Effect of Technological Innovations on Audit Evidence in Kenya

Sammy Kimunguyi

Office of The Auditor-General, Kenya

ABSTRACT

Technological Innovations is the application of Information Technology in auditing. It ranges from simple automation using spread sheets applications to an advanced practice of audit software with Data Bases and Business Intelligence Applications. The study sought to establish the effect of Technological, Organization and Environmental factors of Technological Innovations on Audit Evidence based on a survey research design with a target population of 47 Public Audit firms. Data collection was done using questionnaire and analyzed using Statistical Package for Social Scientists (SPSS). The findings established that use of Technological, Organizational and Environmental factors have statistical significant effects on appropriateness and sufficiency of evidence. In addition, enhanced connectivity and applications software that would enable obtaining audit evidence in real time instead of relying on manual historical data and use of drones and GPRS for physical verification of projects were noted as ways to enhance technological innovations in audit firms.

CONTENTS

List of Tables

List of Figures

1 INTRODUCTION

1.1 Background of the study

An audit opinion is an implicit expression of two conclusions based on the audit evidence collected and processed during the audit: (1) that the opinion is accurate; i.e. that the evidence collected is appropriate to support the opinion, and (2) that the opinion is justified; i.e. the evidence collected provides sufficient support for the opinion (Morton, 2002).

Whether sufficient appropriate audit evidence has been obtained to reduce audit risk to an acceptably low level that will enable the auditor to draw reasonable conclusions on which to base the audit opinion, is a matter of professional judgement (Causholli and Knechel, 2012). While the auditing standards provide some guidance to assist the auditor in deciding the quantity (sufficiency) and quality (appropriateness) of audit evidence to be obtained, they do not dictate exactly how much evidence needs to be gathered, or the quality thereof (Perry, 2011).

Professional Audit Service provided by public accounting firms is vital to most businesses in providing assurance that businesses' financial reports are true and fair (Ismail, 2009). In the growth of information technology (IT), businesses progressively adopt Accounting Information Systems (AIS) to manage their business processes. Evidently, it is imperative that audit firms be able to also audit AIS and use audit technology as a support tool to audit their clients' businesses. Audit technology is an IT application in auditing that signifies the use of any computer-assisted audit tool to improve auditor's capacity in performing an audit. It ranges from a simple audit automation using spreadsheet application to an advanced practice of audit software with databases and Business Intelligence Applications (Rosli, Yeow, & Siew, 2013).

Although, the importance of audit technology is widely accepted by professional accounting bodies and audit firms, in practise audit technology implementation is not widespread among public accounting firms. In Malaysia, despite high AIS usage among businesses (Ismail, 2009), the investment and acceptance of audit technology is still minimal as only 21% of audit firms use

audit technology despite them highly acknowledging the benefits of audit technology (Ismail and Abidin, 2009).

Technological, Oganisational and Environmental Contexts (TOE) framework is the primary used theory in investigating technology adoption in organisations (Venkatesh and Bala, 2012)**.** TOE framework (Tornatzky and Fleischer, 1990), suggests that three components namely Technological, Organisational and Environmental Contexts influence the adoption process of a technological innovation. This study supports the technological components of TOE with technology characteristics of Diffusion of Innovation (DOI) theory (Rogers, 2003) and uses Institutional Theory to explain the environmental components' impacts on audit technology adoption.

Examples of technological innovations used in managing audit evidence include data analytics, digital analysis, expert systems, database modeling, continuous transaction monitoring (Janvrin et al., 2008). The use of data analytics has advanced much more rapidly in auditing, where many organizations use continuous auditing of data that enables them to identify risks as part of their system of internal control (Murphy and Tysiac, 2015, Staub, 2012).

Many studies have been conducted subsequently, examining the auditor's application of analytical procedures and other technological innovations in the audit process. Studies have been conducted in the United States of America (USA) (Trompeter & Wright 2010), Egypt (Samaha & Hegazy 2010), and more recently in Portugal (Pinho 2014) and Yemen (Abidin & Baabbad 2015). Little is known, however, of how auditors in Africa apply technological innovations in the audit process – a gap that this study attempts to fill.

In all of these studies, the authors indicate that the demand for the use of analytical procedures is growing in response to numerous factors, of which technological advancements (Abidin & Baabbad 2015; Samaha & Hegazy 2010) and changes in audit methodologies (Pinho 2013; Trompeter & Wright 2010) are the most significant. In addition, the extant literature highlights the usefulness of analytical procedures when used during each of the phases of the audit process (Abidin & Baabbad 2015; Pinho 2014; Samaha & Hegazy 2010; Trompeter & Wright 2010) and

also shows that by increasing the application of these procedures, the efficiency and effectiveness of the audit is enhanced (Trompeter & Wright 2010).

1.2 Statement of the problem

Many previous literatures studied the implementation of technology in audit profession, focusing on internal auditing job where technology was used by internal auditors in private companies and public organisations (Moorthy et al.,2011). Despite the wide usage of audit technology in internal auditing and the importance of audit technology (Ismail, 2009), such utilisation is not extensive among public accounting firms specifically in performing external audit of their business clients (Curtis & Payne, 2008).

