

## **Information Systems Utilisation by External Auditors in Tanzania**

Asha Baleche Katamba\*  
University of Nottingham Malaysia Campus

Angelina Yee Seow Voon  
University of Nottingham Malaysia Campus

How Shi Min  
University of Nottingham Malaysia Campus

Hsin Vonn Seow  
University of Nottingham Malaysia Campus

— *Review of* —  
**Integrative  
Business &  
Economics**  
— *Research* —

### **ABSTRACT**

As businesses continue to process and store their information electronically and thus financial auditors are also expected to use technology when auditing their computerised clients. However, the pace of technology diffusion amongst external auditors in developing countries is still vague irrespective of their clients having adopted various e-business models into their processes. Hence, this study explores: (1) the level of IS utilisation by external auditors in Tanzania, and (2) factors which motivated external auditors to use IS. A total of 13 external auditors from 12 audit firms that are permitted to audit banks and financial institutions were interviewed. The findings revealed that audit firms had installed office automation technologies (OAT) and audit automaton technologies (AAT), with global firms having installed networking and data transfer technologies (NADTT) and Ecommerce technologies. It was further revealed that external factors had the strongest influence on adoption decision and usage of IS, particularly the nature of clients' complexity, and the audit oversight bodies. These findings can serve as a basis to inform the audit authorities and shareholders on the level of technology adoption by external auditors which will increase the degree of assurance in external audit services.

Keywords: Financial Audit, Information Systems, External auditors, e-business environment

### **1. INTRODUCTION**

In the technology world where most accounting information is processed and stored electronically, auditors must also use information systems (IS) tools when conducting auditing in such an environment (Janvrin et al., 2009; Sun, 2012; Gonzales et al., 2012; Ahmi and Kent, 2013; Mahzan and Lymer, 2014). If they have not fully adopted IS, they should at least be in the process of adoption or having a positive perception towards technology usage (Ahmi et al., 2014). There are several technologies which auditors can utilise to perform their role for improved audit efficiencies ranging from lower level to high level audit technologies (Janvrin et al., 2009; Curtis and Payne, 2014). However, auditors have not fully utilised technology in performing audit tasks due to several factors including individual, organisational and environmental factors. Besides that, there have been very few studies that documented the level of technology adoption by external auditors in developing countries.

Most studies focused on the developed world, such as Portugal (Pedrosa and Costa, 2015), UK (Ahmi and Kent, 2013; and Omoteso et al., 2010), USA (Janvrin et al., 2009 and Curtis and Payne, 2014) and Germany (Greenstein-Prosch et al., 2008). As a result, emerging markets especially those in Africa have been highly unrevealed. Yet, businesses in developing countries have increasingly adopted technology in many aspects of their accomplishments, and they need reliable audit teams with IS capabilities to ensure the safety of their investments (Chang and Chou, 2016). Furthermore, most researches focused on internal auditors' use of technology (Razi and Madani, 2013; Stoel et al., 2012; Vasarhelyi et al., 2012). Hence, little is known about external auditors, yet, technology usage is paramount to both auditors (Ahmi and Kent, 2013), in order to bring the audit profession up to date in technology usage, and for Tanzania, this will be the first study to explore technology utilisation by external auditors.

Semi structured interviews were conducted on 13 external auditors from 12 audit firms that are allowed to audit banks in Tanzania. Interestingly, the findings revealed the usage of varied audit automation technologies (AAT) and office automation technologies (OAT) and networking and data transfer technologies (NADTT) and Ecommerce technology (intruders' detection technologies). On the other hand, external factors were the main motivating reasons for the use of IS by external auditors. The only limitation observed during interviews was that financial auditors' understanding of technology was slightly lower as compared to that of IS auditors, which suggest a need for good teamwork and collaboration between the two auditors in order to ensure effectiveness in audit assignments (Hunton et al., 2004; Brazel, 2008).

The remaining part of this paper is organised as follows: part 2 is literature review, part 3 is research method, part 4 is data analysis and part 5 is discussion and finally, conclusion.

## **2. LITERATURE REVIEW**

### **2.1 The audit dynamics from ticking to clicking**

Auditing is a dynamic field that has been continuously changing (Kotb et al., 2012). In the 1840s towards the 1920s, auditing was an intervening party to a relationship that existed between the principal and the agent when the issue of trust became doubtful (Porter et al., 2008). Auditors perceived themselves more like watchdogs to owner's resources (Ohman et al., 2013); with their main role being to detect fraud and error by ensuring arithmetic accuracy of bookkeeping. The growth in size of businesses in the 1920s towards the 1960s generated huge volumes of trading activities which auditors could not manage to audit the entire transactions (Porter et al., 2008). The emphasis of audit changed into 'lending credibility to financial reports' which surpassed the objective of fraud and error (Matthews, 2006). Likewise, audit techniques changed into sampling and strengthening internal control systems, as it was impractical to audit the entire population (Porter et al., 2008).

