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Emerging Technologies and Internal Auditing Process In Universities In Nigeria

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Abstract

Many businesses and professions have already introduced technological advancements into their work to boost productivity and efficiency; thus, the auditing profession has not been left out of this drive. In order to successfully respond to new risks and possibilities driven by the digital revolution, internal auditors need to leverage these emerging technologies in order to achieve efficiency, effectiveness, and value for money. Thus, this study examined the relationship between emerging technologies and internal auditing process in universities in Nigeria. To achieve the objectives of the study, Using the census sampling technique, the study population of 124 members of the Conference of Heads of Internal Audit Departments/Units in Nigerian Universities (CHIADINU) made up the sample for the study. This study adopted the multivariate regression technique which aimed to establish a connection between many different factors. It specifies the relationship between the two sets of data, the independent and dependent ones. SMARTPLS version 3.0 was used in the data analysis. The results revealed that smart device technologies do not have a significant effect (t=1.666; p= 0,0096) on internal audit process. However, cloud computing had a significant effect (t=7.267; p=0,000) internal audit process. Emerging technology tools improve internal auditing professionals' efficiency, effectiveness, and value for money by enabling the collection of appropriate audit evidence and analysis of procedures and strategies. Thus, internal auditors must identify and utilize these tools to properly carry out internal audit functions in their organizations.

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In addition, organizations must invest in these technologies and also support relevant training of internal auditors.

Keywords: emerging technologies, internal auditing process, smart devices, cloud computing.

Introduction

Organizations today are embracing new digital technologies to leapfrog or keep pace with the growing competition in the marketplace (Barros & Marques, 2022). Potier (2018), opined that technology has changed how organizations run their businesses and from the use of mobile smart devices to robotics, the digital landscape had changed drastically. According to PricewaterhouseCoopers (PWC) 2012, technologies such as smart devices, cloud computing, social media, and cyber security have changed the scope and methodology of internal audit assignments as a result of changes in business operations. Internal auditors must adapt to these developments by updating their processes, procedures, methods, strategies, skills, and expertise to be relevant in the scheme of things (Shabani, et al., 2021). The internal auditing profession must thus embrace the current digitization of society, which presents great opportunities for internal auditors to perform their duties efficiently and effectively with the intention of adding value to their various organizations (Taiwo, et al, 2021).

Numerous studies (Adebayo et al. 2021; Agboola, 2022; Okafor and Obiora, 2022; Peters and Agwor (2022) have demonstrated how technology affects corporate operations and the general consensus is that an auditor may become outdated if he lacks a sufficient understanding of modern scientific, computing, and information technologies. To achieve efficiency, effectiveness, and value for money in auditing, which will continue to make them relevant in the grand scheme of things, the internal auditor must be aware of all these technological changes; how they are applied in various organizations; and how they could be applied to their own functions (Carpenter & McGregor, 2020). The current onslaught of technology has undoubtedly had an impact on the auditing profession, thus many

of the present auditing techniques are becoming obsolete as a result of technological advancements Mohd-Sanusi et al., (2022). Many businesses and professions have already introduced technological advancements into their work to boost productivity and efficiency, the auditing profession must not be left out (Thottoli et al., 2022).

According to Thottoli et al. 2022, investigating the effect of technology on internal auditing process in tertiary institutions would provide an explanation on how technology could increase the efficacy and efficiency of external auditors' tasks. Also, Taiwo et al. (2021) posits that there is a need to investigate the interactions between emerging technology and internal auditing in the Nigerian context, especially in academia where there have been issues of fraud.

The kernel of this study is to examine the interactions between emerging technologies and internal audit process. Different studies (Adebayo et al. 2021; Agboola, 2022; Okafor and Obiora, 2022; Peters and Agwor (2022) established that technology is a critical driver of auditing processes in multinational companies and small and medium-scale enterprises. However, the extent to which it drives the internal audit process in tertiary institutions is still a major concern in the existing literature.

The specific objectives are to:

i. evaluates the effect of Smart Devices (SD) on Internal Audit Process (IAP).
ii. determine the influence of Cloud Computing (CC) on Internal Audit Process (IAP).

Research Questions:

i. What effect do Smart Devices (SD) have on Internal Audit Process (IAP).
ii. What influence does Cloud Computing (CC) have on Internal Audit Process (IAP).

