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Information Technology Advancement and Value for Money Audit: A Study of Selected Tertiary Institutions in Lagos State

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Abstract

The global perspective on the value of an audit has in recent times been shifted due to the capability of information technology to allow for the comprehensive testing of an entire population. Data analytics, an arm of advanced information technology allows auditors to present an ariel view of the financials, and a complete as well as detailed record of accounting. These has led to the provision of more insight into the activities of organizations as information technology defines the "how" of change while humans define the "why" of change. Achieving efficient, effective, and economical use of public / government fund is at the heart of value for money audit and the appropriate use of advanced information technology tools can greatly aid the achievement of this objective. Using TETFUND desk officers from five (5) beneficiary institutions in Lagos State, descriptive and inferential statistics were applied to determine the level of application of IT advancement tools, challenges inhibiting it as well as the impact of artificial intelligence, machine learning, and cloud computing on the effectiveness of VFM audit for TETFUND projects. The study found that IT tools are actually been used presently for VFM audits but only cloud computing as an IT advancement tools has been integrated while AI and ML is yet to be applied to VFM audits. Also, several challenges including seamless integration, expertise availability, and availability of computer systems and other associated gadgets possess serious drawbacks for the use of IT advancements in VFM audit. Capacity to use these advancement tools were however found to be readily present in all beneficiary institutions used for the study.

Keywords: Information technology advancement, Value for money audit, Artificial intelligence, Machine learning, Cloud computing, TETFund

Introduction

An unfettered review of an organization's final books of account with the intent of establishing an unbiased opinion as to the truthfulness and reasonableness of the books of account is what is called an Audit (Okaro & Okafor, 2017). Amongst all the arms of the accounting profession, the audit & assurance function is the most visible and important. (Baldwin, Brown & Trinkle, 2016). This function has also been seen to possess a high degree of uncertainty and litigation, with several high-profile audit failures in the private and public sectors resulting in huge financial losses. Pre-technology era of audit is mainly

dominated by paper evidence, adding machines, and calculators with no information technology tool to aid the process. This resulted in the high probability of mistakes and errors as one wrong input in the calculator results in a wrong output despite the high level of auditors' concentration and focus. Baldwin, Brown & Trinkle (2016) in their study further posited that this has necessitated the call by both the government and several professional bodies to initiate changes in rules, policies, regulations, standards as well as training for accountants / auditors. This call preceded the massive adoption of information technology in the audit and assurance function. Globally, organizations as well as professional bodies involved in the audit profession are intensifying their focus on the impact technology have auditing citing the clear benefits technology brings which include operational efficiency, financial inclusion, and greater insights into issues. Shaikh, Jokhio, Maher, Chandio, Manirajah, Abdullah, Raza, Salam & Shah (2018) reported that the form and nature of audit evidence have substantially changed due to technological advancements as well as future-oriented information technologies.

The Institute of Chartered Accountants of England and Wales (ICAEW) 2017, remarked that technology is driving changes in the finance and audit profession, therefore, auditors need to invest in understanding and developing new technologies as this will provide opportunities for auditing firms to provide futuristic assurance services. They further opined the need for auditors to stay ahead of changes in clients' business models by recruiting and partnering with technology experts and investing in digital initiatives such as artificial intelligence (AI), cloud computing, machine learning, as well as all forms of blockchain technologies.

Advancement in information technology is not just changing the way we do an audit; it will also change the look of an audit in the future. The recent lockdown coupled with physical movement restrictions has forced auditors to change their audit approach. Auditors now have to work remotely with heavy reliance on the use of technology. This has brought to the fore the importance of technology in the auditing profession and is set to change the future of auditing systems. Globally, information technology is rapidly evolving and is already being applied in quite a number of emerging sectors like car manufacturing (driverless cars), blockchain technology (fintech), space exploration, financial services, investment portfolio management, and many more.

