



## **The Use Of ICT Among Academic Staff: A Survey Of Tertiary Institutions In Bauchi State Nigeria**

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### **ABSTRACT**

Information and Communication Technology Adoption (ICTA) among academic staff is of paramount importance towards effective service delivery in Higher Education Institutions (HEIs). However, the poor ICTA by many academics in the teaching and learning process is of particular concern especially in Nigeria. Against this background the paper examines the influence of organizational (ICT Infrastructure capabilities) and technological (perceived usefulness and perceived ease of use) factors on ICTA. A total of 350 structured 5-point likert scale questionnaires were distributed using stratified sampling for the purpose of data collection. The reliability and validity of the questionnaire was tested using Cronbach's Alpha and factor loading while data was analyzed using multiple regression. The overall model account for 45% of ICTA. The result also revealed that technological factors are the most important driver followed by organizational factors. The research concludes with recommendations, implication and suggestion for future research direction.

**Keywords:** ICTA, academic staff, tertiary institution, teaching and learning process, organizational & technological factor.

### **INTRODUCTION**

The increasing importance of Information and Communications Technology (ICT) in improving the learning environment cannot be over-emphasised. Similarly, Higher Educational Institutions (HEIs) are increasingly playing crucial role as the engine for knowledge generation and the entire learning environment. ICT has become an essential part of everyday life and hence its integration in education is inevitable and effective (Tasun & Baris, 2011). This is partly because all the stakeholders (teachers, students' and management team) use it for effective teaching-learning processes to achieve quality education and overall development of students or for administrative purposes (Ghavifekr, Afshari, Siraj & Seger, 2013). Likewise, teachers commonly agree that ICT has the potential to improve student learning outcomes and effectiveness (Chang & Wu, 2012).

Unfortunately, Nigeria is not doing well for example, globally the USA led the way in incorporating ICT to its mainstream affairs, especially education and governance (Dyerson, Harindranath & Barnes, 2009). Today however, Sweden tops the Network Readiness Index (NRI) ranking followed by Denmark then Singapore. Nigeria ranked number 117 out of 134 economies included in the NRI 2020 (World Economic Forum and INSEAD, 2020) partly because many of the teachers are not ICT literate and not fully exposed to the use of ICT in the acquisition of skills and practical teaching (Thomas, Babatope & Jonathan, 2013). Similarly, where ICT is introduced alongside complicated educational reforms, students and teachers lose focus on the essentials of ICT and became distracted by the rapidly changing technologies (Olalube, Eke, Uzorka, Ekpenyong & Nte, 2009) making Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) of the ICT by the teachers as a critical factor. Other factors for the dismal performance is I CT

Infrastructure (II) availability which is equally a factor of interest as most Nigerian universities do not have access to basic instructional technologies, making integration and delivery of quality education difficult (Olalube & Egbezor, 2009). It therefore becomes highly imperative for Nigerian academics to take advantage of ICT to keep abreast with global developments and be able to compete favorably with their counterparts in the advanced nations (Gbenu, 2012).

On a practical term 84% of journal articles and 97% of patents currently came from industrialized countries (Idowu & Esere, 2013). The authors therefore call for the use of ICT particularly the internet to conduct and publish research output and ease international collaborations. It is therefore important to understand the technological (PU and PEOU) and availability of ICT facility factors as a determinants of ICT Adaption (ICTA) by academics in the country (Oye, Iahad & AbRahim, 2012a). Against this background, the research aims to investigate the level of ICT usage among academics at HEIs in Bauchi state Nigeria. Specific objectives include to examine the relationships between PU, PEOU and ICT infrastructural availability towards ICTA. The study is significant in a number of ways, for example, it will provide empirical support to assess the applicability of the key underpinning theory Innovation Diffusion Theory (IDT), as well as providing the much-needed input about the critical success factors for ICTA in the HEIs environment from the most important stakeholder academics. This will consequently guide policy makers to formulate more efficient strategies, capable at smooth deployment and adoption of ICT-based instructional technologies in HEIs across the country and beyond.

