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Exploring Items for Measuring Usage of Information Technology in Internal Audit Effectiveness Construct: An Exploratory Factor Analysis

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Abstract

This research aims to explore investing item for measuring usage of information technology in the construct of internal audit effectiveness through exploratory factor analysis. The objectives of exploratory factor analysis (EFA) include identifying the measure's factor structure and assessing its internal consistency or reliability. EFA is crucial for determining which elements of the study instrument should be included. One of the most important elements influencing the usage of information technology in internal audit. To validate an instrument assessing the usage of information technology in the context of internal audit, this study will utilize exploratory factor analysis. This study's questionnaire is adapted from previous research. For the EFA, the researchers employed a cross-sectional research strategy, collecting data from 168 respondents using a semi-structured questionnaire. The researchers employed Krejcie and Mogan sampling table as the sampling technique. The findings revealed that there is a single component in the construct. Bartlett's Test of Sphericity yielded a significant result, with a with a Kaiser-Meyer-Olkin (KMO) measure of 0.871. The data were found suitable for further analysis (Chi-square = 1345.875, p-value 0.000). All items exhibited a Cronbach's Alpha of greater than 0.7, indicating their reliability. According to the study's conclusion, measurement tools used to assess the usage of information technology in this investigation are considered credible and valid.

Keywords: Usage of Information Technology, Internal Audit Effectiveness, Exploratory Factor Analysis, Instrument

Introduction

Among the determinants of Internal Audit Effectiveness (IAE), the Usage of Information Technology (UIT) is considered most crucial (Popoola, 2017). The public sector's financial management needs to be perfected because of developments in the financial industry on a worldwide scale, and in developing nations especially. The emergence of fraudulent activities and controversies due to financial crises and discrepancies has made internal audit procedures relevant for both public and private sector enterprises (Kaya & Utku, 2021). Following recent financial scandals and corporate failures, there has been a notable shift in research focus towards enhancing information assurance within internal audit functions (Arena & Azzone, 2009b; Cohen & Sayag, 2010; Ali, Mustafa, & Hanefah et al., 2013; Lenz & Hahn, 2015).

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Since actual technology is what is known as mysterious living, Information Technology (IT) is the apparent intelligence that a computer or other machine displays. The most relevant use of IT in Internal Audit Department (IAD) is its utilization. With the help of information technology, auditors can have more effective conversations with the company's top management on a variety of issues. Effective information management inherently relies on the digitalization of information technology. Maintaining open lines of communication with both management and staff can contribute to reducing fraud and corruption. Internal auditors can achieve their objectives and goals effectively and efficiently by leveraging information technology to access necessary data from management. This efficient use of technology supports optimal performance in audit functions (Albrecht, Howe, & Schueler, 1988).

The availability of information technology (IT) data has enabled the internal audit department to improve financial statement accuracy and adhere more closely to international auditing standards (Alzeban, 2019). However, UIT data can be leveraged for internal audit compliance with established standards (Chair et al., 2004). Although structured questionnaire items on UIT are limited in the literature, there is a wealth of research on UIT across various fields (Raudeliuniene, Albats, & Kordab, 2020). Consequently, the purpose of this paper is to validate an instrument for assessing internal audit effectiveness using Exploratory Factor Analysis (EFA). The data collection tool, modified and adapted from an earlier study (Davis, Schiller, & Wheeler, 2010: Fitrawansyah, 2015), was subjected to an EFA examination for validity and reliability. This process facilitates the adoption of the UIT questionnaire by researchers.

Literature Review

Usage of Information Technology (UIT) is defined as the use of any computer or electronic device, along with networking and other physical devices, to create, store, process, and communicate information (Peralta, 2009; Essienubong, 2018). It was identified as an important variable for understanding information technology within an organization. The study chose to utilize this definition due to its inclusivity. The study aims to enhance information technology knowledge and abilities by examining items for measuring UIT within the Internal Audit department. The accounting sector is one where the use of information technology techniques is widespread (Al-Aroud, 2020). Despite this, the field of basic accounting was the first to use information technology (Gioia & Pitre, 1990). Since then, software for financial models has shown to be quite beneficial in the analytical aspect of the auditing industry (Nasrah, Muda, & Kesuma, 2023). Nonetheless, this explains why the current study investigates how the inf tech measurement items have impacted the efficacy of IA in Nigeria. The items for assessing UIT have not been investigated in Nigeria; however, certain research have shown (Cho, Ahn, & Jung, 2018; Demeke, Kaur, & Kansal, 2020; Badamasi, Ahmad & Ghazali, 2024).

