



IJSKSRP

INTERNATIONAL JOURNAL OF SUVARNA KARNATAKA STUDIES AND RESEARCH PUBLICATIONS

CURRENT ISSUE | ONLINE/OFFLINE PRINT JOURNAL EDITION - 5 , 2026

**Current Issue | Edition 5 | Volume 8 | Issue 8 | October-2026–
December-2026 | Multi Disciplinary Subjects Research Journal|DIP:-
IF:-| ISSN NO:2583-7303|Approved Date:-15-05-2023.**

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PARAMEDICAL SCIENCES| ENGINEERING TECHNOLOGY SCIENCES | SOCIAL-BEHAVIOURAL
SCIENCES | PHARMACY | NURSING SCIENCES]**

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JOURNAL PARTICULARS

Title	INTERNATIONAL JOURNAL OF SUVARNA KARNATAKA STUDIES AND RESEARCH PUBLICATIONS
Frequency	Quarterly [LICENSED BY. MBCIT-GOVT.INDIA , UGC-CARE NMC- Aproved, Scopus Indexed Journal]
ISSN NUMBER .	2583-7303, Aproved date ;-15-05-2023.
Publisher	Suvarna karnataka integrated rural development society
Chief Editer	Prof.Dr.Shivalingaiah mallappa.
Copyright	IJSKSRP
Starting year	Edition 1 , Volume1 , Issue-1, October 2022-2023
Subject	Multidisciplinary Subjects

Language	English
Publication Format	Online (View Instruction to Authors)
Phone Number	94499 76451/94491 33684
E-mail	editor@ijsksrp.com ijsksrp2022@gmail.com
Website	https://ijsksrp.com
Publisher Address / Chief Editor Address	<u>Publisher Address :</u> Suvarna karnataka integrated rural development society Someswarapuram tumakuru-572102, karnataka india, Email: skirdsgo1997@gmail.com <u>Chief Editor Address :</u> Prof.Dr.Shivalingaiah mallappa. Professor and head. , dept.Of clinical psychology. Suvarna karnataka institute of studies and research center . No. 2 1st floor 6th cross, someswarapuram. Tumakuru-572102. Karnataka india, Email: ijsksrp2022@gmail.com

ORIGINAL RESEARCH ARTICLE

Digital Forensics and Cybercrime Investigations: An Empirical Assessment of Forensic Readiness in Nigeria's Economic and Financial Crimes Commission (EFCC)

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Abstract

The rapid expansion of Nigeria's digital economy has intensified exposure to cyber-dependent and cyber-enabled crimes, placing significant pressure on national investigative institutions. This study provides an empirical assessment of forensic readiness within the Economic and Financial Crimes Commission (EFCC), Abuja, focusing on technological infrastructure, human resource capacity, procedural compliance, and institutional policy support. Using a mixed-methods design, data were collected from 120 EFCC personnel through structured questionnaires and semi-structured interviews. Quantitative analysis included descriptive statistics, Pearson correlation, and simple linear regression to determine the relationship between forensic readiness and cybercrime investigation effectiveness. Results indicate moderate forensic readiness (overall mean = 3.2), with notable gaps in cloud forensics, staff certification, and alignment with international standards. Human resource capacity scored low (mean = 2.7), while technological infrastructure showed moderate adequacy (mean = 2.9). Procedural compliance was inconsistent, particularly regarding international forensic standards (mean = 2.8). Regression analysis

confirmed a significant positive relationship between forensic readiness and investigation effectiveness ($p < .05$). The study concludes that EFCC possesses foundational forensic capability but requires strategic investment, standardized procedures, and continuous professional development to meet global cybercrime investigative demands. Recommendations include upgrading forensic laboratories, institutionalizing forensic readiness policies, enhancing inter-agency collaboration, and adopting international best practices. Strengthening forensic readiness is essential for improving prosecutorial outcomes, safeguarding digital ecosystems, and reinforcing judicial confidence in Nigeria.