The consequences of the Covid-19 pandemic on financial statement reporting and audit engagements are complex and have resulted in challenges for management, those charged with governance and auditors. The uncertainty arising from the current environment may increase the challenge in obtaining the sufficient appropriate audit evidence needed to form an independent view about the reasonableness of management's estimates and judgments (IFAC,2020).

It is therefore, imperative that auditors adopt technological innovation in the audit process. Hence this paper looks at effect of technological innovations on audit evidence focusing on Supreme Audit Institution (SAI) and Public Accounting Firms in the Republic of Kenya. The study considers SAI Kenya a Public Accounting firm.

1.3 Objectives of the Study

General Objective

To establish the effect of technological innovations on audit evidence among Public Accounting Firms in, Kenya.

Specific Objectives

a. To establish the effect of technological factor of technological innovations on audit evidence among public accounting firms in Kenya;

b. To identify the effect of organization factor of technological innovations on audit evidence among public accounting firms in Kenya; and

c. To establish the effect of environmental factor of technological innovations on audit evidence among public accounting firms in Kenya.

1.4 Hypothesis

H_{01}: Technological factor of technological innovation has no effect on audit evidence among public external audit accounting firms in Kenya;

H_{02}: Organization factor of technological innovation has no effect on audit evidence among public external audit accounting firms in Kenya; and

H_{03}: Environmental factor of technological innovation has no effect on audit evidence among public external audit accounting firms in Kenya.

1.5 Significance of the study

The findings of this study will be important to various stakeholders as follows:

a. Public Accounting firms will use findings of this report to put in place appropriate policy framework for adoption of technological innovations in external audit process
b. Professional bodies will use the findings of this report to come up with appropriate audit standards to guide application of technological innovations in managing audit evidence

1.6 Limitations of the study

In view of time and resource constraints, the study was limited to Supreme Audit Institution, Kenya and Professional Accounting firms in Kenya.

2 LITERATURE REVIEW

2.1 Technological Innovations

Information Technology (IT) innovativeness has been associated with the use of IT to introduce radical business models that disrupt firm practices, such as the case of internet computing in systems development organizations (Lyytinen and Rose, 2003) or the digitization of information that can intra- and inter-organizationally tie activities and processes together (Sambamurthy et al. 2003). Innovative IT is synonymous with IT excellence in that, companies characterized as innovative have used IT to create competitive advantage, improve relationships with customers and optimize internal and external business processes (Friedenberg, 2012).

Technological, Organisational and Environmental contexts (TOE) framework is the primary theory used in investigating technology adoption in organisation (Venkatesh and Bala, 2012)**.** TOE framework (Tornatzky and Fleischer, 1990), suggests that three components namely technological

context, organisational context and environmental context influence the adoption process of a technological innovation. This study supports the technological components of TOE with technology characteristics of Diffusion of Innovation (DOI) theory (Rogers, 2003) and uses Institutional Theory to explain the environmental components' impacts on audit technology adoption.

The framework is strengthened by Diffusion of Innovation (DOI) theory (Rogers, 2003) and Institutional theory (DiMaggio and Powell, 1983) to better explain the technological and environmental context influence on audit technology adoption in audit firms. It is argued that TOE framework only provides a general technological aspect influencing technology adoption without specifically addressing the characteristics of the technology. The gap of the technological aspect could be supported by the characteristics explained in DOI theory.

Besides, with the unique environmental aspect of audit profession, environmental factors in TOE framework could be best described through Institutional theory. Therefore, by combining these three theories, it could provide a comprehensive framework on the adoption of audit technology. According to Rosli et al.., 2012, the framework illustrates how Technological, Organizational and Environmental factors influence audit technologies adoption.

a) TECHNOLOGICAL FACTORS

Technology Cost-Benefit

As supported by DOI theory, benefits which are derived from technology's relative advantage, affect technology adoption rate (Rogers, 2003). According to Rogers (2003), relative advantage means a technology is "perceived as being better than the idea it supersedes" or in other words, the technology "offers improvements over currently available tools". In this study, technology cost-benefit is defined as the perceived benefits that an audit firm would obtain from audit technology outweigh the cost of its adoption.

Technology Compatibility

Technology compatibility refers to the degree to which the use of audit technology is consistent with audit needs and matches the audit tasks that need to be performed by audit firm. It is adapted

from the definition of compatibility in DOI theory by Rogers (2003). This study posits that compatibility will positively influence audit evidence.

Technology Complexity

Complexity as adapted from DOI theory is defined as the degree of difficulty to understand and use the audit technology. Business firms that perceive an IS/IT to be too complicated will likely reject the system from being adopted (Rogers, 2003). Therefore, this study believe that complexity will negatively influence audit technology adoption.

b) ORGANIZATION FACTORS

Top Management Commitment

Top management commitment refers to the degree of top management involvement, direction and support given to audit technology adoption in audit firm. Top management support has been regularly found to be important in making decision for technology adoption in organization (Mahzan and Lymer, 2009). Thus, it is anticipated that top management commitment will positively influence audit technology adoption.

