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Effects of Information Communication Technology on the Operational Performance of Selected Examination Bodies in Nigeria

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Abstract

The use of information communication technology devices has been widely adopted by national examination bodies in Nigeria to enhance their efficiency and improve the credibility of the results of their examination over the last few years. This study therefore examines the effects of the use information communication technology on the operational performance of selected examination bodies in Nigeria. The selected examination bodies are National Examination Council (NECO) and Joint Admission and matriculation Board (JAMB). In this study, quantitative research method is used. The primary data use in this study was collected through questionnaire distributed to the staff of the selected examination bodies. The data collected from the respondents was analysed using SPSS and SMART PL S software for the exploratory and confirmatory factor analysis respectively. The results of the study show that the examination bodies in Nigeria have embrace the use of ICT. Also, the use of ICT for on-line registration has reduced the cumbersomeness in examination registration procedure in Nigeria examination bodies and the adoption of ICT has helpful effect on the performance of the examination bodies.

Keywords: Information Communication Technology, Operational Performance, Operational Time Cycle, Examination Bodies

1.0 Introduction

Examination bodies are saddled with the responsibility of conducting public examinations in which results or certificates could be awarded with varying categorization. The results could inform selection and placement depending on the vision and the mission of the examination body (Okechukwu, 2014). In Nigeria, the national examination conducting bodies include National Examinations Council (NECO), National Business and Technical Examinations Board (NABTEB) and National Board for Arabic and Islamic Studies (NBAIS) and Joint Admissions and Matriculation Board (JAMB). Each of these examination bodies is given specific mandates upon which their performance is assessed (Federal Ministry of Education, 2019).

As public organizations, the performance of the examination bodies is usuallymeasured in operational form, which is seen in the efficiency and effectiveness of achieving the organizational goals (Roge & Lennon, 2018; Fourie &Poggenpoel, 2017).Some of the goals that examination bodies are set to achieve include ease of candidates' registration, seamless examination conduct and timely release of examination results.The

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availability of relevant human and materials resources is germane to the achievement of these goals. The conduct of examination involves various stages starting from the registration of candidates to the processing and final release of results. In other to achieve the mandate for which they are established, the examination bodies utilize human and material resources at the various stages of the examination process. Information and communication technology (ICT) plays vital roles at the different stages of the examinations process, leading to reduction in operational cycle time thereby enhancing operational efficiency of examination bodies.

In this twenty-first century, one of the key resources needed to boost the operational performance of any organization is information and communication technology (ICT). ICT is employed by institutions to ease inquiry, save time, and improve service delivery (Alu, 2002). ICT has been adopted in the Nigerian educational industry for various purposes ranging from teaching, learning, research, examination and lots more (Aworanti, 2016; Adegbija, Fakomogbon and Daramola, 2012; Kwacha, 2007). Over the last one-decade, national examination bodies in Nigeria have deployed various ICT devices to enhance their efficiency and improve the credibility of the results of their examination. The deployment of ICT in the examination process is meant to resolve some challenges associated with registration of candidates, conduct of examination and processing of results through the introduction of online registration, e-examination, data capturing machine, digital processing of result and online checking of results.

This study, therefore, aimed at examining the effects of the use of information and communication technology in the operational performance of two national examination bodies (NECO and JAMB) in Nigeria. The study will particularly assess the extent to which the use of computer and information processing devices affects examination registration, conduct of examination and processing of results in the selected examination bodies.

Over the years, examination conducting bodies have been confronted with lots of challenges due to the large number of candidates sitting for public examinations and the need for timely release of results. In the past, some of the processes involved in the conduct of examination are either done manually or with little involvement of information technology devices. This is responsible for issues such as inability to resolve problems associated with registration of candidates for examinations, difficulty in validation of candidate data, omission in processing of results and delay in release of examination results (Okolie, Nwosu, Eneje& Oluka, 2019).

However, to reduce operational time cycle and enhance efficiency, the examination conducting bodies has introduced different ICT innovations in their mode of operations. Many of their activities that are manually done are now being done online through the use of information and communication technology. The deployment of this

technology come with huge cost and is not completely free from challenges. Unstable electricity supply, shortage of skilled manpower and poor network can sometimes limit the efficiency of the ICT devices (Aworanti, 2016; Agbada, 2008).

In view of the above stated problems, this study assesses the extent to which the use of computer and information processing devices has affects the operational performance of examination bodies in Nigeria.