In the 1960-1990, there were immense business expansions, mergers, takeovers, international diversification, and competition among firms (Ross et al., 2009). These phenomena adjusted the objective of auditing by retaining lending credibility as the core objective in addition to providing advisory services to the management. Accordingly, audit techniques were reformed and the use of computer for auditing and sampling became useful (Janvrin et al., 2009). More prominently was the birth of risk-based auditing which stressed on the need to thoroughly understand the entity and its business environment, including analytical review and testing of weaknesses on internal controls (IFAC, 2009c). At this stage, fraud and error were not mentioned as among audit objectives.

From the 1990s until today, radical changes in auditing have emerged, largely due to increased sophistication in e-business models (Kotb and Roberts, 2011), huge corporate frauds and the collapse of many companies close to the end of the millennium (KPMG, 2006). Due to these phenomena, a backward and forward move in audit role materialised. Lending credibility remained as the core audit objective, when provision of advisory services to the same audit client was removed after the 2002 corporate scandals (Porter et al., 2008). Fraud detection and reporting corporate fraud were brought back on board allocated to particular standards (see IFAC, 2009b; IFAC, 2009c, AICPA, 2002). Auditors assumed the role of risk assurance service providers, meaning that they are concerned about both the audit risk and the business risk that threaten the going concern of the enterprise (Hunton et al., 2004). The use of audit techniques through IS tools was recommended (ISACA, 2013). Today, several audit firms are utilising IS depending on the needs and nature of the clients they serve (Ahmi and Kent, 2013). These tools range from simple to advanced tools which can perform audit in real time (Alles et al., 2008; Omoteso et al., 2010; Vasarhelyi and Romero, 2014).

## **2.2 Technologies relevant for auditing purposes**

There are several technologies that are available for auditors to use. The most common ones are computer-assisted audit tools and techniques (CAATTs). CAATTs are defined as any tool that can be used to assist auditors in performing audit tasks (Braun and Davis, 2003; Mahzan and Lymer, 2014). CAATTs come in different versions, first, as an application and also as a tool specifically to help auditors to conduct auditing in a computerised business environment (Janvrin et al., 2009; Curtis and Payne, 2014). They range from basic applications such as MS Excel (Ahmi and Kent, 2013) to advanced tools such as artificial intelligence, which can be used to perform continuous auditing of highly digitalised clients (Alles et al., 2008; Vasarhelyi et al., 2012; Vasarhelyi and Romeo, 2014). Generally, CAATTs are available in five main categories: utility software, test data, parallel simulation, integrated test facility (ITF) and embedded audit modules (Porter et al., 2008; Ahmi and Kent, 2013). These audit tools can perform different audit functions.

Greenstein-Prosch et al. (2008) provided a typology for audit technologies relevant for auditors of this generation. A detailed list compiled from International Federation for Accountants (IFAC) manuals and Norwegian auditing profession, enabled the study to extract 36 important IT knowledge requirements which were factored into five groups: (a) E-business technologies (b) Networking and data transfer technologies (NADTT) (c) Office automation technologies (OAT) (d) Audit automation technologies (AAT) and (e) Accounting firm automation technologies. This typology has been adopted in this study to classify the level of technology adopted by external auditors in Tanzania.

According to Ahmi and Kent (2013) and Debreceeny et al. (2005), the most known CAATTs is the generalised audit software (GAS) which is available in modular form. GAS can be used to perform several audit tasks such as data extraction, querying, data manipulation, summarising and analytical tasks (Ahmi and Kent, 2013). The unique features in GAS make users find it easy to learn and use, even for auditors who are not IT experts (Sayana, 2003; Wahab, 2006). However, studies on the utilisation of GAS have reported on average, a low usage of this unique, indispensable tool (Ahmi and Kent, 2013, Singleton, 2006, Debreceeny et al., 2005). What constitutes a low usage of IS in auditing is still inconclusive. The next section discusses factors which may influence the use of IS in auditing.

