

USER'S PERCEPTION ON THE ADOPTION OF COMPUTER ASSISTED AUDIT TOOLS AND TECHNIQUES (CAATTS) IN DETECTING FRAUD AMONGST DEPOSIT MONEY BANKS

ADEYANJU, OLANREWAJU DAVID

Department of Accounting, Bowen University, Nigeria. Email: lanre.dagama@gmail.com

ADENIKINJU, OLAYINKA

Department of Accounting, Bowen University, Nigeria. Email: olayinka.adenikinju@bowen.edu.ng

Abstract

Innovations in information technology has increased the demand for computer-assisted approaches in carrying out audit functions in organizations. In the banking industry, the use of Computer Assisted Audit Tools and Techniques (CAATTs) by auditors in combating fraud has become necessary, in the face of emerging challenges. Therefore, this study seeks to assess perceptions on the adoption of CAATTs in fraud detection among Deposit Money Banks (DMBs) in Nigeria. A structured questionnaire on the study variables was developed and a research survey approach was used to harvest information from auditors and audit managers in 20-listed DMBs and the big-four audit firms in Nigeria. One hundred and ninety-nine copies of the questionnaire were properly filled and the data was analyzed using frequency tables, histogram, bar-chart and the Kruskal-Wallis test, all with the aid of the Statistical Package for Social Science (SPSS). The result of the analysis revealed a moderate adoption of CAATTs among the banks. Further results indicated that the educational level of auditor is a major social-demographic variable influencing adoption of CAATTs. The study concludes that educational exposure is a determining factor in the adoption of CAATTs for fraud detection among banks in Nigeria. The study recommends that policymakers and practitioners in the banking sector should include CAATTs into present auditing practices and future laws.

Keywords: Computer Assisted Audit Tools and Techniques; Fraud; Deposit Money Banks

1. INTRODUCTION

At a time when technologies have become a threat to human resources, the increasing pressure to do more with fewer resources, reduced overhead and staff-size, all combined to make productivity gains in the management areas of administration (Senft et al, 2013). The inflow of computer and system software progressively took out the majority of human jobs. As one might expect, the variables that drive corporate organizations also drive the audit function. As a result, auditors had to improve their service while simultaneously becoming more cost conscious in order to better fulfill their clients' increasingly complex expectations. To do so, auditors employ computer-based tools and procedures. Today's auditors are therefore expected to be skilled, with new abilities and areas of competence. Using computer-assisted approaches, they are increasingly required to examine electronic transactions and application controls (Mahzan & Veerankutty, 2011). Computers and technology have long been viewed as critical to the business world's survival, particularly in Africa, since the 1960s (Jacks, Meissner & Novy, 2008). Larger businesses, such as banks, are developing computerized decision support systems for auditing functions including customer acceptance and risk assessment software

(Macaulay, 2016; Eni, 2016). The use of Computer Assisted Audit Tools and Techniques (CAATTs) by internal auditors in fraud detection is no longer new and it has changed over time as businesses embrace information technology (Coderre, 2009; KPMG, 2015). CAATTs are tools and techniques that assist auditors in increasing their personal productivity as well as the audit function's overall management by improving audit effectiveness and efficiency during the planning, conduct, reporting, and follow-up phases of the audit (The World Bank, 2017; Ernst & Young, 2015). Regardless of the obvious benefits of using CAATTs in all audit activities, current research suggests that internal auditors' usage of CAATTs in fraud detection is still insufficient (Bierstaker, Janvrin, & Lowe, 2014). This has been attributed to a number of reasons, including the environment, the complexity of customers' accounting information systems, and the perception of professional accounting groups' support (Siew, Rosli & Yeow, 2019; Subaryani-binti, Suhaily-binti, Rahimah-binti, Binti-Hussin & Syazwani-binti, 2017; Dias & Marques, 2018; KPMG, 2015; Li, Dai, Gershberg & Vasarhelyi, 2018).

According to Omonuk and Oni (2015), effective usage of CAATTs in detecting fraud is still very low, especially in developing countries. The technicality, acquisition and maintenance costs have also limited its usage to the Big-Four auditing firms (Siew, Rosli & Yeow, 2019). Several other scholars have argued that the adoption of CAATT in fraud detection is also low (Subaryani-binti, Suhaily-binti, Rahimah-binti, Binti-Hussin & Syazwani-binti, 2017; Smidt, Van-der & Lubbe, 2014; Mustapha & Jin-Lai, 2017; Ahmi, Saidin, Abdullah, Ahmad & Ismail, 2016). Environmental considerations, the perceived amount of support from professional accounting bodies (PABs) and the complexity of clients' accounting information systems (AIS) all play a part in this. It is therefore the objective of this study to assess user's perception on the adoption of CAATTs in the detection of fraud amongst Deposit Money Banks (DMB) in Nigeria.