### **Literature Review and Hypotheses Development**

Theoretically, the research is premised on IDT. The theory stressed the existence of different categories of adapters requiring different organizational support systems that include top management and peer support systems. The theory propounded by Rogers (1995) is generally regarded apt for researching the adoption of ICT in developing countries (Kyakulumbye, Muhenda & Namanya, 2012). Based on theoretical foundation of IDT various studies have classified factors influencing innovation adoption (Kim & Galliers, 2004). Tornatzky and Fleischer (1990) identified three different categories of factors organizational, technological and environmental factors. Similarly, Kimberly and Evanisko (1981) identified three groups of predictors of innovation: characteristics of organisational leaders, characteristics of organization, and characteristics of environment. Ekundayo and Ajayi (2009) identified some issues that are limiting the deployment of ICT in Nigeria as scarcity of ICT Infrastructure and lack of access, high cost to the consumer, high cost of ownership, unsteady and inadequate electrical power supply. Based on the foregoing, there are four major factors driving adoption of innovation in literature: Organizational, Technological, Managerial and Environmental. However, this study only concentrates on the first two as the last two i.e. Managerial and environmental deals with the impact of competitors and is largely applicable to profit making firms unlike the sample for this research that are all government-owned. Drawing from literature an integrated model of ICTA in Nigerian HEIs is proposed with following variables Availability of ICT Facility II (organisational) and PU and PEOU (technological) in facilitating ICTA. The following hypotheses were developed in order to achieve the aim of the research:

#### *ICT Infrastructure (II)*

ICT infrastructure refers to all the hardware, software, data and network components that supports the flow and processing of information in an organization (Perrlson & Sunders, 2006). In a study in South Africa Miller, Naidoo and Chigona (2006), investigated factors that influence school level ICTA. They found a strong positive relationship between available II and ICT usage in schools. Adoption of e-commerce requires organizations to possess a set of ICT related skills and knowledge (Turban, King, Lee, & Viehland, 2004) such as telecommunication knowledge, ICT security knowledge, and internet application environment. Thus, *H<sub>1</sub> II significantly influence ICTA*

*Perceived Usefulness (PU)*

PU refer to the extent of prospective adopter's recognition of the relative advantage of adopting the innovation. PU is an important factor in adoption of new innovations, thus greater the perceived relative advantage of an innovation, the more rapid its rate of adoption (Rogers, 1985). Empirically, PU have been found to have a positive effect on the likelihood of EDI adoption (Iacovou, Benbasat & Dexter, 1995). Thus,  $H_2$  PU significantly influence ICTA

*Perceived Ease of Use (PEOU)*

PEOU refers to the degree to which a person believes that using a particular system would be free of effort (Davis, 1989). In a research in Bangalore, Padashetty and Krishna (2013) found PEOU and PU are the highest ranked factors driving the adoption of technology. In another survey in education sector, it was also found that PEOU is an essential variable motivating the use of word processing technology (Davis, Bagozzi & Warshaw, 1989). Thus,  $H_3$  PEOU significantly influence ICTA.

**METHODOLOGY**

The research focuses on the organisational and technological determinants of ICTA among the academics in HEIs, a cross-sectional survey research was adopted for the study. The study was carried out in eleven public HEIs in Bauchi state Nigeria these include two universities, two polytechnics, four colleges and three Monotechnics. The population of the study was 2716. A sample of 350 respondents was obtained for data collection using stratified random sampling. Three hundred and fifty (350) copies of a structured 5-point likert scale questionnaire (see table I). In total 283(81%) questionnaires were successfully returned. The questionnaire items were either adapted or adopted from relevant previous studies (see table 2).

**Table 1: List of HEIs, Population and Sample**

S/N	Name of HEI	Population	Sample
1	Abubakar Tafawa Balewa University Bauchi	850	110
2	Abubakar Tatari Ali Polytechnic Bauchi	263	34
3	Bauchi State College of Agriculture Bauchi	61	8
4	Colleges of Education Kangere	42	5
5	Bauchi State University Gadau	272	34
6	Aminu Saleh Collage of Education Azare	445	58
7	College for Legal and Islamic Studies Misau	187	24
8	College of Health Technology Ningi	56	7
9	Federal Polytechnic Bauchi	481	62
10	School of Nursing and Midwifery Bauchi	27	4
11	Social Development Institute Ningi	32	4
<b>Total</b>		<b>2716</b>	<b>350</b>

