



*The Cradle of Knowledge: African Journal of
Educational and Social Science Research
AJESSR - ISSN 2304-2885-p, 2617-7315-e
Volume 14, Issue 2, 2026
P.O. Box 555 (00202), Nairobi, Kenya
editor@serek.or.ke*

**SOCIETY OF
EDUCATIONAL
RESEARCH
AND
EVALUATION
IN KENYA**

Influence of Artificial Intelligence on Evidence Collection in Criminal Investigations in Kilifi County, Kenya

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Abstract

Artificial Intelligence (AI) has emerged as a transformative technology in criminal investigations by improving evidence collection, documentation, and management. Despite its increasing adoption globally, empirical evidence on its effectiveness in decentralized and resource-constrained environments remains limited. This study examined the influence of Artificial Intelligence on evidence collection in criminal investigations in Kilifi County, Kenya. Guided by the Unified Theory of Acceptance and Use of Technology (UTAUT) and Procedural Justice Theory, the study adopted a descriptive mixed-methods research design. Data were collected from 301 respondents, comprising police investigators, forensic analysts, legal professionals, and victims or witnesses, using questionnaires and interviews. Quantitative data were analyzed using descriptive statistics, regression analysis, and Analysis of Variance (ANOVA), while qualitative data were analyzed thematically. The findings revealed that AI significantly enhances evidence collection by improving accuracy, completeness, reliability, traceability, and reducing human errors. Regression results indicated a positive and statistically significant relationship between AI utilization and evidence collection effectiveness ($R^2 = 0.399$, $p < 0.001$), demonstrating that AI accounted for 39.9% of the variation in evidence collection outcomes. Qualitative findings further showed that AI-supported systems improved evidence documentation, organization, retrieval, and overall investigative efficiency. However, inadequate technological infrastructure, limited user training, and concerns regarding data quality were identified as key implementation challenges. The study concludes that AI is a valuable tool for strengthening evidence collection, enhancing procedural integrity, and improving accountability in criminal investigations. The study recommends increased investment in AI infrastructure, continuous capacity building for investigators, and the development of appropriate legal and ethical frameworks to support the responsible adoption of AI within Kenya's criminal justice system.

Keywords: Artificial Intelligence; Evidence Collection; Criminal Investigations; Evidence Management

1. Introduction

Artificial Intelligence (AI) has emerged as one of the most transformative technologies in modern criminal investigations. Across developed jurisdictions such as the United States, the United Kingdom, Spain, and Sweden, AI-assisted investigative tools have become increasingly important in evidence collection, digital forensics, crime scene reconstruction, biometric identification, and evidence management. These technologies enable investigators to process large volumes of information efficiently, identify patterns that may not be immediately visible through conventional investigative methods, and improve the accuracy and reliability of evidence used in criminal proceedings. Studies have shown that AI-enhanced systems improve evidence traceability, reduce documentation errors, and strengthen the integrity of investigative records, thereby increasing the overall effectiveness of criminal investigations (Fernandez-Basso et al., 2024; Lee et al., 2024).



Despite these advancements, concerns remain regarding transparency, accountability, algorithmic bias, and procedural fairness. Research has demonstrated that some AI systems may generate inaccurate outputs when trained using incomplete or unrepresentative datasets. In criminal justice settings, such inaccuracies may introduce risks relating to misidentification, biased decision-making, and challenges to evidential reliability. Consequently, scholars emphasize that AI technologies should operate within appropriate legal, ethical, and governance frameworks to ensure fairness, transparency, and accountability throughout investigative processes (Buolamwini & Gebru, 2018; Wischmeyer, 2020).

The adoption of AI within developing countries remains limited when compared with technologically advanced jurisdictions. Many criminal justice institutions in Africa continue to face challenges associated with inadequate digital infrastructure, limited forensic capacity, poor evidence management systems, and reliance on paper-based investigative procedures. As a result, criminal investigations frequently experience incomplete documentation, weak evidence traceability, delayed case processing, and reduced confidence in investigative outcomes (Mugari & Obioga, 2021; Kabol, 2022). Although several African countries have begun introducing digital forensic technologies, implementation remains fragmented and uneven, particularly within decentralized and resource-constrained regions.

