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Need for Implementing Control on Political Parties Funding

Kaukab Jamal Zuberi

Chief Editor

In today's world most of the countries are ruled by governments elected by the citizens of that country. These representatives belong to the registered political parties supervised by various regulatory bodies.

Political parties are back bone of democratic system and they are supposed to ensure that elected members stick to a their centralized policy communicated to the citizens during the election times. Political Parties therefore, overlook the implementation of various policies and procedures necessary in sound operations of the country. Political corruption disrupts the system and eventually the corrupt practices trickle down to every level of the society.

Political corruption is the manipulation of political institutions and rules and regulations. Laws and regulations are systematically abused, side stepped, ignored or tailored to fit their needs, by those who control political parties

The degenerative effects of political corruption cannot be counteracted by an administrative approach alone. Endemic political corruption calls for radical political reforms.

In developed countries the problem is more of incidental or occasional nature, which can be controlled by improving checks and balances or bringing time to time necessary reforms.

In the third world countries the situation is different. Political parties are usually established to ensure the rule of law and democratic state, and are expected to function

correctly, establish transparency in state affairs and act responsibly. However, these cannot exist and operate without funding therefore, democracy cannot exist without funding of political parties. For their survival political parties look towards various sources to fund their operations. Funding of political parties equals to funding the democracy. Lack of checks and balances, laws and regulations in the third world countries expose the political parties to the funding sources working for their own benefits. Sometimes these funding sources have relations with countries which may have political interests in manipulating the democracies of the third world countries in general or a specific country in particular. Funding in this case means the funding of democracy. Such funding is used to influence the political parties, candidates to election, politicians as state or government leaders, parliamentarians, local elected officials and leaders and responsible persons of local and central authorities.

Political corruption includes position abuses, theft or public resources, fund embezzlement, unlawful use of public goods, lobbyism, active and passive corruption, protectionism and illicit enrichment.

Without proper controls the funding of political parties can be used for abuse of public means or administrative resources, theft or embezzlement of public resources, offering of personal donations in order to advance on hierarchical steps of the party, purchase of seats on lists of the candidate party in elections, funding from sources prohibited by law, anonymous or secret, funding from illegal sources of criminal provenance; funding in exchange of facility attainment from politicians, abuse of public mass-media

resources, use of donations for attainment of political benefits, attainment of funds through extortion, intimidation, blackmailing, purchase of elector's votes, use of information on funding in order to clean the slate with donors of political opposition.

Political funding therefore should be closely monitored as its misuse directly effects the progress of any country. The funding system of political parties and their election campaigns reflect their capacity to appoint in public elective positions conscientious and honest persons and prevent political corruption.

In order to achieve a fair system of political funding in third world countries, the governments should ensure to introduce public funding of political parties and election campaigns, limiting donations to political parties, limiting election campaign expenditure, the transparency of funding sources, monitoring of political funding, established rules/norms to be clear and concrete, ensuring abidance and application of norms in practice (implementation mechanisms, responsibilities and sanctions).

In Pakistan, The Political Parties Order, 2002 section 6 mentions as follows:

- (2) The contribution made by members or supporters of any party shall be duly recorded by the political parties.
- (3) Any contribution made, directly or indirectly, by any foreign government, multi-national or domestically incorporated public or private company, firm, trade or professional association shall be prohibited and the parties may accept contributions and donations only from individuals.

- (4) Any contribution or donation which is prohibited under this Order shall be confiscated in favor of the State in the manner as may be prescribed.

Section 13 explains:

- (1) Every political party shall, in such manner and in such form as may be prescribed or specified by the Chief Election Commissioner, submit to the Election Commission, within sixty days from the close of each financial year, a consolidated statement of accounts of the party audited by a Chartered Accountant containing: -
 - (a) annual income and expenses;
 - (b) sources of its funds; and
 - (c) assets and liabilities.
- (2) The statement referred to in clause (1), shall be accompanied by a certificate signed by the party leader stating that: -
 - (a) no funds from any source prohibited under this Order were received by the party; and
 - (b) the statement contains an accurate financial position of the party.

