

Information Technology and Criminal Investigation

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Abstract— Information communication technology deals with information systems, there for data storage, data access, data retrieval, data analysis and data intelligent decision making. Then Information communication technology has referred to creation, processing, gathering, storing, presenting and a dissemination of information and they also processes and devices are enable all are to be done. The disuse of the technology has prepared the ornaments of the enactment and implementations are the cyber laws. Now a days, computers are playing a major type of role in the almost every kind of crimes that are committed. In the Citizens must not be under the impressions that are cyber crimes are vanishing and must realizing with each of passing days, cyberspaces are become a more dangerously. those places to be in where criminals crime roam freely to the executing their criminal intentions encourage by the so-called anonymities that provide of internet . The Paper focuses are on the new legislations which are covering all of the aspects of the Cyber Crime. They should be passed because of the grey areas are the law can be the removed[4].

Keywords—Criminal investigation, justice, Information Technology, Legal System, Crime.

I. INTRODUCTION

Now a days Information Technology is a very big field in the modern world. That is the use of computers like that Store, Manipulate, Transmit and organize varies types of data[8]. That subject is usually use in business field, economic field, forces and other suitable factors. Generally we call it information and communication technology, information system, information of things etc[8].Human are storing, manipulating retrieving and communicating as they want to include it. Information distribution technologies like television, telephone all electronic media and all printed media. So we can identify the that is very familiar to the modern world system[12].

Then the rule identify the correct and right procedure or behavior in the game like that the introduction of the law[1]. Beside that it is a system of rules that are create around the social or governmental academy[3]. How ever the system of rules are particular state or community validate as regulating the actions of there In the legal system criminal law is the one of main part[3]. Because of that is very serious cause.

Then the legal side it the very important like that this part. Besides that the “criminal investigation” is the main part of the legal system. In the modern world there are many kinds of legal sides. The people use high and new technologies for

that crimes[3]. So legal system must improve their technologies to catch that above crimes. As a example now a days heroin and drugs cheating, data cheating and murders are the large side of criminal parts in the modern world. In U.S.A is the largest data cheating group in the world. That is the large serious cause of country privacy[2],[21]. Besides that heroin and murder causes are also same. In this research I have included that part by using some of research papers, magazines and many other supporters.

II. OVERVIEW OF CRIMINAL LAW AND JUSTICE

Criminal justices are one of the delivery of justice system to these who have dedicated crimes. The system of criminal justice is a kinds of government agencies. Then those institutions whose goals are to identification and touch dislawful individuals are to damage a form of punishment of them. So other kind of goals have included the rehabilitations of accrues are preventing other kind of crimes, the moral of support for these victims. So the primary institutions are many kind of the criminal justice systems are like that Prosecutions, Police and defense of lawyers, Then the courses and persons etc[6].

We can see there are mainly three parts In the criminal justice system. Like that

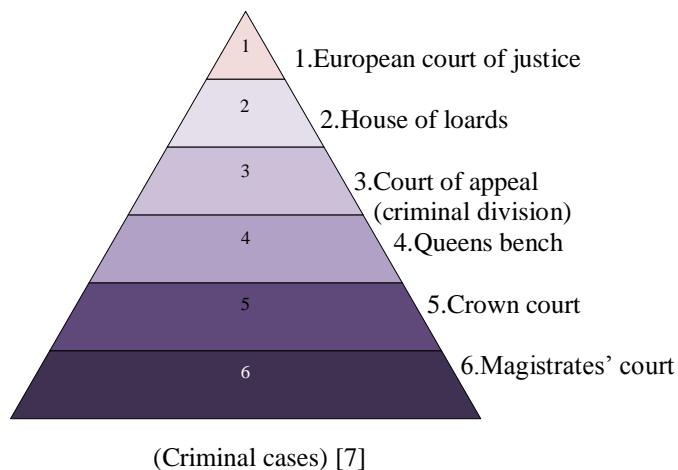
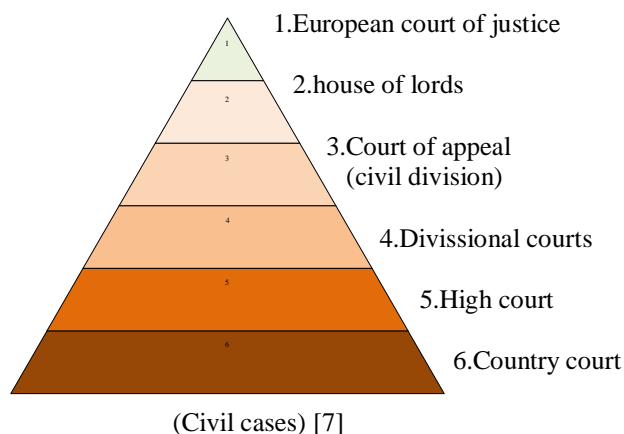
1. The department of law enforcement.(military, police etc.)
2. Many kinds of courts and all defense lawyers.
3. Types of probation agencies(prisons)