2. LITERATURE REVIEW

2.1 Conceptual Review

Auditing is an independent financial examination of records in an organization in order to ensure that the books of accounts are kept and as required by the law (Gupta 2004; Denigi, 2004). The financial examination involves considering, acquiring and analyzing records, evidences and assertions, by auditors in order for them to form their independent opinion (Sharma, 2006). The purpose of auditing is to verify accounting data by verifying the correctness and dependability of financial statements and reports (Dandago & Rufai, 2014). Audit techniques became widely adopted as a result of the industrial revolution and the consequent boom in economic activity (Zimmermann, 2021). Companies realized the necessity of fraud detection and financial accountability procedures when they began to trade on the stock market, and investors began to place a larger emphasis on financial reporting (Zimmermann, 2021).

Computer Assisted Audit Tool and Techniques (CAATTs) are data retrieval and evaluation tools that are utilized in computer applications (Kim, Mannino & Nieschwietz, 2009; Mahzan & Lymer, 2008). Within the IT auditing profession, CAATTs are a rapidly growing field. The

use of computers to automate IT audit operations is the idea behind CAATTs. Basic office productivity software like spreadsheets, word processors, and text editing programs, as well as more advanced software packages like statistical analysis and business intelligence tools, are routinely utilized in CAATTs (Coderre, 2015; Senft, Gallegos & Davis, 2014). They are used to improve audit effectiveness by allowing auditors to directly assess electronic evidence, as well as audit efficiency by recalculating data provided by audit clients (SAS 106; AICPA, 2017). With the use of this technology, any firm's internal accounting department will be able to provide more analytical and precise results. In the Nigerian financial auditing profession, CAATTs have become tools used by auditors to process data from an entity's information system that is relevant to the audit as part of their audit procedures (Ebimobowei, Ogbonna&Enebraye, 2013; Janvrin, 2008; Singleton & Flesher, 2003). They are technologies that are often used to detect financial abnormalities by focusing on certain transactions that have characteristics that are associated to fraud. They enable auditors to concentrate on higher-risk regions, scan millions of files, collect data for analysis, and compare files across many locations and database management systems to seek for fundamental blueprints or linkages (Bierstaker, Janvrin& Lowe, 2014).

2.2 Empirical Reviews

Janvrin, Lowe, and Bierstaker's (2008) examined the factors that influence auditors' approval of CAATTs. In a sample of 181 auditors, which included employees of local, regional, and national Certified Public Accountants (CPA) firms, as well as the Big 4 Accounting firms. The study indicated the need for training programs and computer technical support, as well as managerial and infrastructure support, in order to enhance tool utilization. However, it fails to show the impact of technology on fraud detection. Ebimobowei, Ogbonna, and Enebraye (2013) used data from both primary and secondary sources to study the use of CAATTs in audit practice in Nigeria's Niger Delta region. Data were analyzed using Augmented Dickey-fuller and multiple regression approaches. Result showed that performance expectations, effort expectations, enabling environments, and social influence are all elements that influence CAATT adoption. According to the study, CAATT adoption has become a favorable choice for auditors in the twenty-first century, which suggests why practitioners grow their expertise and management increases technical and managerial support for CAATT adoption. Omoluk and Oni (2015) also investigated Computer Assisted Audit Techniques and Audit Quality in Nigeria. They discovered that the usage of CAATTs is favorably associated with the quality of audit reports in wealthy nations, but not in underdeveloped countries. In addition, there is a positive relationship between the use of CAATTs and audit quality, and local Nigerian firms are not effective in applying CAATTs, and thus do not produce quality audit reports at that time. These findings support the use of CAATTs for effective fraud control. In Malaysia, Shamsuddin, Logenthiran, Dhinesh, Ameer, and Punnir (2015) concluded that the internal auditors' usage of CAATTs is influenced by a number of circumstances. They stated that although CAATTs have the potential to improve audit efficiency and effectiveness, internal auditor's choice is based on the ease of usage and availability of necessary functions and capabilities to help them complete their tasks. The implementation of CAATTs among audit firms in Malaysia was further investigated by Ghani, Rosli, Ismail, and Saidin (2017). The sorts