2.1 Conceptual Review

2.1.1 Operational Performance

Generally, the concept of performance is viewed as the achievement of an organization in relation to the set objectives. Enhancing the effective performance of agencies of government is a major concern and interest of any public administration (Asencio, 2016). Hence, from the public sector perspective, organizational performance is the ability of an agency to discharge its operational and administrative functions well in order to actualize its mission (Al Khajeh, 2018).

In literature, scholars posit that the performance of the public sector in terms of efficiency and effectiveness is important in fulfilling their responsibility to serve the general public (Parhizgari& Gilbert, 2004). The assessment of organizational performance has been viewed by Luo, Huang and Wang (2012)from two perspectives comprising of financial performance and operational performance. According to them, financial performance can be viewed from business-oriented organizations where the performance is evaluated based on profitability, returns on investment, growth in the market share, maximization of owners' wealth among others. However, operational performance is the operational aspect where performance can be evaluated on the basis of observable outcome. In other words, operational performance can be qualitatively measured through; product and service delivery, customer and client satisfaction and employee satisfaction (Simon, Bartle, Stockport, Smith, Klobas &Sohal, 2015; Oztekin et al.,2015). Otheroperational elements employed in measuring the effectiveness and efficiency of organizational performance and service delivery include; operational time target and operational efficiency (Ramadan &Borgonovi, 2015).

2.1.2 Information Communication Technology

The concept of information is considered as being fundamental to the well-being of any contemporary organization (Safa, Von Solms & Futcher, 2016),and it can be seen as a basic commodity without which many organizations cannot effectively operate (Hwang, Kim, Kim & Kim, 2017; Van Niekerk& Von Solms, 2010). Information and Communication Technology comprises a wide range of applications, communication, and technologies used in information retrieval, research communication and administration (Scott, 2002 sited by Agbetuyi & Oluwatayo (2012)). Thus, ICT plays vital role in the development and performance of organizations (Kong *et al.*, 2015; Kong, Kim & Kim, 2012; Soomro, Shah & Ahmed, 2016). ICT has become so crucial that all spheres of lives of people and organizations

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are affected in one way or the other (Van Niekerk, & Von Solms, 2010).

2.1.3 Examination Bodies in Nigeria

Examination bodies are educational institutions established to determine and gauge the educational quality of students moving from one specific level to another. They are entrusted with certification and advisory/selection functions (Okechukwu, 2014). Some of the examination bodies in Nigeria are; WAEC, NABTEB, NECO, JAMB, NTI and COREN. This study is limited to JAMB and NECO because the activities of the bodies serve as a link between the secondary and tertiary education.

2.1.3.1National Examinations Council (NECO)

NECO was established byadecree promulgated in April 1999 by the former military head of state General Abdusalami Abubakar and legislated into law in the National Assembly in Act 2 of 2002, cited in the Law of the Federation CAP N37 of 2004. Upon the establishment, NECO was mandated to take over the responsibilities of National Board for Educational Measurement (NBEM) and to conduct the following examinations (NECO, 2004): National Common Entrance Examinations (NCEE) for Unity Colleges and other Federal Government Colleges, Junior School Certificate Examination now Basic Education Certificate Examination (BECE), Senior School Certificate Examination (SSCE) Internal, Senior School Certificate Examination (SSCE)external, and any other examination as directed by the Federal Ministry of Education

The core value of NECO is to redefine the future of Nigerian child through quality assessment with the vision to become major player in the global assessment industry (NECO, 2014). Also, NECO has a mission to deliver examinations whose results are trusted worldwide for their credibility (NECO, 2017).

2.1.3.2 Joint Admissions and Matriculation Board (JAMB)

JAMB was established by an Act in 1978. The Board is vested with the power to conduct examination and ensure that competent students are admitted into tertiary institutions in Nigeria (Danladi & Dodo, 2019).

The Act of 1978 was subsequently amended in 1989 and in 1993 the board was empowered to conduct Matriculation Examination for entry into all Universities, Polytechnics and Colleges of Education in Nigeria and place suitably qualified candidates in the tertiary institutions (JAMB, 2020; Federal Ministry of Education, 2019).

2.2 Theoretical Framework

In this study, Technology Acceptance Model is reviewed.