To maintain the rule of law in society these three type of departments are doing very large part of criminal points.

Besides that the courts are the serve as the place of where they disputes were then settled and the justices are administered. All countries must have the varies kind of series of justice systems. Basically we have main two parts of justice system. Like that

- 1.Civil matter justices
- 2.Criminal matter justices

Both these two types of justices have the parts different from another. [7].



In modern countries we can saw all these two types of courts. But they are not in common names like that. These names are change as the state wish.

Besides that in the world there we can see some high capacity of criminal crimes. Like that[10].

- Personal crimes- criminal offenses resulting in the harm of another individual.
- Property crimes- interference of other's property.
- Inchoate crime-intended or initiated criminals
- Statutory crimes-related to drugs, traffic, alcohol or other societal.
- Financial crimes –white collar crimes

III. HISTORY OF LAW

History of criminal law and the criminal law begins with the worlds' one and first association. In the past season the people of Sumerians never divide the law in civil or criminal. Firstly they prepare the written law system. Neo, the king of Sumerian have built the oldest written law system which was found early. How ever it never divide the which are the civil and criminal law. [11].

These civil and criminal aspects were not separately analyzed from the detailed conclusions of similarly important guys.

*As a example , it is defined as a tyranny or furtum an adductor. Violence and the Assault are used to hide someone else's property as hacking. The legal liability arising out of the above violations can be waived by paying compensation for financial errors. [11].

Then the first notice about the divide of the law(criminal and civil) can get the England was during the invasion period of NORMANS.

Then the punishment(take care only Europe) for the particular concept of crime came about in the ancient Spanish action Scholastics. According to this concept anguish was brought on a human being to punish the mind for the sake of their crime. That was combined with the "canou-law" and ultimately resulted in the creation of a criminal law free of religious influence.[7]

IV. MEANING OF ABUSE

Now a days in the world there are many kinds of abuse we can see. As a technology world most of people feeling high stress and the release it by doing abuse also. In abuse category sexual abuse is the most capacity abuse in the world. that abuse we can see not only in western countries now a days we can saw that in Asian countries also. Like that Sri Lanka, India, Pakistan, China etc[3]. As an example in Sri Lanka "Jafna lady abuse, Rathnapura Kotakethana Lady abuse" One might description about the rape as analogous to the property crime. Because of a rapists the goal by using her body, which her owns without getting her permisson will. It also describe as the violation of the victims' independent bout to the sex.

Besides the women abuse children abuse are also large capacity of criminal crime. Because of rapist do that little person in the society. Less than 18 years. One day these people are the person of society. So in that day they also become a rapist. So that is very dangerous crime. [13],[14].

. Johnson (2004) has defined the *children sexual abuse* as the any kind of activities with the children before the age limit of legal consent which is for the sexual satisfaction of the adult or a older children. So these activities are including or genital-genital, oral-genital, hand-genital ,genital-rectal, hand-rectal, and hand-breast contact, they showing sexual images and videos to a child or using a child in the production of sexual image and videos . Additionally sexual children abuses has defined from previously is morally incorrect and was not accepted in the society. So the reasons why, because the children were innocent human people, who were vulnerable and did not know about how to understand the right way. So that is the how law labels of children, are as being sexual abuses, and therefore they were victims of crime[13][14].

