

## **An Assessment of Information and Communication Technology Effectiveness in the Banking Sector: Lessons from Nigeria**

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### **Abstract**

*Developments in ICT have made business transactions and marketing much more accessible than envisaged throughout the world. Nonetheless, it has also brought with it problems of control associated with the use of the internet. A number of studies have so far been carried out on the impact of ICT on auditing or accounting in developed countries but research work on the impact of ICT on the effectiveness of internal control systems in prevention and detection of electronic fraud in developing countries is scarce. One of such developing countries is Nigeria, where the financial sector appears to have a compelling need to examine the impact of ICT on internal control systems. This is necessary in view of recent government desires to attract more foreign direct investments to invigorate the economy through improved financial operations, which in turn necessitated benchmarking the effectiveness (COSO, 1994) of internal control against best practices. The development of ICT and its adoption by internet-based businesses are growing rapidly in developing countries like Nigeria. Equally, internet-based fraudulent activities are growing across all business segments in Nigeria but much more in the financial sector (CBN, 2009).*

*This paper examines the effectiveness of ICT in the financial sector of Nigerian Economy using a survey instrument to collect data from the users of ICT (internal auditors). The analyses were done using descriptive statistic.*

*The findings revealed that ICT tools and techniques were effective in a number of control areas like evaluation of risk assessment, control of e-purchases, testing internal control weaknesses and control of segregation of duty among others*

**Keywords:** Impact of ICT, Internal Control Effectiveness, Adoption, Implementation, e-business

## **INTRODUCTION**

The evolution of the digital economy at a global level has changed in no small measure how business enterprises operate, generate; and display financial data; and much more importantly, how they are audited (Razaee et al., 2002; 1). Most financial reports are now generated online and in real time and the overwhelmingly rapid adoption and implementation of e-business technology has led to new challenges for internal auditors, specifically in the area of internal control effectiveness.

It is important to explain the concept of internal control in order to develop an understanding of the impact of Information and Communication Technology (ICT) tools and techniques on internal control effectiveness. Internal control system of an organisation is a structure laid down by executive managers for effective control of the entity's activities. It is closely linked with corporate governance. The Public Company Accounting Reform and Investor Protection Act 2002 otherwise generally referred to as the Sarbanes-Oxley Act, (2002), introduced in the United States, made it mandatory for management to initiate good internal control and provide assessment of its effectiveness. Most regulatory authorities worldwide are adopting the Sarbanes-Oxley Act control concept to prevent a repeat of the scandals which reverberated across the world as experienced with the likes of WorldCom or Enron (Weiddenmier and Ramamoorti, 2006)

The expansion in business activities and the limitless opportunities provided by the internet usage have direct implication on the internal control function. This is more visible in the financial sector as there is a noticeable transformation in traditional banking services (Awad,

1988). The Nigerian stock trading market is the second largest in sub-Saharan Africa with only South Africa larger in terms of volume. The financial sector accounts for more than 65 percent of the stock on the Lagos exchange market (Security and Exchange Commission, 2010). There are mixed results from prior studies on the use of ICT and internal control problems in the financial sector of the Nigerian economy. What is clear is that internal control is associated incidence of fraud. For instance, Adewumi (1986) suggested poor internal control as the main reason for increased level of fraud, Oghojafor et al, (2010) identified a mismatch between supervisory skills of employees and the explosion in the numbers of banks and acquisitions of information technology. In order to have effective fraud prevention and detection, ensure accountability and good Corporate Governance practices, the use of ICT as instrument of internal control must be effective to identify and isolate illegal and fraudulent transactions.

The remaining part of the paper is organised into the following sections: Review of related literature, Objectives, Research methods and analyses, and Conclusion.

### **A Review of Related Literature**

Rezaee and Reinstein (1998) studied the impact of emerging IT on auditing functions. The study discussed the main issues of SAS No 80, which offers auditors guidance to accumulate sufficient evidence to audit the CIS of their clients. Rezaee and Reinstein (1998) observed that IT has made inputting information for transactions and events simpler and led to evaluating the related controls and results more critically. Accordingly, accumulating sufficient evidence needed to construct an informed decision means understanding where to look for that evidence, what control procedures to consider, and how to evaluate such procedures. Rezaee and Reinstein's (1998) study is an important contribution towards understanding the impact of ICT on auditing. Even though the study achieved what it was designed to do, it failed to examine the effectiveness of ICT on detection of accounting mistakes and fraud in the course of auditing.