of CAATTs employed by the respondent firms were investigated using survey and interview methods. The data found that the use of CAATTs differed by company size, with advanced CAATTs (Embedded Audit Modules, Parallel Simulation Software, and Test Data) being the most common in the Big-four companies compared to medium and small businesses. The availability of financial resources, the experience of their partners, and the nature of their clients' operations are all factors that impact their decision to adopt CAATTs. The study's focus is confined to audit firms and a certain geographic area, which distorts generalization. This study's data gathering method was limited to survey and interview only, and the number of participants was modest. Mansour (2016) used the Unified Theory of Acceptability and Use of Technology (UTAUT) to investigate the lack of CAATT uptake and acceptance in Jordan, as well as what factors might influence their adoption and acceptance. A qualifying questionnaire was issued to 200 statutory external auditors to collect the information. Results showed that both the auditor's performance expectations and the firm's supportive environment may impact Jordanian external auditors' inclination to apply CAATTs. It was suggested that Jordanian audit companies might encourage their auditors to adopt CAATTs by marketing their benefits and utility, lowering the effort expectation required to use the tools, and investing more in the management and technical infrastructure supporting the technology. Siti, Azni, Tengku, Suhaili, Maisarah, and Sam (2017) also used the UTAUT to investigate the causes of Small and Medium Practices (SMPs) behavioral intention of CAATTs adoption in Malaysia. A total of 120 SMPs were given survey questionnaires to complete and return. The researchers used multiple linear regressions (MLR) and Pearson's correlation coefficient for the analysis. The results show that performance expectancy, social influence, and the enabling condition all had a substantial impact on behavioral intention to adopt CAATTs, but effort expectancy was minor. The various empirical findings show variations in the usage and adoption of CAATTs in detecting fraud, hence the need to investigate the perception among auditors in Nigerian banks.

2.3 Theoretical Framework

Venkatesh, Morris, Davis and Davis (2003) suggested the Unified Theory of Acceptance and Use of Technology (UTAUT) Paradigm as a technology acceptance model. The theory explains the difference between how users desire to use an information system and how they actually use it. According to the theory, there are four basic constructs that best explain a user's attitude toward technology use, namely; Expectations of performance, Expected effort, Social influence, and Enabling circumstances. The first three are direct predictors of usage intent and behavior, whereas the fourth is a user behavior prediction. Gender, age, experience, and voluntariness of use are all assumed to attenuate the impact of the four key categories on usage intention and behavior. UTAUT was verified in a longitudinal study by Venkatesh et al. (2003), who discovered that it accounted for 70% of the variance in Behavioral Intention to Usage (BIU) and around 50% of the variance in actual use. The hypothesis was further applied by Janvrin, Lowe, and Bierstaker (2008) to predict whether the auditor would accept CAATTs. The UTAUT is therefore the theoretical basis for this study and supports the following hypothesis; H_0 : Perceptions on the adoption of CAATTs in detecting fraud does not vary significantly across social-demographic characteristics.

3. MATERIAL AND METHOD

The study used a descriptive survey research approach to collect information from professionals in Deposit Money Banks (DMBs) and audit firms in Nigeria. Lagos state was chosen as the study area, where all the listed twenty DMBs have their headquarters and in addition to their auditing firms (CBN, 2021). These auditing firms constitute the big-four auditing companies in Nigeria (KPMG Professional Services, Ernst and Young, Price Waterhouse Coopers and Deloitte &Touché). The population of the study consists of professionals in the internal audit control unit of the banks and the audit managers in the big four auditing firms. The convenience sampling technique was used to select a total of 200respondents from the banks and audit firms. This includes 8 senior staff from each of the internal control unit of the 20-quoted DMBs and 10 senior managers from each of the big-four audit firms. A structured questionnaire was administered to the selected respondents through a cloud-based survey, in order to gather relevant data on the study variables. The questionnaire consists of items on the demographic profile of the respondents and the core variables. A reliability test was conducted on the research instrument and a Cronbach Alpha statistic of 0.748 establishes the internal consistency of the question items. Statistical tools such as the frequency tables, percentages, histogram and bar charts were used for the descriptive analysis. The Kruskal-Wallis test was used for the inferential analysis and to test the associated hypothesis. The test is a rank-based non parametric omnibus test, which allows testing for difference among more than two groups. It is expected that perceptions on the adoption of CAATs in detecting fraud should vary across the social-demographic variables.