Although a system exists to monitor the flow of funds to and from the political parties the effective implementation of it yet to be seen. We are a third world country struggling to decrease the corruption in the country. Without proper implementation of the effective monitoring of political parties funding it is almost impossible to decrease corruption in the country. Political parties keep on resisting the controls over political funding. The Election Commission should come up with a system of conducting forensic audits of all the major political parties using the latest technologies to ensure the legitimate sources of political funding and their proper utilization.



Requirement of Strong Legal Framework and Procedures to Contest with Cybercrime in Pandemic Situation

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Abstract:

One of the most significant global occurrences in recent history will be the COVID-19 pandemic in 2020. The government's response of issuing legal stay-at-home orders is one facet of this situation that is unique. The COVID-19 has affected the world in several ways not seen in decades. One of the effects is crime rates, which appear to have fallen in some communities around the world. We argue that the government ordered to stay-at-home may be principal reasoning for the change. While in some other countries, there has been increase. In fact, the impact has been different in different ways. The important question is how the effect on rate of crime will be in future; increase or reduction. The tendency of crime regarding torturing, abusing, molesting, assaulting, rape or killing the innocent women and children increased. Pakistan formulated fresh legislation. The major role in combating the crime depends upon existence of strong legislation capable of causing reduction in crime rate, which allows the investigators vast powers and collaboration with prosecution and safeguarding the witnesses. The criminals are very well organized and using most modern technology and IT equipment, therefore, the police, investigators and prosecutors must have and be highly trained and equipped, similarly. No strategy can be successful in the absence of strong legislation. The criminals involved in Cybercrime and white-collar crime keep on acquiring and hacking the data of people, government and business organizations by crossing security barriers of computers and networks. The occurrence of crime increased particularly in threats to attack and asking money to stop the attack. More strict security measures must adopted to safeguard the data and networks and strong encryption attained and implemented. The European Union advocates focusing on strong legal frame work. In addition, there exists justifications to amend the US cyber legal framework to reduce the frequency of crime. The paper presents some salient legal, procedural and feasible measures. The most salient philosophy presented in this research paper is that there must exist a strong legislation coupled with morality, code of ethics and severe punishment as deterrent forces to combat with these offences.

Keywords: White Collar crime, assaulting, rape, killing, Computer & network security

1. Introduction

The COVID-19 pandemic of 2020 will

undoubtedly be one of the most momentous global occurrences in recent history, having a long-term impact on culture, government

operations, crime, economics, politics, and social relationships. The government's approach of issuing legal stay-at-home orders to try to prevent the spread of the virus is one unique facet of this catastrophe. While the degree and timing of these commands varied by country and state, they invariably started with considerable encouragement for people to separate themselves voluntarily. As the problem became more serious. Several academics have looked into how crime rates have changed with the implementation of COVID-19. To say the least, the results have been inconsistent, especially when comparing broad categories of crime across cities and using different methodology and time.

According to [1], the need for robust and strong legislation to tackle white Collar crime is stressed, which is on the rise in both the public and private sectors. The effect of immoral and unlawful actions in government, notably high-level bribes, has crippled the financial and legislative bodies' normal functioning. Bank fraud and cybercrime are also on the rise, thanks to the widespread use of digital gadgets and the internet. The goal of this study is to learn more about the importance of applying strong regulations as well as morality and ethical principles. Authors of this research argue that morality and ethical norms have a positive influence on minimizing such crimes. There is a pressing need to implement the social welfare system used in Europe, Canada, and the United States. Employees of banks participate in bank frauds and perpetrate embezzlement and illicit transitions using computers and other digital technologies. The importance of corporate ethics in the banking industry cannot be overstated. Some

politicians' commit misdeeds, which be called out with a strong and iron fist.

Human behavior has deteriorated recently, because of economic slump in all countries, political instability, and the rise of the Covid-19 epidemic. Digital offences, money laundering, and unlawful transactions were at an all-time high even before Covid-19. Fighting such illicit professional practices is a huge task for the world. Business activities are likewise expanding, necessitating the requirement for fair financial transactional activity. According to [1,] the most common causes of illegalities are accounts that are not working properly and people who purposefully take money from them. The majority of the crimes are performed with the aid of computer software, hacking and tracking.