Organizations are facing challenges in remaining competitive as business practices rapidly evolve due to the increasing use of information technology. Internal audit functions now prioritize the application of technology-based audit approaches. According to Raudeliuniene et al. (2020) and Joshi and Marthandan (2023), the use of technology in internal audit can enhance the reliability, relevance, and sufficiency of audit evidence. Similarly, Kaya and Utku (2021) found that technology enhances Internal Audit Effectiveness (IAE). The ability to detect abnormalities is significantly aided by risk management, fraud reduction, and the introduction of information

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technology in the internal audit department. Prior research has supported the application of information technology in the field of IAE (Alkebsi, Aziz, Mohammed, & Dhaifallah, 2014; Ahmi et al., 2016; Josh & Karyawati, 2022).

Internal Audit Effectiveness

Various researchers have interpreted effectiveness in different ways. Arena and Azzone (2009a) defined effectiveness as the capacity to produce outcomes that align with the aims of the study. Effectiveness is the capacity to accomplish the aims and objectives of an organization (Dittenhofer, 2001). Nonetheless, endeavours may be deemed efficacious provided their outcomes align with the stated goals (Ahmad, Othman, & Jusoff, 2009; Mihret et al., 2010). Effectiveness is demonstrated by the internal auditor's actions, obligations, and professional practices, all of which are attained by adhering to audit standards, guidelines, goals, and procedures (Noor & Mansor, 2019).

According to Mihret et al. (2010), a survey, the internal audit's value-adding assumption provided insight into its effectiveness. This insight can be observed from two angles: the quality of the internal audit's capacity, which serves as a gauge for whether or not the internal audit is operating satisfactorily. Conversely, the results may provide internal auditors and public sector organizations with incentives to improve their performance. To analyse and explore the possibilities for internal audit to contribute value, a study on IAE is necessary. The investigations revealed conflicting and inconclusive results across diverse criteria proposed by researchers. These criteria are regarded differently, despite the widespread and incomplete notion of an internal audit paradigm change.

Many firms are facing challenges in staying competitive as business and auditing procedures rapidly change due to the increasing use information technology (Prayitno, 2020). Evidence has established that the application of information technology influences IAE (Ouko & Atheru, 2022). There is insufficient experience with information technology in the field of internal audit. High calibre professional internal auditors are needed to handle the intricacy of information technology and there are insufficient training programs for students in higher education. The effectiveness of the IA is correlated with the suitability and timeliness of the information used to expedite the internal auditor's decision-making processes.

Methodology

A quantitative method was employed in this investigation. Data was gathered using a self-administered questionnaire. In social sciences, numerical data gathered data collected in the field is typically analysed using quantitative technique. The data collection method involved administering a questionnaire (Tackie, Marfon-Yiadom, & Achina, 2016). The target demographic of this study comprises internal auditors' in kano state MDAs. Respondents were chosen based on their roles in the internal audit function, including Chief Internal Auditor, Deputy Chief Internal Auditor, and Senior Internal Auditor of Kano state MDAs. A total of 172 participants received copies of the questionnaires for this study. Out of these, 168 surveys were returned and used, which is considered a reasonable rate for investigation continuation (Sekaran, 2006). The study adopted the Krejcie and Mogan sampling technique table to determine the sampling technique.

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However, data for this study was gathered using structured questionnaires. The survey was based on previous investigations and the questionnaire was adapted and modified to suit the research objectives. Pre-testing of this questionnaire was conducted by specialists in the field of accounting and auditing who evaluated the instrument using criteria and content validity to ensure it suited the contextual requirement of the study. The specialists comprise of a professor, associate professor, and senior lecturer who reviewed the questionnaire by adding two additional items (5 & 6). This study utilized SPSS 26 for data analysis.

