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Theme: cyber security and combating cyber-crime

Subtheme: Digital Evidence in Crime Scene

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1. **Introduction:**

The crime evolve tremendously in a very quick manner and their methods become more and more complicated and take advantage of technological development in the areas of communication and computerization , criminals become more and more caution as they acquire a knowledge of the police traditional methods and tactics to prevent and discover crimes and combat organized crime.

Crime scene still the starting point for all criminal investigations regarding build up the criminal profile, physical features of the criminal, the sequence of events consisting the crime and how to approach the criminal.

In Sudan the experiences prove that depending on the exhibits seized from crime scene are the best keys to solve theever complicated and hottest crimes.

This paper aim to clarify benefits obtained from digital evidence and the problems that facing the acquirement of that information's to assist criminal investigation in Sudan

1. **Abstract**

The study aiming to review the recognizing of the digital evidence as an important toolin the fight against modern crime andthe efficiency of retrieving it as apart of physical evidence from crime scene. The study Used the police force in Khartoum state – Sudan asthe study sample .all of the data in which digital evidence was utilized in the investigation were scrutinized ,summarized and interpreted. The paper assessed and evaluate the problems that retard retrieving electronic devices from crime scene as part of the set of physical evidences which prevent full benefit of the information's obtained from that devices. Also the studyillustrates the impact of digital evidence in investigations and howit help reduce time and optimize effort and provide break through information to progressively finish criminal investigations**.**

***Keywords:***digital evidence, crime scene, criminal investigations

1. **Information technology and modern life:**

today's people utilize various electronic mediaand computers in different aspects of their lives. Criminals also use electronic media and computers to facilitate their criminal activities. The present information and communication technology permits suspects to commit crimes remotely anywhere; they can obtain intelligence and penetrate with near anonymity. Instant communication and electronic mail provides a venue for communication between suspects as well as victimsPhysical evidence in crime scene can help investigators to obtain information about the victim that lead to his identification and start digging in his relations, information about the perpetrators, theweapon, the motive, the time of the offence, sequence of incidences and eventually how the crime been commited (Mohammed, 2015) .

The electronic devices found in crime scene whether thought to belong to the victim or the perpetrator can show the latest communications , places and people how related to him and reveal the identity of the owner and his planes and thoughts down to the deepest personal information's using letters ,photos ,e mails internet sites,..etc. this information's will be quick direct and very use full in the hands of investigator , while the information from traditional forensic (Lab.) thequicker the actions the easerthe enclosure of the suspect and along until capture him,information's provide very important tool to interrogation and later to convict him(Ibraeva, 2016).

1. **The Digital Evidence:**

Digital evidence is valuable information to criminal or non-criminal investigation that is kept on, acquired or delivered by mean of electronic device. This evidence can be acquired when electronic devices are seized and secured from crime scene for forensic examination.

This electronic deviceshould be identified during the walk through and crime scene survey and seized during the processing of the crime scene by the technician assigned to this task within the crime scene team(Hewling & Sant, 2012).

Al though the crime scene can by house ,farm ,facility ,indoor or outdoor the aim is to gather the maximum amount of information from that device to assist the investigation , the problem arise from the parties connected to the crime scene , the perpetrators, the victims ,the witness and the first responders.

These parties will affect finding the electronic device in the first place or the conditionof the device and profitability of the device(santhi, Kanakam, & Hussain, 2017).

1. **Problems related to the public:**

The public attend the crime scene sometimes become a problem, there are cases when relatives of the victim try to hide or conceal the electronic device for reasons related to ignorance of its importance to the investigation or their greed to get the value of the device without share it with other inheritants or the fear of exposing an information that can make embarrassment to the victim family or cause problems with others or the fear that the information will reveal a law violations ( personal contact ).

The public in common areas like markets,open spaces, high ways, townoutskirts sometimes will tend to steal the victim belongings especially the valuables like electronic devices ,cell phones, cameras,…etc. This will delay or prevent the acquirement of the valuable information contained in the device.

Thepublic havea little awareness about crime scene and the importance of its preservation from tempering or taking anythingwhich will lead to affect the course of investigation or prevent arresting the perpetrators and bring them to the court of law.

Public sometimes tend to conceal information's about the places and facilities used by the victim in his communications (Net Coffee, Internet libraries…etc.) or conceal the relationship between the victim and others which lead to prevent the seizing of the electronic devices and the information on it.

1. **Crime scene investigation team:**

Police is familiar with the traditional concept of physical evidence; there is long history and experience inherited from generation to another on how to deal with physical evidence in crime scene. in Sudan this experience lead to the establishment of special unit to investigate crime scene and handle the physical evidence on it , this unit started to work in 2003 with different specialties represent the different types of physical evidence in crime scene like fingerprints ,police dogs, arson,… etc.

Police detectives,investigators are not fully aware of the benefits and importance of information and data obtained from electronic devices especially the ones seized from the crime scene until just a few years ago. This awareness is associated with the widespread of personal computers ,mobile phones, modern digital cameras , digital sound recording and playing devices and other media devices which they learn by daily usingtheamount and significance of personal data and links available in single piece of electronics .