In Kenya, efforts to modernize the criminal justice system have resulted in the introduction of various digital initiatives, including electronic case management systems, digital court processes, and selective use of biometric technologies. However, evidence collection and management in many counties remain largely manual. Studies have reported persistent challenges relating to incomplete documentation, lost records, inadequate evidence tracking systems, and inconsistent handling of investigative information. Such weaknesses reduce the reliability of evidence and undermine the efficiency of criminal investigations (Kenya National Crime Research Centre, 2022; Kenya Forensic Services Department, 2023).

These challenges are particularly evident in Kilifi County. According to the Kilifi Judiciary ICT Audit (2023), a large proportion of criminal investigation records continue to be maintained through manual systems, resulting in weak traceability, delayed retrieval of information, and incomplete evidentiary records. Investigators also experience challenges associated with limited forensic resources, inadequate technological infrastructure, and insufficient digital evidence management capabilities. Consequently, criminal investigations often rely heavily on conventional approaches that are susceptible to documentation errors, loss of information, and inconsistencies in evidence handling.

Previous studies have consistently reported positive contributions of AI toward evidence collection and management. Fernandez-Basso et al. (2024) found that AI-supported evidence management systems significantly improved evidence traceability and reduced documentation errors. Rigano (2023) reported that AI-assisted investigative technologies enhanced evidence registration and improved information retrieval processes. Similarly, Huynh-Watkins (2021) established that AI-enabled forensic systems strengthened evidence organization and increased the reliability of investigative records. While these studies demonstrate the potential of AI within high-resource environments, their findings may not be directly transferable to resource-constrained jurisdictions such as Kilifi County due to differences in infrastructure, institutional capacity, and technological readiness.

Furthermore, existing studies have primarily focused on technologically advanced environments, national-level systems, or urban investigative settings. Limited empirical research has examined the influence of AI on evidence collection within county-level criminal investigations in Kenya. Consequently, there remains insufficient evidence regarding whether AI can enhance evidence accuracy, record completeness, traceability, and reduction of human errors within resource-constrained environments. This study sought to address this gap by examining the influence of Artificial Intelligence on evidence collection in criminal investigations in Kilifi County, Kenya.

The study was guided by the Unified Theory of Acceptance and Use of Technology (UTAUT) and Procedural Justice Theory. UTAUT explains how performance expectancy, effort expectancy, social influence, and facilitating conditions shape technology adoption among users, making it well-suited to understanding the adoption of AI technologies among investigators. Procedural Justice Theory emphasizes fairness, transparency, consistency, and accountability in institutional processes and provides a useful framework for examining how AI-supported evidence collection influences procedural integrity within criminal investigations.



The following objectives guided the study:

- 1.To determine the influence of Artificial Intelligence on the accuracy of evidence collection in criminal investigations.
- 2.To assess the influence of Artificial Intelligence on the completeness of evidence records in criminal investigations.
3. To examine the influence of Artificial Intelligence on evidence traceability in criminal investigations.
4. To determine the influence of Artificial Intelligence on the reduction of human errors during evidence collection in criminal investigations.

The following hypotheses were tested:

H₀: Artificial Intelligence has no significant influence on evidence collection in criminal investigations in Kilifi County, Kenya.

H₁: Artificial Intelligence has a significant influence on evidence collection in criminal investigations in Kilifi County, Kenya.

2. Research Methods

This study adopted a descriptive mixed-methods research design to assess the influence of Artificial Intelligence (AI) on evidence collection in criminal investigations in Kilifi County, Kenya. The study was conducted among stakeholders involved in criminal investigations, including police investigators, forensic analysts, legal professionals, and victims or witnesses. The target population comprised 1,150 stakeholders from criminal justice institutions operating within Kilifi County.

A sample size of 301 respondents was determined using Krejcie and Morgan's (1970) sample size determination criteria and proportionately allocated across the respondent categories. Stratified random sampling was used to select quantitative respondents, while purposive sampling was employed to identify key informants with specialized knowledge of criminal investigations and AI-supported investigative systems. Twenty key informants comprising senior investigators, forensic specialists, and judicial officers participated in the qualitative interviews.

Data were collected using structured questionnaires, semi-structured interview guides, and document analysis schedules. The questionnaire measured four dimensions of evidence collection, namely accuracy, completeness, traceability, and reduction of human errors, using a five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). Content validity was established through expert review, while reliability was assessed through a pilot study using Cronbach's Alpha coefficients exceeding the recommended threshold of 0.70.