Keywords: Digital Forensics, Cybercrime, EFCC, Forensic Readiness

INTRODUCTION

Background to Study

Nigeria's rapid digital transformation—driven by electronic banking, mobile money, e-commerce, and digital government systems—has expanded economic opportunities while simultaneously increasing exposure to cyber-dependent crimes. As noted, “the expansion of Nigeria's digital economy has created new frontiers for economic growth but has equally exposed systemic vulnerabilities that cybercriminals exploit with alarming efficiency” (Nwankwo & Adesina, 2022, p. 134). Cybercrime in Nigeria now manifests through online fraud, identity theft, phishing, ransomware, business email compromise, and unauthorized access to sensitive data. These crimes have evolved from isolated incidents into organized, transnational, and technologically sophisticated operations.

Addressing this threat requires strong institutional capacity for digital forensic readiness—defined as the proactive ability to collect, preserve, analyze, and present digital evidence in line with legal and scientific standards. As emphasized, “forensic readiness is the backbone of credible cybercrime prosecution, as it bridges the gap between detection and admissible proof” (Eze & Onwuegbuchi, 2023, p. 211). Although the Cybercrime (Prohibition, Prevention, etc.) Act of 2015 provides a legal foundation, enforcement remains constrained by limited forensic infrastructure and weak institutional coordination (Ibrahim & Ojo, 2023).

The Economic and Financial Crimes Commission (EFCC), established in 2003, plays a central role in investigating cyber-enabled financial crimes. However, the complexity of modern cybercrime has

outpaced its investigative capacity. Persistent deficiencies include inadequate forensic laboratories, limited access to advanced tools, poor evidence storage, and weak chain-of-custody procedures. As reported, “many digital investigations in Nigeria suffer from weak procedural compliance, with evidence sometimes compromised due to lack of forensic documentation or improper storage conditions” (Adebisi & Olalekan, 2022, p. 88). Human resource gaps further undermine investigative effectiveness, with digital forensic competence remaining scarce (Ogunyemi & Abdullahi, 2025).

Judicial skepticism toward digital evidence—stemming from inconsistent forensic procedures—continues to weaken prosecution outcomes (Bello & Eze, 2023). Although the EFCC has established a Cybercrime Section and Digital Forensic Laboratory and engaged in international training, these efforts remain sporadic. As cautioned, “sporadic training and donor-driven interventions do not equate to sustainable forensic readiness” (Adedeji & Nwosu, 2024, p. 223). This study therefore assesses the EFCC’s forensic readiness, focusing on infrastructure, human capacity, procedural compliance, and policy frameworks.

Statement of the Research Problem

Cybercrime has become a daily reality in Nigeria, affecting individuals, businesses, and government institutions. The EFCC is expected to investigate these offences and secure convictions, yet the sophistication of cyber-dependent crimes has intensified pressure on its forensic capacity. Digital evidence—emails, logs, mobile data, server records—now forms the backbone of cybercrime investigations, but effective handling requires high forensic readiness.

Despite the Cybercrime Act of 2015, many cases fail due to poor evidence preservation, analysis, or presentation. As noted, “many cybercrime cases fail not because the offence did not occur, but because digital evidence was poorly preserved, improperly analyzed, or inadequately presented in court” (Ogunyemi & Oludayo, 2022, p. 61). Investigations remain largely reactive, lacking a clearly defined and consistently applied forensic readiness framework (Nwankwo, 2023). Even where tools exist, their effectiveness is limited by inadequate training and insufficient laboratory infrastructure (Eze, 2024).

Given the strategic role of the EFCC’s Abuja headquarters in high-profile cybercrime

investigations, weaknesses at this level have nationwide implications. Delays in forensic analysis, compromised evidence chains, and weak expert testimony undermine prosecutorial success and institutional credibility. Without an empirical assessment of forensic readiness, Nigeria risks maintaining a fragmented, reactive, and technically inadequate cybercrime response system.