## **2.3 Factors influencing the use of IS in auditing**

There are several factors that can induce individuals to use or not to use technology. These factors can be broadly categorised into three groups: personal factors, organisational factors, and environmental factors (Rosli et al., 2013). Individual factors and organisational factors are also termed as internal factors because they involve decisions regarding the organisation and its capabilities like infrastructure, budgetary constraints and IT-human resource capabilities (Curtis and Payne, 2014; Rosli et al., 2013). External factors include pressure from competitors, oversight bodies (example section 404 of SOX or IFAC) and the demand of the e-business environment which, sooner or later, is predicted to demand a real time assurance (Alles et al., 2008; Kotb and Roberts, 2011).

According to Lal and Bharadwaj (2016), internal factors to technology adoption outweigh the external factors. They argue that internal factors, which involve cost-benefits analysis, carry more weight on the decision to use technology in auditing. According to Kotb et al. (2012), external pressure, especially the e-business environment, is the distinct key driver for technology adoption in auditing. Kotb et al. (2012) is considerably on the worry of audit quality in this technology era, where new e-business models among audit clients are constantly evolving. As a result, the e-business models could demand continuous auditing throughout the use of IS tools (Alles et al., 2008; Omoteso et al., 2010; Vasarhelyi et al., 2012). The arguments among these scholars suggest that both internal and external factors can have a significant impact on IS -adoption decision in auditing.

The use of IS has several advantages. According to Ahmi et al. (2014) and Janvrin et al. (2009), there are many functions that IS can do to help auditors in providing effective and efficient assurance in performing audit tasks. Some of them include:

- i. Detection of errors and fraud
- ii. Identifying items in the journal for testing
- iii. Testing correctness of electronic files
- iv. Confirming aging of all accounts receivables
- v. Selecting a required sample from the original files
- vi. Sorting items of transactions which have the same features
- vii. Finding evidence regarding the effectiveness of controls
- viii. Calculating the representativeness and completeness of the inventory

With such advantages, which IS can promise, auditors are expected to be motivated in the utilisation to tap these potential benefits (Ahmi et al., 2014). Instead, auditors were found to be conventional, preferring to use traditional audit techniques to IS. Curtis and Payne (2014), reported in an interview session with auditors saying “*never will I use CAATTs in auditing*”. These perceptions among auditors augment interest among researchers to study why auditors do not use audit technology despite the varied potential benefits. Hence, this study proposed two research questions: (1) what is the level of IS adoption by external auditors in Tanzania? (2) What factors influence external auditors to use IS tools?

### **3. RESEARCH METHOD**

The study collected primary data through interviews. Interview is perceived as a more appropriate method because this study is conducted for the first time (Silverman, 2013).

Furthermore, the issue under inquiry (technology adoption) is on-going which needs clarification from users (Yin, 2009). Hence, a total of 13 auditors from large and medium audit firms in Tanzania were interviewed. The study used a purposive sampling technique to select audit firms that are allowed to audit banks and financial institutions. This is because banks in Tanzania are the leading users of technology into their services and products. The list of audit firms was accessed from the website of the Central Bank of Tanzania (BOT) [www.bot.go.tz/banksupervision](http://www.bot.go.tz/banksupervision). The profile of the respondents is depicted in Table 2.1. Semi-structured interview questions were set based on prior literature. Interviews were conducted from March 2016 to December 2016. Each interview session lasted approximately one hour; and was audio recorded and later transcribed and analysed using thematic coding. The respondents comprised audit managers/partners/directors who were either IT professionals or financial auditors, representing the heads, and system managers who were also active users of IT. The next section will discuss the important findings.

**Table 2.1: Respondents' profiles**

Respondent	Sex	Firm	Position	Education and Audit Experience
R1	Male	A	Managing Partner-FA	BCom (Accounting), MSc, CPA (T), 15 years.
R2	Male	B	Assoc. Director-IS-A	BSc (Electronics), CISA, AFE, 13 years
R3	Male	C	Senior Manager-FA	BCom (Accounting), CIMA, 8 years.
R4	Male	D	Manager-FA	BBA, ACCA, 7 years.
R5	Male	E	Senior Manager-IS-A	BSc (Comp Science), CISA, CPA (T) 8 years.
R6	Male	F	Associate Manager-FA	BBA (Accounting), CPA (T), 9 years.
R7	Male	H	Manager-FA	BBA (Accounting), CPA (K), 7 years.
R8	Female	I	Senior Manager-IS-A	BSc (Comp.Science), CISA, 9 years.
R9	Male	J	Partner-IS-A	BSc (Eng), MSc, CISA, ACCA, 16 years.
R10	Female	K	Assoc. Director-IS-A	BSc, MBA, ACCA, CISA, 15 years.
R11	Male	L	Managing Partner-FA	ATEC, MSc, MBA, CPA (T), 21 years.
R12a	Male	M	Manging Director-FA	B.Com, MBA, PGD, CPA (K), 19 years.
R12b	Male	M	Partner-IS-A	BSc, CISA, CPA (K), 13 years.