The important reasons are deceptive behavior, inadequacy, ineffectiveness, corrupt work style, willful neglect and dysfunction in commercial activities of the workers and employees. Particularly, when it comes to receiving and moving funds, as well as money exchange locally and internationally, auditing that is not up to par, using falsehoods to harm the market, misconduct by private and public companies, commercial, organizations and banks. The scarcity of trustworthy and well-trained bank officers is another reason.

According to [2], there is need to promulgate strong legal framework for women and child protection against offences of torturing, abusing or killing.

It is proposed in [3] that standardization of forensic evidence, its procurement, preservation is essential in court of law using

FBI techniques by FIA.

It is advocated in [4] that the deficiencies in the criminal and procedural must be amended in accordance with need of the day to facilitate the investigators, prosecutors and the the court of law. The use of effective digital electronic devices must be mandatory in the process of investigation. The purpose behind is to effectively implement the law.

Further, in [5] effective roll of business ethics is proposed. It is proposed in [6], that the use of electronics devices be mandatory to investigate the offences of torturing, abusing, molesting assaulting or killing the Innocent women and Children. According to [7], several academics have looked into how crime rates have changed with the implementation of COVID-19. To say the least, the results have been inconsistent, especially when comparing broad categories of crime across cities and using different methodology and times.

2. Spreading Disinformation to Harm Business

This strategy is adopted my criminal minded people to harm the business. The incorrect information is believed to be true, particularly in stock markets, which can be achieved by floating incorrect trade data willfully by miscreants. This adversely influences the trade and industry indexes. The statistical manipulations are affected due to disinformation and hence results in incorrect decision-making. Apart from the trade indexes, it also affects statistical market conditions measures; the business volume, operation, credit availability, price patterns, benefit

potential and investment opportunities rely are hit adversely due to deception.

Inaccurate 'trade data' frequently and intentionally floated to confuse and damage other industry counterparts by firms. Industry and trade indices, measurements of statistical market rates, comparative criteria of industry data based on business volume, activity, credit availability, pricing fluctuations, profit capacity and investment opportunities are carelessly prepared due to confusion, inexperience, or intentionally misleading motive. Disinformation always harm the businesses and create uncertainty in decision-making. The business organizations should be able to take measures such as to spot disinformation online, to take care of web site apps. Every business must adopt techniques of Artificial Intelligence. The companies must comprehend a process of social listing, adopt procedure of regular self-assessment and communicate with their clients regularly, be aware of the fake ads. The organizations and companies must go for litigation for the protection of their legitimate rights as and when infringed.

There is no doubt that the COVID-19 crisis will affect history on a scale not seen since previously indicate that a substantial drop in crime is occurring around the world and within the US. However, the reports also indicate the changes are not even across time, place, or crime type. Therefore, we encourage criminologists to study this crisis through use of new and existing sources of crime data, with a specificity of crime types, in a temporal fashion, and placed based. When the world actually returns to normal, then more

experimentation and tests shall have to be conducted using huge reservoirs of data scattered around the world regarding relationships with offences.

The use of sophisticated IT equipment such as high-speed processing facilities and technological assistance, the automated bank frauds are committed. The authors of this paper the implementation of business ethics, which plays a pivotal and key role in the banking and industrial sector. The risk mitigation is an impotent area in this case. The implementation of machine learning techniques leads to overcome such risks, obsolete and trivial data.

3. The White Collar Crime Frauds and Money Laundering

In [8], public perceptions of white-collar crime and punishment are detailed and [9], presents 2010 National Public Survey on White Collar Crime. The aspects of white-collar crimes discussed in [10]. White-collar crime refers to the person's nonviolent, politically motivated crime perpetrated by corporations and government professionals. It is defined as a crime committed by persons of respectability and high social status in the course of the occupation". For example, it is committed for financial gains, such as securities fraud, embezzlement, corporate fraud, and money laundering. In every society offender having modes-operandi of committing white-collar crime working in influential capacity in the society; either managerial positions or publically and politically powerful. They operate the offence in groups. On the face of it, they non-violent but have strong links to

high-ups. A crime is peculiar to a group of persons, usually in positions of influence linked to them in their society through their social standing. The most appropriate solution to such to combat with such offences is the use of most modern technology, IT equipment, communication tools, and adoption of computer and network security with high level of protection. Some important areas of white-collar crime shown in table-1.