Justification of the Proposed Research

This research is justified by its academic relevance and practical importance. While global scholarship increasingly recognizes the role of institutional readiness in cybercrime enforcement, Nigerian studies have focused more on cybercrime prevalence and legal frameworks than on forensic preparedness (Adejumo, 2021; Nwosu & Abdulraheem, 2023). By assessing forensic readiness within the EFCC, this study contributes original knowledge to criminology, cybersecurity, information systems, and public administration.

Practically, the study supports Nigeria's efforts to strengthen digital security and improve justice delivery. Its findings will guide policymakers and EFCC leadership in resource allocation, training design, and

development of standard operating procedures for digital evidence management. Strengthening forensic readiness enhances the credibility and admissibility of electronic evidence, improves prosecution outcomes, and reinforces judicial confidence.

The study also aligns with the best international practices, including principles of the Budapest Convention on Cybercrime. By identifying gaps and proposing reforms, it provides a pathway for translating global forensic standards into locally workable institutional practices.

Research Questions

- i. To what extent is the EFCC prepared in terms of forensic readiness to effectively handle cybercrime investigations?
- ii. How do the EFCC's infrastructure, digital forensic tools, and technical capabilities support or hinder digital evidence management?
- iii. What challenges does the EFCC face regarding human resource capacity and training in digital forensics?
- iv. How does procedural compliance and adherence to international forensic standards

affect the admissibility of digital evidence in Nigerian courts?

v. What strategies or reforms can enhance the EFCC's forensic readiness and improve cybercrime investigation outcomes?

Research Hypotheses

H₀₁: No significant relationship exists between digital forensic readiness and effective cybercrime investigations in the EFCC, Abuja.

H₁₁: A significant relationship exists between digital forensic readiness and effective cybercrime investigations in the EFCC, Abuja.

H₀₂: Forensic infrastructure availability does not significantly influence the quality and timeliness of digital investigations.

H₁₂: Forensic infrastructure availability significantly influences the quality and timeliness of digital investigations.

H₀₃: Human resource capacity and forensic training have no significant impact on cybercrime prosecution success. H₁₃: Human resource capacity and forensic training significantly impact cybercrime prosecution success.

H₀₄: Institutional policies and evidence-management procedures do not significantly affect digital evidence admissibility.

H₁₄: Institutional policies and evidence-management procedures significantly affect digital evidence admissibility.

Objectives

Main Objective

To assess the forensic readiness of the EFCC in conducting cybercrime investigations, focusing on infrastructure, human resources, procedural compliance, and alignment with international forensic standards.

Specific Objectives

- i. To evaluate the adequacy of EFCC digital forensic infrastructure.
- ii. To assess human resource capacity, training, and competence in digital forensics.
- iii. To examine adherence to forensic best practices and evidence-handling procedures.
- iv. To identify challenges hindering forensic readiness.
- v. To propose strategies and recommendations for improving forensic readiness.

LITERATURE REVIEW

Introduction

Recent Nigerian scholarship (2021–2026) consistently identifies forensic readiness as a decisive institutional condition shaping

cybercrime investigation effectiveness, particularly within the EFCC. The literature highlights persistent gaps in technological infrastructure, human resource capacity, procedural compliance, policy support, and cross-border cooperation. These gaps motivate empirical assessment of forensic readiness as a multidimensional construct influencing the quality of digital evidence and the outcomes of cybercrime investigations.

Forensic Readiness: Conceptual Foundations

Forensic readiness has evolved from a technical function to a strategic institutional capability (Casey, 2011; Rogers, 2020). Nigerian scholars emphasize proactive, system-wide readiness rather than reactive responses. As Adebisi and Olalekan (2022) note, *“forensic readiness represents the institutional bridge between cybercrime detection and judicially sustainable prosecution”* (p. 86). Within this study, forensic readiness is conceptualized as a composite construct comprising four interrelated dimensions: technological infrastructure, human resource capacity, procedural compliance, and policy/institutional support. These dimensions collectively shape the quality of

digital evidence, which in turn determines investigative effectiveness.