V. CRIMINAL INVESTIGATION AND PUNISHMENT

Criminal law is a special law. So it different from other law because of as the output of the criminal crimes are very powerful one when committed under a violation. All of crime are completed from the elements which are need for completed crimes. Physical punishment and physical things may be brought about the whipping or groping, but the laws of many states have been penalized from this situation of punishment. There we can see both physical and nonphysical punishment. So people may be arrested under the many kind of reasons. This type of prison times are valid from a day to many years. then the prison punish justice can arrest the any kind of their own properties. How ever most of Middle East countries use the many kind of physical punishments than other European, Asian, American and many other countries. Like that “lapidating, firing to head, dropping the body parts, hanging etc. These Then there are five kind of fundamental elements are valid to be the implementation of the criminal law. They are[10]

- Retribution
- Incapacitation
- Deterrence
- Rehabilitation
- Restitution

Those kind of elements are different from other in the legal system. [10],[11].

- **Retribution**
“Individuals must pay the result of crime” that is the basic thing of this section. This system was born in the “*Ctalittariyism*”[11].
- **Incapacitation**
Through this type criminals are commonly expected and pursued to hinder the well-being of society. In other words, they would be imprisoned. Then the death penalty and deportation are intended to achieve this idea.
- **Deterrence**
The basic premise of this one is to acquit him to an offence punishable by criminal offences. Execution in case of proving that a murder has been committed, a death sentence has been given to the accused who committed the murder.
- **Rehabilitation**
This is intended to make one who is a victim a good citizen-accountant. In doing so, he understands the harmful effects of his wrongdoing by preventing the criminal from doing so.
- **Restitution**
This is to restore the victim to the compensation given or to restore his crime before the crime occurs. As a example , if someone proves to have misused the money

of another persons. The original person has provided the other with the other provision in the legal system to pay such misappropriated amount. [5],[11],[15].

VI. INTERNARTIONAL LAW

The international criminal court in the HAGUE is conduct the detailed and analytical work on the criminal and criminal activities of the most brutal and most violent, which are the depend all around the world. The case of the Nuremberg trials as the source of the modern international criminal law[21].

In these cases guilty leaders of the Nazism were condemned in the genocide in 1998, then the criminal court was established in the Hague. Under the Rome Statute. This was primarily to punish them for the crimes against humanity by leaders and government officials of various states. But all countries are not participate in these cases. Some countries like that Libiya, Yemen, Israel and Iraq.



International criminal court-
Hague

VII. FUTURE DIRECTIONS

Criminal investigation and criminal justice are closely related two challenging phenomena. Information technology is a major tool in bringing about this to the right judgment. The utility of this utility has come to understand that information technology can not be solved in the right way by means of the existing methods for dealing with problems that are difficult to expose to information under undeveloped periods. Then there were many instances of judgment[6],[16].

Then in the world the historical and theoretical perceptive mainly recommend the CID (criminal investigation department) of any country. So they have large process of that criminal effects. They techniques of criminal investigation and minimize the criminal effects. In 1892 establishment of the department of police they marked the key point of investigation criminal crimes[25].

An observer with an information technology tactic can use accurate data at all times in criminal justice. DNA Testing is a key practice[19]. There were many instances where the crime scene was resolved with a clear indication in a test station. Scanning technology also contributes to the same. Scanning data accurately describe the actual situation of the event.

The signs of the highway and the appearance of the biodiversity in a crime scene are caught in criminal law. Highlights will help to find the vehicle used to commit a crime and then judge the crime through it. Misrepresentations and biological evidence of a chemical in a crime site are very important[17]. Explanation of the biodiversity analysis of explosive chemicals in the environment used in a crime scene are also key factors in criminal justice[16].

The scanning technology have gained various achievement. Normally various kind of bombs use in crime actions. Now there are scan machines can show by the digital way. What kind of explosive materials contained what the explosive time, how much damage happened and how extinguish etc. this technology improve more directions.