Note: R= Respondents; FA-Financial Auditor; IS-A = Information Systems Auditor

Table 2.1 shows that eleven (11) respondents were males and two (2) were females, with working experience ranging between 7 and 21 years. The respondents had Bachelor Degrees in Business or Computer Science and Engineering with professional certification in either CPA, or CISA. Most respondents had CPA (T) and CPA (K) while 3 respondents had a UK accounting qualification (ACCA). The qualification of the respondents is aligning with the description in the changing nature of technology in business which requires auditors to hold multiple skills (Seeburn, 2013; Kotb and Roberts, 2011).

#### 4. DATA ANALYSIS AND FINDINGS

The data were analysed using thematic coding. This approach is characterised by an initial identification of the key words or a topic (theme) that could provide a direction to the investigation (Silverman, 2013). Two themes were coded (1) type of IS tools used (2) the motivation for using the IS tools. After themes were identified, a short narrative of the respondents was included as evidence to support the theme. At first, these themes were identified randomly based on the order of respondents on how they were approached during the interview sessions. Then, they were grouped according to firm size and auditor type.

The answer to the first research question found that all auditors (R1-R12b) mentioned that the use of IS in auditing should not be perceived as voluntary but as a necessity to cater for the growing technology needs in business. However, the use of IS differed among the audit firms, depending on the types of clients they audited. The following types of IS were reflected: Microsoft office packages, ACL, Case ware, SAS, EMS, GAM-X, IDEA, PCAS, Auto-Audit, Teammate and Ethical hacking. It was also found that more than one IS tool were used in the same audit firm. This was supported by the elaboration from R1: *“We use Microsoft Word and Excel for documentation and initial data processing. We also use some tools like adobe, in writing documents and also Audit Command Language (ACL) and EMS”*.

Meanwhile, R2 clarified: *“We have several systems such as Teammate software that is used to perform a variety of data analytics procedures that we use during engagement with large clients such as banks. There is also ACL.... But for data analytics there are several software that we use for example we can use Excel as a data analytic tool and as a documentation software”*. R5 clarified on the use of audit software and how it helps the auditors in their tasks: *“Yes. We have been using ACL (Audit Command Language), and we have our internal software which gives us the procedures to follow in doing the audit. We also have other software that we use in conducting a specialised kind of information security assessment in a client’s systems”*. Meanwhile, R7 delineated: *“Yes, we have been using IS for about 4 years now. We first used SAS and later on we installed Pro-Audi and now we are using IDEA”*.

A total of five auditors [R2, R5, R8, R9 and R10] reported using EMS. Under the audit tools typology provided by Greenstein-Prosch et al. (2008), EMS is categorised under NADTT. In essence, EMS is a software that can help in levelling flexible communication among auditors in different audit engagements. In the new ISAs, transparency in the audit process is emphasised. One way of maintaining transparency is by discussing audit evidence, tests and findings before the final report is signed by the partner (Banker et al., 2002). Furthermore, the use of NADTT can foster independence within the audit engagement (Omoteso et al., 2010).

The use of IS by auditors needs to fulfil the intended objectives and the fitting of the technology within the environment (Goodhue and Thomson, 1995). Therefore, the use of Microsoft office package, which was mentioned by all the respondents, suggest that this tool is needed to accomplish several office-related tasks. Greenstein-Prosch et al. (2008) categorised office applications into one group-office automation technology (OAT). OAT can assist auditors in the preparation of audit reports, documentation and accomplishing of initial audit procedures such as preparation of working papers, computations and data analytics (Simkin et al., 2015). The use of Excel can as well aid auditors to convert a client’s data into alphanumeric so that they can manipulate it either via standard functions or auditor programmed functions (Ahmi and Kent, 2013). In order to support this statement, R3, R4 and R6 mentioned the usage of Excel in multiple audit tasks: R4 mentioned that *“.... But for analysis there is some software.....we can even use Excel. Excel is a very good software for*

*data analysis. Other than that, Excel can also be used for documentation purposes or for working papers”.*