Statement of the problem

Structured, semi-structured, and unstructured decisions are what accounting tasks deal with. Auditing and assurance on the other hand involves much less structured decisions and analysis that have a lot of uncertainties which are majorly a result of risks and lack of information (Baldwin, Brown, and Trinkle, 2016). Shaikh, Jokhio, Maher, et. al (2018) reported that in the past, the calculator was the main tool the auditor uses, and predominantly paper information stands as the source of evidence. This made the

confirmation of the financial statements truthfulness and fairness tasking as the probabilities of committing errors were higher because one wrong input in the calculator could alter the whole process no matter the amount of concentration and focus.

Several dramatic changes have occurred in the field of public sector management which has made value for money (VFM) audit the holy grail of the sectors financial management (Kalubanga & Kakwezi, 2013). VFM has become the mandatory test by which all procuring and disposing government entities must justify their procurement outcomes. The concept ensures that public resources are put to optimal use and that those responsible are accountable for the economic, efficient and effective management of all resources entrusted to them. As information providers and risk assessors, accountants and auditors alike require advanced and state-of-the-art tools to ensure improvement in the effectiveness and efficiency of their tasks. Elliot (1992) as used Baldwin, Brown & Trinkle (2016), posited that information technology advancements are key to the future of the accounting and auditing profession. In Nigeria and the world at large the need for appropriate technology and enabling infrastructures has been severally articulated for business growth and efficiency (Kuye & Sulaimon, 2019).

The dynamics of ever-changing and improving technology across all professions require that up-to-date and advanced innovations be adopted to remain competitive. As organizations (private sector) and governments (public sector) adopt new technologies in their processes, they are also looking for greater assurance services to curb risks in their businesses beyond traditional historical information. With various technological advancements allowing auditors to test the full population of entries instead of the sample testing done with traditional audits, there is the need to move away from asking "what could probably go wrong" to "what has definitely gone wrong".

As the world of auditing and accounting constantly evolves and the auditing profession has already begun its gradual shift towards a sustainable, almost paperless procedure and with the advances in information technology such as AI, CC, and ML, the future of auditing will be affected and it is on this premise and given the lack of recent and adequate literature on the application and impact of information technology advancements on the effectiveness of VFM audit in the public sector, this study sets out to provide new evidence on the subject matter with focus on the following objectives:

i. Establish the extent by which information technology advancements are being applied in VFM audit.
ii. Determine factors inhibiting the application of information technology advancements in VFM audit.
iii. Investigate the impact of artificial intelligence on the effectiveness of VFM audit.
iv. Determine the impact of machine learning on the effectiveness of VFM audit.
v. Examine the impact of cloud computing on the effectiveness of VFM audit.

Literature review

Conceptual Review

Evolution of Information Technology and Auditing

Computer has so far been posited by several researchers as the highest invention of mankind and its effect has been felt and it is still being felt in the accounting and auditing profession so much that it has almost completely encapsulated the way accounting and audit is carried out. The appropriate use of information technology has been identified as a way of improving the productivity of the accountant / auditor as its application has been noted to positively influence the jobs and lives of not just organization managers but every other person in and out of the organization as well as the knowledge base of the entire society (Ajibolade, 2009).

Future audits have been said to demand that necessary information be acquired through the use of Computer-aided accounting Techniques (CAATs) that would constitute a paperless exercise that will create an automated trial using electronic data interchange and become the visible source of audit evidence (Shaikh, Jokhio, Maher et. al. 2018).

Information technology application in all scopes of accounting and auditing have been studied since the early 1980's. Several researchers have looked into all these scopes: taxation (Brown and Streit, 1988; Brown 1988; Messier and Michaelsen, 1987; Dungan and Chandler, 1985), financial accounting, reporting and analysis (Haven, 1998; Etheridge and Sriram, 1997; Agarwal, Barniv and Leach, 1997), management accounting (Sangster, 1996; Brown and Phillips, 1995; Sangster, 1994; Rice & Shim, 1988) and auditing and assurance (Baldwin, 1998; Baldwin, 1993; Murphy, 1990; Biggs, 1988). Information Technology has since its commercial introduction gone through several improvements and developmental stages. From just being an organized system that processes direct business transactions to a more detailed system that provides support in aiding management decisions and then on to providing support for strategic decisions.