Black Money	Counterfeiting	Credit Card
Currency arrangement	Embezzlement	Kickback
Investment Act to commit fraud	Insurance Trickery	Income Tax Avoidance

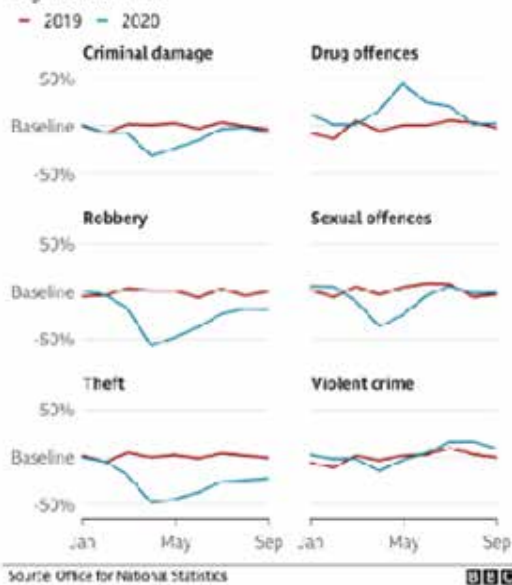
Table 1 : Selected areas of white-collar crime. Source [1]

4. Statistics

This section discusses statistical information on the association between covid-19 and the pre-lockdown work from home situation. Lockdowns in the United Kingdom, as shown in Figure 1 have had a significant impact on crime and criminal justice. Some oscillations in offences been recorded because of the influence of constraints on our lifestyles; these changes to community safety will have a long-term influence for years to come. The most dependable and comprehensive statistic is the Crime Survey for England and Wales, but that face-to-face survey has had a difficult year due to the transition to telephone calls. Considering everything, the best we can say is that total crime recorded to police - the second way we count what is going on - has fluctuated quite a little. The drug crime increased in some parts of UK.

How has crime changed over lockdown?

% difference in crime compared to 2019 baseline
England and Wales



Domestic Abuse Rises

According to [11], Domestic abuse has increased during lockdown because victims have been forced to stay at home with their abusers. While lockdown does not create domestic abuse, it can exacerbate pre-existing behaviors in abusive spouses. Women across the country are being isolated by abusive relationships and children are observing, and in some cases suffering, domestic abuse.

Figure 1: Crime Statistics regarding UK.
Source [11]