Another frequently mentioned IS tool is ACL which is associated with advanced software application. Under Greenstein-Prosch et al. (2008) typology, ACL falls within AAT. Fifty percent of the respondents [R1, R2, R5, R8, R9 and R10] used ACL. ACL is among the software under the category of GAS that can be used to balance ledgers, total records, sort accounts by size, mine huge data, select samples for detailed testing, generate confirmations and identify unusual transactions (Ahmi and Kent, 2013). In a developing country, if audit firms make use of this software, it might suggest that the pace to embrace technology in auditing is on the rise. It could also suggest a possibility of huge volumes of transactions among audit clients which need auditors to use IS tool to effectively analyse their data. Rosli et al. (2013) argued that installing audit software can be expensive and needs availability of resources. The cost-benefit analysis in using software by auditors is anticipated to be compensated by the auditees. It could be reasonable to mention that the average audit clients in Tanzania have invested in technology to influence auditors to use this tool as well. These findings are similar to Mahzan and Lymer (2014), who found that external audit firms in the US used mostly ACL, but in addition to IDEA. The use of Excel exclusively was mentioned by R3, R4 and R6, who were financial auditors, which suggests that technology usage varied according to auditor type (Vendrzyk and Bagranoff, 2003; Hunton et al., 2004). Meanwhile, ethical hacking software were used in five audit firms (R2, R9, R10, R11 and R12). In essence, ethical hacking is a software that is used to track the possibility of intruders hacking the clients' systems. In Greenstein-Prosch et al. (2008), ethical hacking is categorised under Ecommerce technologies or intruders' detection systems. Four respondents stated that they conduct ethical hacking minimum once a year to check vulnerability of their clients systems. However, the test was performed on bank clients only.

In the second question, respondents were asked about the motivation behind the use of IS. The purpose of this question was to find out whether IS was used by auditors due to internal organisational motivation or external pressures. In response to the question, except for R10, the remaining respondents mentioned the reasons to include clients' nature of automation which became impossible to audit without the use of IS tool. R12b commented: *“One reason for us to use technology is the nature of our clients. Most of our clients have moved into ERP in the past five years and the trend is increasing. I will comfortably say that 80 percent of our clients are now using computerised systems. Our theory is, if a few clients have advanced in IT, then an audit has to be even more advanced, because as auditors, we have to be more advanced than our clients”.* Another respondent further clarified *“In fact, most of our clients are using information systems in one way or another. So, it is difficult for us to continue using manual”* (R8). Furthermore, R11 clarified *“...the changes in our clients' automation forces us to use technology. There is also a new trend of cloud computing where more businesses are processing and storing their information in clouds; increasingly, this trend will command auditors to use information systems whether we like it or not.”*

The second most cited motivation for auditors to use IS was found to be audit oversight bodies, which are divided into local (the National Board of Accountants and Auditors) (NBAA) and international (International Federation for Accountants) (IFAC). The respondents found that compliance with International Standards on Auditing (ISAs) can be difficult to achieve without the use of IS tools. R3 clarified: *“ISA requires us to retain audit documentation to support the opinions that we make during financial statements audit after confirming that financial statements are not materially misstated. The standards require that I*

*should maintain my working papers for about seven years to say why I got into the same conclusions. The only way to do that is through the use of information systems”.*

Meanwhile, R11 further delineated, *“The mother motivator for us to use technology is regulators. Regulators want us to use technology, whether we like it or not, forcefully. For example, our regulators (NBAA) give us the licence to operate, which requires us to follow IFAC standards. So, from time to time, NBAA will come and do spot checks by picking a few files. If they find any missing procedures they can have our license terminated. So, it is really about abiding to the available rules and regulations to stand compliant. So, IT is imperative”.*

To add more on the role of NBAA as a motivator in technology adoption, R3 mentioned: *“NBAA had forced literally even small firms to use IT. This is because when the audit review of firms was carried out, the NBAA found that small firms had no methodical way of documenting their work. So, they forced them to use a tool called PCAS. It's a computerised tool which the local firms are now forced by the NBAA to use”.*

Besides the external factors, respondents mentioned other motivations for using IS in auditing which include attaining the required level of efficiency and effectiveness in auditing. Unlike the use of manual techniques, technology can reduce time in manual computations, ease supervision, filling systems, foster accountability and maintain the firm's profitability. R7 clarified the adoption of IS tools: *“Basically we opted to use caseware because we wanted to move out from manual paper work. From our investigation and according to the advice we got, we simply opted to use caseware”.* Meanwhile, R9 commented: *“To achieve audit efficiency is our main motivation. In traditional audit efficiency, as audit firms, we are looking for a way of achieving our objectives more using less resources. So, in order to retain our profitability, we have to embrace technology”.*