Hypothesis

Arising from the questions above, the following hypotheses were formulated:

$H0_1$: Smart Device Technology does not significantly affect Internal Audit Process

$H0_2$: Cloud Computing Technology does not significantly influence Internal Audit Process

2.1 Conceptual Review

2.1.1 Emerging Technologies

Emerging technologies are associated with scientific and technological advancements that are unique or disruptive and still in their early stages; but could have significant effects on the economy, environment, or society (Kӧnig et al., 2021). Emerging technology is a radical innovation and relatively rapid expansion of technology that is characterized by a degree of coherence that endures over time and has the potential to significantly affect the socio-economic domain(s) as seen in terms of the makeup of actors, institutions, and patterns of interactions among them, as well as the associated knowledge production processes. However, because its greatest influence will not be seen until later, the situation is still unclear and premature in the emerging phase (Rotolo, Hicks & Martin, 2015). Expert systems, big data analytics, artificial intelligence (AI), blockchain technology, mobile applications, digital tokens, Unstructured Supplementary Service Data (USSD), digital ledgers, augmented reality (AR), virtual reality (VR), drones, the Internet of Things (IoT), 3D printing, robotics, smart gadgets, social media, and cloud computing are critical technological inventions (Taiwo et al., 2021). However, smart devices, cloud computing, social media, and cyber security have been identified as important to the audit process (PWC, 2012).

2.1.2 Operationalization of Emerging Technologies

Smart Devices Technology

As the name indicates, a smart device is an electronic tool that can connect, share, and communicate with its user and other smart devices. Smart devices often feature a few megabytes of computer

power while being modest in size. It is a wired or wireless context-aware electronic gadget that can link to other devices for data exchange and perform autonomous computation. Examples are artificial intelligence, virtual reality, augmented reality, 5G networks, machine learning, green tech, drones; 3D printing, robotics, smart desks, smart locks, multi-device keyboards, WiFi scanners, E-Reception, smart thermostats, Closed circuit television (CCTV) Cameras, and a variety of other devices (Silverio, 2022).

Cloud Computing Technology

Cloud computing is the on-demand internet access to computing resources, such as software, servers (both physical and virtual), data storage, development tools, and networking capabilities, which are housed in a distant data center and controlled by a cloud services provider (CSP) for a monthly subscription fee or on an use basis (Alshareef, 2023). Examples include Software-as-a-Service, Infrastructure-as-a-Service, Platform-as-a-Service, File Sharing/Data Storage, Big Data Analysis, block chain, internet of things, fintech, cloud computing; voice assistant, defi, and big data; and Data Governance (Golightly, et al., 2022).

2.1.3 Internal Auditing

Audit refers to a methodical process for gathering and objectively assessing evidence of claims regarding financial operations and processes in order to ensure that the claims and benchmarks are consistent and to inform interested parties of the findings (Taiwo et al., 2021). Kumar and Sharma (2012) described auditing as checking the veracity, accuracy, and dependability of financial records. The financial records of a corporation are examined objectively, scientifically, thoughtfully, and critically. Internal audit, according to the Institute of Internal Auditors (IIA 2020), is an independent, unbiased assurance and consulting activity that aims at providing value and enhancing an organization's operations.

Auditing is a large field of study. Thus, the type of audit necessary under certain circumstances determines how the entire process will flow. Organizational structure (statutory, private, and government

audits), timing and scope of audit procedures (internal, interim, final, and balance sheet audits), specific objectives (cost, tax, management, operational, marketing, social, human resources, energy, and environmental audits), and affiliation of auditors (internal audit and external audit) are all factors that can help in classifying auditing (Kumar & Sharma, (2012)

According to Hammar (2015), an internal audit process entails planning (defining the scope and objective to developing audit steps to meet the objective); fieldwork (conducting the steps identified in the planning process which includes interviews, reviewing laws, policies, and best practice, verifying sample transactions, analyzing data sets, and conducting surveys); reporting (discussing the results of the audit, specific findings, and recommendations to the auditee) and follow-up (reviewing audit recommendations and corrective action plans to provide assurance that plans are implemented.

Universities are not exempted from the widespread usage of developing technologies in all sectors of business, and their importance cannot be overstated. The majority of university activities, such as student acceptance letters, course registration, tuition payments, result verification, and other things, are automated using information technology, and internal auditors are entrusted with preserving and monitoring all university activities. As a result, working as auditors in a digital world today presents more difficulties (Akinleye & Olanipekun, 2019).