Technological Infrastructure

Technological capability remains the most cited barrier to forensic readiness. Many agencies lack modern forensic laboratories, analytical tools, secure storage systems, and cloud-forensic capabilities. As documented, *“many Nigerian law enforcement agencies operate with outdated or insufficient forensic technologies”* (Nwankwo & Adesina, 2022, p. 136). Emerging technologies—encryption, blockchain, mobile platforms, and AI-driven threats—further widen the gap between offence complexity and investigative capacity (Okoro & Abubakar, 2024; Eze, 2024). Even where tools exist, underutilization stems from poor integration with case-management systems and fragmented workflows (Nwosu & Abdulraheem, 2023). Scholars emphasize that technology must be paired with trained analysts and standardized procedures (Ogunyemi & Abdullahi, 2025).

Human Resource Capacity and Continuous Professional Development

Skill shortages among digital forensic analysts constitute a structural weakness in Nigeria's cybercrime response. Cybercrime investigations demand multidisciplinary expertise, yet enforcement agencies face persistent gaps in training, certification, and continuous professional development. Ogunyemi and Abdullahi (2025) observe that *"the shortage of trained and certified digital forensic analysts in Nigeria has created a structural weakness in cybercrime investigations"* (p. 44). Human capacity is therefore a mediating factor determining whether technological resources can be effectively deployed. Continuous professional development remains limited, underfunded, and inconsistently institutionalized (Nwosu & Abdulraheem, 2023).

Procedural Compliance and Evidence Handling

Procedural weaknesses—poor documentation, inconsistent chain-of-custody practices, and uneven application of forensic protocols—undermine the admissibility of digital evidence. Courts increasingly scrutinize authenticity and reliability, with Bello and Eze (2023) noting that *"judicial resistance to digital evidence in Nigeria is often rooted*

in weak forensic documentation and inconsistent evidence-handling procedures rather than the technology itself" (p. 174). Procedural compliance directly influences evidence credibility, investigation timeliness, and prosecution outcomes.

Policy and Institutional Support

Although Nigeria's Cybercrimes Act (2015) provides a strong legal foundation, operationalization remains constrained by weak coordination, limited funding, and project-based interventions (Adedeji & Nwosu, 2024; Nwankwo, 2023). Policy support determines whether forensic units are adequately funded, whether training is continuous, and whether procedural standards are enforced. Scholars argue that forensic capability remains fragile because it is often treated as a short-term initiative rather than an institutionalized priority (Adedeji & Nwosu, 2024).

Inter-Agency Collaboration and Information Sharing

Siloed operations among the EFCC, NPF, DSS, and other bodies impede forensic readiness. Poor information sharing leads to duplicated efforts, lost evidence, and delayed prosecutions (Ogunyemi & Abdullahi, 2025). Effective readiness requires interoperable systems, joint task

forces, and institutionalized collaboration mechanisms (Adeniran & Suleiman, 2024). Coordination enhances evidence integrity and investigative outcomes (Eze & Onwuegbuchi, 2023).

Cross-Border Cybercrime Challenges

Cybercrime's transnational nature complicates evidence collection, authentication, and admissibility. Nigerian agencies face bureaucratic delays, incompatible legal frameworks, and weak international cooperation mechanisms (Adeniran & Suleiman, 2024). Even when evidence is obtained, poor chain-of-custody integration often renders it inadmissible (p. 59). Readiness therefore requires alignment with global standards, bilateral agreements, and training in international evidence protocols (Owolabi & Adeyemi, 2023).

Public Awareness, Reporting Behaviour, and Ethical Considerations

Low digital literacy, mistrust of law enforcement, and underreporting reduce the availability of timely digital evidence (Ogunyemi & Oludayo, 2022; Adebisi & Olalekan, 2022). Public education and private-sector partnerships—especially with banks and telecoms—are essential for timely evidence preservation (Suleiman, 2024). Ethical and privacy concerns further shape

readiness, as courts scrutinize lawful collection and rights compliance (Adeniran & Suleiman, 2024). Privacy-by-design principles and ethical SOPs are increasingly necessary (Nwankwo, 2023).