Hermanson et al., (2000) conducted an exploratory study to examine the IT-related activities of Internal Auditors in US organisations. Information gathered from over 100 Internal Audit

directors indicated that Internal Auditors focus primarily on traditional IT risks and controls, such as IT asset safeguarding, application processing, data integrity, privacy and security. However, other areas such as risks related to systems development and acquisition received little attention from Internal Auditors. The results also revealed that several factors have been associated with Internal Audit performance of IT evaluations, including the nature of the audit objective, the prevalence of computer audit specialists on the Internal Audit staff and existence of new Computer Information System. Even though the study suffered from lack of theoretical underpinnings, the study met its stated objective and contributed to knowledge in understanding the focus of Internal Audit activities. The study was however carried out in a developed economy i.e. United States. This makes generalisation of results to a developing economy unrealistic. The current study is carried out in response to the call of Hermanson et al., (2000) to investigate the role of Internal Auditors that might be potentially involved in IT risk assessment and management, particularly for areas receiving little attention from Internal Audit, and to examine the efforts of other groups in addressing such risks.

Rishel and Ivancevich (2003) discussed some important responsibilities for Internal Audit in the IT implementation process. They argued that Internal Audit responsibilities traditionally have been centred on risk management issues and control testing, particularly in the pre-implementation and monitoring phases of IT projects, rather than playing an integral role in enhancing the viability of IT implementations. The study suggested that Internal Auditor can and should provide input with regard to system configuration in order to ensure that the proper integral controls are in place. Internal Auditor should also communicate with the IT team to ensure that new systems and modifications to existing systems are adequately documented. As proper documentation can be so vital to internal audit in its evaluation of controls and risks, Rishel and Ivancevich (2003) study is a step ahead of Hermanson et al.'s (2000) work.

In a recent study, PricewaterhouseCoopers (2007) surveyed the chief audit executives (CAEs) of Fortune 250 companies to gain insight about trends likely to affect internal auditors over the next five years and what they expect internal audit to look like in 2012. The questionnaire survey was combined with interview to achieve a mixed method approach to the investigation. PricewaterhouseCoopers was able to obtain required responses from nearly a third of the Fortune 250. A total of 82 survey responses and 19 in-depth interviews were

conducted across the survey population. The findings of the PricewaterhouseCoopers (2007) survey showed the following trends as impacting internal audit roles, responsibilities, and functions.

Trend	Impact on Role & responsibility very strong (%)	Impact on function moderate (%)	Combined Total Impact & responsibility + Impact on function.(%)
Technology	60	35	95
New Regulations	51	37	88
Risk Management	58	29	87
Corporate governance	58	26	84
Ethics and Compliance	56	21	77

**Table 1: PricewaterhouseCoopers (2007) survey**

The survey showed that between 2007 and 2012 technology, risk management, fraud prevention and globalisation are expected to significantly impact internal audit roles, responsibility and functions in that order. The survey also attempted to find what factors drive the greatest projected increases in responsibility ten identified factor : continuous auditing or monitoring; auditing the ERM process; auditing outsourced or offshore operations; fraud detection; fraud risk assessments; auditing executive compensation and disclosures; auditing operational efficiency and effectiveness; auditing IT security; auditing or evaluating compliance with laws and regulations; fraud investigations. Continuous auditing or monitoring is identified as having the greatest impact in driving projected increase in responsibility of internal auditors with a combined totals of 90 percent. It was also found that fraud detection and fraud risk assessments are expected to produce significant increases in responsibility for internal audit functions.

The PricewaterhouseCoopers (2007) survey has been very useful for academics and policy makers in that it sheds light on possible future outcomes of internal audit functions in a technologically changing global environment. However the choice of Fortune 250 for data collection restricts the generalisation of results to developing countries. Besides, the methods used to analyse the data collected were doubtful as they were not clearly stated.

## **OBJECTIVES**

One of the objectives of this paper is to find out the extent of adoption of IT in the financial sector of a developing economy using Nigeria as case study. The second objective is to investigate the perception of internal auditors on effectiveness of IT in internal control. This is important for a developing country like Nigeria where there are lots of allegations of increased internet financial frauds. Can the use of IT curbs the opportunities it has provided the fraudsters to exploit third parties? Does the user of IT in internal control see it as effective in controlling fraudulent activities?

## **METHODOLOGY AND ANALYSIS**

510 semi-structured questionnaires were served on Internal Auditors that were involved in using IT in their internal control processes. Only those financial organisations with substantial investments in ICT are targeted. A purposive sampling method is adopted and the conclusion generalised by means of inference and triangulation (Jankowicz, 2000). Purposive sampling is adopted because investigating the effectiveness of ICT tools and techniques in preventing and detecting electronic fraud incidence and improving security of internal control cannot be based on a random sampling either across industries or within a particular chosen organisation, as it is subject to peculiar target research. 100% sample frame is adopted since it is convenient to survey the entire population of internal auditors in financial organisations (Banks, Insurance, Mortgage Banks companies) where ICT is substantially adopted in Nigeria.