Finger mark observation also rapidly developing[20]. This technology majorly use in the crime determination as we know there is no equal finger marks in the world. Then the world has many classifications of the finger prints. Like that

- *About 60-70% (loops)
- *About 25-35% (whorls)
- *About 6-7% (arches)
- *About 1-2% (composite)
- *(accidentals)[20].

The finger mark observation technique now reached up when the finger mark washed out or blurred normal method useless[20]. In that case we can use newly discovered Luminas scanning method. By this way true abuse case report can provide.

The abuse and crush body scanning technology also have full filled in many ways. The true criminal report can provide by this scanning. By this method seriously crushed body by a criminal action can examine. The weapon or tools, the depth of sows, the sharpness of tools also can observe. The all these evidence can forward to a criminal court.

The DNA technology achieved up to atomic structure experiment of a DNA cells, by using powerful electronic microscope if the DNA cells smashed but atomic structure never decay[19]. Generally the CCTV witness make by using the view of the camera. Nearly using by the criminals' view in the CCTV going to analyses comparing their previous behavior by using ICT software technical system. In that way it is more help to prove the CCTV evidence at a criminal court[22],[24].



In night crime observation now use the UV (Ultra Violet) ray camera[18].The camera operate by using the soundless drawn craft therefore the criminals do not know that they are observed. It is more useful in a jungle terrorist activity, drug smuggling and on thieves activity. Besides that there isn't any sound or any flasher. So that is a very suitable object for find criminal crimes[23].



VIII.CONCLUSION

With the development of Information Technology, all crime parts were developed automatically. The most of individuals of crime use modern technology to success their crimes. So that is very large problem in now a days. So now I am going to study what are the points they use for that crimes. In this research paper I have include many proposals to minimize that big question.

At last I have shown the comparison tables some are related to the research that use to finish that paper.

TABLE 1: SUMMARY OF SOME RELEVANT RESEARCHES

Title of the Research Paper	Aim and Problems Addressed	Limitations/ Challenges	Future Directions
01) "Digital Paradigm"	Collection of errors in Digital Paradigm. Communication encounters. Digital paradigm of Harvey collection. Main three parts of Harvey Digital Paradigm. Identify the "Diamox" a Case in the New Zealand supreme court	Data protections. Limitation of digital paradigm. Paradigm is always not suitable as follows.	Introduce what are the paradigm of Harvey collection. Identify what are the main three Diamox case in New Zealand.
02)	Carnal		In the future

<p>“CARNAL KNOWLEDGE: Rape from a legal purview”</p>	<p>knowledge is basically describe the crime of rape discussion. All kind of society regard always rape causes are serious crime. Woman and children rape are important among them. In England and Wales prosecuting for offenders are easy consent. Burden of proof of rape cases and sexual rape cases are the high serious cases.</p>	<p>With the increase of modern technical side there many kind of rape causes will improve automatically. World can not stop at once all type of rapes because of technology is increase day by day.</p>	<p>the women sexual rape causes and children rape causes will be increase automatically because of today technology is high than future. So in that section we must find a very big and the most suitable solution for that. So in the CARNAL KNOWLEDGE he explain them in briefly and comfortable.</p>	<p>04) Crime and justice</p>	<p>Crime and justice part is related to deal with the legal crime and criminal justice. Discuss about the separate things of different justices and different period justices. Sensitiveness of crime and justices.</p>	<p>busy cultural time people who doesn't know about what are the crime or justice or criminals. High class murder causes some times hidden by government power.</p>	<p>minimize the government power by using information automatic systems. To notice all about things around the justice, criminals and many other legal things.</p>
<p>03) “Cyber Law and Information Technology”</p>	<p>Main Aim is to use of empowerment of law to rape causes and deterrence to all criminals. Then minimize the wrongness of who make the cyber spaces. Then old laws not suitable for modern criminals. So as a solution cyber law and information technology is use for it.</p>	<p>Old law are not satisfy for the modern criminals. Cyber offenders activity wrongness.</p>	<p>In future direction like that to prepare legislations to cover any kind of cyber crimes. Government must appropriate actions to easily download cyber law cover software. Organize the programs which are minimize the criminals.</p>	<p>05) “The feature of criminal law”</p>	<p>Face to the large number of challenges. Policing, juries, judicial power, sexual crimes, criminal responsibilities and many other categories of criminals. Providing the informal and formal education which is related to the criminals.</p>	<p>Lack of consensus among the varies type of practitioners.</p>	<p>Hidden or minimize the proposals of reform even radical. Many kind of discussion received at the conference of ROBBINA.</p>
				<p>06) “Criminal justice system of India”</p>	<p>India is a one of cyber rule published country in the world. But cyber law of India has not respond by them selves. Many type of loopholes in that legal system. Relevance</p>	<p>Weak skills and errors of lawyers and justice. Challenges of needs and security protection.</p>	<p>Property and data protection security. Strengthen of data security. Minimizing the Police investigation and criminal errors.</p>