2.1.4 Emerging Technology and Internal Audit Process

Although technological innovation can improve operational efficiency and effectiveness, it also introduces a number of risks that, if not addressed properly by auditors, can affect audit quality, efficiency, and professional development (McGregor & Carpenter, 2020). Thus, auditors must adopt new audit methods by utilizing state-of-the-art data analytics tools and technologies that can offer deeper insights into financial records in order to be more effective and hence raise the standard of the audit process as a whole (Nwankpa, 2014). The manual approach of auditing, which was the prior method in use, has become obsolete due to advancements in technology. Over time, an auditor's duties increased in precision, efficiency, professionalism, and quality, all of which could not be achieved with

the manual technique of auditing. Recent years have seen a tremendous increase in the complexity and size of company organizations, making it impossible for the traditional auditing method to continue serving its purpose effectively (Olagunju & Olugbenga, 2012). The internet, computers, and other current science and technology tools and facilities are typically used by firms in their businesses. As a result, information technology is used more and more in internal control management. Internal management data can assist businesses in changing the structure of their internal audit department, maximizing their audit resources, and ultimately reforming their auditing procedures (Xiaoqing & Chengqian (2015).

2.2 Theoretical Framework

This study is anchored on the Technology Acceptance Model (TAM) developed by Fred Davis in 1986. According to the model, when people are exposed to new technology, a variety of factors have a role in how and when they will use it. The two variables are perceived usefulness, which measures how much a person thinks using a certain system would improve his job performance, and perceived ease-of-use, which measures how much a person thinks using a certain system would be effortless. Therefore, if the technology is not regarded as beneficial and simple to use, no one has a favorable opinion of it (Owolabi et al., 2022). The adoption of the technology acceptance model is due to its ability to better predict how emerging technologies will be received based on their long-term benefits and simplicity of use. Thus, before adopting developing technologies as new strategies, processes, procedures, and methodologies in the internal auditing process, internal auditors must take into account the advantages of such technologies in addition to the belief that they will be simple to use.

2.3 Empirical Review

Carpenter and Macgregor, (2020) looked into how emerging technologies might be leveraged to improve business operations as a result of advancements in technology.. This study performed a qualitative analysis of prior research on the potential effects and applications of utilizing emerging technology in the audit process, as well as the benefits audit firms may get from doing so. Developing audit technology may improve the efficiency and caliber of audits by

automating a number of tiresome, repetitive tasks and assisting with the analysis of large datasets. The authors' claim was not put to an empirical test.

Adebayo et al., (2021) investigated whether or not information technology has a significant impact on tertiary institutions' internal control systems, researchers evaluated how information technology affects internal control systems in postsecondary institutions in Osun State. While the population of the study is made up of tertiary institutions in Osun State, a judgmental selection approach was used to select Obafemi Awolowo University because of its accessibility and ease. The questionnaire was circulated in one hundred and twenty (120) copies; one hundred (100) of those copies were returned and subjected to regression analysis. The study's findings showed that internal control systems and internal audit procedures at tertiary institutions in Osun State are highly influenced by information technology, with t-value and p-value values of 20.029 and 0.000, 19.049 and 0.000, respectively. It was determined that internal control systems and internal audit procedures at tertiary institutions are strengthened and improved by information technology.

Noor, et al. (2022) emphasized that the development of audit technology has altered many conventional methods of accounting and auditing evaluation. The study used the Technology to Performance Chain (TPC) paradigm to determine the major factors influencing Malaysia's auditors' use of audit technology. The findings were based on a survey completed in Malaysia using audit rooms of various sizes, and they were evaluated using the statistical techniques of structural equation modeling and partial least squares (PLS). The mediating effects of audit evaluation on the relationships between audit technology, situational support factors, and improved auditor work performance were also examined. The findings indicate that audit technology and situational assistance are more important to the effectiveness and efficiency of auditors' job. Additional analysis also gives evidence for the audit evaluation.