4. RESULTS

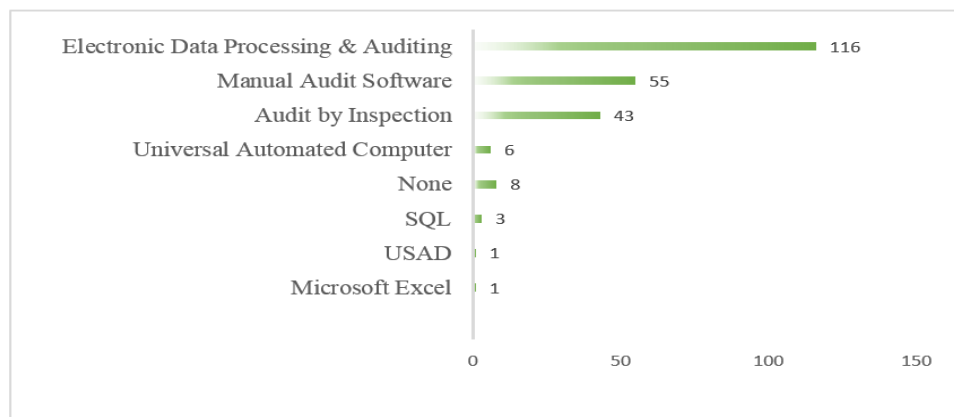
Table 1: Demographic Characteristics of Respondents

Measure	Data	Frequency	Percent
Age bracket	18 - 24 years	13	6.7
	25 - 34 years	52	26.3
	35 - 44 years	71	35.8
	45 - 54 years	51	25.7
	55 - 64 years	11	5.5
Academic Qualification	First degree	109	55.1
	MSc	79	39.9
	PhD	10	5.0
Work Experience	1 - 5 years	55	27.7
	6 - 10 years	48	24.2
	11 - 15 years	41	20.7
	16 - 20 years	28	14.1
	Above 20years	26	13.1
Gender	Male	127	64.0
	Female	71	36.0
n=198			

The demographic characteristics of the respondents in Table 1 revealed that majority of them are male and falls within the working class age group of 35-44 (35.8%) with a minimum qualification of first degree. Furthermore, the spread of the years of working experience suggests that the respondents have relatively adequate experience in banking operations.

4.1 Pre-CAATTs Usage

Figure 1: Histogram showing Pre-CAATTs Usage

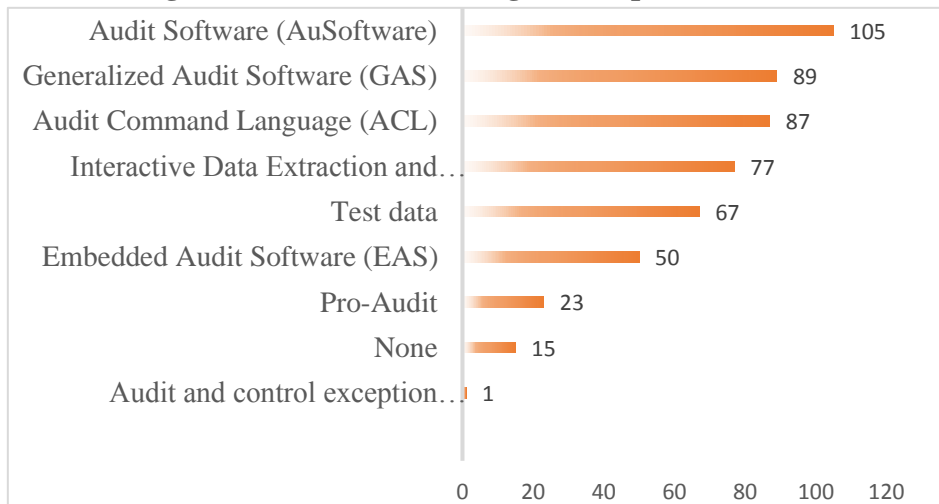


The results in Figure 1 were compiled using count method and presented using a histogram. Figure 1 shows that majority of the respondents (116 counts, 58.6%) are of the opinion that Electronic data processing and auditing was the most prominently used technique for fraud detection, prior to the adoption of CAATTs. This is followed by the Manual Audit software with 55 counts (27.8%). Audit by inspection had 43 counts (21.7%), Universal Automated Computer had 6 counts (3.0%), Structure Query Language (SQL) had 3 counts (1.5%), while USAD and Microsoft excel had 1 count each (0.5%). The respondents who indicated none were 8 counts (4.0%). The spread of the result agrees with Felix Kaufman's book on Electronic Data Processing and Auditing, which was popularized in 1961. Despite the gradual introduction of the automated accounting systems, the Manual Audit was still noted for being a norm in the 1950s in the US, where firms chose to exclusively make use of its techniques. (Kaplan, 2012).

