

## COMPARAISON OF TRADITIONAL METHODS OF INVESTIGATION V/S. INFORMATION TECHNOLOGY APPLICATIONS

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### ABSTRACT

The investigating agencies around the world have till recent past depended on age-old methods of crime detection as statements of eyewitnesses, hearsay, prejudices, confessions of suspects, manual evaluation of physical evidences as fingerprints, clothes, blood, etc. **But with the advent of information technology and criminals using information technology applications to conduct new crimes and to commit traditional crimes in new ways, the methods of investigation too need to be adapted accordingly.** In today's era of technological revolution, new technological innovations have been developed to prevent crime and to improve the performance of the police, but little is known about how and why certain innovations are adopted, and the consequences of technology-driven solutions to the problem of crime. This article provides an examination of a wide range of new technological innovations that have applications in the areas of crime investigation and their advantages against the traditional methods of investigation. The objective is to highlight the drawbacks of conventional methods in this era of technological revolution and stress upon the imminent need to adopt Information Technology applications for investigation of criminal cases.

Keywords: Crime, Investigation, Information Technology

### INTRODUCTION

Police is the branch of Executive which is responsible for enforcing laws and maintaining law and order in the State. Thus one of the major functions of police agencies is to register and investigate all cognizable offences coming to their notice through such complaints or otherwise, to apprehend offenders, and extend requisite assistance in the prosecution of offenders. The traditional methods of investigation include patrols, manual collection and analysis of physical evidences, recording statements of witnesses and culprits. Till the advent of era of information technology, police agencies were dependent on the age-old traditional methods alone. **But with the advent of information technology and criminals using information technology applications to conduct new crimes and to commit traditional crimes in new ways, the methods of investigation too need to be adapted accordingly.** Thus for effective and strong investigation it is necessary for police to incorporate advanced technology for crime investigation. Scientific investigation of crime through latest techniques eliminates the factors based on hearsay, statements of witnesses, confessions, etc. traditional methods of investigation. The elimination of subjective element also enhances accuracy of evidences, thus increasing chances of conviction. The aim of criminal investigation process is to seek the truth, without fear or favour. This task, integral to both public safety and justice concerns, must be conducted in an unbiased and professional manner. Thus maximum use of scientific techniques of investigation and latest information technology applications as advanced investigation software, Automated fingerprint and ballistic identification systems, Crime mapping software, Geographical Information Systems, etc should be made to eliminate subjective biases in investigation and arrive at accurate facts.

**However, before blindly switching to the technological innovations** in the field of crime investigation, it is important to examine the reasons why the traditional methods of crime investigation fail to detect crimes committed with the help of latest technological applications and how can the inventions in information technology help police agencies in the detection of crimes. This study aims at examining the efficacy of traditional methods of investigation in this era of cyber crimes against the latest technological tools and suggesting the adoption of latest IT innovations in the field which has become a necessity in the modern scenario.

## **COMPARISON OF TRADITIONAL METHODS OF INVESTIGATION AND INFORMATION TECHNOLOGY APPLICATIONS**

### **• INFORMATION SYSTEMS Versus MANUAL RECORDS**

Investigative police work is mostly about the recovery, analysis and interpretation of information about criminals and criminal offenses. Timely and accurate information is critical to the success of policing. This information is collected by the police officers through routine patrol, informants and old criminal records available to them. However collection of such information consumes a lot of time. Lot of paperwork is required and storage of data consumes lot of space. Again verification of this information is a tedious and time consuming task. Only information which is duly processed and authenticated can for intelligence input required by investigators to detect a crime. All the more cumbersome is recording this information in multiple registers and protecting it from being leaked or destroyed. There have been numerous instances when data has been destroyed due to natural calamities. Also retrieval of data requires manual search of voluminous records which wastes much of the time which can be utilised effectively for investigation. Also sharing of data hardly occurs.