Data collection was conducted between May and June 2026. A total of 304 questionnaires were distributed, of which 301 were completed and returned, resulting in a response rate of 99%. Quantitative data were analyzed using the Statistical Package for Social Sciences (SPSS) through descriptive statistics, regression analysis, and Analysis of Variance (ANOVA). Qualitative data were transcribed, coded, and analyzed thematically. Findings from both approaches were integrated through triangulation to enhance the validity and credibility of the study.

Ethical approval and research authorization were obtained from the relevant authorities before commencement of the study. Participation was voluntary, informed consent was obtained from all respondents, and confidentiality and anonymity were maintained throughout the research process.

3.0 Analysis Result and Discussions

This section presents the findings on the influence of Artificial Intelligence (AI) on evidence collection in criminal investigations in Kilifi County, Kenya. The results are organized into descriptive statistics, qualitative findings, regression analysis, and analysis of variance (ANOVA). The discussion integrates the empirical findings with existing literature and the guiding theoretical framework of the study.

3.1 Descriptive Results on Artificial Intelligence and Evidence Collection

Respondents were asked to indicate their level of agreement with statements concerning the role of Artificial Intelligence in evidence collection. The results are presented in Table 1.



Table 1: Descriptive Statistics on Artificial Intelligence and Evidence Collection

Statement	Mean
AI tools produce high-quality crime scene images	3.46
AI improves evidence labelling and recording	3.58
AI ensures completeness of evidence records	3.50
AI captures details missed during manual documentation	3.68
AI minimizes documentation errors	3.76
AI reduces human errors in evidence processing	3.32
AI-generated records are reliable	3.72
AI produces repeatable and consistent results	4.10

The findings indicate a generally positive perception of the contribution of Artificial Intelligence to evidence collection among criminal investigation personnel. The highest mean score was recorded for the statement that AI produces repeatable and consistent results ($M = 4.10$), suggesting strong confidence in the ability of AI systems to support standardized investigative procedures. Similarly, respondents agreed that AI minimizes documentation errors ($M = 3.76$) and enhances the reliability of evidence records ($M = 3.72$).

The findings further reveal that AI assists investigators in capturing critical details that might otherwise be overlooked during manual documentation processes ($M = 3.68$). The relatively high mean scores across all indicators imply that AI contributes positively to evidence accuracy, record completeness, and overall evidence management. These findings suggest that AI technologies have the potential to strengthen investigative processes by reducing human error and improving procedural consistency.

The results support existing literature which argues that AI-assisted systems enhance evidence traceability, automate documentation processes, and improve the quality and integrity of investigative records. The findings therefore highlight the growing importance of AI in modern criminal investigations.

3.2 Qualitative Findings

Qualitative data obtained from interviews corroborated the quantitative findings. Participants consistently reported that AI technologies have enhanced evidence documentation, retrieval, and management during criminal investigations. One senior investigator stated: “When we use AI tools to label and record evidence, it is almost impossible to miss important details. Before, with manual recording, some things would slip through, but now everything is captured accurately.”

This statement demonstrates the role of AI in improving the accuracy and completeness of evidence documentation. Another respondent noted: “AI organizes all the evidence digitally. When I need to cross-check fingerprints or digital data, I can find it instantly.” This finding highlights the contribution of AI to evidence accessibility and retrieval, which are critical elements of efficient criminal investigations.

A forensic analyst further observed: “AI-supported systems have significantly reduced the time required to process and retrieve evidence. Investigators can now focus more on analysis rather than searching through records.” The statement suggests that AI improves operational efficiency by reducing the administrative burden associated with evidence management.

Thematic analysis of twenty interview transcripts generated four dominant themes: **evidence accuracy, evidence completeness, evidence traceability, and reduction of human errors**. These themes closely correspond with the quantitative dimensions assessed in the survey and provide strong evidence of methodological triangulation. Collectively, the qualitative findings demonstrate that AI enhances evidence quality while simultaneously improving the efficiency and reliability of investigative processes.



3.3 Regression Analysis

Regression analysis was conducted to determine the influence of Artificial Intelligence on evidence collection effectiveness.