Information Technology has since advanced through the period of manual processing using mechanical aids to its present state of high-level innovation advancement and this is altering the way businesses are done and data analyzed. "Know your data" (KYD) is presently replacing "know your customer" (KYC) due to increased focus on data management. Using cloud computing has expanded the possibilities of collecting and analyzing data to a previously unimaginable scale.

Performance auditing which is now widely known as value for money audit came into use in the 1960's in several countries across the world which include the USA, Great Britain, Sweden, Canada, and other Nordic Countries as a response to demand for improved accountability and transparency in government spending by stakeholders (INTOSAI, 1992). On the other hand, Okwoli (2004) as used in Owolabi and Ogunode (2020) reported that Nigeria as a country adopted the use of VFM audit after receiving the 1995 Ayida's civil

service reform report which recommended that VFM audit as a task be included in the schedule of duties of the Auditor General.

Information Technology Advancement

Today, information technology is evolving at a speedy pace, encouraging greater change and faster progress in all human endeavor. However, it is not only technological trends that are evolving, several other things have changed in recent times due to the outbreak of COVID-19. This made the professionals come to the realization that their role will not stay static in the contactless world tomorrow and that henceforth, they will constantly be learning, unlearning, and relearning (out of necessity if not desire). A 2020 KPMG survey on innovation trends in the auditing world indicates that 37% of organizations had IT innovation as a priority during 2020, while 55% indicated that IT innovation is principal priority henceforth. Therefore, it is expected that more businesses will begin implementation of emerging technologies like data lakes, AI, CC, and ML. They will also integrate these technologies into all their major business processes and this will further improve the relevance of IT usage within the audit function. Some recent advancements in the IT space include: machine learning - similar to AI as it uses technology to replicate established human processes. Instead of simulating human thought, ML is more concerned about building systems that is able to learn and improve processes based on received data. ML application include product recommendations; email & malware filtering; as well as search engine refinement. Cloud computing refers to using cloud computer servers to store data rather than storing the information on local servers.

This has greatly led to a big change in how data are stored by both individuals and businesses alike as it has become normal to store mail, photos, documents, and important files on the internet for safekeeping. Monitoring and predicting provides cognitive systems that predicts and detects errors in computer programs which can then help companies respond quickly to or even completely avoid catastrophic failures.

Value for Money Audit

Profitability is the conventional measure of performance in the profit-making private sector of the economy. ICAN, 2014 posited that the absence of a profit-making motive in the not-for-profit public sector brings about massive difficulties in the measurement of their performance and has led to the emergence of VFM audit as the tool used in measuring public sector performance using variables that include: efficiency, effectiveness, and economy (Kururia, 2018; Ogungbade, Adebiyi, Kolawole and Lubo, 2021). Its popularity also stems from the public perception that the conventional performance audits used in the private sector evaluating performances in tandem with some laid down principles are highly insufficient for public sector audits (Matthew & Patrick, 2013). International Institute of

Auditors (2011) described the public sector as governments, all publicly controlled / funded agencies, enterprises, as well as any other entity that provides public goods and services.

This comprises government ministries, parastatals, departments, agencies, utility boards, corporations, and local authorities. VFM audit is generally seen as a systematic, professional, and objective examination of public institutions processes and procedures which is established to make sure all its resources are managed economically, efficiently, and effectively. VFM audit is primarily concerned with achieving balance amongst the 3'E's to ensure wastages, inefficiencies and extravagance are reduced. This helps to ensure an ideal relationship exists between the input consumed by an activity, the objective the activity is supposed to achieve and the resources incurred in achieving these objectives (Ogungbade et. al., 2021). Balkaran, Roth, and Cassels (2017), in their paper titled 'Focus on the three Es' posited that value for money audit enhances internal audit function as it ensures that resources are acquired at the lowest cost without compromising quality and reduction in performance. It also helps in discovering inefficiencies and ineffective operations thereby leading to an eventual business performance improvement.

