Effect of Resources on Latent Fingerprint Processing In Crime Investigations in Kenya

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Abstract

Latent fingerprints processing is an essential part in any criminal investigations. It is from this identification and classification of fingerprints from a surface in a crime scene that determines the success of a criminal investigation. This study focused on effect of resources on latent fingerprint processing in criminal investigations in Kenya. The objective driving this study was to examine the influence of resource orientation on criminal investigations in Kenya. The study is anchored on the Prospect Theory by Daniel Kahneman and Amos Tversky and supported by Locard's principle. This study used a cross-sectional research survey and mixed methods approach. The unit of analysis was 205 criminal investigators and analysts. A semi-structured questionnaire was used for data collection and data was analyzed using statistical methods (frequencies and percentages) and inferential statistics, and chi-square was used to test the hypothesis. The collected data was analyzed using the Statistical Package for Statistics (SPSS) version 23. The study results established that resources significantly influence criminal investigations. The outcomes of the research show the significance of availability of resources, proper training and illustrates how imperative it is for criminal investigators to have proper knowledge on crime scene identification, which all leads to effective investigations. The study recommends that the investigators should support the practice of processing mock crime scenes and surfaces for fingerprints in order to develop and refine skills in evidence collection in the face of scarcity to avoid wastage. The investigators should also leverage on technology to maximize efficiency. This might involve the use of digital tools for evidence collection and processing.

Key words: Kenya, Latent Fingerprints Processing, Crime Investigation, Resources.

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Introduction

The use of fingerprint identification in criminal investigations in the past has mostly concentrated on crimes like homicide, rape, and suicide, (Maloney, 2014). Fingerprint development at a common crime scene like burglary and motor vehicle theft, now are routinely being used to investigate such crimes (McCartney, 2013). Detection of fingerprints at a scene of a crime is of great importance to investigators. The search for fingerprints ought to be done systematically, by considering the possible areas to search for fingerprints, for example, an investigator should visualize the probable movements of the intruder through the premises (Coupe, 2019). To locate and identify physical evidence at crime scenes, one should also consider the point of entry, exit, doors and windows, utensils, tabletops, and objects likely to look disturbed such as papers that could have been touched, (Garg, 2011).

Lennard, C. (2001) Postulates that the availability of resources and the identification of crime scenes should be coupled with proper training of criminal investigators on various techniques used in latent fingerprint development and collection of evidence to help sustain trials in a court of law.

In Kenya, the importance of fingerprints has been super imposed by the government's directive for all Kenyans above the age of 18 to have their fingerprint taken before issuing an Identity card. The first attempt at the use of fingerprints in Kenya was in 1948 this is according to (Michael Blundell 1964), a colonial settler. In 1977, the first national identity card bearing the left thumbprint of the bearer was rolled out under his stewardship at the National Registration Bureau. Kareithi, (2019) explained that no two fingers can be found to contain similar fingerprints, identical twins can have similar DNA but not the same fingerprint pattern.

Ali Shah & Hussain (2021), voiced a concern that; "chronic lack of funding is the foremost obstacle to training of new experts and maintaining the old guards. Lack of Standard Operating Procedures s, dependence on foreign instructors and accreditation from other nations affects the quality of forensic and physical evidence used in criminal prosecution.

Statement of the Problem

The Government of Kenya (GoK) has invested heavily in security infrastructure by establishing a fingerprint bureau for all Kenyans above 18 years, a criminal records registry at the Directorate of Criminal Investigators, and most recently the Huduma Number database. However, successful convictions and adequate processing of crime scenes for fingerprint residues remains low due to resource constraint. In addition, the state of forensic investigations in Kenya is still low although a good number of crime scene investigators are trained in fingerprinting techniques (Mbaya, 2016). This shortfall has led to the exoneration of criminals and in some instances the innocent people are jailed for crimes they did not commit. A failure to have a well-established latent fingerprint analysis and interpretation system due to lack of resources leads to an inept criminal justice system in the country, this

means justice is delayed and cases of crime will increase, which leads to investors lacking confidence to do business in the country.