With the use of information technology, police department has started storing this information in computers. The computer stores criminal records conveniently and efficiently. One consequence is making it easier for police to collect and process information eliminating the duplication of paper and electronic records and the multiple entries of the same data. Backup of data prevents from hazard of destruction or loss due to computer viruses. Password protection of data provides cushion against leaking of information. Thus police officers spend less time on paperwork and more time on investigation. Digitisation of criminal records allows various Police units to communicate and access shared databases. Information technology may well have the potential over the longer term to deliver substantial administrative efficiencies for police organisations .Hence, any gains in the ease with which specific recording and administrative requirements can be complied with may conceivably be counterbalanced by an increase in the sum total of requirements. As manual search of voluminous registers of records is not required and any information can be searched and shared within seconds through a click of computer, Information systems have led to improved information sharing and improved communication between various police units, allowing people to work more cooperatively, creating a better work atmosphere. The computers at different work stations in the police department are interconnected for sharing of information through intranet. Computers have become essential to communication within police departments. Emails, website updates, blogs and other forms of digital communication have become some of the primary forms of communication in police departments, allowing for the rapid exchange of ideas and other information that can be critical in many investigations. Improvement in communication between police personnel is largely the result of the availability of intranet and e-mail, which facilitated teamwork, information gathering and information sharing. Not only can police officers store records and reports in online databases, but they can also use computers and hard drives to store thousands of images, reports and videos. Computers make mass storage possible, and enable giant online databases that can accurately trace suspects anywhere in the country. Also various softwares assist investigators in recording the details of the case they are investigating and generate reports needed. Thus they are able to keep track of the investigation as well as prepare the reports needed for prosecution. The digitization of case history and details also provides protection against records being lost or destroyed. Again, a repository of such case histories maintained at level of Police stations is a very good source of learning and information for young officers. Also instead of depending solely on collection of information through patrols and informers, investigators also use social networking sites to gather information about criminals through their face book accounts, email accounts, etc. Thus today police have access to vast sources of information. The collection and sharing of information through new technology has revolutionised the information systems in police department.

### **• MANUAL SURVEILLANCE Versus CCTV CAMERAS**

Surveillance is the covert observation of people, places and vehicles, which law enforcement agencies and private detectives use to investigate allegations of illegal behaviour. There are a number of reasons to conduct surveillance. Surveillance is conducted to prevent crime, to obtain evidence of a crime, to obtain evidence in civil suits, to document an individual's location, to document activities in or around a specific location or building, to obtain information to be used in an interrogation, to gather intelligence, or to obtain information to be used in court. Traditionally police department has been relying on surveillance through patrols, beat personnel, undercover operations and informers for surveillance. These methods have numerous limitations. Surveillance through police patrol in police vehicles is exposed. Thus criminals become alert and not much information is gained. Same is the case with beat personnel. As criminals who are local identify the beat personnel, the very purpose of surveillance is defeated. Dependence on informers and private detectives is risky and costly too. Moreover even if police personnel witness a criminal incident during patrol or undercover operations, it is difficult to record through camera as the criminal will become alert and escape. Also the first response of a police person who witnesses a crime is to prevent it and nab the culprit rather than to videograph the incident as in the mean time the criminal would escape. Due to shortage of manpower, 24 hours surveillance of all the places is not possible. The statements of surveillance personnel alone cannot stand as evidence sufficient for conviction. This raises doubt regarding the effectiveness of traditional techniques of surveillance.

Thus the need of surveillance through latest technological equipments: IP based Closed Circuit Television Cameras (CCTV) cameras, drones and internet. CCTV is of enormous value as a technique in the investigation of crime:

1. The use of CCTV has a clear benefit in respect of identification and arrest of suspects
2. The video footage taken by CCTV cameras is of assistance in the gathering of evidence.
3. Video evidence can be most useful in the speedy resolution of cases, as suspects generally plead guilty when confronted with such evidence
4. CCTV makes possible more effective utilisation of police officers to patrol other areas, thus allowing for saving on resources
5. The use of CCTV may further serve as a deterrent to potential perpetrators.
6. One of the primary benefits of CCTV use is that it is a source of comfort to law-abiding citizens

CCTV aims to increase the perceived risk of capture, a factor which will de-motivate the potential offender. Thus surveillance through CCTV also helps in crime prevention and deterrence. The traditional techniques of surveillance are of hardly any help in detection of cyber crimes. Due to proliferation of computer related crimes surveillance through internet has become essential to identify the criminals. The Information Technology Act, 2000 provides for admissibility of digital records as evidence.