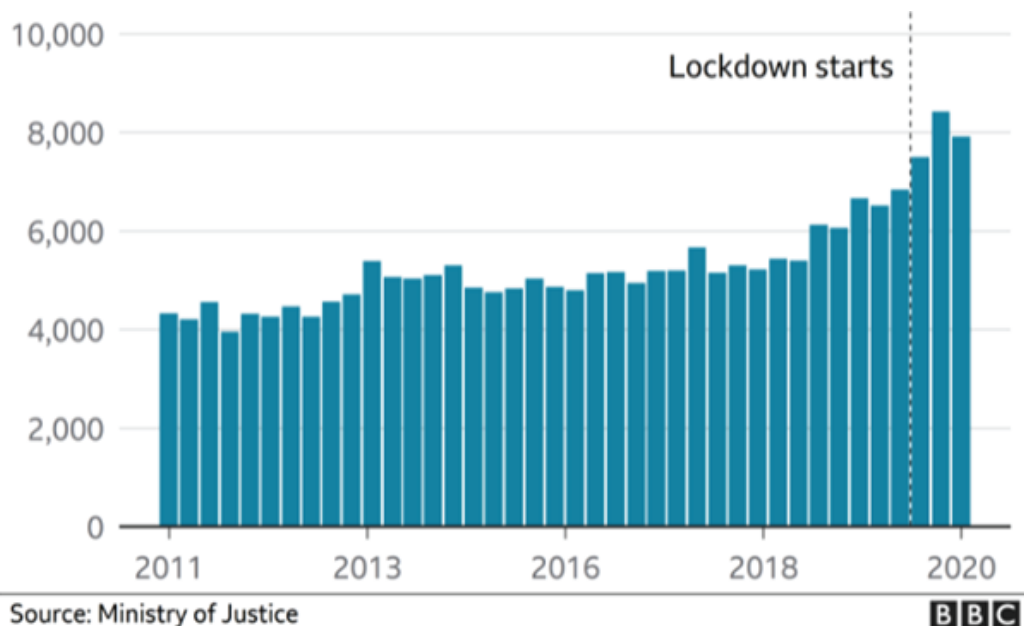


Figure 2 : Domestic violence, Courtesy BBC

5. Situation of Offences During Lock Down in US

Because many offenders would presumably conduct less serious crimes in a non-pandemic world, we draw attention to the likelihood that mandatory lockdown orders have taken minor offenders and placed them in situations where intimate partner violence, serious battery, and homicides are widespread. While crime appears to be decreasing generally in the United States, this good news should not mislead us to a worrying co-occurring reality — a reality that presents a bleak picture of unintended repercussions to public health and criminal justice budgets because of COVID-19 lockdowns. State governments around the United States issued obligatory stay-at-home orders in reaction to the COVID-19 epidemic towards the end of March 2020. Though designed to halt the spread of the COVID-19 virus, the lockdowns have had far-reaching consequences on people's lives in ways that were not anticipated. The goal of this study is to look into how government actions to COVID-19 have affected crime rates in the United States. Crime has reduced significantly in comparison to the pre-pandemic year of 2019, as assessed by calls for service to law enforcement. However, there are also signs that the crime drop is being driven by reductions in small offences, which are commonly committed.

6. Crime Scenario in Pakistan During 2020-21

According to the reports and statements of lawyers and journalists, the people and political leaders were subdued due to policies

of the Government. Strict actions against senior politician has been one aspect. The terrorist activities and offences against innocent women and children frequently took place. People not having mask were torture by police and fined. In violence several innocent people died. The most agonizing situation has been when political leaders have been fighting for no real cause. A woman political leader slapped the member of Provincial assembly during deliberation in TV program. The violation of freedom of expression occurs all most every day. The street crime increased in major cities. In several cases in 2020, government regulatory agencies blocked cable operators and television channels that had aired critical programs. The media coverage was restricted several times. Two senior judges of highest Courts were tried in court. One of them is honorably, exonerated and acquitted of the burden of all allegations. The contestants could not prove the case against him.

The Federal Investigation Agency (FIA) started investigation into at least 12 journalists and activists in late September for alleged violations of the Electronic Crimes Act. A senior journalist in the Punjab province was charged with sedition and "high treason". Government officials continued to use the National Accountability Bureau (NAB), an anti-corruption agency, to target critics. On March 12, NAB agents in Lahore arrested editor-in-chief of the Jang group, the largest media group in Pakistan. This is unfortunate that the victims, without proof allege the establishment. The Pakistan Army is one of the best in the world; fighting on all fronts with terrorists activities. Abuses against female children and Women occurred in great frequency. Rape, murder, acid assaults,

domestic abuse, and forced marriage are all common forms of violence against women and girls in Pakistan. Human rights activists estimate that approximately 1,000 women are killed each year in so-called honor killings. Domestic violence cases climbed 200 percent from January to March 2020, according to data from domestic violence helplines across Pakistan, and intensified during the Covid-19 lockdowns following March.

In September 2020, nationwide protests were held to demand police reform after the Lahore Police Chief made a public statement implying that a woman who was gang-raped on a Punjab highway was at fault because she should not have been travelling “without her husband's permission” on a motorway late at night.

7. Conclusion and Recommendations

1. There is need for reaffirmation and making currently available legislation into a stronger set of procedural and criminal law. To reduce corruption and bribery, the government must take proactive measures.
2. The criminal need to be allowed to ruin the life of others. We should identify them quickly after finding out their locations and IP addresses. For the sake of protection of the business, experts may hired to do the needful and track the blackmailers.
3. The public funds not to be squandered or wasted. To prevent bribery and corruption, take strong measures against public servants and place them under rigorous observation.
4. Adhere to the privacy policy during the emergency and detection of attacks.
5. Computerization i.e. e-commerce and e-governance, be implemented in all public sector companies. Reducing rules and making the procedure simple with appropriate tools will also help the process.
6. Special vigilance is essential in services where bribes and corruption touch millions of people. Allow the press to reclaim its freedom so that they can launch the campaign. To reduce corruption and bribery, the government must take proactive measures.
7. The comprehensive programs planned and developed for bankers during training at banking institutes in the area of business ethics, economics and morals
8. In-house ethics activities, conferences, seminars and short-term training in ethical philosophy related to banking and employee advice conducted. All meaningful actions should be taken to organize moral education.
9. To prevent the financing of terrorism, obsolete laws and regulations are required be removed and replaced with new stringent legislation. The actual cause of such activities is the random use of discretionary powers; consequently, these powers must be restricted, curtailed, and decreased, and officials

