

Impact of Information and Communication Technology on Internal Control and Risk Management

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ABSTRACT

Despite the increasing adoption of Information and Communication Technology (ICT) in organizational operations, many organizations in Nigeria continue to experience weaknesses in internal control and risk management systems. Challenges such as inadequate fraud detection, poor compliance monitoring, ineffective financial reporting, and limited technological competence among employees have exposed organizations to operational and financial risks. These persistent issues underscore the need to examine the role of ICT as a tool for strengthening internal control mechanisms. This study therefore investigates the influence of Information and Communication Technology on internal control and risk management systems in organizations operating in Oyo State, Nigeria. The study covers small and medium-sized enterprises (SMEs) and large organizations, including hotels, manufacturing companies, finance companies, and accounting firms. The population of the study comprises 100 firms across these sectors. A stratified random sampling technique was employed to select 100 staff members from the sampled organizations. Primary data were collected through structured questionnaires and analyzed using descriptive statistics and the Chi-square test of independence. The study examined key components of internal control such as financial reporting, risk management, fraud detection, compliance monitoring, and overall operational controls. The findings reveal that ICT adoption significantly enhances the effectiveness of internal control systems by improving transparency, safeguarding assets, strengthening compliance, and mitigating organizational risks. The study recommends continuous investment in ICT infrastructure and targeted employee training to develop relevant technological skills, thereby enabling organizations to maximize the benefits of ICT in internal control and risk management.

Key words: Risk management, Internal control system, Information Communication Technology, Organization

Introduction

The rapid advancement of Information and Communication Technology (ICT) has fundamentally reshaped organizational processes by reducing time, distance, and space constraints in business operations. ICT integrates high-speed computing devices with advanced communication networks capable of transmitting multimedia information, thereby enhancing operational efficiency, accuracy, and responsiveness. Conceptually, ICT encompasses the electronic collection, storage, processing, and dissemination of information, while communication technology refers to the hardware and software infrastructures that enable data transmission across physical locations. The strategic application of ICT has become indispensable for organizations seeking to improve productivity, reduce operational costs, and strengthen governance mechanisms (Raita et al., 2020).

Empirical evidence from industrialized economies demonstrates that ICT facilitates fast, cost-effective, and reliable communication, contributing significantly to improved organizational performance (Raita et al., 2020). Studies by Hendriyani and Auliana (2018) further confirm that the adoption of digital technologies including the internet, cloud computing, artificial intelligence, big data analytics, mobile communication, and broadband networks positively influences efficiency, competitiveness, and decision-making capabilities of organizations. However, these benefits are not uniformly realized across countries, as developing economies such as Nigeria continue to face challenges related to infrastructure, technological readiness, and workforce competence, which may limit the effectiveness of ICT deployment.

Within organizational governance, ICT plays a critical role in enhancing internal control systems, particularly in financial reporting and risk management. A well-designed ICT infrastructure supports the integration of financial transactions throughout the accounting cycle, improves data accuracy, and enables timely preparation of reliable financial statements through accounting information systems. Wijayanti et al. (2024) identified accounting information systems as among the oldest and most widely adopted information systems in business, highlighting their central role in ensuring accountability and transparency.

Showing the necessity of ICT-driven control mechanisms. According to Apriliya and Mulyadi (2023), an internal control system consists of organizational structures, policies, and

procedures designed to safeguard assets, ensure the reliability of accounting information, enhance operational efficiency, and promote adherence to management policies. Similarly, Koutoupis and Malisiovas (2023) conceptualize internal control as a continuous process that provides reasonable assurance regarding the achievement of organizational objectives. Mulyadi et al. (2017) further emphasize that effective internal control systems rely on coordinated methods and measures to mitigate risks and prevent fraud.