Research Instrument

Research instrument refers to tool used in quantitative research to collect and analyze data. It undergoes adoption, modification, and customization to align with the specific needs and objectives of a particular study. UIT consists of six (6) items adapted from previous studies (Davis et al., 1997; Fitrawansyah, 2015). The questionnaire is the primary tool employed in this study. The study has adopted and customized the questionnaire to commence the process of Exploratory Factor Analysis (EFA).

While existing empirical research has investigated the use of different UIT items in IAE, much of this research has predominantly focused on variables, such as Big Data and Computer Assisted Auditing Techniques (CAATs), among other factors. This indicates that certain UIT and IAE elements have received less attention (Chugh, 2019). To address this gap, this study incorporates additional items relevant to the context. Furthermore, the current study contributes to the body of knowledge by offering empirical evidence on UIT items in Nigeria that enhance internal audit effectiveness.

Exploratory Factor Analysis (EFA)

Exploratory factor analysis and exploratory structural equation modelling (ESEM) are the two most often utilized types of factor analytic techniques. Principal-axes and principal-components analysis are among the methods used in these technique (Grima, Baldacchina, Kizilkaya, Tabone, & Ellul, 2023). The instruments used in this study were derived from those developed by pervious researchers, with certain statements modified to align with the objectives of the present study. Researchers are required to utilize the EFA technique when modifying existing instruments and revising statements to fit the specific needs of their study (Frost & Wilmshurst, 1998). Out of the unrotated factor solution used in the exploratory factor analysis, it was found that 6 factors with eigenvalues larger than one accounted for 80.24% of the variation.

Findings and Discussions

Usage of Information Technology Construct

Six items (UIT1 through UIT6) were assessed using 5-point Likert scales to evaluate the UIT construct. Table 1 displays the item code, item statement, mean, and standard deviation for each item. It summarizes the mean and standard deviation of the investigation into UIT measurement item within the context of Internal Audut Effectiveness (IAE) variables using exploratory factor analysis in Nigeria. Respectively, the mean values ranged between 4.08 to 4.17 and the standard deviation ranged between 0.524 to 0.569 for the two variables. Consistent with the findings of

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Grima et al. (2023) and Kumar, Garg, and Garg (2020), the results confirmed that the UIT items are validated and can be utilized as a reference point or to move on with the EFA.

Table 2 shows that the KMO value for UIT is 0.871 and the Bartlett's Test of Sphericity yielded a significant result (Chi-square = 1345.875, p-value 0.000). These findings indicated that the data are suitable for proceeding with the factor analysis process, which aligns with the conclusions stated by Ali and Naushad (2022).

Table 3 demonstrates that the EFA yielded a single component with an eigenvalue greater than 1.0. This component explains 80.244% of the total variation in UIT measurement, which is considered adequate when the total variance explained exceeds 80%. The measurement items of UIT described were validated for internal audit effectiveness, as indicated by the EFA results shown in Table 3, where all items contributed to a total variation explained of over 80%.

Table 1: Mean and Standard Deviation

Item Code	Item Statement	Mean	Std. Deviation
UIT1	Internal auditing would be difficult to perform without the usage of hardware.	4.08	.552
UIT2	Using software applications allows internal auditors more control over internal audit activities.	4.17	.569
UIT3	Using communication technologies improves the effectiveness of internal auditors.	4.14	.524
UIT4	Information technology is used to monitor, optimize, and troubleshoot the performance of programs used by internal auditors.	4.13	.531
UIT5	Using networking decreases the time spent by internal auditors on non-productive activities.	4.13	.549
UIT6	Using electronic data allows internal auditors to complete more work than would otherwise be possible.	4.13	.553

Source: Authors (2023)

Table 2: KMO and Bartlett's Test

Kaiser-Meyer- Olkin Measure of Sampling Adequacy		.871
Approx. Chi-Square		1345.875
Bartlett's Test of Sphericity	DF	15
Sig.		.000

Source: Authors (2023)

Table 3: Total Variance Explained (TVE)

Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.815	80.244	80.244	4.815	80.244	80.244
2	.652	10.862	91.107			
3	.253	4.208	95.315			
4	.180	2.996	98.312			
5	.076	1.264	99.576			

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6	.025	.424	100.000			

Extraction Method: Principal Component Analysis.