VFM audit is also said to encapsulate assessment of the rate at which all government programs, policies, projects, and plans are executed within the confines of accountability (Okwoli, 2004). It is also used as a basis for assessing the performance of all governmental parastatals and agencies of government. This means that all government ministries, agencies, and parastatals are expected to adequately account for every fund spent and at the same time ensure that the expected utility from the service provided are derived by the public. VFM audit in Nigeria is most often performed as a form of special audit but it is also carried out as part of the internal audit function in most ministries, agencies, and parastatals. Owolabi and Ogunode (2020) summarize the description of the three elements of VFM as *spending less per time* (Economy); *spending well per time* (Efficiency), and *spending wisely per time* (Effectiveness).

Information Technology Advancement and Value for Money Audit

Presently, the future has been termed as one where humans and machines will work together and this will lead to outsourcing of repetitive tasks to machines so as to enable humans focus on solving problems, envisioning, and strategizing areas where judgment plays a key role. According to Shaikh et.al (2018), future-oriented IT methods and technological advancements is greatly changing the form and nature of audit evidence by completely modifying the accounting cycle as well as the internal controls on financial reporting. Information technology has a significant impact on VFM audits as it allows auditors to determine whether an entity is acquiring, managing, and utilizing its resources economically and efficiently.

Technology enables auditors to have a comprehensive view of financials and accounting records, providing more insight and the ability to detect fraudulent transactions (Nwosu, 2015). However, the use of technology in audits can also present challenges as glitches or bugs in the software can disrupt the audit process and may require additional time and the expertise of IT specialists (ICAEW, 2017). Overall, information technology transforms the audit process, allowing for more efficient resource utilization and the detection of inefficiencies, but also requiring auditors to adapt to the complexities of electronic environments (Alheety & Marei 2017; Kamil & Nashat, 2017).

Empirical and Theoretical Review

Empirical Review

The use of information technology advancement in value for money audit has attracted quite some attention from various researchers both in the technology field as well as the accounting, finance, and auditing field. Critical review of some of these studies as well as their findings are discussed hereunder.

In a 1985 study by Frohman titled "Putting Technology into Strategic Planning", he opined that for any profession and business, making technological decisions is of utmost necessity and it must therefore be made in the fullest context of each profession's strategic thinking. In a 2006 study by Baldwin, et. al on the Opportunities for AI Development in the Accounting Domain: Auditing as a Case, they opined that due to the complex nature of the numerous tasks performed by auditors, research on AI for these tasks can be greatly improved upon if and when AI researchers and accounting cross disciplinary lines and collaborate. Owolabi, Jaiyeoba, and Ajibade (2016) in their study on the Development and Evolution of Auditing posited that there is a changing role of auditors from the past which was filled with paper fraud detection responsibility to a future that will be dominated by the use of audit software's (advanced Information Technology).

Public Company Accounting Oversight Board (2010), remarked that the presence of documentary evidence alone does not give the utmost credence to audit quality, stating that the process and technology used in preparing audit evidence contribute greatly to the overall quality of the VFM. Owolabi and Ogunode (2020) in their paper titled Public Sector Engagements and VFM Audit in Nigeria recommended that public entities should adopt the use of E-Procurement (Advanced Technology) to ensure successful improvement in Value for Money audit which if well implemented will considerably aid reduction in governance cost as well as ensure scarce resources are focused on priority areas to restore public confidence in the country's leadership. Kong and Yusheng (2020), looked at the impact of Effective IT Governance on Audit Technology Performance in Ghana: using the PLS-SEM approach to test their hypothesis, they concluded that firms must indicate in their IT policies

and action plans all requirements and priorities necessary for technology-based training so that advanced IT utilization can be employed in auditing.