Shabani et al., (2021) studied Big Data Analytics in Internal Auditing. In their opinion, the usage of data is more important than ever as the world moves closer to an era of automation and artificial intelligence

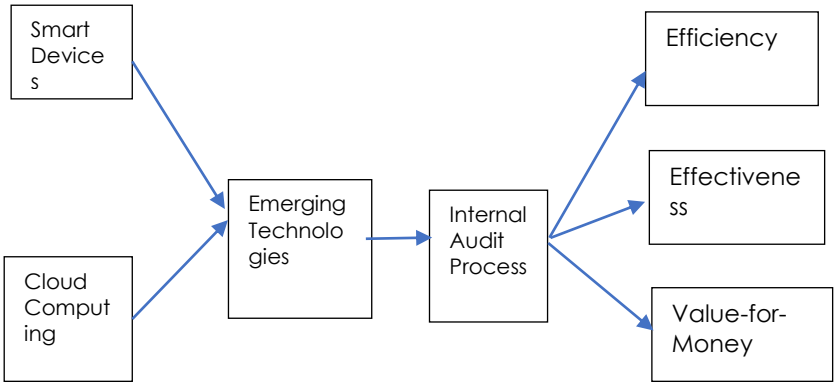
(AI). Numerous data analytics techniques are used by auditing companies to plan and carry out their audits. The article offers a thorough analysis of internal auditing as the key focus of big data analytics' application in auditing. Big data analytics' benefits for internal audits were discussed in the report. The study summarized the results of significant research in the field and also covered the most recent and cutting-edge developments in big data analytics in internal auditing. The study also discussed numerous difficulties in integrating big data analytics in internal auditing and offered predictions about further developments. The authors' claims were not put to an empirical test.

Taiwo et al., (2021) posited that the world is increasingly driven by technology, leading organizations to adopt innovative technologies to enhance their internal control mechanisms, including internal audits. The study investigated the impact of innovative technologies on the internal auditing of Osun State's local governments. A purposive sampling technique was used to select 100 auditors from 15 of the state's 30 local governments. The "Innovative Technology in Internal Audit Instrument" (ITII) was developed and validated using factor analysis to determine content validity, and Cronbach Alpha was used to evaluate the internal consistency and reliability of the ITII, which has an index of 0.791. The research hypotheses were analysed using analysis of variance (ANOVA). The findings reveal that innovative technology had a significant impact on internal audit of local governments in Osun State, Nigeria.

2.4 Conceptual Framework

Figure 1 indicates the relationship between emerging technologies dimensions and internal audit process

Figure 1: Conceptual Framework



Source: Author's (2024)

3.0 Methodology

This research work adopted the descriptive survey research design. The Nigerian universities were used as the theatre of study. The choice of this is influenced by the dearth of literature in the sector. The population of this study was made up of the entire 124 heads of internal audit departments from Nigeria's federal, state, and private universities who are members of the Conference of Heads of Internal Audit Departments/Units in Nigerian Universities (CHIADINU). The census sampling technique was used as all the 124 members of CHIADINU which made up the population were selected for the data collection. This technique is suitable because the population size is small and a higher degree of accuracy would be achieved because each member of the population is investigated.

Since this analysis is theoretical and the research setting is constrained, a sample size of 124 was deemed adequate for the study. The questionnaire was employed as the research tool to gather

information for the study. Mugenda and Mugenda (2003) argue that questionnaire is more objective than other survey devices. The questionnaire designed by Adebayo et al. (2021) and Noor et al. (2022) was modified for this research to capture the local dynamics. A five-point Likert scale was employed throughout data collection. According to Finstad (2010), the five-point Likert scale offers a more exact, significant, and accurate appraisal of the respondents' perspectives. The questionnaire was titled: "Application of Emerging Technologies on Internal Auditing Process". A 5-point Likert scale was used to measure the respondents' degree of acceptance of emerging technologies in the internal auditing process to achieve efficiency, effectiveness, and value for money. The questionnaire was subjected to validity and reliability tests. The research instrument was administered online to the respondents through the CHIADINU Whatsapp platform.

The study adopted a multivariate analysis technique to achieve the aim of the study. Brown (2016) asserts that a multivariate analysis takes into account more than one dependent variable and examines the numerous explanatory factors that might affect the dependent variables while also improving the study results. It specifies the relationship between the two sets of data, the independent and dependent ones. The SMARTPLS version 3.0 was used in the data analysis.