Statement of the Problem

Despite the theoretical and empirical support for ICT as a facilitator of effective internal control, many organizations in Nigeria continue to experience deficiencies in financial reporting accuracy, fraud detection, compliance monitoring, and risk management. These challenges are particularly pronounced among small and medium-sized enterprises, where limited ICT infrastructure and insufficient employee technical skills undermine the effectiveness of internal control systems. The persistence of these weaknesses raises concerns about the extent to which ICT adoption has been effectively integrated into internal control frameworks within Nigerian organizations. Consequently, there is a need for empirical investigation to scientifically establish the influence of ICT on internal control and risk management practices. This study aim focus on the influence of Information and Communication Technology on internal control and risk management in organizations

Research hypotheses

- H₀₁: Adoption of Information and Communication Technology (ICT) has no significant effect on the design, implementation, and adaptation of internal control procedures in organizations.
- H₀₂: Adoption of Information and Communication Technology (ICT) has no significant influence on organizations' ability to identify, manage, and respond to emerging risks and comply with regulatory requirements.

Literature Review

Empirical studies have consistently demonstrated the significant role of Information and Communication Technology (ICT) in strengthening internal control systems and risk management across diverse sectors. In the Nigerian context, Adebayo et al. (2024) examined the influence of information technology on internal control systems in tertiary institutions using a questionnaire-based survey and a descriptive research design. The study assessed internal control activities in relation to ICT usage and found that information technology significantly enhances internal control systems as well as internal audit processes within Nigerian tertiary institutions. These findings underscore the relevance of ICT in improving accountability and governance in public-sector organizations.

Extending the discourse to advanced industrial environments, Rodríguez-Espíndola et al. (2022) analyzed the adoption of emerging digital technologies for risk management in the era of digital manufacturing. Grounded in institutional theory and the resource-based view, the study evaluated technology acceptance levels associated with artificial intelligence and cloud computing from the perspective of operations managers. Using data from 117 operations managers in the United Kingdom manufacturing sector and employing structural equation modelling, the study revealed that the adoption of advanced digital technologies significantly improves organizational risk management capabilities. However, the authors identified a gap concerning the broader integration of managerial perspectives beyond operations management.

Similarly, Fraihat et al. (2024) investigated the impact of information management technology on financial internal controls in accounting firms in Jordan. Drawing on the Committee of Sponsoring Organizations of the Treadway Commission (COSO) Enterprise Risk Management framework, the study examined how technology adoption, firm size, and system integration influence internal control efficiency. The population comprised 45 accounting firms, and data were analyzed using Partial Least Squares (PLS) and Analysis of Variance (ANOVA). The results indicated a statistically significant positive relationship between technology adoption and internal control effectiveness, highlighting the importance of integrated technological systems in governance structures.

Beyond organizational and accounting contexts, Naik and Navaneetham (2024) explored the influence of ICT on farm management and climate risk mitigation in Telangana State, India.

Employing a descriptive survey design and convenience sampling, data were collected from 80 farmers. The findings revealed a significant positive relationship ($p < 0.001$) between ICT usage and climate change risk management. Although ICT adoption had a limited impact on productivity levels, it enhanced income stability, decision-making, and market access. Collectively, these studies provide robust empirical evidence that ICT adoption plays a critical role in improving control systems, risk management, and decision-making across sectors, while also highlighting contextual variations in outcomes.

Methodology

This study adopted a **descriptive survey research design**, which is appropriate for examining the influence of Information and Communication Technology (ICT) on internal control and risk management practices within organizations. The design enables the collection of quantitative data from a cross-section of respondents and facilitates statistical analysis of relationships between ICT adoption and internal control mechanisms. The study was conducted in **Oyo State, Nigeria**, a region with a diverse concentration of business organizations across multiple sectors, making it suitable for investigating ICT adoption and internal control practices. The population of the study comprises **100 organizations**, including large enterprises and small and medium-sized enterprises (SMEs) operating in Oyo State. These organizations span various sectors such as **hotels, manufacturing companies, finance companies, and accounting firms**. The selected sectors are particularly relevant due to their reliance on ICT for financial reporting, operational control, and risk management. A **stratified random sampling technique** was employed to ensure adequate representation of key professional groups involved in internal control and financial decision-making. A total of **100 respondents** were selected from the sampled organizations. The stratification was based on professional roles as presented below:

Group	No. sampled
Accountants	50
Auditor	20
Financial analyst	20
Others	10
Total	100

Primary data were collected using a **structured questionnaire** designed to capture respondents' perceptions of ICT adoption, internal control procedures, and risk management practices. A total of **100 questionnaires** were administered and retrieved, ensuring a high response rate suitable for statistical analysis. Data collected were analyzed using **both descriptive and inferential statistical techniques**. Descriptive statistics, including frequency distributions, tables, and charts, were used to summarize respondents' demographic characteristics and key variables. Inferential analysis was conducted using the **Chi-square test of independence** to examine the relationship between ICT adoption and internal control as well as risk management practices. The Chi-square test was considered appropriate due to the categorical nature of the data and the study's hypotheses.

Chi-square test (χ^2)

The observed value (O) of a variable are the values obtained as a result of a survey or performance of an experiment. On the other hand, the expected values (E) are the values that ought to result from the experiment under normal condition.

$$\chi^2 = \sum_{i=1}^n \frac{(O_i - E_i)^2}{E_i} \quad (1)$$

Also, $\chi^2 = \frac{(n-1)S^2}{\sigma^2}$ (on population variance) with the degree of freedom (r-1)(c-1).

The expected frequency is computed by:

$$E = \frac{(\text{Row total}) \times (\text{Column total})}{\text{Total Sample size}} \quad (2)$$

Result and Discussion

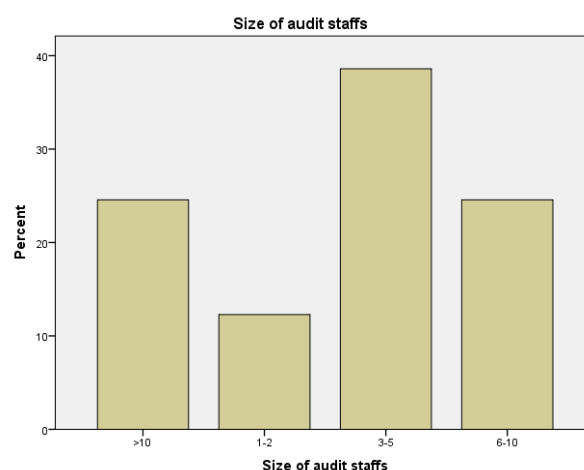
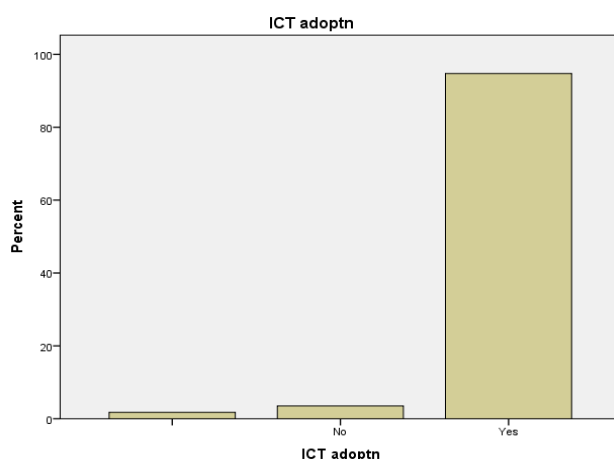
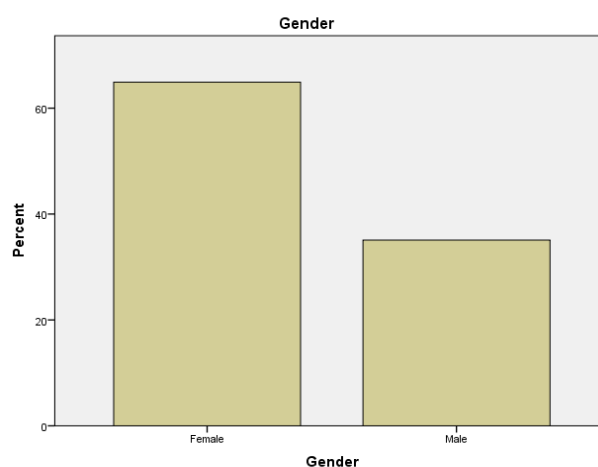
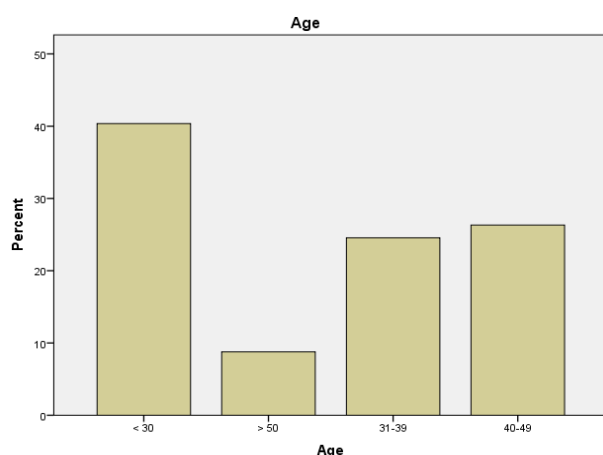
Descriptive presentations