Using regression analysis, Al-Sayyed, Al-Aroud, and Zayed (2021) reported in their study which looked at the effect of AI technologies on audit evidence that AI technologies are necessary for the tomorrow of auditing profession as they are important tools that will equip the auditors with the necessary means to improve the effectiveness and efficiency of their job. Remarking on The Challenges of Public Sector Audit as an Effective Accountability Tool in PPP arrangements in Nigeria, Okaro & Okafor (2020), found that poor use of technology amongst other reasons poses a candid challenge facing public sector audit.

Alheety and Marei (2017), in their paper that looked at how information technology impacts the development of audit process: reviewing accepted theories of IT by auditors concluded that the connection between performance expectancy and intent to utilize Computer Aided Audit Techniques (CAATs) was vigorously fortified and that the intention to utilize CAATs within the audit profession is likely to continually increase. The position of Shaikh et. al. 2018, in their paper titled - Beyond Traditional Audits: Implications of IT on auditing is that advancement in ICT has greatly changed the way audit firms examines financial statements to ensure compliance with extant laws, legislations, and regulations as clients progress towards automation with the use of modern-day ICT for their operations, which has also led to a paradigm shift in the role of the audit firms. Most studies that have been carried out has not looked at the impact of IT advancement on value for money audit, the gap this study intends to address with interest on TETfund projects in TETfund beneficiary institutions. The study therefore hypothesized that:

i. There is no significant application of information technology advancements in VFM audit.
ii. Inhibiting factors have no significant impact on the effectiveness of VFM audit.
iii. There is no significant impact between artificial intelligence usage and the effectiveness of VFM audit.
iv. Machine learning usage has no significant impact on the effectiveness of VFM audit.
v. There is no significant impact between cloud computing and the effectiveness of VFM audit.

Theoretical Framework

Diffusion of Innovation (DOI) Theory

E.M. Rogers developed the DOI theory in 1962 and it is one of the oldest social science theories. Originally used in the communication space to describe how over sometime, a product or an idea becomes popular and spreads (diffuse) throughout a particular social system. The outcome of the spread is that all the people who are part of this social system adopts this new idea, behavior, or product. For adoption to be valid, the entity

or person must perceive the idea, behavior, or product as new as well as innovative, and it is through this that diffusion becomes possible. For an entity or person to adopt an innovation, and thereby accomplish diffusion, the following stages must be followed: awareness of the need for an innovation; decision to adopt (or reject) the innovation; initial use of the innovation to test it; and continued use of the innovation. There are also five adopter categories namely: relative advantage; compatibility; complexity; trial – ability; and observe-ability.

Materials and Methods

This study adopted a quantitative research design. All seven (7) TETfund beneficiary institutions in Lagos State made up our population which include three (2) universities, one (1) polytechnic, and three (3) colleges of education. Using convenience sampling technique, five (5) TETfund beneficiary institutions was picked from all the seven (7) TETfund beneficiary institutions in Lagos State.

Data collection was through primary sources using a structured Likert scale questionnaire designed to elicit appropriate responses on the subject matter from our sample. The questionnaire was validated by an expert while the reliability will be established using the Cronbachs Alpha method of testing reliability. Inferential statistics and regression analysis was used for data analysis to detect the connections between our variables. Limited outcomes due to limited options for response is the major research study limitation experienced.

Results

1 Table 1a Presentation of demographic data

GENDER DISTRIBUTION		
GENDER	FREQ.	%
MALE	3	40%
FEMALE	2	60%

AGE DISTRIBUTION		
AGE	FREQ.	%
36 - 45	1	20%
46 - 55	2	40%
56 -65	2	40%

EDUCATIONAL LEVEL DISTRIBUTION		
HIGHEST EDU	FREQ.	%
BSC	2	40%
MSC	2	40%
PHD	1	20%

DESIGNATION DISTRIBUTION		
DESIGNATION	FREQ.	%
CHIEF ACCT	1	20%
ASST. CHIEF ACCCT	1	20%
PRINCIPAL ACCT	3	60%

DURATION ON POST DISTRIBUTION		
DURATION	FREQ.	%
13 YEARS	1	20%
12 YEARS	1	20%
10 YEARS	1	20%
8 YEARS	1	20%
5 YEARS	1	20%