Furthermore, the use of IS can foster accountability and responsibility on the part of auditors. R11 clarified *“During the old days of manual documentation and audit without technology, supervisors were less responsible to the audit process. Most of the audit tasks were left to junior and senior auditors. Supervisors would sign all the audit reports in one particular day, which contradicts the best practice in auditing. But the use of IS tools can foster accountability during the audit process because the software would record signatures, time and date of all the auditors involved in a given audit engagement”.* The process of signing in and out of the audit process through the interlinked software is called ‘stamping’. R11 elaborated that *“stamping is a methodical process applied in the audit process by adhering to standards and procedures in doing audit work.”* He further clarified *“when the reviewer of audit quality (NBAA) comes, they must be able to review our audit falls and conclude that we had planned the audit before we executed the work, and the supervisor actually reviewed the work on a timely basis. So, it actually requires that we use IT tools, otherwise we cannot be able to achieve stamping” [R11].*

## **5. DISCUSSION AND CONCLUSION**

From the literature review, it was reported that audit firms have adopted different technologies to support their audit activities. Both internal and external factors influenced auditors to adopt a particular technology. Cost benefit analysis has been used to influence the management on whether or not to use technology. This study finds from the interview that the level of IS usage by external auditors can be categorised into three main clusters: those related to office automation, those related to audit automation, and those related to communication tools. The usage also varied largely according to auditor type and firm size. According to



firm size, medium audit firms used IS to a lesser degree as compared to large audit firms. Such a difference is mostly related to the need of the firm and the nature of the clients they serve (Greenstein-Prosch et al., 2008; Ahmi and Kent, 2013). Documentation and preparation of working papers were among the most cited benefits of using IS. Seven auditors (R1, R2, R3, R4, R5, R6 and R7) agreed that the use of IS should be seen at an earlier stage in the firms' level for documentation and preparation of audit working papers. In reacting to this, respondents highly agreed that the use of IS in external auditing is not just an individual wish, but also an important requirement by ISAs. These findings suggest that the use of IS in external auditing in Tanzania is influenced by external factors- the emphasis from the NBAA. Surprisingly, these findings are contrary to prior studies by Ahmi and Kent (2013), who found that GAS usage by external auditors in the UK did not relate to audit professional factors. The findings are also different from Curtis and Payne (2014) who found that a low usage of CAATTs by auditors in the US was due to voluntariness in technology usage. One may conclude that the NBAA stresses the use of technology in auditing at all levels of firms. This perception should be instilled to other national audit authorities in order to foster utilisation of IS to tap potentials of IS usage in auditing (Janvrin et al., 2009).

The use of audit software among medium audit firms was influenced by the type of audit that they conduct, the nature of their clients and the software that is used by their clients. In responding to this issue, R3, R4, R5 and R6 explained that the reason for the use of Excel was because of the nature of the clients they audit. Most of them had their data installed in Excel. The use of another software concurrently with Excel has also been reported. The NBAA emphasis has also made R3 and R4 to use PCAS software. R4 mentioned: *"Yeah... mostly medium audit firms were using Excel. But recently, the NBAA recommended the use of a software called PCAS that we use in conjunction with Excel"*. Meanwhile, large firms use a variety of IS ranging from the lowest to advanced software. The applications for documentations, preparations of working papers and auditing-specialised clients were among the mentioned drivers for using different IS tools. The software that was used by large audit firms includes ACL, IDEA, SAS, Teammate, EMS, GAM-X, Auto-Audit and other in-house applications such as EY-software mentioned by one auditor from an international audit firm. These findings are similar to those of Greentein-Prosch et al. (2008), who found that large audit firms had vast IS capabilities to audit large clients.

To sum up, the extent of usage of IS amongst external auditors in Tanzania was examined and the factors motivating the use of IS were documented. It was found that auditors perceived the use of IS as important but the usage differed according to the needs of their clients. The study found that the most common IS technologies are OAT and AAT, while NADTT was used by large audit firms. External factors to technology usage had a strong impact, namely, the changing clients' e-business environment and oversight bodies, particularly the NBAA. The NBAA recommended some of the audit technologies for adoption to local audit firms which had difficulties to deal with cost issue of acquiring an audit software or high fees in hiring a software from vendors. It was also noted from the interviewed auditors that technology usage was perceived as vital even under resources constraints and other challenges such as power shortages. All auditors stated that they have a positive perception on technology usage with anticipation that their firms would increase IS usage in the future. This is because audit firms want to use IS to align with the nature of the sophistication of the e-business world. However, the study observed a difference in the use and understanding of audit technologies between financial auditors and IS auditors, suggesting a need for a careful organisational structure in order to maintain balanced human resources capabilities to ensure quality audit is achieved. The findings of this study can serve as a basis to inform the audit

authorities and shareholders on the level of technology adoption by external auditors in a developing country which will increase the degree of assurance in external audit services.