Table 1: Demographic structure of respondents

S/N	Variables	Characteristics	Frequency (F)	Percentage (%)
1	Gender	Male	37	64.9
		Female	20	35.1
	Total		57	100
2	Age	< 30	23	40.4
		31-39	14	24.6
		40-49	15	26.3
		> 50	5	8.8
	Total		57	100
3	Qualification	ACA/ CPA	4	7.0
		HND/ Bsc	37	64.9
		MSc/ PhD	12	21.1
		OND	4	7.0
	Total		57	100
4	Years of Experience	0	7	12.3
		1-2	8	14.0
		3-5	21	36.8
		6-10	13	22.8
		>10	8	14.0
	Total		57	100
5	Size of audit staff	1-2	7	12.3
		3-5	22	38.6
		6-10	14	24.6
		>10	14	24.6
	Total		57	100
6	ICT adoption	No	3	5.3
		Yes	54	94.7
	Total		57	100

Source: field survey, January 2024.

Comments: As indicated in Table 1, 37 (64.9%) out of the 57 respondents are male while female accounts for 20 (35.1%). 23(40.4%) of the respondents are 30 years old and below, 14(24.6%) of the respondents are age between 31 and 39 years old, 15 (26.3%) are between the ages of 41 to 49 years old while the rest 5(8.8%) of the respondents are of age 50 years old and above. 4 (7%) of the respondents have ACA/ CPA, 4 (7%) are OND holders, 37 (64.9%) are HND/B.Sc. holders while 12 (21.1%) of the respondents are M.Sc./PhD degree holders. Majority of the respondents 17 (43.1%) have more than ten years of experience. 21 (36.8%) of the respondents have between 3 to 5 years of experience while 13 (22.8%) of the respondents have between 6 to 10 years of experience. 54 (94.7%) of the respondents adopt ICT.