**RESULT AND DISCUSSION**

Out of the 283 returned questionnaires, only 248 valid responses are considered fit for further analysis after dropping morbidity and substantially unfilled responses as well as data cleaning/screening and the subsequent deletion of both univariate and multivariate outliers. Majority of respondents are male 216(87.1%) while female 28(11.3%) and 4(1.6%) did not disclose their gender. Similarly, majority of participants have been between the ages of 31- 40 years; (48.0%), followed by 41- 50 years (35.1%) while lowest participants 60- above (0.8%). With regard

to education only 5(2.0%) have PhD, Masters and degree having the highest representation at 110 and 133 respectively. In terms of HEIs Abubakar Tafawa Balewa University Bauchi has the highest representation at 31% while School of Nursing and Midwifery Bauchi and Social Development Institute Ningi both have 3(1.2%) with lowest representation.

After data entry, the data was subjected cleaning and screening resulting to the detection and correction of some wrong entries. Having met the requirements for the factorability, Cronbach's Alpha and factor loading were used to evaluate the reliability and validity of the dataset respectively. As presented on Table 2 all the three variables of interest satisfied the reliability and validity tests.

As shown in table 3 the three independent variables in the model explain 45.0% of the dependent variable-ICTA. The adjusted R<sup>2</sup> is slightly lower at 44% of the variance in IIU. Similarly, the ANOVA statistics also in table 3 indicated the relationship is significant at 0.0000<sup>b</sup> with an F-value 39.553. Meaning that, the predicting variables significantly facilitate ICTA among the academic staff. As shown in table 3, two out of the three independent variables have significant contribution towards the prediction of the ICTA. Only II haven a less contribution compare with the remaining two independent variables toward predicting ICTA. Similarly, the column for standardized coefficients of Beta for each of the three independent variables shows the relative contribution of each predictor. The standardized coefficient Beta value for the technological factors (PU 0.341 and PEOU 0.347). Followed by Organisational factor (II 0.161).

**Table 2: Constructs/Items/Cronbach's Alpha/Factor Loading**

<b>Constructs/items/</b>	<b>Cronbach's Alpha</b>	<b>Items Source</b>	<b>Factor Loading</b>
<b>ICT Infrastructure (II)</b>	<b>a= 0.823</b>	<b>Aghaunor (2006)</b>	
<b>II1</b> Our Institution is well computerized with LAN and WAN			0.568
<b>II2</b> We have high band width connectivity to the Internet in our institution			0.701
<b>II3</b> We have an established enterprise -wide IT infrastructure in our institution			0.513
<b>II4</b> We have sufficient experience with network-based applications in our institution			0.621
<b>II5</b> We have modern instructional technologies that aid us in imparting knowledge to our student			0.534
<b>Perceived Usefulness (PU)</b>	<b>a=0.949</b>	<b>Davis (1989)</b>	
<b>PU1</b> Using ICT in our institution can reduce cost of our operations			0.752
<b>PU2</b> Using ICT in our institution improves the way we service our students			0.868
<b>PU3</b> Using ICT in our institution enable us to reap operational usefulness			0.894
<b>PU4</b> Using ICT in our institution increases our ability to compete			0.898
<b>PU5</b> Using ICT in our institution facilitate our institutions research collaboration with other institutions			0.756
<b>Perceived Ease of Use (PEOU)</b>	<b>a=0.901</b>	<b>Davis (1989)</b>	
<b>PEOU1</b> Learning to operate ICT in our institutions would be easy			0.716
<b>PEOU2</b> The interaction with ICJ is clear and understandable			0.792
<b>PEOU3</b> It is easy to perform the steps required to use Instructional ICT in our institution			0.665
<b>PEOU4</b> Using ICT makes the handling of imparting knowledge easier			0.762
<b>PEOU5</b> It is easy for students to understand lectures using pictorial presentation			0.672
<b>ICT Adoption (ICTA)</b>	<b>a=0.812</b>	<b>Lawrence (2010)</b>	
<b>ICTA1</b> Given the opportunity. I will use ICT for imparting knowledge			0.718
<b>ICTA2</b> I am likely to use instructional ICT in the near future			0.770
<b>ICTA3</b> I intend to use ICT when the opportunity a rises			0.719