The technical support for investigations with respect to digital evidence was slow and starts with efforts from some communication companies and related government units.

the information provided by these companies are merely the location of the mobile phone under investigation and whether a particular phone chip is attached and information associated withusage of the chip, this information'shelped the investigators to confront mobile phone robbery and return back many belongings for theirowners.

Recently specialized Laboratory wasestablished In the Forensic Laboratories For the examination of physical evidence which include examination of digital devices examination and handle of computer networks and media equipment's to assist criminal and non-criminal investigations.

Although, there is crime scene investigation teams trained and equipped to process crime scenes even for accidents likebombing, radiologicalincidents,…etc.,there is no special training or equipment's available to seize, transport and preserve electronic devices contain digital evidence.

The physical evidence in crimescene is very delicate and should be handled with great care, the digital evidence is more delicate and can be subject to damage by a lot of traditional factors,actions and conditions including:

1. The first responder does not know the right way to handle this digital evidence.
2. The uncertainty of the benefits obtained from data extraction for digital evidence lead to neglect or misuse of the electronic device.
3. The total reliance on traditional methods and the doubt of referring to modern methods for gathering information.
4. The ignorance about databases that can be used in correlation with the extracted information and the digital evidence in it.
5. There is no special unit to handle digital evidence found in crime scene like other kinds of evidence.
6. **Digital evidence and criminal investigations:**

In spite of all this reasons and factors, we can realize that since 2006 there arehuge number of crimes that had been solved by the use of digital evidence retrieved from the crime scene.

There are two situations for the involvementof theelectronic device in the course of the investigation

1. The electronic device missing from the crime scene and assumed stolen, in this case,the investigator seek to locate its position , who is using it, who is communicating with the user , these situations apply to murder crimes, robberies , rape crimes,…etc.
2. The electronic devices found in the crime scene and assumed it is the crime tool ( computers, Laptops, smart phones,…etc)
3. **Cases of crimes solved using digital evidence**

There are crimes lookedstrange and shocking in the beginning but step by step using the crime scene both physical evidence for the Lab. And physical evidence for crime scene reconstruction which include digital evidence, at the end we find all the answers.

1. (Policerecords)In the year 2009 a woman found murdered in her house in Khartoum North in a neighborhood called *Helat Khougliy*the house was partially burned, the body was found naked and her clothes torn to the ground near her body, there weremultiple stab wounds, obvious signs of violence on her body and evident possibility of rape.

Thewardrobe was broken and the clothes and everything else is thrown to the ground, there were blood residues all over the floor from the body to the center of the house.

The crime scene investigation reveals that the fire in the house is arson, and there is one set of foot wire in the floor near the body moved to the other room and the center of the house, which indicate one perpetrator.

The coroner s report confirm the rape ,The investigations show that her mobile phone is missing and money she received lately is missing too, investigations show that there is a suspect who have thesame way of committing crimes and have violent temper for this they believe that he faced resistance from the victim result to her death, technical support by tracking the stolen mobile phone they managed to locate its position which lead to his arrest and seizing the mobile phone after rounds of interrogation he confessed and re-act the crime with the presence of the attorney , the court convicted him with the crime of murder and sentenced by execution .(Policeinquiry No. 3996 16/8/2009 Khartoum North police station).

1. (Police records) in 2014 a Spanish Diplomat was found killed in his apartment in garden city neighborhood Khartoum – Sudan. The body found lying in the hall floor with under wire and pole of blood surrounding him,the body Examining show multiple stab wounds mainly in the chest ,nick and hands.

Crime scene investigation clarify that there is no signs of breaking in, there were a guest setting with the deceased, one set of blooded foot prints moving several times from the hall to the bathroom and back foot measures indicate someone else , clothes with blood on it found in the path room with signs of recent shower measurement and comparison with size of cloths found in the deceasedwardrobe indicate someone else , the deceased mobile phone is missing and assumed stolen , a knife was found near the body covered with blood assumed the crime weapon.

Technical support by tracking the stolen mobile phone they managed to locate its position which leads to his arrest and seizing the mobile phone after rounds of interrogation he confessed and re-act the crime with the presence of the attorney, the court convicted him with the crime of murder and sentenced by jail. (Police inquiry No. 4386 7/8/2014 Buripolice station).

1. **Conclusion**

The study figure to the great impact of digital evidence in criminal investigations as it reduce the consumed time and resources and enable the investigator to focus his efforts in points of break through which often result in success.

Despite the lack of specialized equipment's crime scene investigation teamsmanage to process electronic devices in safe manner without any record of damage digital exhibit.

1. **Recommendations**
2. Train Crime scene investigation teams on how to collect the electronic device properly to preserve the digital evidence on it.
3. Supply the suitable tools for securing and transport electronic device from crime scene to the Lab. And back to the unit requested the examination and to the court.
4. Educate the investigators, patrol officers …, the entire set investigation and first responders on the importance of digital evidence and what they might benefit from it.
5. Issue clear and direct instruction and guides on how to handle and seize electronic device for the purpose of examining and extracting digital evidence.

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