Organization Readiness

This study defines organization readiness as the level of firm's available financial and technological resources to adopt audit technology. With financial resource, a firm can equip its organization with necessary IT sophistication, technological facility and internal environment to support technology adoption (Venkatesh and Bala ,2012). Prior literatures on computer assisted audit tools adoption stressed that organizational physical facility and technological infrastructure influence the motivation of computer assisted audit tools adoption (Janvrin et al., 2008; Mahzan and Lymer, 2009). Hence, this study posits that organization readiness will positively affect audit technology adoption.

Human Resource's IT Competency

As supported by TOE framework, knowledge and competency of workforce are required for a firm to successfully adopt a technology (Tornatzky and Fleischer, 1990). Human resource's IT competency refers to the level of IT/IS competency and capability possessed by audit firm's

employees. This study believe that human resource's IT competency will positively influence audit technology adoption.

c) ENVIRONMENTAL FACTORS

Complexity of Client's AIS

Complexity of client's AIS variable is adapted from Janvrin, Bierstaker and Lowe (2008). It is defined as the level of complexity, difficulty and volume of transactions processed by AIS which is used in client's organization. Audit firm provides audit services to its clients, among others to examine its client's business financial reporting, AIS and its internal control (Hall, 2011). Therefore, it is expected that audit technology adoption by audit firm will be positively influenced by the complexity of clients AIS.

Competitive Pressure

Competitive pressure refers to the perceived level of pressure within the business environment in which the audit firms operates. Competitive pressure is found as a factor affecting AIS adoption (Cartman and Salazar, 2011). As stressed by TOE framework and previous studies, firms are more likely to accept an IT when many competitors in its industry are adopting the technology (Zhu et al., 2005). This study hypothesizes that competitive pressure will positively influence audit technology adoption.

Professional Accounting Bodies Support

Previous literature found that there is a relationship between professional association and technology adoption (Swan and Newell, 1995**).** From the normative viewpoint of Institutional theory, a firm will follow the same norm of its professional groups and react to its environment (DiMaggio and Powell, 1983**).** In this study, professional accounting bodies support is defined as the guidance and support given to public audit firms through dissemination of audit technology use and standards. Thus, it is anticipated that professional accounting bodies support will positively influence audit technology adoption.

2.2 Audit Evidence

The auditor lends credibility to financial statements by attesting to the reliability of such statements in the audit opinion (Budescu, Peecher and Solomon, 2012). Carrington (2010) stated that "a

sufficient audit is about a reliable ritual of verification that produces the comfort users need in order to trust the audited financial statements". Consequently, it can be concluded that the audit opinion is dependent on the sufficiency and appropriateness of the audit evidence obtained. Thus, at a practical level, the task faced by the auditor is to gather evidence of adequate quantity (sufficiency) and quality (appropriateness) to support the audit opinion (Budescu et al., 2012). In this regard, the study addresses the objective of the study "effect of technological innovation on Audit Evidence".

2.3 Operationalization of Variables and Conceptual Framework

Operationalization of variables

Table 1 : Operationalization of variables

Particulars	**Study variables**	**Attributes**	**Measurement scale**	**Source**
Independent variable (Technological innovations)	Technological context / factor	• Technology Cost Benefit	Ordinal and Nominal	Venkatesh and Bala, 2012 and (Rosli et al., 2012).
,,	,,	• Technology Compatibility	,,	,,
,,	,,	• Technology Complexity	,,	,,
,,	Organizational context / factor	• Top management Commitment	,,	,,
,,	,,	• IT competency of firm's employees	,,	,,
,,	,,	• Firm's readiness	,,	,,
,,	Environmental context	• Complexity of client's accounting systems	,,	,,
,,	,,	• Professional accounting bodies supports	,,	,,
,,	,,	• Competitive pressure	,,	,,
Dependent variable (Audit Evidence)	• Audit evidence	Sufficiency & Appropriateness	,,	Budescu et al ., 2012