## REFERENCES

- [1] Ahmi A; Saidin S.Z and Abdullah A (2014), "IT Adoption by Internal Auditors in Public Sector: A Conceptual Study", *Procedia-Social and Behavioural Sciences* 164, 591-599
- [2] Ahmi, A., and Kent, S. (2013), "The utilisation of generalized audit software (GAS) by external auditors", *Managerial Auditing Journal*, 28, 88 – 113.
- [3] AICPA (2002), American Institute of Public Accountants, Statements on Auditing Standards (SAS) 99- Consideration of Fraud in a Financial Statement Audit, Auditing Standards Board of the American Institute of Certified Public Accountants (AICPA) in October 2002.
- [4] Alles, M.G; Kogan, A., and Vasarhelyi, M. A. (2008), "Putting Continuous Auditing Theory into Practice: Lessons from Two Pilot Implementations", *Journal of Information Systems*, 22, 195–214.
- [5] Banker R. D; Chang H. and Kao, Y. (2002), "Impact of Information Technology on Public Accounting Firm Productivity" *Journal of Information Systems*, 16, 209-222.
- [6] Braun R. L. and Davis, H. E. (2003), "Computer-Assisted Audit Tools and Techniques: Analysis and Perspectives", *Managerial Auditing Journal*, 18, 725 – 731.
- [7] Brazel, J. F (2008), "How do Financial Statement Auditors and IT Auditors Work Together?" *The American CPA Journal*, 78, 38-41.
- [8] Chang, C. J; and Chou. L. L (2016), "Auditor Choice under Client Information Uncertainty", *Review of Integrative Business and Economics Research*, 5, 329-370.
- [9] Curtis, M. B., and Payne, E. A., (2014), "Modelling voluntary CAAT utilization decisions in auditing", *Managerial Auditing Journal*, 29, 304 – 326.
- [10] Debreceeny, R., Lee, S., Neo, W. and Toh, J.S. (2005), "Employing generalized audit software in the financial services sector: challenges and opportunities", *Managerial Auditing Journal*, 20, 605-618.
- [11] Gonzalez, G.C., Sharma, P.N. and Galletta, D.F. (2012), "The antecedents of the use of continuous auditing in the internal auditing context", *International Journal of Accounting Information Systems*, 13, 248-262.
- [12] Goodhue, D.L. & Thompson, R.L. (1995) Task-Technology Fit and Individual Performance. *MIS Quarterly*, 19, p.213.
- [13] Greenstein-Prosch, M., McKee, T. E and Quick, R. (2008), "A Comparison of the Information Technology Knowledge of United States and German Auditors". *The International Journal of Digital Accounting Research*, 8, 45-79.
- [14] Hunton, J. E., Wright, A. M., and Wright, S. (2004), "Are Financial Auditors Overconfident in Their Ability to Assess Risks Associated with Enterprise Resource Planning Systems?" *Journal of Information Systems*, 18, 7-28.
- [15] IFAC (2009a), International Federation for Accountant, International Standard on Auditing (ISA) 200. Overall Objectives of the Independent Auditor and the Conduct of an Audit in Accordance with International Standards on Auditing, IFAC, UK.
- [16] IFAC (2009b), International Federation for Accountant; International Standard on Auditing (ISA) 240 The Auditor's Responsibilities relating to Fraud in an Audit of Financial Statements. IFAC, UK.