Table 2: Regression Model Summary

R	R Square	Adjusted R Square	Std. Error	Durbin-Watson
0.632	0.399	0.397	0.512	1.954

The regression results indicate a moderate positive relationship between Artificial Intelligence and evidence collection effectiveness ($R = 0.632$). The coefficient of determination ($R^2 = 0.399$) shows that approximately 39.9% of the variation in evidence collection effectiveness can be explained by the use of AI technologies. This suggests that AI is an important predictor of effectiveness in evidence collection processes.

The adjusted R^2 value of 0.397 demonstrates that the explanatory power of the model remains stable even after adjusting for possible sampling effects. Furthermore, the Durbin-Watson statistic of 1.954 indicates that there was no significant autocorrelation among the residuals, suggesting that the regression model satisfies the independence assumption.

Overall, the findings indicate that increased adoption of AI technologies is associated with improvements in evidence accuracy, completeness, traceability, and error reduction. Consequently, the null hypothesis was rejected, and the study concluded that Artificial Intelligence has a statistically significant influence on evidence collection in criminal investigations in Kilifi County.

3.4 ANOVA Results

Table 3: ANOVA Summary

Variable	F-value	p-value
Accuracy of evidence labeling and recording	13.028	< .001
Completeness and organization of records	2.864	.037
Captures details missed during manual documentation	4.370	.005
Lower error rates than manual methods	27.609	< .001
Reliability of evidence records	37.267	< .001

The ANOVA results indicate statistically significant relationships between Artificial Intelligence and all major dimensions of evidence collection. Since all p-values are below the conventional significance threshold of 0.05, the results demonstrate that AI significantly improves evidence labeling, record completeness, information capture, reliability, and error reduction.

The strongest effect was observed in the reliability of evidence records ($F = 37.267$, $p < .001$), followed by lower error rates than manual methods ($F = 27.609$, $p < .001$). These findings suggest that AI technologies are particularly effective in enhancing record reliability and minimizing procedural mistakes.

The results provide empirical support for the proposition that AI contributes meaningfully to evidence quality and strengthens evidence management systems within criminal investigations. Consequently, the study establishes that AI adoption is associated with significant improvements in evidence collection outcomes.



4.0 Discussion of Findings

The findings of this study demonstrate that Artificial Intelligence has a significant and positive influence on evidence collection in criminal investigations. Descriptive results revealed that respondents perceived AI as an effective tool for enhancing evidence accuracy, consistency, reliability, and completeness. The highest-rated indicator, repeatability and consistency of results, suggests that investigators value AI's capacity to support standardized procedures and reduce variations associated with manual processes.

The regression findings further confirmed the importance of AI in evidence collection. The model explained 39.9% of the variation in evidence collection effectiveness, indicating that AI contributes substantially to improving investigative outcomes. These findings imply that organizations that invest in AI-supported evidence management systems are likely to achieve higher levels of efficiency, accuracy, and procedural integrity. The results are consistent with Fernandez-Basso et al. (2024), who found that AI-assisted investigative systems improve evidence traceability and reduce documentation errors. Similarly, Huynh-Watkins (2021) reported that AI enhances the organization, accessibility, and retrieval of forensic information. The present study extends these findings to the context of county-level criminal investigations in Kenya, thereby contributing empirical evidence from a developing-country perspective.

The study further revealed that AI reduces human error and improves procedural consistency in evidence management. This finding supports Wischmeyer (2020), who argued that algorithmic systems strengthen procedural reliability through standardized analytical processes. Enhanced consistency contributes to greater transparency, accountability, and confidence in criminal investigations and subsequent judicial proceedings. From a theoretical perspective, the findings support the Unified Theory of Acceptance and Use of Technology (UTAUT). Specifically, the results affirm the concept of performance expectancy, which posits that individuals are more likely to adopt technologies perceived to improve job performance. Respondents consistently indicated that AI enhanced evidence documentation, organization, retrieval, and verification, demonstrating its perceived usefulness in investigative work.

The findings also support Procedural Justice Theory, which emphasizes fairness, consistency, transparency, and accountability in institutional processes. By improving evidence traceability, reducing procedural errors, and promoting standardized documentation practices, AI contributes to procedural integrity and enhances confidence in criminal justice outcomes. Therefore, the study concludes that AI is not only a technological innovation but also an important tool for strengthening the effectiveness and legitimacy of criminal investigations in Kilifi County, Kenya.