INSTITUTION DISTRIBUTION		
INSTITUTI	FREQ.	%
ACOE	1	20%
FCEA	1	20%
LASU	1	20%
UNILAG	1	20%
YABATECH	1	20%

Source: Survey (2025)

Table 1a shows the presentation of the study's demographic data. Gender distribution consists of 40% female participants and 60% male participants. This distribution suggests a higher male representation in the study. The age distribution shows that the age range is split amongst three groups: 20% of participants are aged 36-55, 40% of participants are aged 46-55 years, and 40% are aged 56-65 years. This indicates that the sample is skewed toward older participants.

The educational level of the respondents shows that the sample is fairly well-educated, with 40% holding a Bachelor's degree (B.Sc.), 40% holding a Master's degree (M.Sc.), and 20% having a Doctoral degree (Ph.D.). Respondents' designation indicates that the sample represents a broad spectrum of seniority within the accounting profession of the institutions with 1 of the respondents as a Chief Accountant, 1, an Assistant Chief Accountant, and 3, Principal Accountants. The analysis shows that the distribution of years of experience in the current role is varied, with participants having between 5 to 13 years of experience.

This suggests a mix of relatively new and well experienced professionals handling the role of TETfund desk officers in the institutions. Respondents were drawn from five different institutions, with each institution represented equally in the sample. This diversity in institutional affiliation can provide a broader view of the practices, challenges, and technological adoption across different contexts.

5.2 Table 2 Descriptive statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max
Application of IT advancement in VFM	5	3.6	.7674308	2.8	4.8
Challenges of IT advancement application in VFM	5	3.1	.5511709	2.4	3.8
Artificial Intelligence and VFM Audit	5	2.7	.9519153	1.7	4.2
Machine learning and VFM Audit	5	2.9	1.244195	1.2	4.2
Cloud computing and VFM Audit	5	4.2	.6418833	2.2	4.5

Source: Survey (2025)

Inferential Statistics

The hypotheses of the study stated earlier in this study is tested in this section stated in their null form.

Hypothesis 1

Ho: There is no significant application of information technology advancements in value for money audit.

Table 3 ANOVA analysis on the application of information technology in VFM audit

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.080[a]	0.006	-0.325	1.312

a. Predictors: (Constant), Appication of information technology

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	0.033	1	0.033	0.019	.898[b]
	Residual	5.167	3	1.722		
	Total	5.200	4			

a. Dependent Variable: Value of money audit

b. Predictors: (Constant), Appication of information technology

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	11.083	4.947		2.241	0.111
	Appication of information technology	-0.083	0.599	-0.080	-0.139	0.898

a. Dependent Variable: Value of money audit

Source: Survey (2025)

Decision: table 3 shows a coefficient of -0.083 and a p-value of 0.898. With an above 0.05 p-value, the null hypothesis is accepted and this shows that there is no significant application of information technology application in VFM audit.

Hypothesis 2

Ho: Inhibiting factors have no significant impact on the effectiveness of value for money audit.

Table 4 ANOVA analysis on inhibiting factors impact on VFM audit

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.559[a]	0.313	0.083	0.957

a. Predictors: (Constant), Inhibiting Factors

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.250	1	1.250	1.364	.327[b]
	Residual	2.750	3	0.917		
	Total	4.000	4			

a. Dependent Variable: Value for money audit

b. Predictors: (Constant), Inhibiting Factors

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	13.375	2.922		4.578	0.020
	Inhibiting Factors	-0.625	0.535	-0.559	-1.168	0.327

a. Dependent Variable: Value for money audit

Source: Survey (2025)

Decision: table 4 shows a coefficient of -0.625 and a p-value of 0.327 which is greater than 0.05 and this implies that the null hypothesis which states that inhibiting factors have no significant impact on the effectiveness of VFM audit is accepted.

Hypothesis 3

Ho: There is no significant impact between artificial intelligence usage and the effectiveness of value for money audit.