- [17] IFAC (2009c), International Federation for Accountant, International Standard on Auditing (ISA) 315. Identifying and Assessing the Risks of Material Misstatement through Understanding the Entity and its Environment; IFAC, UK.
- [18] ISACA (2013), “IS Auditing Guideline, Use of Computer Assisted Audit Technique (CAATs)”, Information Systems Audit and Control Association, Houston, TX.
- [19] Janvrin, D., Bierstaker, J., and Lowe, J.D. (2009), “An Investigation of Factors Influencing the Use of Computer-Related Audit Procedures”, *Journal of Information Systems*, 23, 1-22.
- [20] Kotb, A. and Roberts, C. (2011), “The Impact of E-Business on the Audit Process: An Investigation of the Factors Leading to Change”, *International Journal of Auditing*, 15, 150–175.
- [21] Kotb, A., Roberts, C. & Sian S. (2012), “E-business audit: Advisory jurisdiction or occupational invasion?” *Critical Perspectives on Accounting*, 23, 468– 482.
- [22] KPMG, (2006), Fraud Risk Management; Developing a Strategy for Prevention, Detection and Response to Fraud; A Manual Guide for Auditors, available at: [www.kpmg.com/CN/en/.../Fraud-Risk-Management-O-200610.pdf](http://www.kpmg.com/CN/en/.../Fraud-Risk-Management-O-200610.pdf).
- [23] Lal, P. S. & Bharadwaj, S. (2016), “Understanding the impact of cloud-based services Adoption on organizational flexibility”, *Journal of Enterprise Information Management*, 29, 566 – 588.
- [24] Mahzan, N., and Lymer, A. (2014), "Examining the adoption of computer-assisted audit tools and techniques: Cases of generalized audit software use by internal auditors", *Managerial Auditing Journal*, 29, 327-349.
- [25] Matthews, D. (2006), A History of Auditing: the Changing Audit Process in Britain from the Nineteenth Century to the Present Day, Routledge, London.
- [26] Öhman, P., E. Häckner, and D. Sörbom. (2013), Client satisfaction and usefulness to external stakeholders from an audit client perspective. *Managerial Auditing Journal*, 27, 477- 499.
- [27] Omoteso, K; Patel, A and Scott, P (2010), “An Investigation into the Application of Continuous Online Auditing in the U.K” *The Intern. Journal of Digital Accounting Research*, 8, 23-44.
- [28] Pedrosa, I., and Costa, C. J (2015), “Financial Auditors and Models for Individual Technology Acceptance: collecting data using expert interviews”. Selected papers on *IRIS Information Systems Research Seminar in Scandinavia, the IRIS Association* Nr. 3. Available at [www.akademickaforlag.no/pdf](http://www.akademickaforlag.no/pdf).
- [29] Porter B, Simon, J., and Hatherly, D. (2008), “Principles of External Auditing”, Third Edition, Willey, LA.
- [30] Razi, M. A., and Madani, H. H (2013), “An analysis of attributes that impact adoption of audit software: An empirical study in Saudi Arabia”. *International Journal of Accounting and Information Management*, 21, 170-188.
- [31] Rosli, K., Yeow, P., and Siew, E.-G. (2013), Factors Influencing Audit Technology Acceptance by Audit Firms: A New ITOE Adoption Framework”. *Journal of Accounting and Auditing: Research and Practice*, 1–11.
- [32] Ross. A. S; Westerfield. R. W., and Jaffe. J (2009), Modern Financial Management. McGraw Hill Higher Education; 8th edition.
- [33] Sayana, S.A. (2003), “Using CAATs to Support IS Audit”. *Information Systems Control Journal*, 1, 21-23.
- [34] Seeburn, K. (2013), “Information Systems Auditor: What are the Key Knowledge requirements?” *International Journal of Auditing Technology*, 1, 34-44.
- [35] Silverman, D (2013), Doing Qualitative Research, Fourth Edition, Sage Publications.

- [36] Simkin. M. G, Rose, J. M. and Norman, S. C. (2015), Core Concepts of Accounting Information Systems, 13th Edition, Willey, LA.
- [37] Singleton, T. (2006), "Generalized Audit Software: Effective and Efficient Tool for Today's IT Audits". *Information Systems*, 1–3.
- [38] Stoel, D., Havelka, D., and Merhout, J.W., (2012), "Analysisn of Attributes that Impact Information Technology Audit Quality: A study of IT and Financial Audit Practitioners", *International Journal of Accounting Information Systems*, 13, 60-79.
- [39] Sun, C. (2012), "From CAATTs Adoption to Continuous Auditing Systems Implementation: An Analysis Based on Organizational Routines Theories", *MIS Review*, 17, 59-85.
- [40] Vasarhelyi A. M., Alles M; Kuenkaikaew A., and Littlely J. (2012), "The acceptance and adoption of continuous auditing by internal auditors: A micro analysis", *International Journal of Accounting Information Systems*, 13, 267–28.
- [41] Vasarhelyi, M. A., and Romero, S. (2014), "Technology in audit engagements: a case study", *Managerial Auditing Journal*, 29, 350 – 365.
- [42] Vandrzyk, V. P & Bagranoff, N. A., (2003), "The Evolving Role of Information System Audit: A Field Study Comparing the Perceptions of Information System and Financial Auditors". *Advances in Accounting*, 20, 141–163.
- [43] Wahab, W. (2006), Generalized Audit Software (GAS) [Internet]. Available from: <[http://ezinearticles.com/?expert=Wale\\_Wahab](http://ezinearticles.com/?expert=Wale_Wahab)>.
- [44] Yin, R. K. Case study research: Design and methods (2009), (4th Ed.). Thousand Oaks, CA: Sage.