Source: Authors (2023)

Figure 1's scree plot demonstrated that the EFA results in a single component, suggesting that this component encompasses all parts within this construct.

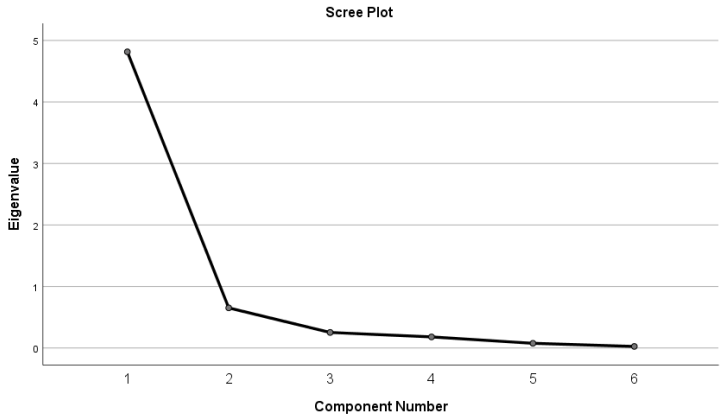

Figure 1: scree plot
Authors (2023)

Table 4 displays the factor loadings for each item, all of which belong to the same component. Each item had a factor loading exceeding 0.6, meeting the criteria for retention in the analysis. Thus, all items were retained for further investigation.

Table 4: Component Matrix

Item Code	Component 1
UIT1	.880
UIT2	.696
UIT3	.969
UIT4	.960
UIT5	.925
UIT6	.916

Extracted Method: Principal Component Analysis
a. 1 component extracted
Source: Authors (2023)

Reliability

Reliability is defined as the ability of an instrument to display the same result consistently over time. It demonstrates how reliability and consistently the instrument measures the variable (Ouko & Atheru, 2022). The objective of reliability analysis is to achieve substantial agreement across multiple attempts to measure the same theoretical constructs (Ahmed Haji & Anifowose, 2016). The lower bound's Cronbach's Alpha coefficient was used in a reliability test to ensure that the

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instrument could consistently measure the items it was designed to assess, and the result was found to be greater than or equal to 0.7 (Ramzan, Khurram, & Ahsan, 2022). Table 5 displays the Cronbach's Alpha value, indicating that the UIT construct in this study exhibited high reliability coefficient values, qualifying for further research.

Table 5. Reliability Statistics

S/N	Construct	No. of Items	Cronbach's Alpha
1	Usage of Information Technology (UIT)	06	.947

Source: Authors (2023)

Conclusion

This study makes a valuable contribution to the measurement of usage of information technology. It successfully demonstrated the validity and reliability of the new instrument, supported by a high Cronbach's Alpha in the reliability measurements. The UIT construct was assessed using six (6) items. The significant results from Bartlett's Test of Sphericity and the KMO indicate that the data can be used further. The comprehensive scale development and validation procedures used in this study affirm that the new UIT instrument is robust and exhibits internally consistent.

This research project aims to address a gap in the literature by examining UIT constructs related to internal audit effectiveness. There were six developed items that may be utilized to investigate how UIT affects different factors. By employing this scale, researchers can assess how different capabilities of UIT platform influence the determinants of IAE. Professional auditors can use this scale to understand how internal auditors perceived these functionalities, with the aid of this scale, aiding the stakeholders in evaluating their impact various aspects. This scale can help identify weaknesses in functionality and suggest improvements, enhancing the user experience for internal auditors as they update and refine their audit working papers.

The study aims to provide future researchers with valuable insights into the measurement items of UIT in internal audit department by validating UIT items that fit certain contextual setting to improve internal audit function. In addition, the study considered a wide range of internal and external factors that impact on the measurement items of UIT in the effectiveness of internal audits, building on research on IAE in the context of UIT.

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