	and advantages of information technology, justice and criminals.		
08) "Analyzing the technology"	Turn in to the new schedule of the data protection and enabling unit. Then they give the opportunity to collaborate the industry. Besides that it full fill the aims of GDPR. Decentralization of the types of data. New mind set create the trust full theme in protection process.	irreconcilable tensions of the GDPR and the block chain technologies .	control and determination all of data and information. Further data protection and control is very dangerous theme of the data processing life cycle. In criminal law that is the very serious case of the justices and criminals.
09) "Criminal law and punishment"	Discuss about the relation about criminal crimes and their punishment and prohibitions. How ever criminal law and crimes are not depend on the prohibited ground level. Basically criminal law is depend on the citizens and nations	Types of citizens and nationality. As a world there we can found many types of rules like that Muslim sharia law.	Get the better solution By using the information systems and IOT for finding any solution for that different criminals to finalize one way to punish. As the international law justice can minimize the civil law. Like that sharia etc.

	but some are open for all around the international rules like murders and sexual crimes.		
10) "Criminal law"	Basically criminal law is a body of law and that is relates to the crime. Then criminal law is proscribes and conduct perceived as the harmful, threatening and endangering to any property, protection and safety, health etc.	Any property, security and protection are harm to health, threat and harm.	Use the modern technology supports. Like that scanners, GPS, DNA, CCTV and many other things.
11) " Child Sexual Abuse"	There we can five main Abuse in criminal law. Like that Verbal, Mental, Sexual, emotional and physical etc. Sexual abuse is the most dangerous abuse among them. In sexual abuse child sexual abuse is very big criminal issue. Parents must get that responsibility because of their children. Must get the responsibility	In busy and modern society children are enter that automatically. Parents also haven't responsibility of their children.	Prepare some specific rules and standard way to punish abusers. Besides that build some standard methods for reporting those criminals.

	y about the suspected injuries of children and never neglect those criminals and fix children’s mind as follows.		
12) “Criminal Law and Development”	In the applied justice if there isn’t standard rules accused must become some issues and un satisfaction actions. As a support both left hand and right hand accused may be satisfaction.	Some Arabic countries and many other Asian countries not use that kind of criminal actions in 100%. Because of the use their religious rules as they wish. Like that Muslim law.	Apply for all kind of criminal matters and all accused get the satisfaction of from the justice as follows.
13) “Crime prevention.”	Applying the SCP(Situational crime prevention) details to the information systems, cyber crimes, sexual abuse etc.	Crime displacement.	focus the topic on environment ,mental situation and many other factors of the crime individuals.
14) “Criminal Law- over view of UAE penal law.”	Applying the basic situations and the criminal situations of the crime effects.	Politician effects and many social situations are some limitations in the law filed.	
15) “Reflected ultra violet imaging.”	UV imaging of reflected. Ultra violet imaging package.	Technical and capital issues.	Using ultra violet images to the high criminal crimes.
16) “DNA identificatio	Get the details of	Cost of the reliance on	Combine the details of