4.2 CAATTS ADOPTION

The results in Figure 2 reveal eight different CAATTs and their level of adoptions by the respondents. The Audit Software (AuSoftware) appears to be the most widely adopted CAATTs with 105 counts (53%). In addition, Generalized Audit Software (GAS) has 44.9% of the counts and closely followed by Audit Command Language (ACL) with 43.9% of the total counts. Furthermore, the Interactive Data Extraction and Analysis technique had 38.9%, Test data has 33.8%, Embedded Audit Software (EAS) has 25.3%, Pro-Audit has 11.6% and Audit and Control Exception Manager has 0.5% of the total counts. Lastly, about 7.6% of counts indicates none adoption of the CAATTs. These results imply that the AuSoftware technique is the most widely adopted CAATTs.

Figure 2: Bar chart showing the adopted CAATTs



4.3 PERCEPTION OF CAATTS ADOPTION IN FRAUD DETECTION

Table 2: Knowledge of the use of CAATTs in DMBs

S/N	Items	Yes (%)	No (%)	Not sure (%)
1.	Up to 70% current usage of CAATTs in organizations	100(50.5)	48(24.2)	50(25.3)
2.	Awareness on the usefulness of CAATTs	156(78.8)	30(15.2)	12(6.1)
3.	CAATTs adoption is useful for turning auditors into specialists that rely on technology	158(79.8)	16(8.1)	24(12.1)
4.	CAATTs eases financial audit profession	153(77.3)	13(6.6)	32(16.2)
5.	CAATTs is suitable for analyzing large sample relative to manual audit	166(83.8)	9(4.5)	23(11.6)
Note: n=198				

Table 2 shows the respondent’s perception of the use of CAATTs in their bank. The results reveal that more than half of the respondents (50.5%) has up to 70percent current usage of CAATTs in their bank. Furthermore, over 75percent of the respondents are aware of the usefulness of CAATTs in turning auditors to specialists and making financial audit profession easy. Lastly, majority of the respondents (83.4%) accept the CAATTs over manual audit. The spread of the result suggest a moderate adoption of CAATTs amongst the banks.

4.4 Hypothesis Testing

The Kruskal-Wallis test was conducted in order to test if the perception of the adoption of CAATTs in DMBs varies significantly across different socio-demographics of the respondents. The socio-demographic characteristics of interest include gender, age, education and work experience.

Table 3: Kruskal Wallis Test

Variable	Category	N	Mean Rank	Kruskal-Wallis H	Chi-Square	Df	Asymp. Sig. (2-tailed)
Gender	Male	127	95.35	1.985	0.807	1	0.159
	Female	71	106.92				
Age							
Age (in years)	18-24	13	97.19	1.934	6.502	4	0.748
	25-34	52	102.89				
	35-44	71	94.41				
	45-54	51	106.02				
	55-64years	11	88.82				
Qualification							
Education	First degree	109	89.85	9.731	10.015	2	0.008
	MSc	79	108.11				
	PhD	10	136.70				
Experience							
Work experience (in years)	1-5	55	95.91	5.964	12.492	4	0.202
	6-10	48	89.52				
	11-15	41	105.93				
	16-20	28	118.84				
	Above 20	26	94.56				

Results from Table 3 reveal that the Chi-square value of Gender, as a social-demographic variable is not statistically significant at the 5% level ($\chi^2 = 0.807, p = 0.16$). This implies that the respondent's perceptions on the adoption of CAATTs in detecting Fraud amongst DMBs, does not vary significantly across their gender. Similarly, Age and Working Experience also have Chi-square values which are not significant at the 5% level ($\chi^2 = 6.502$ & $12.492, p = 0.75$ & 0.20 respectively). This also suggest that perceptions on the adoption of CAATTs in detecting Fraud amongst DMBs, does not vary significantly across the age and years of working experience of the respondents. However, the Chi-square value of Educational Qualification is statistically significant at the 5% level ($\chi^2 = 10.015, p = 0.01$). This implies that the respondent's perceptions on the adoption of CAATTs in detecting Fraud amongst DMBs, varies significantly across their educational level.

In summary, the perception on the adoption of CAATTs in DMBS did not vary across gender, age, and work experience. However, significant variation was found in the case of education, suggesting that educational status significantly influences perception of the respondents on the adoption of CAATTs in DMBS for fraud detection.