The Technology Acceptance Model (TAM) is an information systems theory that models how users come to accept and use a technology. It was developed byDavis and Richard Bagozzi (Davis 1989, Bagozzi, Davis & Warshaw 1992).The model suggests that when users are presented with a new

technology, a number of factors influence their decision about how and when they will use it. Perceived usefulness (PU) and Perceived ease-of-use (PEOU) are two major factors that have direct influence on technology acceptance model. PU is defined by Fred Davis as "the degree to which a person believes that using a particular system would enhance his or her job performance". It means whether or not someone perceives that technology to be useful for what they want to do. Likewise, Davis (1989) defined PEOU as "the degree to which a person believes that using a particular system would be effortless". If the technology is easy to use, then the barriers conquered. However, if it's not easy to use the interface is complicated and no one has a positive attitude towards it.

In general, TAM focuses on the individual 'user' of a computer, with the concept of 'perceived usefulness', with extension to bring in more and more factors to explain how a user 'perceives' 'usefulness'. The TAM ignores the essentially social processes of information system development and implementation and the social consequences of information system use.

2.3 Empirical Review

Many identified studies on organizational performance in Nigeria are tailored towards financial performance of non-governmental organization (Balogun, 2016; Abubakar, Nasir & Haruna, 2011).Besides, some of the available studies on operational performance of public organization in Nigerian are not in the aspect of the examination conducting bodies (Diugwu et al., 2019; Pius et al., 2017; Sutia et al., 2013).Some of the studies on the effects of information and communication technology on the performance of both public and private organization are reviewed below.

Diugwu et al., (2019) assessed the impact of ICT on the Nigerian banking industry using eleven selected commercial banks in Nigeria and discovered that the use of ICT in the banking industry increases return on equity. Also, Balogun (2016), examined customer's and employee's responses to technology innovation, and their effects on the performance of the Nigerian banks. His findings revealed that technological innovation influenced banks employee's performance, customer's satisfaction and improvement in banks profitability. The deployment of ICT in the banking sector has transformed it operations from the traditional to presumably better ways with technological innovation, resulting in improves efficiency. This has perhaps increased the bank level of ICT usage over the years (Ovia, 2005).

Baba &Odiba, (2015) examined the effects of ICT on Nigerian educational system with a focus on Kogi State University, Anyigba. The result of the study revealed that lack of ICT professional, resources, infrastructure and management support affects effective teaching and learning and research development in Nigerian schools. In similar study, Aworanti, (2016) examined the challenges of ICT deployment in the educational assessment industry and found that, the major challenges of ICT in Nigeria educational assessment system includes: poor computer literacy level among students and teachers, dearth of ICT skilled personnel,

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inadequate ICT infrastructures and lack of fund.

A thorough search of the available literature reveals a dearth of study on the effect of ICT on operational performance of examination bodies in Nigeria. Therefore, this study intends to examine the effect of ICT on operational performance national examination bodies in Nigeria. National examination bodies are selected because they provide an important service to large numbers of Nigerian students.

2.7 Research Gap

Several studies in the field of public organization have taken interest in the area of organizational performance. The indication from the central review of literature shows that to date, most of the studies on the effects of information and communication technology on organization performance are mostly tailored to organization financial performance in the private business settings such as banks, industries, hotel businesses and SMEs. However, a critical review of literature indicates a dearth of empirical studies relating to effects of information and communication technology on operational performance of the examination conducting bodies in Nigeria. This study, therefore, seeks to provide insight on the effects of information and communication technology on operational performance of national examination bodies in Nigeria.

3.0 Methodology

In this study, quantitative research method is used. The survey research design was employed to find out the views of NECO and JAMB staff on effect of ICT on operational performance of their organization. The primary data use in this study was collected through questionnaires. The questionnaire is sub-divided into two sections. Section A gives information on the demographic data of the respondents. Section B of the questionnaire consists of fifteen items. Each item contains four options in the form of Likert-scale: Strongly Agree (SA), Agree (A), Disagree (D), Strongly Disagree (SD). Statistical package SPSS and SMART PLS software were used for the analysis of the data collected.

The population of this study comprises of the headquarter staff of selected departments (ICT, Accounts and Examination Administration) in the chosen examination bodies as shown in the Table 1.

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Table 1: Population of the Study

Examination Bodies	ICT Department	Accounts Department	Examination Administration Department	Total
NECO	75	43	85	203
JAMB	81	47	73	201
TOTAL	156	90	158	404

Source: Author's Field Survey 2021

The sample size of this study is determined using the Taro Yamane (1967) formula as follows:

$$n = \frac{N}{1-Ne^2} = \frac{404}{1-4040.10^2} \approx 80 \text{ .....Eqn 1}$$

Where 'n' is sample size, 'N' is population size and 'e' is the level of significance. The level of significance for the study is set at 10% and the population size is four hundred and four staff of the three departments of the two examination bodies.