### **Proposition 1: Financial Institutions Current Level of Provision of ICT Tools and Techniques for internal control purposes is increasing.**

Question B28 asked respondents to state which auditing package /software they are using for their work. The result shows that 15.4 percent use Microsoft office software to generate audit reports and specific analysis of data. 18.2 percent use software developed in-house (the majority of this category comes from insurance industry and finance houses). Majority of respondents 44.2 percent uses Audit Command Language (ACL), 21.2 percent use Gemini case-ware/case-view. Only 1 percent of the respondents indicate they use ADM Plus software. 10 participants representing 4.6 percent of the sampled population did not indicate

what they use probably because of the sensitive nature of the question. This result is consistent with what was obtained below for B26 (my organisation operates COA) and B30 (my organisation provides knowledge based expert system). Slightly above 60 percent of respondents gave positive response.

B28. Which of the following tools/packages do you use?

	Frequency	Percentage	Valid Percentage	Cumulative %
Valid				
Microsoft Office application			15.4	15.4
Microsoft Office application			18.3	33.7
Software developed in-house				
Microsoft Office application			44.2	77.9
Software developed in-house				
Gemini Case-ware/case view				
ACL				
Microsoft Office application			21.2	99.0
Software developed in-house				
Gemini Case-ware/case view				
ACL/IDEA/ADM-Plus				
Microsoft Office application +			1.0	100.0
			100.0	
Total				

**Table 2: Packages/tools use by Internal Auditors in Nigeria**

Questions B22 and B30 WAS are further analysed for the sake of comparison since the questions are similar. The results are presented in Table 7.12 below:

**Table 3: Calculated WAS for questions B26 and B30**

	5 Strongly agree	4 Agree	3 Neither agree nor disagree	2 Disagree	1 Strongly disagree	Weighted Average Statistics
<b>B26</b>						
My organisation operates COA	102 (46.7%)	10 (4.6%)	4 (1.8%)	22 (10.6%)	80 (36.8%)	686/218 = 3.15
<b>B30</b>						
My organisation provides knowledge based expert systems	97 (44.5%)	23 (10.6%)	6 (2.7%)	14 (6.4%)	78 (35.8%)	701/218 = 3.22

Calculated WAS for B26 (My organisation operates COA) and B30 (My organisation provides knowledge based expert system) are very close (3.15 and 3.22). The result corroborates the view of prior researchers that COA can only thrive on knowledge-based expert systems (Rezaee and Elam 2000; Shaikh, 2005). Since the maximum WAS obtainable is 5 the result shows that more than 60% of those sampled are using knowledge based expert system and are operating COA. This opinion is supported by the interview responses that follow:

There is an increased usage of ICT tools and techniques by financial institutions either because it makes them more efficient (perceived benefits), competitive or because financial regulators (external pressure) make it obligatory for them. Furthermore, as discussed in the



preceding proposition, organisation readiness and trust are evidenced as financial institutions are ready to spend as much as possible to acquire necessary ICT equipments and train staff in order to trust them with effective use of that equipment.

Analysis of question B24: ....list specific ICT-based audit tools and techniques you use.

The response to this question is similar with that of B25 and B28. This is an open ended question and 208 respondents (95.4 % of the total) answered the question. The pattern of the answer is illustrated below in accordance with respondents' aggregate prioritisation:

Software	N = 208	Percentage (%)
Microsoft Office	180	86.5
Audit Command Language (ACL)	48	23.1
Gemini Case ware	41	19.7
Auto audit 2000	32	15.4
ADM-Plus	30	14.4
In house software	25	12.0
Wiz Rule	18	8.7

**Table 4: Specific ICT tools in Use**

The analysis of respondents answer shows that ACL are most mentioned audit software apart from Microsoft office which came first with 86.5 percent, while Gemini Case-ware came third. 18 respondents are using WIZ Rule package, 25 respondents mentioned in house package. It is evident from this analysis that the use of ICT tools and techniques for internal control is improving. More sophisticated internal audit tools and techniques are now being used in Nigeria financial sector.

**Proposition 2: ICT Tools and Techniques are Useful to Internal Audit's Task, Efficiency and Effectiveness**

Questionnaire questions B1 to B16 addressed the usefulness of ICT tools and techniques to internal audits' task, efficiency and effectiveness. The result of the respondents are

summarised from frequency tables (see appendix) as shown in Table 7.14 below. The result is grouped into three categories of those agree or strongly agree that ICT tools and techniques are useful for specific audit tasks, Disagree or strongly disagree, and those that are neither agree nor disagree. The percentage of those who agreed or strongly agreed ranges between 65 and 95 percent, except for question B3 (ICT tools and techniques are useful for evaluation of audit risk) which has 48 percent. This is expectedly so, as evaluation of audit risk involves a lot of professional judgement which cannot be completely transferred to computer. The second category is those who disagree or strongly disagree with the proposition (ranges between 01 percent and 20 percent except for B3 which is 39 percent), while those of who neither agree nor disagree ranges between 1 percent and 16 percent.