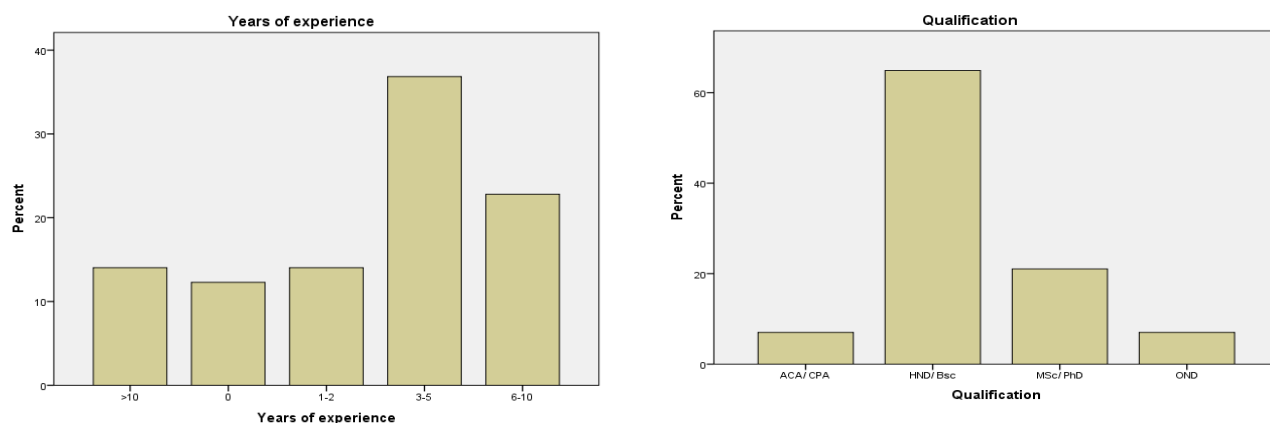


Figure 1: Bar Charts representing Age, Gender, Size of audit staff, ICT adoption, Qualification and Year of Experience of the Respondents.

Chi-Square Test

Table 2: Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Adoption of ICT influence	100	4.42	.653	3	5
Changes in the segregation of duties	100	1.82	.384	1	2
ICT Risk assessment	100	3.56	1.102	1	5
ICT challenges to the overall effectiveness	100	2.61	.620	1	3
Challenges of ICT adoption	100	2.40	.842	1	4
Training and support during ICT transition	100	3.02	.855	1	4

Table 3: Test Statistics

	Adoption of ICT influence	Changes in the segregation of duties	ICT Risk assessment	ICT challenges to the overall effectiveness	Challenges of ICT adoption	Training and support during ICT transition
Chi-Square	16.421 ^a	24.018 ^b	32.211 ^c	34.211 ^a	31.211 ^d	23.912 ^d
Df	2	1	4	2	3	3
Asymp. Sig.	.000	.000	.000	.000	.000	.000

Decision: From Table 3, all the p-values are 0.000 which are less than 0.05 level of significance. Alternative hypothesis is thereby accepted.

Table 4: Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
ICT facilitate identification of risks	100	3.14	.811	1	4
ICT and regulatory requirements	100	3.28	.648	2	4
Challenges in ICT adoption	100	1.68	.469	1	2
Collaboration with IT security teams	100	2.95	.833	1	4
Regulatory requirements to ICT adoption	100	1.84	.368	1	2

Table 5: Test Statistics

	ICT facilitate identification of risks	ICT and regulatory requirements	Challenges in ICT adoption	Collaboration with IT security teams	Regulatory requirements to ICT adoption
Chi-Square	29.246 ^a	14.632 ^b	7.737 ^c	35.561 ^a	26.684 ^c
Df	3	2	1	3	1
Asymp. Sig.	.000	.001	.005	.000	.000

Decision: From Table 5, all the p-values are less than 0.05 level of significance. Alternative hypothesis is thereby accepted.

Discussion of Findings

The adoption of ICT does significantly influence the design and adaptation of internal control procedures, resulting in changes to control activities, segregation of duties, and risk assessment. This is in line with Huidong, M (2023) that reported that ICT (digital transformation) has a positive impact on the improvement of corporate internal control quality. Further analysis revealed that the adoption of ICT influences the identifying and addressing of emerging risks as well as meeting regulatory requirement. This is in convergence with Bam, *et. al* (2022) that reported that ICT played an important role on effectiveness of risk management.

Conclusion and Recommendations

The findings reveal that ICT adoption significantly enhances organizations' ability to identify and address emerging risks while ensuring compliance with regulatory requirements. The study concludes that ICT is a critical tool for strengthening internal control and risk management systems. Accordingly, it is recommended that both SMEs and large organizations intensify the adoption of ICT to improve internal control effectiveness, and that managers and business owners actively promote the use of ICT for efficient and sustainable risk management.

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