There are hardly any studies focusing on effect of resources on latent fingerprint processing during criminal investigations. Kirui (2021) research focused on "Determinants of Forensic Science Application in Criminal Investigations at the Directorate of Criminal Investigations, Nairobi, Kenya ". Nderitu's (2016) study focused on "Analyzing the Efficiency of Forensic Science Units within Kenya Police Units in Solving Crimes." These studies hardly address relationship of resources and latent fingerprint processing in Kenya. This study expects to seal this knowledge gap, which is missing from the aforementioned local studies.

Objective of the Study
To examine the influence of resource orientation on crime investigations in Kenya

Review of Related Literature
A good number of researchers have used empirical evidence to investigate the current state of resources for successful investigations. A statistical paper conducted by Dezfoli and his colleagues in 2015 explored the trends of different aspects of crimes for which forensic science is used and to what extent criminal investigations need adequate resources. For example, the scholars suggest some factors that digital investigators should bear in mind is adapting to novel solutions to challenges in investigating this field (Dezfoli et al., 2013). In support of this, (Ferguson, R.I., Renaud, K., Wilford, S. and Irons, A. (2020), study revealed a yearly increment in the amount of forensic information under investigation, and the bulk of information being analyzed in an individual case. Using this data the FBI published crime pattern analysis between 2007 and 2011.

The scholars discovered that there was a rise in digital crimes each year and therefore, there was a need to update and avail more resource to the investigators, as the literature implies. (e Brito Rodrigues, Angêlica Rocha Martins, André Braz, Amanda Belém Chaves, Jez Willian Braga, Maria Fernanda Pimentel, 2017) in their study give an overview of the prevailing trends in forensic science that affect its application in a criminal investigation. Conducting forensic analysis requires an investigator to understand the crime trends as this will provide an understanding of resources needed to carry out the task. In case the tools, apparatus, and human resources are not adequate to satisfactorily process a crime scene, there is a possibility that some evidence might be left at the crime scene. If investigators are not able to gather, all the evidence required the analyst might get thrown of the track leading to aborted investigations. (Adderley, R., Smith, L. L., Bond, J. W., & Smith, M.2012).

The availability of sufficient hardware cannot be ignored as stressed by the instructional booklet utilized by American criminology specialists. Thus, the unavailability of equipment for collecting evidence at crime scenes has negative effects on the outcome of a criminal investigation. Globally investigators such as the FBI, Scotland Yard, and the Mossad of Israel are largely involved in analyzing a scene of crime to determine who, how, why, and what motivated the crime (Ogeto, 2018). To have a well-detailed report, investigators must be aware that their results heavily rely on the availability of resources (Azman, A. R., Mahat, N. A., Wahab, R. A., Ahmad, W. A., Huri, M. A. M., & Hamzah, H. H. (2019).

Ogeto (2018) also looks into ethics that apply to investigations and the field of forensic science. Ethics provides rules for personal conduct in a profession. These guidelines determine how forensic tools and their applications should be professionally handled. The

inadequacy of required resources is one of the reasons for unsuccessful investigations, which leads to injustices to the victims and cases of bribing and corruption by officers.

In a study conducted by (Dror, 2013) most developing countries are not well furnished with the essential investigation assets, which has led to most cases being in admissible in court. For example, sexual offenses and related cases might be difficult to handle and prove beyond doubt, if an expert cannot adequately access forensic analysis tools needed for DNA samples for comprehensive and accurate results. (Towler et al., 2018). A lack of financial resources and support has crippled most of the investigations. According to (Salfati et al., 2015) investigations in first world have been a success because of financial assistance investigators receive from the state, from management of their departments and political goodwill. According to (Muthini, 2018) criminal investors in Kenya play the role of prevention of crimes and investigation of committed crimes. For the investigators to work efficiently and within the law they ought to have standard operating procedures that indicate common methodologies, which allow consistency in carrying out investigations, good investigation practices, and working conditions and lastly availability and accessibility of resources. When all these needs are met, they deter bad practices and encourage the application of professional standards, thus ensuring successful investigation.