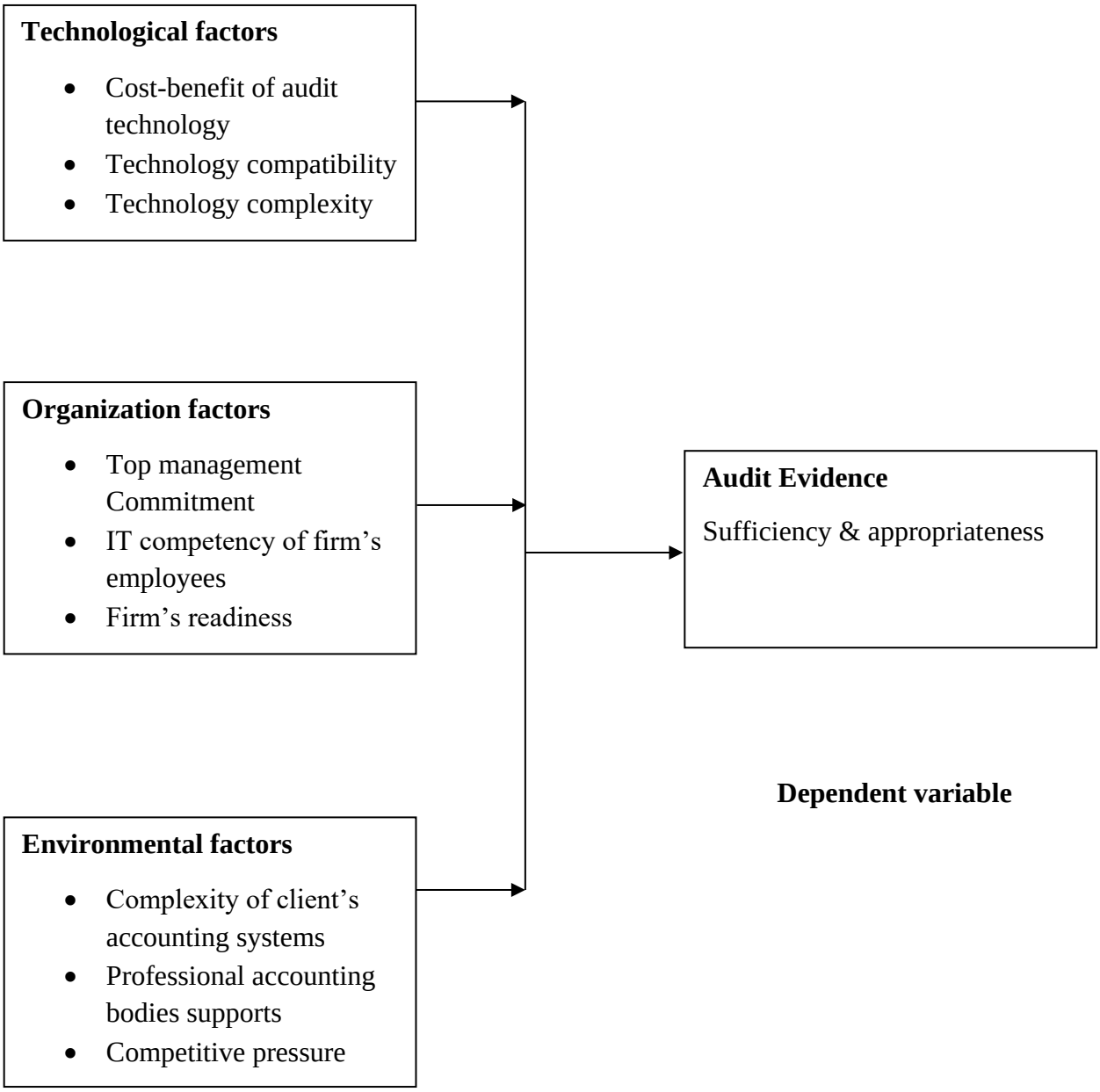

Figure 1 : Conceptual Framework

2.4 Empirical Review

Audit technology ranges from a simple audit automation using spreadsheet application to an advanced practice of audit software with databases and business intelligence applications (Rosli, Yeow, & Siew, 2013). In Malaysia, despite high AIS usage among businesses (Ismail, 2009), the investment and acceptance of audit technology is still minimal as only 21% of audit firms use audit technology despite them highly acknowledging the benefits of audit technology (Ismail and Abidin, 2009).

3 RESEARCH METHODOLOGY

Data from audit firms were gathered through questionnaire survey. The questionnaire items were mainly derived and adapted from survey instruments in the previous literatures. A five-point Likert scale ranging from strongly disagree (1-point) to strongly agree (5-point) was used to capture audit firm's effect on technological, organizational and environmental factors of technological innovations on audit evidence. According to Mugenda and Mugenda (2003), surveys enable researchers to obtain data about practices, situations or views at one point in time through questionnaires and interviews.

The Republic of Kenya has a total of 47 County Governments (Constitution of Kenya ,2010). For purpose of ensuring representation, the study stratified the country into 47 County Governments with each County Government forming strata. Through simple random sampling, the study selected one Public Accounting firm per stratum (County Government) to participate in the study. For purpose of this study, the Supreme Audit Institution of Kenya was also considered a Public Accounting firm. In this regard, the study sampled 47 Public Accounting Firms distributed in the 47 County Governments in Kenya.

The questionnaire was scrutinized by five practicing auditors to assess its validity. Reliability is if the researcher measures the same variable several times, and the results are approximately the same (Rabianski, 2003). The reliability of the questionnaire was tested using the Cronbach's alpha correlation coefficient with the aid of Statistical Package for Social Sciences (SPSS) software. The study conducted a pilot study in Kiambu County in Kenya. The pilot also tested data for relevance, interpretability and usefulness in addressing the study objectives (Baker (2003**).** Data entry and descriptive analysis for the questionnaire were done using Statistical Package for the Social Sciences (SPSS).

Besides using frequencies and descriptive analysis, the study used ordinal regression analysis to investigate overall statistical relationships between variables.