Accreditation, Standardization, and Quality Assurance

The absence of accredited forensic laboratories undermines evidence reliability. Many labs lack ISO/IEC 17025-aligned procedures, resulting in inconsistent analysis and documentation (Nwankwo & Adesina, 2022; Suleiman, 2024). Pilot accreditation efforts exist but remain limited (Sibe & Kaunert, 2024). Quality assurance must integrate infrastructure, personnel, and procedural discipline (Nwosu & Abdulraheem, 2023).

Integrated Conceptual Framework

The conceptual framework positions forensic readiness as the independent variable comprising four dimensions—technological infrastructure, human capacity, procedural compliance, and policy support. These dimensions interact to shape the quality of digital evidence, the intervening variable. High-quality evidence—complete, authentic, and legally admissible—enhances investigation timeliness, prosecution success, and judicial confidence. Weaknesses in any

dimension compromise evidence integrity and investigative outcomes. This proactive orientation aligns with Akinola and Hassan's (2021) argument that *"forensic readiness is most effective when it is anticipatory, institutionalized, and aligned with investigative strategy"* (p. 66).

Integrated Theoretical Framework

Routine Activity Theory (RAT) explains cybercrime as arising when motivated offenders exploit weak guardianship. EFCC's forensic readiness functions as capable guardianship; weak institutional preparedness creates opportunities for cybercriminals (Adedeji & Nwosu, 2024). TOE complements RAT by explaining why readiness varies across agencies: technological tools, organizational capacity, and environmental pressures jointly shape forensic capability (Nwankwo, 2023; Suleiman, 2024). Together, RAT and TOE provide a causal logic linking forensic readiness improvements to reduced offender opportunity and enhanced investigative effectiveness.

Conclusion

Across the literature, forensic readiness emerges as a multidimensional institutional condition central to cybercrime control in Nigeria. Its components—technology,

human capacity, procedures, and policy—shape evidence quality and investigative outcomes. Integrating conceptual and theoretical insights provides a robust foundation for empirical assessment of EFCC's forensic readiness and its impact on cybercrime investigation effectiveness.

MATERIALS AND METHODS

This study employed a mixed-methods descriptive survey design to systematically assess digital forensic readiness within the Economic and Financial Crimes Commission (EFCC) headquarters in Abuja, Nigeria. As stated in the document, the design "integrates both quantitative and qualitative data collection" to capture measurable indicators and contextual experiences of personnel involved in cybercrime investigations. The approach enabled triangulation, enhancing validity, credibility, and robustness.

Study Area, Population, and Sampling

The EFCC headquarters in Abuja—its central hub for cybercrime investigations, forensic laboratory operations, and policy implementation—served as the study location. The document notes that this site "coordinates major cybercrime investigations nationally and serves as the

hub for policy implementation, forensic operations, and digital evidence management” .

The study population consisted of approximately 250 personnel directly engaged in digital forensics, including investigators, analysts, evidence officers, and policy staff. Purposive sampling was used to ensure respondents possessed relevant expertise. A total of 120 participants completed the quantitative survey, while 20 were selected for in-depth interviews based on experience and involvement in high-profile cases.

Variables and Instruments

Forensic readiness—defined as the EFCC’s capacity to collect, preserve, and utilize digital evidence—served as the dependent variable. Independent variables included technological infrastructure, human resource capacity, procedural compliance, and institutional support. These were operationalized through structured Likert-scale questionnaires and semi-structured interview guides.

The questionnaire measured availability of forensic tools, adherence to chain-of-custody, staff training, and institutional support. Interviews explored operational challenges, technological gaps, and policy constraints,

allowing respondents to articulate experiences “not easily captured by structured survey items” .

Data Collection and Pilot Testing

Ethical approval was obtained from the EFCC research ethics committee. Surveys were administered physically and electronically, while interviews were audio-recorded and transcribed verbatim. Data collection spanned six weeks.