In this research, the relationship model of research orientation and criminal investigation was constructed as shown in figure 1.
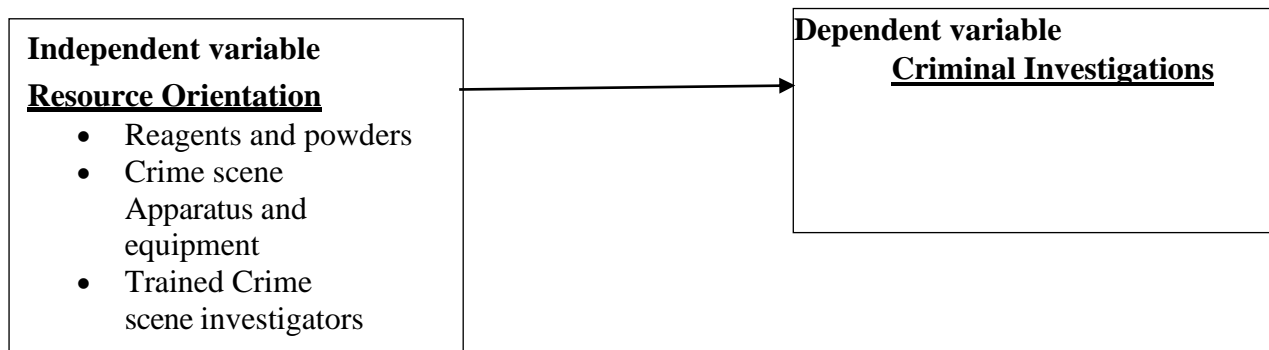

Figure 1: Model of Conceptual Framework
Researcher, 2023

Research Methodology
This study adopted a cross-sectional research design using both quantitative and qualitative methods. This design is easy to manage, simple, practical and economical, provides timely and relevant results. Cross-sectional research design is also good when establishing preliminary evidence when planning a future advanced study (Wang, 218) the unit of observation is the Directorate of Criminal Investigations (DCI) and the unit of analysis was 205 investigators and analyst working at the DCI. The sampling technique that was used in this study was census and the sample population was 205 officers.

The data was collected by using questionnaires. Questionnaires were designed for officers dealing with fingerprint processing and analysis. The questionnaire consisted of open-ended questions and 5-point Likert scale questions were used to measure the aims of the research. Likert scaling is a one-dimensional scaling method (Sansoni, 2011) whose content is usually easy to understand because you have more or less of an opinion; Kothari (2009) explained that 5-point Likert scales are used because they are more reliable and informative. The secondary data was sourced from academic journals, books, selected DCI reports and e-

resources. Data was analyzed through descriptive and statistical analysis, and the Statistical Package for Social Sciences (SPSS) version 23 was used.

Analysis and Findings

An overall of 205 questionnaires were issued and out of this, 160 questionnaires were dully filled thus yielding a response rate of 78.05%. which is considered adequate (Lund, 2021).

Table 1: Analysis of Resource availability

	Mean	Standard deviation
Involvement of DCI in collection of latent fingerprints.	**1.50**	**.785**
Use of Standardized powders	**2.05**	**.937**
Availability of equipment used in collecting Physical Evidence	**2.29**	**.962**
Use of Forensic analysis tools in criminal investigation/forensic analysis	**2.41**	**1.030**
Utilization of internationally recognized techniques	**2.15**	**.960**

Source: Researcher, 2023

The variables addressed under resources orientation are as shown in table 1.The study shows that there is availability of resources needed for collection of physical evidence during criminal investigations as shown by a mean of 2.29. The respondents also indicated that there is availability and use of forensic analysis tools in criminal investigation/forensic analysis as shown by a mean of 2.49. The DCI utilizes internationally recognized techniques as shown by a mean of 2.15. The respondents also indicated that they use Standardized powders as shown by a mean of 2.05 and that the DCI was involved in collection of latent fingerprints as shown by a mean of 1.50. All these factors play an important role in the outcome of criminal investigations. These findings are in line with Ali Shah & Hussain (2021). Who found out that availability of resources helped in enhancing the discipline and training of new experts in criminal investigations, forensics and physical evidence and further avails research opportunities for forensic scientists. A resource rich approach when dealing with physical evidence can enhance investigative capabilities, improve forensic analysis and facilitate better collaboration among law enforcement agencies

Reliability Statistics

Cronbach's alpha: CA was used to determine the reliability of the scales adopted in this study. The measurement scales' reliability was significant, at 0.740 (Table 2). The study met the CA threshold ranged from 0.7 to 0.9.