4.5 Implication of Findings

The summary of the results on pre-CAATTs usage revealed that electronic data processing and auditing was the most prominently used technique for fraud detection, prior to the adoption of CAATTs. This result agrees with Felix Kaufman's book on Electronic Data Processing and Auditing, which was popularized in 1961. Despite the gradual introduction of the automated accounting systems, the Manual Audit was still noted for being a norm in the 1950s in the US, where firms chose to exclusively make use of its techniques. (Kaplan, 2012). Similarly, result

has shown that the Audit Software (AuSoftware) is the most widely used CAATTs among the sampled auditors. This agrees with the findings of Debrecey et al. (2003); Singleton et al. (2004) and Rindang and Synthia (2017). However, the results disagree with Ghani et al (2017), who rated EAS and Test data as the two top widely used techniques, especially by the big four firms in Malaysia. Furthermore, the result on the adoption of CAATTs suggest a moderate adoption amongst the banks, which agrees with the report of Debrecey et al (2003), who asserted a varying adoption and usage of CAATTs among financial institutions. Lastly, the Kruskal-Wallis test revealed that educational status significantly shaped the perceptions on the adoption of CAATTs for fraud detection amongst DMBs.

5. CONCLUSION AND RECOMMENDATIONS

The study assessed the perceptions of auditors in Deposit Money Banks in Nigeria, on the adoption of CAATTs in detecting fraud. Results revealed that the Nigerian banking industry has not fully embraced the idea of adopting proper implementation of CAATTs. The study concludes that the disposition of users of CAATTs in banks and audit firms is determined by their level of knowledge. The study recommends the inclusion of CAATTs, by way of policy, into auditing practices in Nigerian banks. Government, stakeholders and relevant professional bodies in the banking sector should also facilitate policies that will strengthen the adoption and usage of CAATTs.

References

- Ahmad, A., Nidal, A. S., &Ezz, H. (2019). Factors that influence the use of Computer Assisted Audit Techniques (CAATs) by internal auditors in Jordan, *Academy of Accounting and Financial Studies Journal*, 23(3), 1-15
- Ahmad, M. &Takah, B. M. I. (2019). The impact of Computer Assisted Auditing Techniques (CAATs) on development of audit process: an assessment of performance expectancy of by the auditors, *International Journal of Management and Commerce Innovations*, 7(2), 1199-1205, Available at: www.researchpublish.com
- Ahmi, A., Saidin, S. Z., Abdullah, A., Ahmad, A. C. & Ismail, N. A. (2016). State of Information Technology Adoption by Internal Audit Department in Malaysian Public Sector, *International Journal of Economics and Financial Issues*, 6(S7), 103-108
- Ahmi, A. & Kent, S. (2013), "The utilization of generalized audit software (GAS) by External auditors", *Managerial Auditing Journal*, 28(2), 88-113.
- Ahmi, A., Saidin, S.Z., & Abdullah, A. (2014). IT Adoption by Internal Auditors in Public Sector: A Conceptual Study. *Procedia - Social and Behavioral Sciences*, 164(8), 591--599.
- AICPA (2020). *The Data-Driven Audit: How automation and AI are changing the audit and the role of the auditor*, Canada: Chartered Professional Accountants of Canada
- AICPA (2017). *Blockchain technology on audit and assurance profession*, Canada: Chartered Professional Accountants of Canada
- AICPA (2011). *Audit data standards and applications*, University presentation, assurance services executive committee, June, 2011, American Institute of Certified Public Accountants
- Ajala, O. A.; Amuda, T. &Arulogun, L. (2013). Evaluating internal control system as a preventive measure of fraud in the Nigerian banking sector, *International Journal of Management Sciences and Business Research*, 2(9), 15-22.