Model Specification

Anchored on the technology acceptance model and the studies of Adebayo et al. (2021) and Noor et al. (2022), a composite econometric model was formulated to reveal the interactions among the independent variable (emerging technologies) and the dependent variable (internal audit processes). According to Hair et al. (2019), the composite econometric model should be adopted when many variables are combined into one. Hence, the composite econometric model was adopted in the study to measure the multidimensional constructs used in the study represented by a single metric.

$$Internal\ AUdit\ Processes = \beta_0 + \beta_1(SDT) + \beta_2(CCT) + \mu$$

Where:

Internal Audit Processes = Efficiency, Effectiveness and Value for Money
SDT= Smart Devices Technology
CCT= Cloud Computing Technology
β0 is a constant
β_1, and β_2, are the coefficient estimators
μ= Error term

Based on the model above, there is expected to be a positive interaction between emerging technologies dimensions and the internal audit process measures in the apriori.

Table 1: Measurement of Variables

Variables	Variable Type	Latent Variable	Observed Variable	Authors
Internal Audit Processes	Dependent Variable	Internal Audit Processes	Efficiency, Effectiveness and Value for Money	Taiwo et al. (2021) and Shabani et al. (2021)
Emerging Technologies	Independent Variable	Emerging Technologies	Smart Devices Technology and Cloud Computing Technology	Kȍnig et al. (2022), Owolabi et al. (2022)

Source: Author's (2024)

Table 1 indicates the variables, their measurements and similar studies where they were used.

Reliability and Validity of the Research Instrument

A total of 121 (97.6%) questionnaires were filled out and found appropriate for analysis. According to Mugenda and Mugenda (2012), a questionnaire retrieval rate equal to or more than 50% is sufficient to make an inference. Confirmatory factor analysis (CFA) was performed to evaluate the diagnostic performance of the

instruments. The model's components were narrowed down based on Fornell and Larcker's (1981) criteria, and the observations of the independent variable (emerging technologies) and the dependent variables (internal audit process) were analyzed. The latent variables and the items' internal consistency were more than 0.5. The collected findings demonstrated acceptable construct and average variance dependability. This is vital for building credibility and establishing content validity. The researcher used the approaches of prior academics (Taiwo et al., 2021; Owolabi et al., 2022) as a starting point, modifying them so that they more accurately reflected the dynamics of the area. Both the first and second surveys were sent out to respondents with a two-week gap in between them so that the variables of interest could be assessed. Table 2 clearly demonstrates this.

Table 2: Reliability Test

Measurements	Construct Reliability (Crobanch Alpha)	Average Variance Extract	Confirmatory Factor Analysis
Emerging Technologies	0.833	0.769	0.818
Smart Devices Technology	0.841	0.757	0.832
Cloud Computing Technology	0.797	0.746	0.801
Emerging Technologies	0.885	0.762	0.845
Efficiency	0.821	0.753	0.818
Effectiveness	0.824	0.755	0.822
Value for Money	0.819	0.744	0.803

Goodness-of-fit indices: CMIN = 2.51; CFI = 0.98; IFI = 0.98; RMSEA = 0.05

Table 3 shows that the model passes Kline's normality test (1998). The value of Cook's distance was utilized to determine whether there was any external influence on the performance of the model, and it was found that none existed. As demonstrated in Table 3, the normalcy tests were successful.

Table 3: Normality Test

		Recommended Value	Emerging Technologies Dimensions	Internal Audit Process Dimensions
Multicolinearity	Tolerance	>. 10	0.84 to 1.84	1.87 to 1.96
	VIF	<10	4.64 to 5.76	2.73 to 4.15
Independence of Residual	Cook's distance for residual	<1.0	0.534	0.462

Results

The results in table 4 show that Smart Device Technology does not have a significant effect on Internal Audit Process. There is a non-significant relationship between Smart Device Technology and Internal Audit Process (β=0.337). The coefficient of variation (R^2=0.091) shows that 9.1% variation in Internal Audit Process is caused by Smart Device Technology. The standard error (SE= 0.181) shows that the model is not a good fit by indicating the extent Smart Device Technology accurately predicts Internal Audit Process since the value falls above the accepted estimates 2.5. The unstandardised beta (B=0.301) reveals that Internal Audit Process increase by 0.301 units when Smart Device Technology increases by a unit. The t-value (t=1.666, p=0.096) indicates that smart device technology not is a significant predictor of Internal Audit Process. The findings of the result establish that Smart Device Technology does not significantly drives Internal Audit Process.