4 DATA PRESENTATION, ANALYSIS & DISCUSSION

4.1 Descriptive statistics

The study established that majority of the respondents had a job experience of 1-5 years at 39.3% as detailed below:

Table 2 : Descriptive statistics

	Frequency	Percent	Valid Percent	Cumulative Percent
Btw 5-10 years	5	17.9	17.9	17.9
Over 10 years	5	17.9	17.9	35.7
less than 1 year	7	25.0	25.0	60.7
Btw 1-5 Years	11	39.3	39.3	100.0
Total	28	100.0	100.0	

4.2 Technological Innovations in Audit firms

The study established that each of the sampled firms had adopted at least a technological approach in their audit works. 35.7% of the firms had adopted Data Structured Query Language (SQL) and related software's while 39.3% had an Audit Management System (AMS) embedded with Electronic Working Papers (EWP) as the major innovation. Only 3.6 % of the firms had forensic toolkit as part of their audit processes a low number that compared at 3% with Electronic spreadsheets as detailed below.

Table 3 : Technological innovations in Audit firms

Technological Innovations	Total number of Firms that adopted the Innovation	Total firms that have not adopted the innovation
Electronic spreadsheets	3	25
%	10.7%	89.3%
AMS embedded EWP	11	17
%	39.3%	60.7%
Forensic toolkit	1	27
%	3.6%	96.4%
Data SQl and related software's	10	18
%	35.7%	64.3%

The findings are divergent from Ismail (2009) that established that in practise, audit technology is not wide spread among public accounting firms. The increase in adoption of technological approach in audit technology could be attributed to increased automation of clients operating systems thereby exerting pressure on Auditors to adopt technological change.

4.3 Ordinal regression analysis.

Ordinal regression analysis is used to predict an ordinal dependent variable measured on ordinal Likert items like in this case. In addition, the model needs to meet the following assumptions to be feasible; One or more independent variables either needs be categorical or ordinal, there should be no Multi-collinearity between independent variables and the model needs to have proportional odds. To ensure robust results from the model, multi-collinearity and proportional odds of the model needs to meet (Agresti,2010). To explore this analysis, the cumulative odds ordinal logistic regression with proportional odds will be used.

4.3.1 Testing Multi-Collinearity Assumption

Table 4 : Multicollinearity Coefficients

Model		Collinearity Statistics	
		Tolerance	VIF
1	TC1	.133	7.521
	TC2	.178	5.626
	OP1	.331	3.025
	OP2	.580	1.723
	EF1	.150	6.688
	EF2	.147	6.820

a Dependent Variable: Audit Evidence

NB: all the 3 variables were measured on a Likert scale from 1 to 5, however, 1 to 2 scales were rendered redundant since they were non responsive.

-Dummy variables were created based on scale 3 to 5, hence 2 variables created.

-TC1 is dummy variable 1 for technological innovations

-TC2 is dummy variable 2 for technological innovations,

-OP2, OP2 EF1and EF2 are dummy variables for operational factors and environmental factors respectively.

Multi-collinearity results in high correlation between independent variables. Consequently, technical issues arise when considering which variable(independent) contributes and explains the dependent variable. In this regard, the "Tolerance" and "Variance Inflation Factor (VIF)" values shown in the table above are consulted. According to Laerd Statistics (2015), a VIF of less than 10 depicts a fairly reason to believe that collinearity does not exist. From the table above, VIF ranges from 7.521 to 1.723 suggesting multi-collinearity is insignificant among independent variables in our dataset. This therefore implies that the data complies with multi collinearity requirement for ordinal regression analysis.

4.3.2 Testing Proportional Odds assumption

Having met multi-collinearity assumptions, proportional odds assumption is explored as documented by Agresti (2013) and further explored with SPSS by Laerd Statistics (2015). Proportional odds assumption stipulates that each independent categorical variable has the same influence on each of the cumulative splits of the ordinal dependent variable. To ensure this assumption is not violated in our data set, the following results are tabulated.

Table 5 : Test of proportional odds assumption

Test of Parallel Lines[a]

Model	-2 Log Likelihood	Chi-Square	Df	Sig.
Null Hypothesis	31.782			
General	21.753	10.029	12	.000

a. Link function: Logit.

This test compares the proportional odds model under null hypothesis and a general model without proportional odds as shown in the table above under the -2 log likelihood column.

As can be assessed on the table, the assumption of proportional odds was met when comparing the likelihood ratio test of a proportional odds location model to a model with varying location parameters, X2(12) =10.029, p=.001.

4.4 Model results and interpretation

Having met the assumptions of an ordinal regression model significantly, the main objectives of this section is to establish which of the independent variables- Technological factors, Operational

factors and Environmental factors have any statistical effects on appropriateness and sufficiency of audit evidence.

4.4.1 Overall model fit

To assess the model fit, Likelihood ratio test which checks the change in model when comparing the full model to intercept only model was done. The results are as tabulated in the table below:

Table 6 : Model Fitting Information

Model	-2log Likelihood	Chi-Square	df	Sig.
Intercept only	41.257			
Final	32.782	9.475	6	.000

Link Function: Logit.

Under column -2 log likelihood column shows the model fit at 41.257 for the Intercept only as compared to a full model with all the independent variables labelled as final in the table which has a -2 log Likelihood of 32.782. The difference between the two model is shown under chi Square column,9.475. Equally important, the final model is statistically significant and predicts the dependent variable (Appropriateness and sufficiency of audit evidence) over and above the intercept-only model, $\chi 2(6) = 9.475$, $p < .001$.