#### • **MANUAL MATCHING OF FINGERPRINTS Versus AUTOMATED FINGERPRINT IDENTIFICATION SYSTEM**

Human fingerprints are detailed, unique, difficult to alter, and durable over the life of an individual, making them suitable as long-term markers of human identity. Thus identification of fingerprints helps police to identify criminals who have left their fingerprints on the scene of crime, or to identify people who are incapacitated or deceased and thus unable to identify themselves, as in the aftermath of a natural disaster.

In [traditional fingerprint](#) identification system, fingerprints at scene of crime are lifted manually using substances as graphite powder, grey powder, aluminium powder, etc. A common method of making these fingerprints visible is by dusting the area with fingerprint powder that will attach itself to the natural oils from the skin onto the fingerprint making this visible for photography and evidence collection. It is sometimes difficult to detect fingerprints present on certain substances, such as

multicoloured backgrounds, fibrous papers and textiles, wood, leather, plastic, adhesives and human skin. The fingerprints from a suspect are taken by taking an ink impression of fingers made on paper. Hands are be cleaned to wipe away dirt or other substances, and then dipped in ink. The suspect would roll each finger tip across a section in a piece of paper, and then press all five fingers down onto the paper. Although this fingerprint technique gave an effective impression of a person's unique prints, it required manual examination to determine a match. A fingerprint expert would examine the fingerprint of a suspect in a case to the fingerprints of known suspects .As fingerprinting files grew by the thousand; identification became a laborious process easily subject to human error. Also fingerprint examiners lack objective standards for evaluating whether two prints match. There is simply no uniform approach to decide what counts as a sufficient basis for making identification. Some fingerprint examiners use a point-counting method that entails counting the number of similar ridge characteristics on the prints, but there is no fixed requirement about how many points of similarity are needed Others reject point-counting for a more holistic approach. Either way, there is no generally agreed-on standard for determining precisely when to declare a match. Although fingerprint experts insist that a qualified expert can infallibly know when two fingerprints match, there is, in fact, no carefully articulated protocol for ensuring that different experts reach the same conclusion. Thus lifting, developing and matching fingerprints through the traditional techniques is quite cumbersome and do not produce an evidence beyond doubt.

The modern techniques of fingerprinting make use of chemicals and laser technology to lift fingerprints from the scene of crime. The fingerprints of suspects are taken by biometric technique. A biometric fingerprint [sensor](#) is an [electronic device](#) used to capture a [digital image](#) of the fingerprint pattern. The captured image is called a live scan. This live scan is [digitally processed](#) to create a biometric template (a collection of [extracted features](#)) which is stored and used for matching. This technique is very accurate, speedy and easy to use. Again Automated Fingerprint Identification System (AFIS) is used for matching fingerprints. In AFIS technology computer scans and digitizes fingerprints to automatically create a spatial geometry or map of the unique ridge patterns and minutiae of the prints, and to translate this spatial relationship into a binary code for the computer's searching algorithm. Making incredibly fine distinctions among literally thousands or millions of prints, an AFIS computer can in a matter of minutes compare a new fingerprint with the massive collections of prints on file and make identifications that previously were possible only through a time consuming and error-prone process of manual comparison. This has greatly increased the speed and accuracy of ten-print processing and has made it possible to conduct cold searches (i.e. a search where there are no suspects or other identifying information other than the crime scene prints) against very large fingerprint files. The search time in a file of less than 500,000 prints may range from a matter of minutes to about one-half hour. Computers also store databases of all the fingerprints for ready reference by the investigators. Thus modern techniques of fingerprint identification have helped to increase speed and accuracy of investigation and authenticity of fingerprint as evidence.

- **MANUAL MAPS Versus CRIME MAPPING SOFTWARE**

Since ancient times police and military have relied heavily on maps for investigation and detection of crime. The investigation of any offence starts with examination of the scene of crime. The location of scene of crime hols great importance in detection. Thus investigators always locate the scene of crime on map for detection of the offence. The conventional techniques involved drawing of maps manually. Such maps are not very clear and accurate. Also drawing maps manually takes lot of time and involves many calculations of scale, latitude and longitude. Such maps can hardly be of much help for future investigations as with time they would become less explicit because ink would fade or paper would tear off, many new localities would come up in the region thus making earlier map irrelevant. However advent of software which assists police agencies in creating crime maps and availability of satellite imageries and maps through websites as Google maps has resulted in great efficacy and accuracy in detection and forming strategies for prevention. The database of such crime maps is stored in computers and available to investigators on a click of button. Accurate location of crime scene facilitates gathering of other evidences necessary for detection and identification of culprits .These maps are also updated from time to time. Using [Geographic Information Systems](#) (GIS), crime analysts can overlay other datasets such as [census demographics](#), locations of markets,