- Ajzen, I. (1985). From intentions to actions: A Theory of Planned Behavior. In J. Kuhl & J. Beckmann (Eds.), *Action control: From cognition to behavior*. Berlin, Heidelberg, New York: Springer-Verlag. 11-39.
- Ajzen, I. (2002). Perceived Behavioral Control, Self-Efficacy, Locus of Control, and the Theory of Planned Behavior, *Journal of Applied Social Psychology*, 32(1), 665-683.
- Ajzen, I. (1991). "The theory of planned behavior". *Organizational behavior and human decision processes*, 50 (2), 179–211.
- Akinyomi O. J. (2012). Examination of fraud in the Nigerian banking sector and its prevention *Asian Journal of Management Research*, 3(1), 184-192
- Al-Ajam, A. S. & Khalil, M. D. (2013). Customers' Adoption of Internet Banking Service: An empirical examination of the theory of planned behavior in Yemen, *International Journal of Business and commerce*, 2(5), 44-58.
- Association of Certified Fraud Examiners (2020). "Report to the nations 2020 on occupational fraud and abuse: <https://acfe-public.s3-us-west-2.amazonaws.com>" Page 5. Accessed May, 30, 2021.
- Bierstaker, J., Janvrin, D. & Lowe, D.J. (2014). What factors influence auditors use of computer assisted audit techniques? *Advances in Accounting* 30(1), 67-74.
- Dandago K. I. & Rufai, A. S. (2014), An examination into the Quality of Audited Financial Statements of Money Deposit Banks in Nigeria, *International Journal of Academic Research in Accounting, Finance and Management Sciences*, 4 (1), 145–156
- Davis, R. E. (2005). *IT Auditing: An adaptive process*. Mission Viejo: Pleier Corporation. ISBN 978-0974302997.
- Davis, F. D., Bagozzi, R. P. & Warshaw, P. R. (1989). User acceptance of computer technology: A comparison of two theoretical models", *Management Science*, 35 (8), 982–1002.
- Debreceeny, R., Gray, G. & Yau, W. (2005). Embedded audit modules in enterprise resource planning systems: implementation and functionality. *Journal of Information Systems*, 19(2), 7-27.
- Debreceeny, R. S., Lee, S., Neo, W. & Toh, J. S. (2005). Employing Generalized Audit Software in the Financial Services Sector: Challenges and Opportunities. *Managerial Audit Journal*, 20(6), 605-619.
- Denigi G. (2004). *Audit and Review*. Pp 1, www.goldsmithibs.com/freedownloads/Auditing/WhatisAuditing.pdf. Retrieved on 6-11-2012.
- Dias, C. & Marques, R. P. (2018). The use of computer-assisted audit tools and techniques by Portuguese internal auditors. 2018 13th Iberian Conference on Information Systems and Technologies (CISTI), 1–7.
- Ebimobowei, A., Ogbonna, G. N. & Enebraye, Z. P. (2013). Auditors: usage of computer assisted audit tools and techniques: empirical evidence from Nigeria. *Research Journal of Applied Sciences, Engineering and Technology*, 6(2), 187-195.
- Eni, L. C. (2016). Considerations regarding the design of an online collaborative audit system, *Managerial Auditing Journal*, 31(1), 64-86.
- Ernst & Young (2015). The future of assurance: How technology is transforming audit. <https://doi.org/10.1097/00002508-198602020-00001> (Retrieved 26/12/2019)
- Ghani, R., Rosli, K. Ismail, N. A. & Saidin, S. Z. (2017). Application of computer-assisted audit tools and techniques (CAATs) in audit firms, *Journal of Advanced Research in Business and Management Studies*, 9(1), 67-74.
- Jacks, D. S., Meissner, C. M. & Novy, D. (2008), "Trade Costs, 1870-2000", *American Economic Review*, 98(2), 529-534.