4.4.2 Tests of Model Effects

The ordinal regression necessitates creation of j-1 cumulative logits equations, where j is the number of categories arising from the ordinal dependent variable (Agresti,2013). As there are five categories in the dependent variable (strongly disagree, disagree, no opinion, agree, strongly agree) there are 4 equations from the 4 cumulative logits created.

However, there is need to establish how the three factors (technological factors, Operational factors and Environmental factors) influence the dependent variable. Therefore, the table below establishes an omnibus statistical test to explore if they are statistically significant overall before exploring any specific contrasts that shows up in Parameter Estimates table.

Table 7 : Tests of Model Effects

Source	Type III Wald Chi-Square	Df	Sig.
Technological factors	14.372	2	.001
Operational factors	11.956	2	.001
Environmental factors	12.563	2	.001

Dependent Variable: Audit Evidence

Model: (Threshold), Technological factors, Operational factors, environmental factors

The table above shows technological factor has a statistically significant effect on the sufficiency and appropriateness of audit evidence, Wald $\chi 2(2) = 14.327$, $p = .001$. In addition, Operational factors and environmental factors significantly contribute to sufficiency and appropriateness of audit evidence as indicated by the Wald statistics, Wald $\chi 2(2) = 11.956$, $p = .001$. and Wald $\chi 2(2) = 12.563$, $p = .001$ respectively.

4.4.3 Parameter estimates

In addition to test of model effects, parameter estimates are necessary to indicate how the factors differ or explain the dependent variable based on the Likert scale. Therefore, the parameter estimates represented in the table below indicates the parameter estimates of each of the independent variables.

Table 8 : Parameter estimates

Parameter Estimates

Parameter		B	Std. Error	95% Wald Confidence Interval Lower	95% Wald Confidence Interval Upper	Hypothesis Test Wald Chi-Square	df	Sig.	Exp(B)	95% Wald Confidence Interval for Exp(B) Lower	95% Wald Confidence Interval for Exp(B) Upper
Threshold	[Audit Evidence=2.00]	7.0672	1.1600	4.7	9.2	36	1	.000	1172.8594	115.835	10828.043
	[Audit Evidence=3.00]	6.0672	1.5600	4.7	8.2	36	1	.000	431.4708	123.835	11828.043

[Audit Evidence=4.00]	11.0672	2.1470	4.7	29.2	36	1	.000	64035.954	423.835	19828.043
[Technological factors=5.00]	1.034	0.7991	1.081	6.013	1.90	1	.000	2.801	2.389	11.678
[Technological factors=4.00]	1.27	0.391	0.344	5.750	2.30	1	.000	3.560	1.567	5.879
[Technological factors=3.00]	0[b]	.	.	.	.	.	.	1	.	.
[Operational factors=5.00]	1.769	0.5147	3.934	8.396	1.227	1	.001	5.864	.020	10.975
[Operational factors=4.00]	1.968	.9901	0.973	2.908	3.955	1	.004	7.156	.378	18.323
[Operational factors=3.00]	0[b]	.	.	.	.	.	.	1	.	.
[environmental factors=5.00]	1.486	2.1873	0.801	5.773	4.462	1	.497	4.420	.061	321.569
[environmental factors=4.00]	0.196	2.0861	-4.285	3.893	4.9	1	.925	.822	.014	49.042
[environmental factors=3.00]	0[b]	.	.	.	.	.	.	1	.	.
(Scale)	1[c]									

Dependent Variable: Audit Evidence

Model: (Threshold), Technological factors, Organizational factors, Environmental factors

a. Set to system missing due to overflow

b. Set to zero because this parameter is redundant.

c. Fixed at the displayed value.

4.4.4 Interpretation of results

Objective 1: Effect of technological factor of technological innovations on audit evidence among public accounting firms in Kenya

The odds of respondents who strongly agree that technological factors influencing sufficiency and appropriateness of audit evidence was 2.801, 95% CI [2.389, 11.678] times those who have no opinion, a statistically significant effect, Wald $\chi 2(1) = 1.90$, $p = .001$. This finding concurs with Trumpeter and wright (2010) who established that technological factors have a positive influence on quality of audit evidence.

The odds of respondents who only agree that technological factors influence sufficiency and appropriateness of audit evidence was 3.560, 95% CI [1.567, 5.879] times those who have no opinion, a statistically significant effect, Wald $\chi 2(1) = 2.30$, $p = .001$. This finding concurs with Rodgers (2003) who found out that technological compatibility positively influences sufficiency & appropriateness of audit evidence. This study therefore rejected the null hypothesis (**H_{01}**) "Technological factor of technological innovation has no effect on audit evidence among public external audit accounting firms in Kenya"

Objective 2: Effect of Organization factor of technological innovations on audit evidence among public accounting firms in Kenya

The odds of respondents who strongly agree that organization factors influence sufficiency and appropriateness of audit evidence was 5.864, 95% CI [0.020, 10.975] times those who have no opinion, a statistically significant effect, Wald $\chi 2(1) = 1.227$, $p = .001$.