Table 5 ANOVA analysis on AI usage impact on VFM audit

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate		
1	.000[a]	0.000	-0.333	1.414		

a. Predictors: (Constant), Artificial intelligence usage

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	0.000	1	0.000	0.000	1.000[b]
	Residual	6.000	3	2.000		
	Total	6.000	4			

a. Dependent Variable: Value for money audit

b. Predictors: (Constant), Artificial intelligence usage

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	8.000	3.303		2.422	0.094
	Artificial intelligence usage	0.000	0.477	0.000	0.000	1.000

a. Dependent Variable: Value for money audit

Source: Survey (2025)

Decision: Table 5 revealed a coefficient of 0.477 and a p-value of 1.000. This therefore shows that there is no significant impact between AI usage and VFM audit effectiveness.

Hypothesis 4

Ho: Machine learning usage has no significant impact on the effectiveness of value for money audit.

Table 6 ANOVA analysis on machine learning usage impact on VFM audit

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.846[a]	0.716	0.622	2.067

a. Predictors: (Constant), Machine Learning

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	32.379	1	32.379	7.577	.071[b]
	Residual	12.821	3	4.274		
	Total	45.200	4			

a. Dependent Variable: Value for money audit

b. Predictors: (Constant), Machine Learning

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-2.028	3.970		-0.511	0.645
	Machine Learning	1.236	0.449	0.846	2.753	0.071

a. Dependent Variable: Value for money audit

Source: Survey (2025)

Decision: table 6 shows a coefficient of 1.236 and a p-value of 0.071, since this p-value is greater than 0.05, the null hypothesis is accepted and this means that machine learning usage has no significant impact on the effectiveness of VFM audit.

Hypothesis 5

Ho: There is no significant impact between cloud computing and the effectiveness of value for money audit.

Table 7 ANOVA anaylsis on cloud computing usage impact on VFM audit

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.569[a]	0.324	0.099	1.826

a. Predictors: (Constant), Cloud Computing

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	4.800	1	4.800	1.440	.316[b]
	Residual	10.000	3	3.333		
	Total	14.800	4			

a. Dependent Variable: Value for money audit

b. Predictors: (Constant), Cloud Computing

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	6.500	3.675		1.769	0.175
	Cloud Computing	0.500	0.417	0.569	1.200	0.316

a. Dependent Variable: Value for money audit

Source: Survey (2025)

Decision: table 7 shows a coefficient of 0.417 and a p-value of 0.316 which is greater than 0.05. Therefore, this implies that there is no significant impact between cloud computing usage and the effectiveness of VFM audit.

Discussion of findings

(a) The extent by which information technology advancements are being applied in value for money audit. The studyfound out that information technology advancement tools are being used in VFM audit for TETFUND projects. It revealed that IT advancement tools are perceived as useful for Data Collection, data analysis, and reporting in the VFM audit process.

(b) Factors inhibiting the application of information technology advancements in value for money audit. The study found out that several factors including integration process, availability of expertise, availability of computer systems and associated gadgets as well as security issues inhibits the application of IT advancement tools in VFM audit for TETFUND projects. Desk officers / teams' capacity to work with these IT advancement tools is however found to be present.

(c) Impact ofAI on the effectiveness of value for money audit. The study found out that artificial intelligence is presently not being applied in VFM audit for TETFUND projects. With a coefficient of 0.477 and a p-value of 1.000 which is greater than 0.05, therefore the null hypothesis is accepted that there is no significant impact of AI on the effectiveness of VFM audit for TETFUND projects.

(d) Impact of machine learning on the effectiveness of value for money audit. The study found out that machine learning is presently not being applied in VFM audit for TETFUND projects. With a coefficient of 0.449 and a p-value of 0.071 which is greater than 0.05, therefore the null hypothesis is accepted that machine learning has no significant impact on the effectiveness of VFM audit for TETFUND projects.