Table 2: Reliability Statistics

Variables	Number of Items	Cronbach's Alpha	Comment
Availability of resources required to carry out investigations	3	0.740	Accepted

Researcher, 2023

The study addressed the null hypothesis on resource orientation by using chi square test critical of 1.253 and the findings obtained were; H_{01}: Resource orientation has no influence on criminal investigations in Kenya. The critical ratio (C.R.) of the resource orientation was found to be 1.253, which is less than the standard normal distribution Z-score of 1.96. The null hypothesis was rejected and the alternative hypothesis embraced as shown in table 3.

Table 3: Hypothesis testing results Resource Orientation

Hypothesis	Estimates and test statistics	Conclusion
H_{01}: Resource orientation has no influence on criminal investigations in Kenya,	Coefficient estimate β =0.13 C.R = 1.253	The C.R is less than the 1.96 standard normal Z-score, Reject H_{01}

Researcher, 2023

Regression Analysis for Resource Orientation
Regression coefficient estimates (regression weights) of the structural model were used to determine effect of resources on criminal investigation. As shown in table 3, the coefficient estimate of resources on the model is 0.113. The coefficient estimate is not significant as shown by the Critical Ratio (C.R), which is less than the standard normal Z-score of 1.96. The P value also exceeds 0.05%, indicating no significance. This translates to resource orientation does not have any real effect on criminal investigation.

**Table 4: Regression Weights for Resources and Investigation**

			Estimate	S.E.	C.R.	P
Resources	**<-->**	**Investigation**	.113	.054	1.253	.210

Researcher, 2023

In path diagrams, the absolute value of the coefficient indicates the strength of the relationship. A larger absolute value suggests a stronger relationship, while a smaller one suggests a weaker relationship.

The influence of resources on criminal investigation was further represented in a path diagram, with a coefficient figure that represented the strength and path of the association between the two mentioned variables. Figure 2 below illustrates the path from the objectives to the observed indicators. In this case, from resources availability to criminal investigations

indicates a positive relationship.
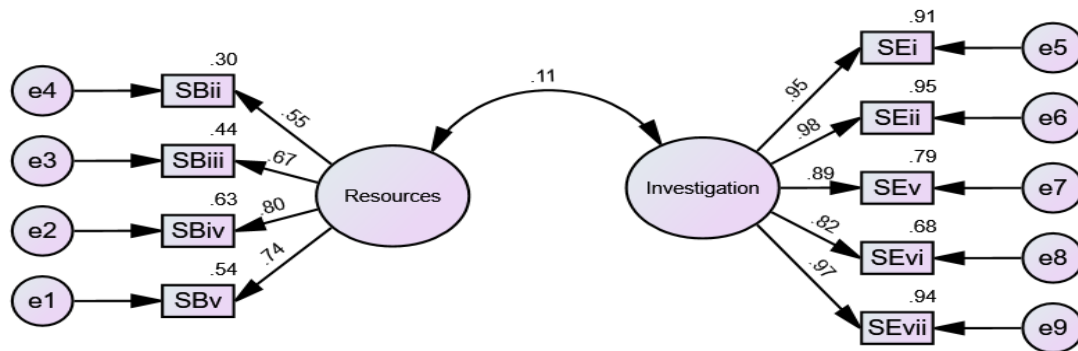
Conclusion

The study concludes that resources orientation significantly affects criminal investigations. Investigators ought to have proper training on crime scene identification, types of surfaces suitable for latent fingerprint processing and the use of internationally recognised standards when handling physical evidence at a scene of crime. All the above subsequently leads to effective prosecution of criminal cases.

Recommendations

The study recommends that in the face of scarcity the DCI should seek external funding through grants or partnerships with organisations that support investigations. The investigators should support the practice of processing mock crime scenes and surfaces for fingerprints in order to develop and refine skills in evidence collection to avoid wastage. The study also recommends that investigators should implement effective case management practices, transparency and communication with stakeholders to manage expectations and gain support. The investigators should also leverage on technology to maximize efficiency. This might involve the use of digital tools for evidence collection and processing.

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