**Table 5: Summary of frequency tables for questions B1 to B16**

ICT tools and techniques are useful for	Agree and Strongly agree	Disagree and Strongly disagree	Neither agree nor disagree
<b>B1 Evaluation of risk management</b>	(142) 65%	(44) 20%	(32) 15%
<b>B2 Evaluating audit risk assessment</b>	(170) 78%	(13) 06%	(35) 16%
<b>B3 Control within payroll application</b>	(104) 48%	(85) 39%	(29) 13%
<b>B4 control of e-payment application</b>	(203) 93%	(15) 07%	(0) 0%
<b>B5 control of e-purchase</b>	(194) 89%	(16) 07%	(8) 4%
<b>B6 control of e-sales</b>	(176) 81%	(28) 13%	(14) 6%
<b>B7 control of e-receipt</b>	(182) 83%	(22) 11%	(14) 6%
<b>B8 control of identity</b>	(201) 92%	(8) 04%	(9) 4%
<b>B9 testing internal control weaknesses</b>	((199) 91%	(9) 04%	(10) 5%

<b>B10</b> quality of internal control	(204) 94%	(11) 05%	(3) 01%
<b>B11</b> testing general control	(207) 95%	(2) 01%	(9) 04%
<b>B12</b> identifies transaction flows	(200) 92%	(4) 02%	(14) 06%
<b>B13</b> control e-funds transfer	(196) 90%	(12) 05%	(10) 05%
<b>B14</b> authorisation control	(184) 84%	(14) 07%	(20) 09%
<b>B15</b> segregation of duty control	(184) 84%	(16) 8%	(16) 08%
<b>B16</b> ICT useful for security standard	(170) 78%	(14) 06%	(34) 16%

Source: Field Questionnaire, 2011

This result is further reinforced by cross tabulation of Type of Organisation against Internal control quality. This is because the quality of internal control is perceived to be related to internal audit efficiency and effectiveness. Out of 218 respondents 11 (5 percent) either disagree or strongly disagree, and 204 (94 percent) respondent agree or strongly agree that ICT tools and techniques improves internal control quality, while only 3 (01 percent) neither agree nor disagree. The result supports the proposition that ICT tools and techniques improve internal audit's task, efficiency and effectiveness. The responses cut across banks, insurance companies, mortgage institutions and stock houses sampled.

Furthermore Spearman's rank correlation is computed using Internal control quality and Business type. The internal control quality was ranked according to the perception of internal auditors in the questionnaire responses while business types represent the number of business types contacted for the survey. 91 internal auditors agree that banking firms have high internal control quality. The highest is ranked as 1 while the lowest is ranked 6.

Firms	Internal Control	Business Type	Rank X	Rank Y	X <sup>2</sup>	Y <sup>2</sup>	XY
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	Quality X	Y					
Banking	91	9	1	3	1	9	3
Insurance	41	11	3	2	9	4	6
Mortgage	52	14	2	1	4	1	2
Stock Firm	15	8	4	4	16	16	16
Finance House	10	4	5	5	25	25	25
Others	4	2	6	6	36	36	36
TOTALS			21	21	91	91	88

**Table 6: Sperman's Ranking Table**

$$\begin{aligned}
 r_s &= \frac{n \sum XY - \sum X \sum Y}{\sqrt{(n \sum x^2 - (\sum x)^2)(n \sum y^2 - (\sum y)^2)}} \\
 &= \frac{6 \times 88 - 21 \times 21}{105} = \frac{87}{105} \\
 &= \underline{0.83}
 \end{aligned}$$

The spearman's rank correlation result of .83 indicates a positive ranked correlation between internal control quality and Business types.

## CONCLUSION

There is an increased use of ICT tools and techniques for processing and controlling financial information in banks and allied industries. The adoption of IT is being increasingly accepted as a norm in the business world across the globe. This is in agreement with prior studies (PricewaterhouseCoopers 2007, Abiola 2013).

The perception of the users of ICT tools and techniques (the Internal Auditors) is that it has been efficient and effective in virtually all aspects of the functional areas of internal control. The seemingly increased IT control breaches in financial institutions and resultant fraudulent activities may therefore be traced to other human factors.

One major identified limitation of this study is the use of internal auditors as major respondents. Since internal control activities are supervised by the internal auditors they can be regarded as interested party. Their opinion may therefore be susceptible. Apart from this the researcher had initial problem of getting the respondents interested in the study since they are very busy and also tried to protect their organisations since they regard the ICT tools and techniques they use as very vital secret of their operations.

A future longitudinal case study may be useful to find out the effects of increased computerisation on financial organisations. The effects can only be isolated over a time frame period of time.

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