The odds of respondents who only agree that organization factors influence sufficiency and appropriateness of audit evidence was 7.156, 95% CI [0.378, 18.323] times those who have no opinion, a statistically significant effect, Wald $\chi 2(1) = 3.955$, $p = .001$.

These findings are in agreement Mahzan and Lymer (2009) that established that top management commitment positively influences sufficiency and appropriateness of audit evidence. Jarran et al., (2008) also came up with similar findings.

This study therefore rejected the null hypothesis ($\mathbf{H_{02}}$) that Organization factors of technological innovation has no effect on audit evidence among public external audit accounting firms in Kenya.

Objective 3: Effect of Environmental factor of technological innovations on audit evidence among public accounting firms in Kenya

The odds of respondents who strongly agree that environmental factors influence sufficiency and appropriateness of audit evidence was 4.420, 95% CI [0.061, 321.569] times those who have no opinion, a statistically significant effect, Wald $\chi 2(1) = 4.462$, p = 001.

The odds of respondents who only agree that environmental factors influence sufficiency and appropriateness of audit evidence was 0.822, 95% CI [0.014, 49.042] times those who have no opinion, a statistically significant effect, Wald $\chi 2(1) = 4.9$, p = .004.

The findings concur with Hall, 2011, Cartman and Salazar (2011) and Zhu et al., 2005 who established that environmental factors of technological innovations positively influence audit evidence.

The study therefore rejected the null hypothesis ($\mathbf{H_{03:}}$) that Environmental factor of technological innovation has no effect on audit evidence among public external audit accounting firms in Kenya.

5 CONCLUSION & RECOMMENDATION

In conclusion, the three factors, Technological, Organizational and Environmental factors have statistical significant effects on appropriateness and sufficiency of evidence. In addition, enhanced connectivity and applications software that would enable obtaining audit evidence in real time instead of relying on manual historical data and use of drones and the General Packet Radio Service (GPRS) for physical verification of projects were noted as ways to enhance technological innovations in audit firms.

Since there exists sufficient evidence that technological innovations influence audit evidence, it is recommended that:

- Public Accounting firms and Supreme Audit Institutions put in place appropriate policy framework for adoption of technological innovations in external audit process;
- Professional bodies should come up with appropriate audit standards to guide application of technological innovations in managing audit evidence; and
- Public Accounting firms should consider adopting Forensic Tool Kits to enhance their responsiveness to fraud risks. Professional bodies should put in plave policy framework to guide the same.

6 REFERENCES

Abidin, S. & Baabbad, M.A. 2015. The use of analytical procedures by Yemeni auditors. *Corporate Ownership & Control*, 12(2): 17–25.

Agresti, A. (2010). Analysis of ordinal categorical data (2nd ed.). Hoboken, NJ: John Wiley & Sons.

Agresti, A. (2013). Categorical data analysis (3rd ed.). Hoboken, NJ: John Wiley & Sons.

Baker, T. L (2003), Doing Social Research (2nd ed). New York: McGraw-Hill inc.

BUDESCU, D.V., PEECHER, M.E. and SOLOMON, I., 2012. The joint influence of the extent and nature of audit evidence, materiality thresholds and misstatement type on achieved audit risk. Auditing, 31(2), pp. 19-41.

Cartman, C., and Salazar, A. 2011. "The influence of organisational size, internal IT capabilities and competitive and vendor pressures on ERP adoption in SMEs," *International Journal of Enterprise Information Systems* (7:3), pp. 68–92.

CARRINGTON, T., 2010. An analysis of the demands on a sufficient audit: Professional appearance is what counts. Critical Perspectives on Accounting, 21(8), pp. 669-682.

CAUSHOLLI, M. and KNECHEL, W.R., 2012. An examination of the credence attributes of an audit. *Accounting Horizons*, **26**(4), pp. 631-656.

Curtis, M. B., & Payne, E. A. (2008). An examination of contextual factors and individual characteristics affecting technology implementation decisions in auditing. *International Journal*

of Accounting Information Systems, *9*(2), 104-121. http://dx.doi.org/10.1016/j.accinf.2007.10.002

DiMaggio, P. J., and Powell, W. W. 1983. "The iron cage revisited: Institutional isomorphism and collective rationality in organizational fields," *American Sociological Review* (48:2), pp. 147–160.

Ernst & Young. "How Big Data and Analytics Are Transforming the Audit." EY Reporting 5.9 (2015): Web. 20 Feb. 2016.

Friedenberg, M. (2012). How to succeed in business: Award-winning IT Innovation," CIO; July 27.http://www.cio.com/article/711435/How_to_Succeed_in_Business_Award_Winning_IT_Innovation, accessed 8/13/2012.

Hall, J. A. 2011. *Information Technology Auditing*, (3rd ed.) USA: Cengage Learning.

IAASB, 2014b. International framework for assurance engagements. *SAICA electronic handbook.* Johannesburg, South Africa: SAICA.