The proportionate stratified sampling technique is used to determine the number of staff to include in this study from each department. This is achieved by using the equation 2.

$$n_{sd} = \frac{N_{sd}}{N} \times n \text{ ..... Eqn 2}$$

Where 'n_{sd}' is the sample size of the department, 'Nsd' is the population size of the department 'd', n is sample size for this study (80) and N is the population size for this study (404). The resulting sample is seen in the Table 2.

Table 2: Study's Sample Size

Examination Bodies	ICT Department	Accounts Department	Examination Administration Department	Total
NECO	15	9	17	41
JAMB	16	9	14	39
TOTAL	31	18	31	80

3.1 Model Specification

The dependent variable is operational performance while the independent variable is ICT. The dependent variable, operation time cycle (OTC) is proxy for operational performance while the components of the independent variable include resources, capabilities and support. .

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This is expressed as shown below:

OTC = f (ICT)……..... Eqn (3)

Specifying it in econometric form, we will have:

OTC = f (Resources, Capabilities, Support)

OTC = f (RSS, CPL, SPT)

$OTC = \beta_0 + \beta_1 RSS + \beta_2 CPL + \beta_3 SPT + e_i$……..... Eqn (4)

Where:

OTC = Operational Time Cycle

β = Constant

β_i - β_3 = Coefficient of independent variable

RSS = Resources

CPL= Capabilities

SPT = Support

e_i = Error term which represents other factors outside the model

4.0 Presentation and Interpretation of Result

The data collected from the respondents was analysed using SPSS and SMART PLS software for the exploratory and confirmatory factor analysis respectively. Details of the result are further presented in the following subsections.

4.1 Reliability of the measurement instrument

To obtain the overall reliability of the research data, the Cronbach's Alpha measure of reliability was computed. The result, as shown in Table 3, revealed that the obtained reliability is statistically significant at a value of 0.829. Ideally, a reliability value greater than 0.7 is considered statistically significant, which implies that the scale used in the measurement items can satisfactorily provide a metric for the measurement item.

Table 3: Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	Number of Items
.829	.862	21

4.2: Path Analysis

As stated in the expression in Equation 4, the overall operation time cycle is a regression problem, which requires a path analysis of the contributing factors. By computing the path analysis using SMART PLS, the overall regression weight of each factor as well as each item on the respective factor, can be achieved. The result of the path modelling is shown in Figure 1. A statistically significantly regression weight of 0.478 was obtained for the OTP construct. A synthesis of the result is further explained.

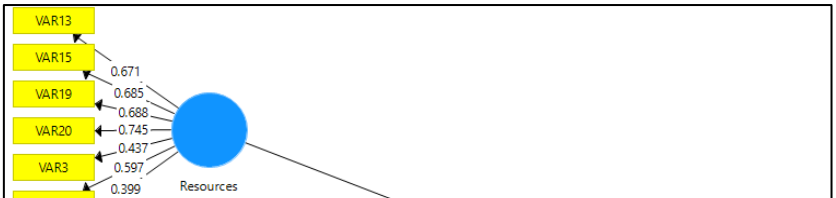

Figure 1: Path Analysis of the Study

The analysis details the reliability and the validity of both the construct and the scale. Table 4 shows the construct reliability and validity matrix computed from the regression model. Factors and constructs are used interchangeably to mean the same thing in this context. First, from the reliability of each construct, it was observed that both capabilities and support fell below the standard requirement. However, the OTP and Resources construct adequately satisfied the reliability requirement. However, the average variance extracted (AVE) for each construct fell below the standard 0.5 benchmark. The AVE is a metrics used to measure the degree of variance exhibited by a construct, relative to the variance of random measurement error. An AVE ≥0.5 is considered a measure of the convergent validity of the construct.

Moreover, the composite reliability (CR) shows an internal consistency in the summed scale for each construct. A CR value ≥0.7 is implied to truly reflect the internal consistency of the construct. As shown in the Table 4, the CR for all the constructs is above the acceptable threshold, except the Capability construct. In terms of the discriminant validity, as shown in Table 5, Capability shows a clear distinction when compared to the other constructs, as it has a relatively higher correlation with itself at 0.623. Similarly, the OTC exhibited a clear discrimination with other constructs with a self-correlation value of 0.694. However, the converse was recorded for the Resources and Support constructs. There was a higher correlation between Resource and OTP at value of 0.664, which is greater than 0.616 self-correlation. Similar, a higher correlation was observed between Support and Resource

construct at 0.664, in contrast to the 0.616 self-correlation, obtained for the Resource construct. A visual illustration of these result is further presented in Appendix ZZZ, where the RED colour indicates a below standard observation and a GREEN depicts a satisfactory result.