A pilot test involving 10 EFCC personnel in Lagos evaluated clarity and relevance of instruments. Feedback led to refined questionnaire items and improved interview prompts, ensuring instruments were “practical and contextually appropriate” for the main study population .

Validity and Reliability

Instrument validity was established through expert review, content validation, and alignment with the forensic readiness framework. Reliability was confirmed using Cronbach’s alpha (0.82), indicating strong internal consistency. Qualitative reliability was supported through standardized interview procedures and triangulation of quantitative and qualitative findings.

Data Analysis

respondents indicate that current digital forensic readiness positively impacts evidence collection and investigation outcomes ($M = 3.35$), supporting hypothesis H_{11} .

Technological Infrastructure

Forensic infrastructure and tools present a significant bottleneck ($M = 2.95$). While basic secure storage ($M = 3.0$) and software support exist, the agency is underequipped for modern cyber threats. Specifically, capabilities for mobile device forensics ($M = 2.8$) and cloud data extraction ($M = 2.6$) are insufficient. This lack of advanced infrastructure negatively impacts the timeliness and quality of complex cybercrime investigations, supporting hypothesis H_{12} .

Human Resource Capacity

Human capital is the most critical vulnerability identified in the study ($M = 2.84$). Although investigative staff possess adequate general experience in cybercrime ($M = 3.3$), they severely lack formal digital forensic training ($M = 2.7$), continuous professional development ($M = 2.6$), and relevant industry certifications ($M = 2.5$). In alignment with hypothesis H_{13} , these skill gaps directly threaten the success rate of cybercrime prosecutions.

Procedural Compliance and Admissibility

Compliance with evidence-handling procedures is moderate ($M = 3.05$). The EFCC consistently maintains chain-of-custody and standardized documentation ($M = 3.1$). However, adherence to global international forensic standards is lagging ($M = 2.8$). This misalignment poses a risk to the legal admissibility of digital evidence in court (supporting H_{14}), emphasizing the need for rigorous auditing.

Strategic Reforms and Recommendations

To bridge the gap between current capacity and optimal investigative performance, respondents identified several high-priority strategies (RQ5). The consensus points toward multi-dimensional reforms rather than isolated fixes.