**Table 3: Multiple Regression**

	F	Sig.	R	R <sup>2</sup>	Adjusted R <sup>2</sup>
ANOVA <sup>b</sup> & Model Summary	39.553	.000 <sup>b</sup>	.671 <sup>a</sup>	.450	.438
Dependent Variable – ICT Adoption					
Predictors	II		PU		PEOU
Standardized Beta Coefficients	.161		.341		.347
Beta Sig.	.010		.002		.000

Based on the foregoing hypothesis all the three hypotheses are accepted which is more predictable. Results for factor II have significant effect on ICTA, which is in line Kyakulumbye, Olobo and Kisenyi, (2013) and Kyakulumbye. et al.. (2012). Hence, the more HEIs possess II capabilities the more the adoption. Likewise, the result shows that PU also significantly affect ICTA consequently, the use of ICT is seen by academics as having a great benefit to their job requirements which is consistent with the finding of Oye, Iahad and AbRahim. (2012b). In the same vein PEOU also significantly influence ICTA which is also in tandem with previous aforementioned studies.

Finding of this study further reinforces the position of Idowu and Esere (2013) that despite the obvious possibilities, Nigeria is yet to take full advantage of the possibilities of ICT-driven education. In addition, to adequate funding of ICT- driven initiatives in the education sector as suggested by Idowu and Esere (2013), it is clear that for Nigeria to achieve the much-needed romance between ICT and HEIs. Even though, environmental factors fall outside the scope of this research. However, it may seem some environmental factors are part of the reason militating against real and sustainable II. For example, Ekundayo and Ajayi (2009) identified unsteady and inadequate electrical power supply as one of the key factors limiting the deployment of ICT in Nigeria.

### CONCLUSION AND IMPLICATIONS

This research suggests technological and organizational factors are the most important determinant of ICTA in the context of HEIs in Bauchi state based on the findings. HEIs should also pay serious attention to both technological factors by clear communicating the relative advantage and ease of use features of adopting ICT in the learning environment. Furthermore, HEIs should re-strengthen organization factors giving their central role in driving ICTA. Finally, from the perspective of theory, the findings of this study have validated the strength of the IDT in predicting the determining variables from the perspective of a developing country such as Nigeria. The findings also contribute significantly to the existing literature in the field of ICTA in Nigeria. Future studies should use different HEIs especially private, thus include Management and or environmental factors.

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### REFERENCES

- Aghaunor, L. (2006), *Factors affecting ecommerce adoption in Nigerian banks, Paper within IT & business renewal*, Sweden: Jönköping International Business, Jönköping University.
- Chang, I. H., & Wu, J. K. (2012). The effect of principals' technological leadership on teachers' technological literacy and teaching effectiveness in Taiwanese elementary schools. *Educational Technology & Society*, 15(2), 328–340.

- Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319-340.
- Davis, F. D., Bagozzi, P. R., Warshaw, P. R. (1989). User acceptance of computer technology: A comparison of two theoretical models, *Management Science*, 35(1), 982-1003.
- Dyerson, R., Harindranath, G., & Barnes, D. (2009). National survey of SMEs' use of IT in four sectors. *The Electronic Journal of Information Systems Evaluation*, 12(1), 39–50.
- Ekundayo, H. T., & Ajayi I. A. (2009). Towards effective management of university education in Nigeria. *International NGO Journal: Academic Journal*, 4(8), 342-347.
- Gbenu, J. P. (2012). State of teacher quality in Lagos state senior secondary schools, Nigeria: Implications for educational planning, *Online Journal of Education Research*, 1(7) 125-131.
- Ghavifekr, S., Afshari, M, Siraj, S., & Seger, K. (2013). ICT application for administration and management: A conceptual review. *13<sup>th</sup> International Educational Technology Conference, Procedia - Social and Behavioral Sciences* 103, 1344 – 1351.
- Iacovou, C. L., Benbasat, I., & Dexter, A. S. (1995). Electronic data interchange and small organizations: Adoption and impact of technology. *MIS Quarterly*, 19(4), 465-485.
- Idowu, A. I., & Esere M. (2013). ICT and higher educational system in Nigeria: *Academic Journals*, 8(21), 2021-2025.
- Kim, C., & Galliers, R. D. (2004). Towards a diffusion model for internet systems. *Internet Research Journal*, 14(2), 155-166.
- Kimberly, J. R., & Evanisko, M. J. (1981). Organizational innovation: The influence of individual, organizational, and contextual factors on hospital adoption of technology and administrative innovations. *Academy of Management Journal*, 24(4) 689-713.
- Kothari, C. (2005). *Research Methodology*. New Delhi: New Age International (P) Ltd.
- Kyakulumbye, S., Muhenda, M. B., & Namanya, A. M. (2012). *ICT utilization in Uganda local governments: Why low uptake?* Retrieved August 2, 2016 from: <http://ssrn.com/abstract=2186371>.
- Kyakulumbye, S., Olobo, M., & Kisenyi, V. (2013). Information communication technology (ICT) utilization in private universities in Uganda: Exploring strategies to improve. A case of Uganda Christian university, *Scientific Research, Technology and Investment*, (4) 22-29. doi.org/10.4236/ti.2013.41004.
- Lawrence, T. (2010). *ICTs for modern educational and instructional advancement: New approaches to teaching*. United States of America: Information Science Reference (an imprint of IGI Global).
- Miller, L., Naidoo, M., & Chigona, A. (2006). An empirical survey on domestication of ICT in schools in disadvantaged communities of South Africa. *Information & Management*, 4(34), 304-321.
- Ololube, N. P., & Egbezor, D. E. (2009). Educational technology and flexible education in Nigeria: Meeting the need for effective teacher education. In S. Marshal, W. Kinthia and W. Taylor (Eds), bridging the knowledge divide. Educational technology for development. pp. 391-413.
- Ololube, N. P., Eke, P., Uzorka, M. C., Ekpenyong, N. S. & Nte, N. D. (2009). Instructional technology in higher education: A case of selected universities in the Niger Delta, *Asia-Pacific Forum on Science Learning and Teaching*, 10 (2), 1-17.
- Oye, N. D., Iahad A., N., & AbRahim, N. (2012a). ICT literacy among university academicians: A Case of Nigerian public university. *ARPN Journal of Science and Technology*, 2(2) 98-110.
- Oye, N. D., Iahad, A., N., AbRahim, N. (2012b). A comparative study of acceptance and use of ICT among university academic staff of ADSU and LASU: Nigeria. *International Journal of Engineering and Technology*, 2(1). 103-115.
- Padashetty, S., & Krishna, k. (2013). An empirical study on consumer adoption of mobile payments in Bangalore city: A case study. *Journal of Arts, Science & Commerce*, 4(1). 124-129.
- Peansupap, V., & Walker, D. H. (2005). Factors enabling ICT diffusion and actual implementation in construction organizations. *Information Technology for Development*, 3(5), 134-146.
- Perrison, K. E., & Sanders, C. S. (2006). *Managing and using information systems, a strategic approach* (3rd ed.). New York: John Wiley.
- Rogers, E. M. (1983). *Diffusion of innovations* (3rd ed.). New York: Free Press.
- Rogers, E. M. (1995). *Diffusion of innovations* (4th ed.). New York: Free Press

- Thomas, O. O., Babatope, K. O., & Jonathan, O. O. (2013). Teacher education, information and communication technology: Prospects and challenges of e-teaching profession in Nigeria. *American Journal of Humanities and Social Sciences, 1(2)* 69-74.
- Tornatzky, L. G., & Fleischer, M. (1990). *The process of technological innovation*. Lexington, MA: Lexington Books.
- Tosun, N., & Baris, M. F. (2011). Using information and communication technologies in school improvement. *The Turkish Online Journal of Educational Technology, 10(1)*, 223-231.
- Turban, E., King, D., Lee, J., & Viehland, D. (2004). *Electronic commerce: A managerial perspective*. New Jersey: Pearson/Prentice Hall.