Table 4. $H0_1$: Smart Device Technology does not significantly affect the Internal Audit Process

Variable		Internal Audit Process B	SE.	β	T-Value	P-Value
Smart Device Technology	0.301		0.181	0.337	1.666	0.096
AdjR2	0.091					
F-Stat	3.167					

The results in table 5 showed that Cloud Computing Technology significantly affects Internal Audit Process. There is a significant relationship between Cloud Computing Technology and Internal Audit Process (β=0.569). The coefficient of variation (R^2=0.304) shows that 30.4% variation in Internal Audit Process is caused by Cloud Computing. The standard error (SE= 0.076) shows that the model is a good fit by indicating the extent Cloud Computing Technology accurately predicts Internal Audit Process since the value falls within the accepted estimates 2.5. The unstandardised beta (B=0.551) reveals that Internal Audit Process increase by 0.551 units when Cloud Computing Technology increases by a unit. The t-value (t=7.267, p=0.0000) indicates that Cloud Computing is a significant predictor of Internal Audit Process. The findings of the result establish that Cloud Computing Technology significantly drives Internal Audit Process.=

Table 5. $H0_2$: Cloud Computing Technology does not significantly affect Internal Audit Process

Variable	B	Internal Audit Process SE.	β	T-Value	P-Value
Cloud Computing Technology	0.551	0.076	0.569	7.267	0.00
AdjR2	0.304				
F-Stat	3.167				

Figure 2 shows the interactions among the variables. The result reveals in achieving a robust internal audit process, cloud computing technology (β2=0.527) is the most significant dimension of emerging technologies. The analysis also shows that value for money (β2=0.851) is the most significant measure of the internal audit process affected by cloud computing.

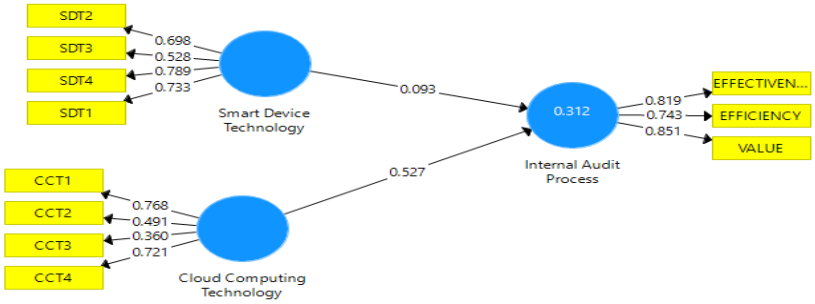


Figure 2: Effect of Emerging Technologies and Internal Audit Processes

$$\beta_0 + \beta_1(0.093) + \beta_2(0.527) + 0.141$$

Discussion of Results

Anchored on the technology acceptance model, the study established the link between emerging technologies and the internal audit process. In achieving the first research objective, the analysis shows that smart device technologies do not significantly affect the internal audit process. This may be explained by the fact that smart devices such as drones, robotics, 5G network and a host of such devices may not be readily available in a developing country like

Nigeria. This result is at variance with the study of Adebayo et al., (2021), who posited that internal audit procedures in tertiary institutions in Osun State are highly influenced by information technology, The analysis of the second research objective shows that cloud computing significantly drives Internal Audit Process. This may also be connected to the fact that cloud computing technologies such as the internet of things, fintech, voice assistant, defi, and big data are already available and in use in the country. The result is in consonance with that of Taiwo et al., (2021) who found out that innovative technology had a significant impact on internal audit of local governments in Osun State, Nigeria

5.0 Conclusion and Recommendations

Auditors can conduct audits in a more timely, effective, and efficient manner by using emerging technology tools, devices, and software. Emerging technology tools enable auditing professionals to gather sufficient and appropriate audit evidence. It can also be used to analyze procedures, processes, and strategies. As a result, auditors must utilize these tools to properly audit the financial statements of their clients. Advanced analytics and other digital technologies like robotic process automation are also assisting internal auditors in becoming more effective. They enable internal auditors to test the entire population as opposed to simply a sample of transactions, and by automating repetitive operations, they can significantly reduce costs. Additionally, they enable the internal audit department to concentrate on the jobs that call for human judgment, increasing understanding and allowing internal auditors to offer greater guidance on corporate procedures in addition to better auditing. However, in order to achieve these benefits, new abilities and more adaptable audit planning strategies will be needed. In addition, organizations must invest in these technologies and also support relevant training of internal auditors. Further research work could be carried out on other emerging technology variables such as social media and cyber security to determine their relationship with the internal audit process.

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