must adhere to the law, Rules, and Regulations.

10. Use Electronic methods to track elected politicians. Encourage individuals to use social media to express their displeasure with corruption and ransom requests for specific services.
11. Complete programmes in business ethics, economics, and morals may be designed during banker training.
12. The underlying cause of such actions is the indiscriminate use of discretionary powers; as a result, these powers must be limited, curtailed, and reduced, and officers must work in line with the law, Rules, and Regulations.
13. The electronic methods adopted and implemented to examine and track the cases and accounts of elected politicians will be a great success.
14. Complete programmes in business ethics, economics, and morals can be designed and created during banker training.
15. Attempt to change legal and ethical standards in terms of moral principles by introducing enhancements to existing rules. The ethos of the banking industry is survival of the fittest; technical advice, experience, abilities, and business expertise are passed down, and banking management remains fit. When engaging with workers, policymakers and clients are professional, inventive, educated, and knowledgeable.

16. The laws must be based on and drawn from a valid moral theory that takes market dynamics into consideration.
17. It is critical to hire folks of good faith and ordinary conscientiousness who will honestly accept the codes and principles. Public authorities must be allowed to reap the benefits of
18. If a person has been wrongfully permitted to join as an employee, management must have the right to discharge the misfit if it is not to contribute successfully to the accomplishment of pre-settled goals. Employee competency, behavior, preparation and expertise requirements should be favoured over political pressure for appointments in the banking sector, especially for technical personnel.
19. Reasonable steps should be taken to reestablish traditional ideals in order to inspire trust and honesty into banking industry operations and partnerships in order to develop lucrative relationships with employees and clients.
20. Stepladders should be taken to eliminate unethical financing norms and practices.

8. Acknowledgement:

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9. References:

- [1]: Dr Aftab Ahmad Malik, Mujtaba Asad and Waqar Azeem, "To Combat White Collar Crimes in Public and Private Sector and Need for Strong Legislation and Ethics", International Journal for Electronic Crimes Investigation(IJECI); Vol 4 Issue 3, July-September 2020 PP-1-8.
- [2]: Dr Aftab Ahmad Malik, Mujtaba Asad and Waqar Azeem," Promulgate Strong legal framework for child protection against offences of torturing, abusing or killing"; International Journal for Electronic Crimes Investigation(IJECI) Volume 4 issue 2, April-June 2020 ; PP 1-10 .
- [3]: Dr Aftab Ahmad Malik, "Standardization of forensic evidence its procurement preservation and presentation in court of using FBI techniques by FIA"; International Journal for Electronic Crimes Investigation (IJECI); Volume 4 issue 1 , Jan - March 2020 PP :1-6.
- [4]: Aftab Ahmad Malik, Mujtaba Asad, Waqar Azeem, "Deficiencies In PECA and Proposed amendments to facilitate Investigating Agencies, Courts and Prosecution, Proper Use Of Electronic Devices For Effective Implementation Of Law"; "International Journal for Electronic Crimes Investigation"(IJECI) Published in October-December Issue 2019.
- [5]: Dr Aftab Ahmad Malik, "Bank Frauds Using Digital Devices and the Role of Business Ethics", "International Journal for Electronic Crimes Investigation"(IJECI) volume 2 issue 4, 2019.
- [6]: Dr Aftab Ahmad Malik "Electronic Devices to Investigate Offences of Torturing, Abusing, Molesting Assaulting or Killing the Innocent Children"; International Journal of Electronic Crime Investigation (IJECI); Volume 3, issue 2; April-June, 2019.
- [7]: Ben Stickle, Marcus Felson (2020), "Crime Rates in a Pandemic: the Largest criminological Experiment in History", American Journal of Criminal Justice (2020) 45: PP 525–536 <https://doi.org/10.1007/s12103-020-09546-0>
- [8]: Holtfreter, K., Van Slyke, S., Bratton, J., and Gertz, M. (2008). Public perceptions of white-collar crime and punishment. Journal of Criminal Justice 36: 50–60.
- [9]: Huff, R., Desilets, C., and Kane, J. (2010). The 2010 National Public Survey on White Collar Crime. Morgantown, WV: National White Collar Crime Center.
- [10]: Syeda Marryium, et.al (2019): "Aspects of White Collar Crime", IJECI Volume 3, issue 4, October-December
- [11]: Dominic Casciani & Ben Butcher (2020) Covid: What's happened to crime during the pandemic? BBC Report;