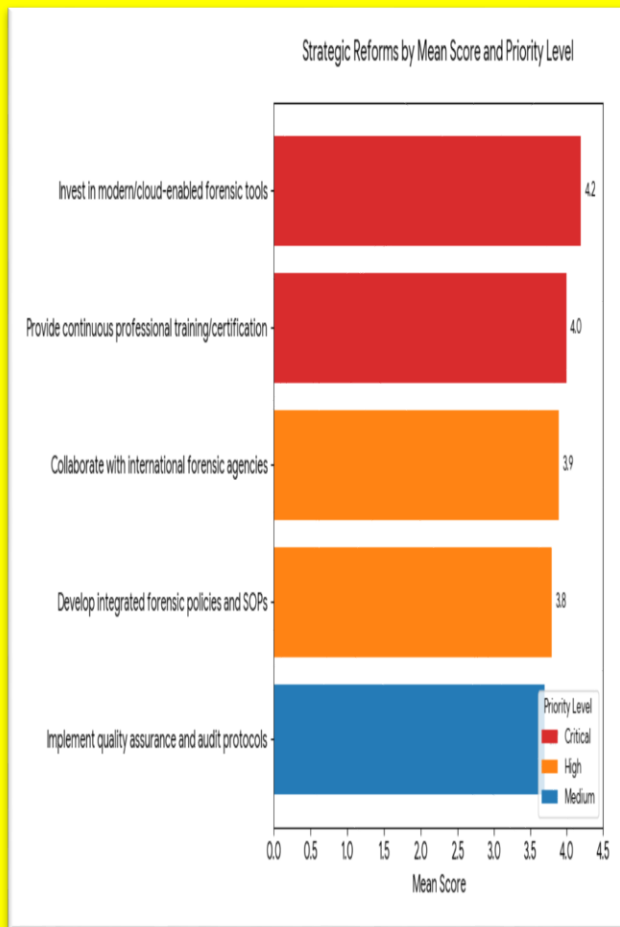


Figure2: Prioritized Strategies for Enhancing Forensic Readiness

Graphical Representation of Composite Means



3.0 | Procedural Compliance

2.8 | Human Resource Capacity

2.6 |

2.4 |

Infrastructure

Figure 3: Comparative Mean Scores of Study Variables

Analysis

The figure illustrates that forensic readiness dimensions remain below optimal levels (4.00 and above). The greatest deficiency exists within personnel training and professional competency.

Pearson Correlation: Factors influencing investigation effectiveness

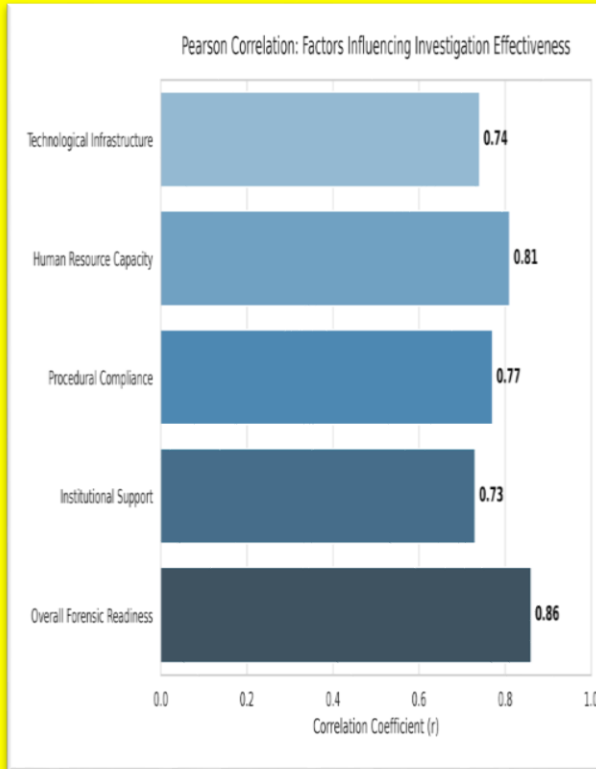


Figure 4 Pearson Correlation Analysis

Interpretation

The analysis shows strong positive relationships between forensic readiness variables and investigation effectiveness. With an r -value of 0.86, Overall Forensic Readiness shows the strongest correlation with Investigation Effectiveness, followed closely by Human Resource Capacity (0.81). This suggests that improving forensic readiness significantly enhances investigative outcomes.

Conclusion of Findings: While the EFCC possesses the operational foundation for cybercrime investigations, its effectiveness is constrained by a lack of specialized training, outdated technical infrastructure for mobile/cloud environments, and incomplete alignment with international legal standards. Targeted investments in these areas are required to ensure evidence is consistently court-ready and legally defensible.

Summary of Hypothesis-Related Findings

Across all hypotheses, mean scores (2.8–3.35) indicate that forensic readiness, infrastructure adequacy, human resource capacity, and procedural compliance moderately influence investigation effectiveness and legal outcomes. While respondents perceive positive relationships, inferential statistical testing (e.g., correlation or regression) is required to confirm significance.

DISCUSSION

This study evaluated the forensic readiness of the Economic and Financial Crimes Commission (EFCC) in Abuja. Overall forensic readiness was moderate ($M = 3.2$). While formal policies, operational laboratories, and protocols exist, their practical integration into daily investigations

remains inconsistent ($M = 2.9$). This policy-practice gap aligns with Adebisi and Olalekan (2022), who noted that Nigerian institutional forensic frameworks are often underutilized, limiting investigative effectiveness. Supporting H_{11} , the results confirm that forensic readiness influences cybercrime investigation success, though operational effectiveness relies heavily on consistent policy execution and tool utilization.