Table 4: Construct reliability and validity matrix

	Cronbach's alpha	Composite reliability	Average variance extracted (AVE)
CAP	0.227	0.652	0.388
OTP	0.719	0.817	0.481
RSC	0.724	0.804	0.38
SUPP	0.651	0.77	0.377

Table 5: Discriminant validity

	CAP	OTP	RSC	SUPP
CAP	0.623			
OTP	0.468	0.694		
RSC	0.471	0.664	0.616	
SUPP	0.532	0.545	0.664	0.614

The respondents answer to the questionnaires is collated and the percentage of the responses from the 79 respondents collected was presented in Table 6. The results show a strong agreement to the use and positive effects of ICT on the performance of the examination bodies in Nigeria. Specifically, more than 90% of the respondents agree to the use and positive effects of ICT on the performance of the examination bodies except for the use of E-examination as indicated in questions 8 and 10 with 63.3% and 86.6% level of agreement. This result is in agreement with Agbetuyi and Oluwatayo (2012) who stated that the use of on-line registration (ICT) has reduced the cumbersomeness in examination registration procedure in Nigeria examination bodies. Also, it can be inferred from the result that the examination bodies in Nigeria has embrace the use of ICT and the adoption of ICT has helpful effect on the performance of the examination bodies.

Table 6: Percentage of responses obtained from the questionnaires

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S/N	Statement	Strongly Agree (SA) %	Agree (A) %	Disagree (D) %	Strongly Disagree (SD) %	Not Applicable (NA) %
1	ICT makes candidates/clients payment procedure faster	65.8	34.2	0.0	0.0	0.0
2	Registration of candidates are done online through ICT	70.9	26.6	0.0	0.0	2.5
3	Biometric capturing of candidates is enhance by ICT	79.7	19.0	1.3	0.0	0.0
4	Validation of candidates data is done online through ICT	67.1	29.1	1.3	0.0	2.5
5	Online registration saves time in collating students' data	63.3	36.7	0.0	0.0	0.0
6	Biometric capturing of candidates reduces impersonation	79.7	16.5	3.8	0.0	0.0
7	Online validation reduces error in candidates' data	36.7	57.0	6.3	0.0	0.0
8	E-examination has been adopted in my organization	43.0	20.3	15.2	6.3	15.2
9	E- examination reduces malpractice cases	48.1	43.0	8.9	0.0	0.0
10	E- examination reduces time of processing of results	49.4	39.2	11.4	0.0	0.0
11	ICT enhances the processing and timely release of results	67.1	32.9	0.0	0.0	0.0
12	ICT enhances E-Confirmation and Verification of Results	67.1	32.9	0.0	0.0	0.0
13	On-line results" checking is made available through ICT	75.9	24.1	0.0	0.0	0.0

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14	On-line support services is made available through ICT	59.5	39.2	1.3	0.0	0.0
15	Processing and Payment of staff claims is enhanced by ICT	46.8	46.8	5.1	0.0	1.3
16	ICT enhances operational efficiency of my organization	55.7	44.3	0.0	0.0	0.0
17	ICT makes accounts preparation faster	55.7	43.0	1.3	0.0	0.0
18	ICT makes reconciliation of accounts easier	48.1	49.4	1.3	0.0	1.3
19	Availability of resources enhance proper implementation of ICT	54.4	45.6	0.0	0.0	0.0
20	Competencies and Capabilities of Staff promotes ICT innovations	64.6	35.4	0.0	0.0	0.0
21	ICT adoption is enhanced by strong management /executive support	62.0	38.0	0.0	0.0	0.0

5.0 Conclusion

The effect of information and communication technology (ICT) on operational performance of examination bodies has been examined in this study. The findings of this study as obtained from the two selected examination bodies can be summarised as follows:

The use of ICT is adopted at various stages of the examination process stating from candidates' registration to the checking of results.

To a large extent, the use of computer and information processing devices affects examination registration, conduct of examination and processing of results in the selected examination bodies.

The adoption of ICT has positive effect on the organisational performance of the examination bodies in Nigeria.

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