(e) Impact of cloud computing on the effectiveness of value for money audit. The study found out that cloud computing is presently being integrated in VFM audit for TETFUND projects, although not in a significant way. With a coefficient of 0.417 and a p-value of 0.316 which is greater than 0.05, therefore the alternative hypothesis is accepted that there is a significant impact of cloud computing on the effectiveness of VFM audit for TETFUND projects.

Summary of findings from qualitative research question

i. **Room for Improvement and Awareness**: Several respondents pointed out that while IT advancements in VFM audits have made progress, there is still much to be done. Respondent 1 emphasizes that there is a lot of ground to cover, and Respondent 2 calls for more awareness about these advancements. This suggests a need for greater education and advocacy to fully leverage IT tools in auditing.

ii. **Positive Impact of IT on VFM Audits:** Respondent 3 emphasizes that IT advancements (in general) have a positive impact on VFM audits. These technologies

improve efficiency, enhance data collection and analysis, and help ensure compliance with regulations. Respondent 5 specifically mentions that Cloud computing has greatly facilitated the retrieval of information, allowing for auditors to easily access data when needed. This demonstrates effectiveness of IT advancements in enhancing audit processes.

iii. **IT Advancements as Facilitators of Speed, Efficiency, and Predictability:** Respondent 4 notes that IT advancements should not only make audits faster and easier but should also help predict future occurrences to prevent losses. This response suggests that IT tools like predictive analytics can significantly improve the ability to foresee and mitigate risks, making the audit process more proactive.

Conclusion

This study has highlighted the significant potential of information technology (IT) advancement tools in enhancing the efficiency, accuracy, and scope of VFM audits. The findings demonstrate that IT tools such as artificial intelligence (AI), data analytics, machine learning, and cloud-based platforms can significantly improve audit process by enabling auditors to handle large volumes of data, identify inefficiencies, and provide more comprehensive and timely assessments of public sector spending. However, despite the clear benefits, the study has also revealed a key challenge: the limited availability and accessibility of these advanced IT tools in many auditing environments. The lack of adequate infrastructure, financial resources, and access to specialized software tools has significantly hindered their adoption.

Furthermore, the expertise required to effectively utilize these tools is often lacking, creating a gap between the potential of technology and its actual use in VFM audits. From these findings, it is evident that while IT advancement tools have great potential to improve the quality and impact of VFM audits, their benefits will remain unrealized unless significant efforts are made to overcome these barriers.

Recommendations

The findings of this study highlight limited availability and accessibility of information technology (IT) advancement tools for VFM audits, stated below are the proposed recommendations to address the challenges identified as well as enhance the effectiveness of VFM audits in the future:

i. **Investment in IT infrastructure and tools for auditing bodies:** organizations, particularly in the public sector, should prioritize investments in IT infrastructure and tools to support effective and efficient VFM audits.
ii. **Collaborations with technology providers**: Establish partnerships and collaborations between audit institutions and technology providers to enhance the availability and affordability of IT tools for VFM audits.

iii. **Capacity building and training for auditors:** Invest in capacity-building programs to equip auditors with the necessary skills and knowledge to effectively use available IT tools.

Contribution to knowledge

This study makes several significant contributions to the understanding of how IT advancement tools enhance Value for Money (VFM) audits. By demonstrating the practical and strategic value of integrating cutting-edge technology into audit processes, this research provides critical insights that can influence both academic thought and real-world audit practices which include: empirical evidence on IT Tools in VFM Audits, improved audit accuracy and comprehensive analysis, cost-effectiveness and resource optimization, enhanced transparency and accountability, and shaping future audit Practices.

Suggestion for further studies

This study has identified other exploratory areas of research that need to be investigated to increase the understanding of how information technology advancement tools can be used to improve value for money audit. This study's scope was limited to only TETFUND projects, further studies can look into all government activities.

Other areas to further look into include: assessing the relationship between the cost of implementing advanced IT tools and the benefits in terms of VFM outcomes, exploring the role of cyber security and data integrity in IT-enabled VFM audits, and examining how AI, machine learning, and big data analytics are transforming the evaluation of public sector and corporate spending in VFM audits.

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