- Janvrin, D.J., Lowe, D. J. & Bierstaker, J. L. (2008a). Auditor acceptance of computer-assisted audit techniques. Retrieved from: [aaahq.org/meetings/AUD2009/Auditor Acceptance.pdf](http://aaahq.org/meetings/AUD2009/Auditor%20Acceptance.pdf). February, 2017.
- Janvrin D, Bierstaker, J. & Lowe D. J. (2008b). An examination of audit information technology use and perceived ease of use, *Accounting Horizon*, 22(1), 1-2.
- Janvrin, D. J., Bierstaker, J. L. & Lowe, D. J. (2009). An Investigation of Factors Influencing the Use of Computer Related Audit Procedures. *Journal of Information System*, 23(1), 97-118
- Kaplan. M. (2012). *Computer Assisted Audit Techniques*. Published by International Federation of Accountants.
- Kim, H. J., Mannino, M. & Nieschwietz, R. J. (2009). Information technology acceptance in the internal audit profession: Impact of technology features and complexity, *International Journal Accounting Information System*, 10(4), 214-228.
- KPMG (2015). *Data & Analytics enabled Internal Audit*. Retrieved from <https://assets.kpmg.com/content/dam/kpmg/pdf/2016/04/DA-Enabled-Internal-Audit-Survey.pdf> on 26/12/19.
- Lowe, D.J., Bierstaker, J.L., Janvrin, D. J. & Jenkins, J.G. (2018). Information technology in an audit context: have the big 4 lost their advantage?. *Journal of Information Systems*, 32 (1), 7-107
- Macaulay, M. (2016). How cognitive technology is revolutionizing the audit, *Financial Executives International*.
- Mahzan, N. & Lymer, A. (2008). Adoption of Computer Assisted Audit Tools and Techniques by Internal Auditors: Current issues in the UK. Being a Paper Presented for British Accounting Association Annual Conference, Blackpool, UK, April.
- Mahzan, N. & Veerankutty, F. (2011). IT auditing activities of public sector auditors in Malaysia. *African Journal of Business Management*, 5(5), 1551-1563.
- Mustapha, M. & Jin-Lai, S. (2017). Information Technology in Audit Processes: An Empirical Evidence from Malaysian Audit Firms. *International Review of Management and Marketing*, 7(2), 53-59.
- Omonuk, J. B. & Oni, A. A. (2015). Computer Assisted Audit Techniques and Audit Quality in Developing Countries: Evidence from Nigeria. *Journal of Internet Banking and Commerce*, December 2015, 20(3), 127-130.
- Rindang, W. & Synthia, A. A. (2017). Exploring the use of computer assisted audit techniques and its impact to the transparency and accountability of financial statements, *Journal of Theoretical and Applied Information Technology*, 31st December. 95(24), ISSN: 1992-8645.
- Senft, S., Gallegos, F. & Davis, A. (2014). *Information Technology Control and Audit (4th ed.)*, *Journal of Information Privacy and Security*, 10(1), 53-55
- Senft, S., Gallegos, F. & Davis, A. (2013). *Information technology control and audit*, Fourth Edition, CRC Press, Amazon.com, NY, USA
- Shamsuddin, A., Logenthiran, R., Dhinesh, M., Ameer, M. F. M. & Punnir, M. M. (2015). Factors influencing usage level of computer assisted audit techniques (CAATs) by internal auditors in Malaysia. *Proceeding - Kuala Lumpur International Business, Economics and Law Conference*, 6(1), 123-131.
- Sharma, A.K. & Nanda G. L. (2006). "Frauds in credit card business", *Banking Finance*, (7).
- Sharma, P.H. (2006), "A Review of Statement of Financial Accounting Standard. No. 156", *Accounting for Servicing of Financial*, Wiley CPA Review Assets, Pp 293-295.
- Siew, E. G., Rosli, K. & Yeow, P. H. (2019). Organizational and environmental influences in the adoption of computer assisted audit tools and techniques (CAATTs) by audit firms in Malaysia, *International Journal of Accounting Information Systems*, 1(1), 1-19

Singleton, T., Todd, K. & Messina, F. (2004). How to Use Computer-Assisted Audit Techniques to Uncover Fraud. Retrieved November 25, 2017, from <https://www.forensicstrategic.com/wp-content/uploads/2012/08/>

Siti, S. B. Z., Azni, S. B. S., Tengku, R. B. T., Suhaili, B. H., Maisarah, S. B. O. & Sam, J. J. (2017). Determinants of computer assisted audit techniques (CAATs) adoption: A study in small and medium practices in Malaysia, *European Journal of Business and Social Sciences*, 6(02), 135–150.

Smidt, L., Van der-Nest, D. P. & Lubbe, D. (2014). The use of sampling and CAATs within internal audit functions in the South African banking industry. 9th Iberian Conference on Information Systems and Technologies (CISTI)

Subaryani-binti Z. S., Suhaily-binti S. A., Rahimah-binti-tunku A. T., Binti, H. S. & Syazwani-binti, O. M. (2017). Determinants of Computer Assisted Audit Techniques (CAATs) Adoption: A Study in Small and Medium Practices in Malaysia. *European Journal of Business and Social Sciences*, 6(2), 135-150.

Venkatesh, V., Thong, J. Y. L. & Xu, X. (2012). Consumer acceptance and use of information technology: Extending the unified theory of acceptance and use of technology. *MIS Quarterly*, 157-17

Venkatesh, V., Morris, M. G., Davis, G. B. & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view, *MIS Quarterly*, 27(3), 425–478.

World Bank (2017). Audit data analytics: opportunities and tips. The World Bank. Retrieved from http://siteresources.worldbank.org/EXTCENFINREPREF/Resources/4152117-1427109489814/SMPs_spreads_digital.pdf on 26/12/19.

Zimmermann, William (2021) "American Railroad Accounting Practices", *Penn History Review*, 28(1), 59-80, Article 4, Available at: <https://repository.upenn.edu/phr/vol.28/iss1/4>