n in the criminal Justice System.”	DNA to find the criminal cases and minimize them. DNA identification in criminal cases.	DNA technology. So any cases cannot use these techniques as follows.	DNA with the IOT system.
17) Information technology security.”	Now a days in the modern world individuals are using the high level of social media and many kinds of information items in their daily life and official use. So some risks are available for the individual users in that information technology.	In modern world the relationship of the technical products and social medias are dramatically. So their security is very low. That is the risk of section.	In modern world information system daily update the new technology items for the developed technologies . So the efficiency and security also in high capacity. So there isn’t risk for the user.
18) “Crime-UV and blood.”	There were many common factors to identify the blood at the crime situation. Then the very quick and easy thing to identify blood is to use that Ultra Violet light.	That part also the high cost technical part in the criminal case. Not easy to use all people.	Minimize the risk of the collecting unnecessary stains in the crimes. Use that UV camera for the here and there unclear blood. So that one can give answers for the many questions in criminal cases.
19) “THE CELL-Book”	There is no any life without cells. And just as life itself as drivers, so are the	Damaged cells and many errors of cells cannot identify the true judicial.	Many crimes and many acts can solve by identification the cell technology. But arrows

	forms and functions of the cells that constitute life. Scientists also can scan the cells by using varies types of microscopes. So by using that operations we can minimize some criminal crimes and acts.		of cells and damaged cells clearly identify the high scanning technologies by using IOT.
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References

- [1] David Harvey, "Collisions in the Digital Paradigm", Lecture of university of Edinburg, No.7,2015.
- [2] Prof.dr.Piotr stec, prof.dr,EmodVeress, prof.dr.Joanna Czaplinska, prof.dr.Zsuzsanna Tapodi, Dr.Boroka Prohaszka-Red, Dr.Janons Szekey. "law and Artificial Interlligence". No.2,2019.
- [3] .Siniour lecturer, University of South Wales, "CARNAL KNOWLEDGE: Rape from a legal purview". No.18,
- [4] R.M.Kamble. "Cyber Law And Information Technology". No 6, 2013.
- [5] Sandra Gayol Gabriel Kessler Claudia Mauch, "Crime and justice",No.40,2018.
- [6] R.A.Duff Zach ,Hoskins Neha Jain. "The feature of criminal law".No.174,2014
- [7] GagandepnKaur Malhotra, "challenge of Information Technology To The Criminal Justice System Of India". No.13,2019.
- [8] Yanwei Li, Araz Taeihagh, Martin de Jong, "The Govenrence of Risk in Ridesharing A Revelator Case from Singappor". No.21,2018.
- [9] Private Ryan,"Analyzing the technology and governance",No.47,2012
- [10] Elena Loizidou,University of London-UK, "Criminal law and punishment", No.17,2004.
- [11] Wikipedia- the free Encyclopedia, "Criminal Law",No.07, 2017.
- [12] Kamran Adil, "Internet of things and Law", No.05, 2006.
- [13] Elvia Macias, "Child Sexual Abuse", No.06, May 12,2015.
- [14] Raquel Kennedy Bergen, Jeffrey L.Edleson, Claire M.Renzetti, "Violence against Woman", No.14, 2005.
- [15] Vyacheslav A.Tulyakov, "Criminal Law and Development", No.06, 2018.
- [16] Wikipedia, "Crime prevention", No.08,
- [17] M.Shokry Ei-Dakkak, "Criminal Law-over view on the United Arab Emirates Penal Law", No.204,2014
- [18] DCS5 APPLICATIONS, "Reflected ultra violet imaging", No.04, March 2015.
- [19] Gregor Urbas- University of Canberra, "DNA identification in the criminal justice", No.07, May 2002.
- [20] Palash Kumar Bose, Mohammad Jubaidul Kabir, "Fingerprint- A unique and reliable method for identification", No.06, September 12, 2016.
- [21] George Sadowsky, James X.Dempsey, Alan Greenberg, Barbara J.Mack, Alan Schwartz, "Information Technology Security", No.392, 2003.
- [22] Victor Toom, Rafaela Granja, Anika Ludwing, "Comparison of forensic DNA data", No.20,March 2019.
- [23] Labino, "Crime- Ultra Violet and blood", No.14. 2017.
- [24] John Pfriffer, "The Cell- book", No.00, March 2000.
- [25] Mike Maguire, Faculty member of South Wales "Criminal Investigation and Criminal Control", No.32,

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