performance. Both descriptive and inferential statistical tools were used in the analyses of the formulated hypotheses. Statistical software called SPSS (Statistical Package for Service Solution) was used to analyze the data.

Data Analysis

Analysis of Questionnaire

A total number of 125 structured questionnaires were distributed among the respondents, out of which one hundred and five (105) were appropriately filled and returned. Given this, it implies that approximately 84% of the administered questionnaires were retrieved. The tabular presentation of the questionnaire analysis is given below;

Table 1 Analysis of Response Rate

Questionnaires	Nigerian Breweries	Percentage (%)
Returned	105	84
Not returned	20	16
Total distributed	**125**	**100**

Source: Field Survey, 2020.

Results

Correlation and regression analysis were made use of to measure the effect and relationship of the independent variables and dependent variable of hypotheses 1, 2 and 3.

Hypothesis One

H$_0$: Telehealth has no significant effect on public health sector performance

Table 2a   Summary of Model

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.038[a]	.620	.134	1.84866

a. Predictors: (Constant), Telehealth

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b. Dependent variable: Public Health Sector Performance

Table 2b   **ANOVA[a]**

Sum of Squares	Df	Mean Square	F
.845	1	.845	1.247
591.235	173	3.418	
592.080	174		

a. Predictors: (Constant), Telehealth
b. Dependent variable: Public Health Performance

Table 2c   **Coefficients[a]**

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	8.535	.454		18.817	.000
Training and Development	130	.061	.038	.497	.000

a. Dependent Variable: Public Health Performance

Interpretation of result

The result from table (2a-c) explain the results of the regression analysis. The analysis revealed that there exists a significant effect of telehealth on public health sector performance; (R^2=0.620, Adjusted R^2= 0.134, P=0.000). These indicates that of the variation in public health sector performance, telehealth accounted for 62%. Also, the F-values statistics (1.247) shows that the overall equation is significant at (Sig. level=0.000; P< 0.05). Therefore, the null hypothesis (H_O) which state that there is no significant effect of telehealth on public health sector performance is hereby rejected and the alternative accepted.

Hypothesis Two
a. **H_0: Health Information system has no significant effect on Public Health Sector Performance**

Table 3a   **Summary of Model**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.290[a]	.084	.079	2.2081

a. Predictors: (Constant), Health Information System.
b. Dependent Variable: Public Health Sector Performance

Table 3b   **ANOVA**[a]

Model	Sum of Squares	Df	Mean Square	F	Sig.
1 Regression	64.633	1	64.633	15.827	.000[b]
Residual	706.476	173	4.084		
Total	771.109	174			

a. Predictors: (Constant), Health Information System
b. Dependent Variable: Public Health Sector Performance

Table 3c   **Coefficients**[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant) Performance Management	5.501	.496		11.095 3.978	.000
	.265	.067	.290		.000

a. Dependent Variable: Public Health Sector Performance

Interpretation of Result
The result from table (3a-c) explain the results of the regression analysis. The analysis revealed that there exists a significant effect of Health Information System on Public Health Sector Performance; (R^2=0.084, Adjusted R^2= 0.079, P=0.000). These indicates that of the variation in public health sector performance, health information system accounted for 84%. Also, the F-values statistics (15.827) shows that the overall equation is significant at (Sig. level=0.000; P< 0.05). Therefore, the null hypothesis (H_O) which state that there is no significant effect of health information system on public health sector performance is hereby accepted and the alternative accepted.

Hypothesis Three
H0: There is no significant relationship between E-training and public health sector performance

Table 4   **Correlations**

		E-training	Public Health Performance
E-training	Pearson Correlation	1	0.107

			0.000
Public Health Performance	Sig. (2-tailed) N Pearson Correlation Sig. (2-tailed) N	105 0.107 0.000 105	105 1 105

*. Correlation is significant at the 0.05 level (2-tailed).

Interpretation of Result

The Pearson correlation value of hypothesis is 0.107 (10.7%). It shows the existence ofweak positive relationship between the dependent variable and independent variables and shows a r value of 0.107 and p value of 0.000 which is less than 0.05 (5%). Hence, it can be concluded that there is a significant relationship between E-training and public health performance. Therefore, the decision to be made would be to reject the null hypothesis (H$_O$), which state that, there exists no significant relationship between E-training and public health performance and accept the alternative hypothesis.

Conclusion

The study examined the role of e-government on public health sector in Nigeria. Three hypotheses were raised in order to verify the effect of e-government on public health sector performance based on three independent variables that are used to represent e-government which are telehealth, health information system and e-training. The first hypotheses that was tested revealed that telehealth significantly affects public health sector performance in Nigeria. This implies that telehealth has the capacity to control performance of health sector in Nigeria. The second hypothesis that was tested also revealed that health information system has a significant impact on public health sector performance in Nigeria. This connotes that if government intend to improve public health sector performance, they can initiate health information system in order to achieve their goals. The last hypothesis that was tested shows that there is a relationship between e-training on public health sector performance which implies that attending virtual workshop, conferences, seminars, watching health documentaries can influence and empower public health sector workers to perform better which will translate to increase in the way public health sector deliver their services to the public.

The study concludes that e-government (Telehealth, Health Information System and E-training) is a veritable tool that can be adopted in improving public health sector performance in Nigeria. For government to ensure improvement in public sector performance in Nigeria, e-government (Telehealth, Health Information System and E-training) can be initiated. This finding affirms the claim of Mwantimwa (2019) who believes that introduction of ICT to any establishment has the capacity to influence performance of such establishment.

Recommendations

Based on the findings of the study and in order to improve public health sector performance in Nigeria, the following recommendations were made;

i. Government should invest in technology in the health sector in order to enhance their performance and satisfy the public.

ii. Nigerians should be orientated about the importance of telehealth in order to increase acceptability level when introduced.

iii. The health sector needs to embrace electronic database which will improve their performance compare to traditional way of keeping information which often consume time and space and can be easily destroyed.

iv. Health workers are to be empowered with adequate training in order to enable them to optimally utilize ICT in order to improve their service delivery.

v. Virtual conference, workshop and seminars have to be encouraged among health workers in order to facilitate knowledge sharing.

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