IAASB, 2014e. ISA 230: Audit documentation. *SAICA electronic handbook.* Johannesburg, South Africa: SAICA.

International Federation of Accountants [IFAC] (2010): "2010 Handbook of International Quality Control, Auditing, Review, Other Assurance, and Related Services Pronouncements", New York: International Federation of Accountants [IFAC]

Ismail, N. A. (2009). Factors influencing AIS effectiveness among manufacturing SMEs: Evidence from Malaysia. *The Electronic Journal of Information Systems in Developing Countries*, *38*(10), 1-19.

Ismail, N. A., & Abidin, A. Z. (2009). Perception towards the importance and knowledge of information technology among auditors in Malaysia. *Journal of Accounting and Taxation*, *1*(4), 61-69. http://dx.doi.org/10.5897/JAT09.017

Janvrin, D., Bierstaker, J., & Lowe, D. J. (2008). An Examination of Audit Information

Technology Use and Perceived Importance. Accounting Horizons, 22(1), 1-21.

Joshi, P. and Deshmukh, A. (2009): "An Empirical Analysis of Auditors' Evidence Gathering Techniques in Bahrain", Afro-Asian Journal of Finance and Accounting, Vol. 1, No. 4, pp 333-352

Lyytinen, K., Rose, G.M. (2003). The disruptive nature of information technology innovations: The case of internet computing in systems development organizations. MIS Quarterly; 27:4, 557-595.

Mahzan, N., and Lymer, A. 2009. "Examining adoption of computer assisted audit tools and techniques (CAATTs) by internal auditors: Cases of UK internal auditors," in *Proceedings of 12th International Business Information Management Association (IBIMA) Conference*, Kuala Lumpur, Malaysia, pp. 1–46.

MAUTZ, R.K. and SHARAF, H.A., 1961. *The philosophy of auditing.* New York, USA: American Accounting Association.

Mugenda, O.M. & Mugenda, A.G. (2003). *Research Methods: Quantitative and Qualitative Approaches*. Nairobi: Acts Press

MOIZER, P., 2005. *Governance and auditing.* Northampton, USA: Edward and Elgar.

MORTON, J.E., 2002. The dual role of audit evidence. *Academy of Accounting and Financial Studies Journal,* **6**(3), pp. 95-113.

Moorthy, M. K., Seetharaman, A., Mohamed, Z., Gopalan, M., & San, L. H. (2011). The impact of information technology on internal auditing. *African Journal of Business Management, 5*(9), 3523-3539.

Murphy, Maria L., and Ken Tysiac. "Data Analytics Help Auditors Gain Deep Insight."

Journal of Accountancy (2015): Web. 5 Mar. 2016.

PERRY, T.P.M., 2011-last update, SAS 106: Audit evidence: Is it effective? Available: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1907438 [23 November, 2012].

Pinho, C. 2014. The usefulness of analytical procedures: an empirical approach in the auditing sector in Portugal. *International Journal of Business and Social Research*, 4(8): 25–33.

Rabianski, J.S. (2003). Primary and Secondary Data: Concepts, Concerns, Errors, and Issues, *The Appraisal Journal*, 71(1), 43-55.

Rogers, E. M. (2003). *Diffusion of innovations* (5th ed.). New York, Free Press.

Rosli, K., Yeow, P. H. P., & Siew, E. (2013). Adoption of Audit Technology in Audit Firms. In *24th Australasian Conference on Information Systems*, Melbourne.

Samaha, K. & Hegazy, M. 2010. An empirical investigation of the use of ISA 520 "analytical procedures" among Big 4 versus non-Big 4 audit firms in Egypt. *Managerial Auditing Journal*, 25(9): 882–911.Saunders, M., Lewis, P. & Thornhill, A. 2012. *Research methods for business students.* 6th ed. London: Pearson.

Sambamurthy, V., Bharadwaj, A., Grover V. (2003). Shaping agility through digital options: Reconceptualizing the role of information technology in contemporary firms. *MIS Quarterly*; 27(2): 237-263

Sharma, Ruby. "Big Data and Analytics in the Audit Process." EY Center for Board Matters (2015): Harvard. Web. 2 Jan. 2016.

Swan, J. A., and Newell, S. 1995. "The role of professional associations in technology diffusion," *Organization Studies* (16:5), pp. 847–874.

Staub, Walter A., "Auditing Developments During the Present Century." *Massachusetts:*

Harvard University Press (2012): p.15, 17, 26, 29

Tornatzky, L. G., & Fleischer, M. (1990). *The Processes of Technological Innovation*. Lexington MA, Lexington Books.

Trompeter, G. & Wright, A. 2010. The world has changed: have analytical procedure practices? Contemporary Accounting Research, 27(2): 669–700.

Venkatesh, V., & Bala, H. (2012). Adoption and impacts of interorganizational business process standards: Role of partnering synergy. *Information Systems Research*, 1-27. http://dx.doi.org/10.1287/ isre.1110.0404

Zhu, K., and Kraemer, K. L. 2005. “Post-adoption variations in usage and value of e-business by organizations: Cross-country evidence from the retail industry,” *Information Systems Research* (16:1), pp. 61–84.