Technical infrastructure provided moderate support ($M = 2.9$). Despite existing secure storage and laboratory facilities, inadequate mobile and cloud forensic capabilities hinder the management of complex digital evidence. Consistent with Nwankwo and Adesina (2022) and Suleiman (2024), outdated tools and limited cloud capabilities constrain evidence preservation. Supporting H_{12} , infrastructure adequacy is a primary determinant of investigation quality and timeliness. Additionally, human resource capacity emerged as a critical limitation ($M = 2.8$), despite moderate staff experience levels ($M = 3.3$). Insufficient formal training and certification create skill gaps that compromise investigative and prosecution outcomes, corroborating Akinola and Hassan (2021) and Eze and Onwuegbuchi (2023). Supporting H_{13} , structured training

and mentorship programs are essential to enhance operational competence.

Procedural compliance ($M = 3.05$) demonstrated moderate adherence to chain-of-custody and documentation protocols. However, misalignments with international standards threaten the legal admissibility of digital evidence in Nigerian courts, echoing Rogers (2020) and Adebisi and Olalekan (2022). Supporting H_{14} , strengthening standard operating procedures and auditing mechanisms is vital for ensuring evidence is legally defensible. Consequently, respondents prioritized technological upgrades ($M = 4.2$) and professional development ($M = 4.0$) to enhance readiness. Aligning with Suleiman (2024) and Nwosu and Abdulraheem (2023), achieving optimal readiness requires a multi-dimensional approach integrating technology, human resources, inter-agency collaboration, and rigorous audits.

In conclusion, while the EFCC possesses foundational forensic structures, operational challenges persist across technological adequacy, procedural integration, and human resource development ($M = 2.8\text{--}3.2$). Targeted interventions—specifically investments in modern tools, structured

training, standardized policies, and regular audits—are essential. Addressing these gaps will improve the quality, timeliness, and legal defensibility of cybercrime investigations, ultimately strengthening institutional effectiveness and judicial outcomes.

CONCLUSION

The EFCC exhibits a moderate but fragile level of digital forensic readiness. While the agency possesses the necessary institutional framework for cybercrime investigations, practical challenges in daily procedural integration, technological obsolescence, and underdeveloped human resources heavily constrain its overall effectiveness. To transition from baseline preparedness to proactive and legally robust cybercrime management, the EFCC must pivot from isolated fixes to a multi-dimensional reform strategy.

STRATEGIC RECOMMENDATIONS

To enhance the EFCC's forensic readiness and improve cybercrime investigation

outcomes, this study recommends the following:

- 1. Technological Infrastructure:** Prioritize continuous upgrades to forensic laboratories, with a specific focus on cloud and mobile forensics capabilities. Enhance secure evidence storage systems to guarantee the integrity and admissibility of digital evidence against evolving threats.
- 2. Capacity Building & Recruitment:** Implement structured technical training, professional certifications, and mentorship programs to bridge experience gaps. Furthermore, recruitment policies should strictly target personnel with demonstrable technical expertise in digital forensics.
- 3. Procedural Standardization:** Align Standard Operating Procedures (SOPs) with international digital forensic standards to ensure all collected evidence is consistently court-ready. Enforce these protocols through regular compliance audits and periodic refresher training on chain-of-custody.

4. **Strategic Integration & Collaboration:** Embed forensic readiness as a core strategic objective with corresponding increases in budgetary allocations for forensic operations. Strengthen multi-agency collaborative frameworks with domestic law enforcement, cybersecurity experts, and international partners.
5. **Monitoring & Evaluation (M&E):** Establish formal M&E mechanisms to track the effectiveness of forensic initiatives. Feedback loops from investigative teams should be utilized to continuously refine technology deployment, procedural adherence, and human resource development.

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Current Issue | Edition 5 | Volume 8 | Issue 8 | October-2026–
December-2026 | Multi Disciplinary Subjects Research Journal|DIP:-
|IF:-| ISSN NO:2583-7303|Approved Date:-15-05-2023