schools, etc., to better understand the underlying causes of [crime](#) and help [law enforcement](#) administrators to devise strategies to deal with the problem. Police patrol vehicles fitted with GIS help police to locate and reach the scene of crime in minimum possible time. With the help of Crime mapping softwares, police persons in police control room, on receiving a call about occurrence of a crime or accident, can locate the scene of crime immediately on maps on their computer screens and instruct the nearest police patrol vehicle to reach the location. This is called Computer aided dispatch(CAD). Thus Crime mapping softwares have reduced response time of police to any crime and the same patrol vehicle and personnel can hence attend to more incidents in the same time. This has also helped the police department, to some extent, to overcome one of its major problems, i.e., shortage of manpower. These are some of the very obvious benefits of this latest technology over conventional manual mapping system.

- **TRADITIONAL TECHNIQUE OF BALLISTIC EXAMINATION Versus AUTOMATED BALLISTIC IDENTIFICATION SYSTEMS (ABIS)**

Common physical evidence an investigator comes across in a firearm cases are weapons as rifle, pistol, revolver, etc. and ammunition as bullets, pellets, cartridge cases, etc. It is essential to identify the firearm and match it to the mark made by it during the crime, which can be on a body or on a material, in order to prove that crime has been committed by the same same weapon which has been recovered from the scene of crime or from the suspect. Traditional firearms identification involves the use of a [Comparison Microscope](#). A firearms examiner visually compares the ballistic signature of a bullet/cartridge recovered from a crime scene with those in the police files. This process and its outcome, while accurate and acceptable in court, is extremely time consuming. Because of this, its usefulness as an investigative tool is severely limited.

Automated Ballistic Identification Systems (ABIS) are specialized computer hardware/software combinations designed to capture, store and rapidly compare digital images of bullets and cartridge casings. The relatively new field of computational forensics attempts to overcome the human bias angle by objective analysis and statistical probability that can withstand the arguments in a court of law. The computer images in systems such as ABIS are presented as correlation lists against a given specimen. This association provides an investigative lead that allows a forensic examiner to microscopically examine the evidence to determine if there is indeed identification or if the image association resulted from just a trick of shadow and light. Many types of software have been developed to enhance accuracy in identification of ballistics. Thus use of computers has completely revolutionized the field of ballistics.

- **TRADITIONAL METHODS OF INTERROGATION Versus BRAIN FINGERPRINTING**

Detection of deception is one of the important duties of an investigator in order to identify the real culprit. How far an investigator is successful in tackling this problem depends on the methods used for the same. Traditionally, structured questionnaires have been used to interrogate the suspects. Sometimes police also resorts to third degree methods. Then polygraph was invented. During polygraph test also a questionnaire is used. However this is supplemented by a polygraph machine which measures the changes in the blood pressure/pulse rate of suspect while he/she answers these questions. These techniques are quite cumbersome and time consuming. Also they are not very accurate. Moreover the polygraph test report 'per se' is not admissible in the court of law in our country. Brain fingerprinting is a computerised technique to identify a culprit accurately by measuring brainwave responses to crime related words or pictures when shown to suspect on the monitor of a computer. The fundamental difference between a perpetrator and a falsely accused, innocent person is that the perpetrator, having committed the crime, has the details of the crime stored in his brain, and the innocent suspect does not. This is what Brain Fingerprinting detects scientifically. There is no questionnaire involved in this as in case of polygraph. This technology was invented by Dr Farwell on the basis of the principle that the information stored in the brain of a person about an incident that occurred sometime again can accurately be recognised and is as accurate as conventional fingerprinting. Farwell Brain Fingerprinting utilizes multifaceted electroencephalographic response