5. Conclusions

This study sought to assess the influence of Artificial Intelligence (AI) on evidence collection in criminal investigations in Kilifi County, Kenya. The findings established that Artificial Intelligence positively influences evidence collection by improving the accuracy of evidence documentation, enhancing the completeness of evidence records, strengthening evidence traceability, and reducing human errors during evidence management. The study further established that AI-supported systems improve the reliability, consistency, and accessibility of evidence, thereby enhancing the effectiveness of criminal investigations. These findings confirm that Artificial Intelligence has significant potential to strengthen evidence collection processes within criminal justice institutions.

The study also found that successful implementation of Artificial Intelligence depends on the availability of adequate digital infrastructure, technical capacity, institutional support, and quality data. Consequently, while AI offers substantial opportunities for improving evidence collection, its effectiveness remains dependent on an enabling technological and organizational environment. Based on the regression and ANOVA results, the study rejected the null hypothesis that Artificial Intelligence has no significant influence on evidence collection in criminal investigations in Kilifi County, Kenya. The study therefore concludes that Artificial Intelligence has a significant positive influence on evidence collection in criminal investigations.

5.1 Limitations of the Study

This study was limited to Kilifi County and therefore the findings may not be generalized to all counties in Kenya without further empirical investigation. The study also employed a cross-sectional research design, which captured respondents' perceptions at a single point in time and did not allow assessment of changes in Artificial Intelligence



utilization over time. Although a high response rate was achieved, the study relied on self-reported data from respondents, which may be subject to response bias. Additionally, limitations relating to access to certain investigative records and Artificial Intelligence systems restricted direct observation of some evidence management processes. Future studies should consider covering multiple counties, incorporating longitudinal research designs, and examining additional dimensions of Artificial Intelligence within criminal investigations to enhance the generalizability of findings.

6. Recommendations

6.1 National Police Service (NPS)

The National Police Service should invest in AI-enabled evidence management systems, including digital evidence repositories, automated documentation platforms, and evidence tracking technologies. Priority should be given to police stations and DCI offices in Kilifi County where manual evidence management remains prevalent. Such investments will improve evidence accuracy, traceability, and accountability.

6.2 Directorate of Criminal Investigations (DCI)

The Directorate of Criminal Investigations should establish continuous training programmes on Artificial Intelligence, digital forensics, and evidence management. Annual refresher courses and specialized certification programmes should be introduced to enhance investigators' technical competencies and effective utilization of AI-supported investigative tools.

6.3 Judiciary of Kenya

The Judiciary should develop standardized guidelines for the admissibility, authentication, and evaluation of AI-generated evidence in court proceedings. Clear procedural standards will strengthen confidence in AI-supported evidence and promote consistency in judicial decision-making.

6.4 Office of the Data Protection Commissioner and ICT Authority

The Office of the Data Protection Commissioner, in collaboration with the ICT Authority, should develop policies and regulations governing data security, privacy protection, and ethical use of Artificial Intelligence within criminal investigations. This will safeguard sensitive personal and forensic information while promoting responsible AI adoption.

6.5 Ministry of Interior and National Administration

The Ministry should formulate a national framework for implementation and governance of Artificial Intelligence within the criminal justice system. The framework should provide guidance on procurement, deployment, monitoring, accountability, and oversight of AI technologies used in investigations.

6.6 County Government of Kilifi

The County Government should collaborate with national criminal justice institutions to strengthen digital infrastructure, including internet connectivity, data storage facilities, and technological support services necessary for AI-enabled investigations.

6.7 Human-AI Collaboration

Criminal justice institutions should adopt a complementary approach in which Artificial Intelligence supports rather than replaces professional judgment. Investigators, forensic analysts, and judicial officers should remain responsible for final decisions while using AI as a decision-support tool.

6.8 Recommendations for Future Research

Future studies should:

1. Replicate the study in other counties in Kenya to determine whether similar results are obtained in different contexts.
2. Use longitudinal research designs to assess long-term effects of AI on evidence collection and criminal investigations.
3. Evaluate the effectiveness of specific AI applications such as facial recognition, predictive analytics, biometric identification, and automated evidence management systems.
4. Examine ethical, legal, and privacy concerns associated with AI-assisted criminal investigations.



5. Conduct comparative studies between AI-supported and traditional evidence collection systems to determine relative effectiveness and cost efficiency.

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