analysis (MERA) to detect information stored in the human brain. A memory and encoding related multifaceted electroencephalographic response (MERMER) is elicited when an individual recognizes and processes an incoming stimulus that is significant or noteworthy. When an irrelevant stimulus is seen, it is seen as being insignificant and not noteworthy, and the MERMER response is absent. This pattern occurs within about a second after the stimulus presentation, and can be readily detected using Electroencephalograph (EEG) amplifiers and a computerized signal-detection algorithm. This technique is very useful in detecting such crimes where a criminal has not left any physical evidence, neither fingerprint nor any biological evidence for DNA Analysis but certainly carries his brain along with him. Thus Brain Fingerprinting is the latest scientific computerized technique for the detection of deception. It eliminates the third degree methods while interrogating suspects and is scientific method of detection. Though no legislation has been passed in any country to legalise the use of this technique as evidence, yet Courts are accepting these techniques as corroborative evidence.

#### • **SUMMARY**

Thus Information Technology has opened a completely new category of investigation, as specialists explore digital traces on information carriers such as cell phones, laptops, and car computers. Information can now be produced more quickly than was ever thought possible. The collection and analysis of evidences, through these Information Technology Applications, is more accurate and carries greater evidential value in the Courts of law than many conventional investigative techniques. However, there are certain barriers in adoption of these technologies by police agencies. The successful implementation of Information Technology Applications requires appropriate technical infrastructure as sufficient number of computers, space for operation, networking, etc. This would require sufficient budget allocation to the police department for purchase of these Information Technology Applications and erecting required infrastructure. Another significant issue is community support for use of these technological applications. Appropriate laws need to be passed to validate the use of these technology applications by police agencies. Implementation of this change from traditional methods of policing to use of Information Technology applications in the police department also entails change in the organisational settings and culture and formulation of appropriate strategies. Today one of the major challenges in policing include identifying technologies that are most effective (and cost-effective) in reducing crime, overcoming the barriers in adoption and implementation of these Information Technology applications, formulation of appropriate strategies for implementation and training officers to use those technologies properly. Technology is a tool and how well the tool is used depends finally upon the workmen.

#### **REFERENCES**

- Bayley, D. (1995). Police for the future. NY: Oxford University press.
- Brown, M. M. (2000), 'Criminal justice discovers information technology', in National Institute of Justice (Ed.), Criminal justice 2000 - V.1 - The nature of crime: Continuity and change, U.S. Dept. of Justice, Office of Justice Programs, National Institute of Justice, Washington, D.C.
- BYRNE, J. and REBOVICH, D. (2007). The New technology of Crime, Law and Social Control Monsey, NY: Criminal Justice Press.
- CHAN, J. (2001). "The Technology game: How information technology is transforming police practice" Journal of Criminal Justice, 1:pg.139-159.
- Davis, L. M., & Jackson, B. A. (2004), 'Acquiring, implementing and evaluating information technology', in Pattavina, A. (Ed.), Information technology and the criminal justice system, Sage Publications, Inc.
- Lyman, Michael D. (1999). Criminal investigation: The art and the science (2nded.). Upper Saddle River, NJ: Prentice Hall, Inc
- Manning, P. (2008). 'A view of surveillance', In: Leman-Langlois, (ed) Techno-Crime: Technology, Crime, and Social Control, Willan Publishing: Collompton, Devon, pg. 209-242
- M.B. Rao, Handbook on Forensic Science, Published by SVPNPA, 2008.

- NOGALA, D. (1995). "The future role of technology in policing". In: BRODEUR, JP. (ed) Comparisons in Policing: An International Perspective, Avebury, UK: Aldershot, pg. 191-210.
- Nunn, S.(2001). Police technology in cities: Changes and challenges. Technology in workloads. Police Quarterly 1(2): pg.21-49
- Police Executive Research Forum (2011) 'Use of technology in Policing: The chief's perspective', Critical Issues in Policing Series. Washington, D.C. Police Executive Research Forum (April 4, 2011).
- STONE, C. and TRAVIS, J. (2011). 'Toward a New Professionalism in Policing', New Perspectives in Policing. Cambridge: Harvard Kennedy School.
- Stroshine, M. (2005), 'Information technology innovations in policing', In R. Dunham and G. Alpert, eds., Critical issues in policing (5th ed.) Longrove, Il.: Waveland Press.