[12]: John H. Boman, Owen Gallupe (2020), “
Has COVID-19 Changed Crime? Crime
Rates in the United States during the
Pandemic; PMCID: PMC7340780;
PMID: 32837168; American Journal of
Criminal Justice. Jul 8 : PP 1–9. doi:
10.1007/s12103-020-09551-3 [Epub
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Electronic Filing System, Virtual Courts & Online Dispute Resolution -Need of the Hour for Pakistan Legal System

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Abstract:

This paper addresses the impact that the ongoing coronavirus (COVID-19) pandemic situation is having upon the ability for courts and tribunals to conduct hearings, and the measures that may be deployed in order to ensure that disputes continue to be dealt with fairly, effectively and as expeditiously as possible.

The ongoing situation has compelled both courts and arbitral tribunals to hold virtual hearings, to a far greater extent than has ever been experienced before. As a result, the general level of exposure to E-filing of documents and videoconferencing technology will lead to a greater level of understanding of and competence in the use of such technology amongst judges, counsel and parties. Whilst we must all hope that the impact of COVID-19 on the vulnerable, elderly as well as businesses all over the world is minimized, it seems inevitable that there will be greater use of video hearings and the online aspects of dispute resolution not just during the course of the stringent 'lockdown' situation currently being experienced around the world but also, possibly, thereafter.

Zafar Iqbal Kalanauri, Arbitrator, Mediator, Master Trainer, Advocate Supreme Court of Pakistan, White Collar Crime Investigator, Adjunct Faculty of Law at SAHSOL, Lahore University of Management Sciences (LUMS) & Law College University of Punjab, SAF Centre, #3 3rd Floor, 8-Fane Road Lahore 54000, Pakistan. E-judiciary shall be a new step towards modernization in legal system of Pakistan. Information and communication technology in the court structure of Pakistan, have virtually established a new approach of modernizing the judicial system. The use and an overall review of administration development achieved in the justice system with reference to artificial intelligence, are going to be considered in sentencing process. In this regard, some of the innovative study such as video conferences from jail to court room and from court room to witnesses shall be discussed.

This paper sights a short history of IT introduction and its challenges in the legal system, advancement in the virtual courtroom, and security concerns that may arise as a consequence of these new enabling technologies. The impact of technology with reference to continuing legal education and training field, shall be discussed. The paper aims to follow three different groups of study including computerization in past, its present stage and ways of its evolution in the future. Finally, scientific experiential analysis will focus on how the computerization in judiciary being an effective tool, will limit and reduce the delay of cases.

Introduction

World's adoption towards the information society is changing the Global Legal System. The regular use of IT has become a routine practice by most of the lawyers, judges and legal administrators, and leads to the progress of new technology even in the courtroom which is considered as the last support to an outdated legal practices.

Legal professionals and court administrators despite of determined efforts, are still facing lawyers and litigants bodies who oppose the use of new technology even in the developed countries like USA, UK and Australia. Therefore, it is the only reason in the slow development of the universal adoption of Alternative Dispute Resolution (ADR) in countries like Pakistan.

On contrary to Alternate Dispute Resolution (ADR) and Online Dispute Resolution (ODR) assistance in litigation, traditional litigation has the advantage of providing all types of

trials from simple to long complex multi-party case with many years in civil courts.

Cases conducted in different jurisdictions with large number of papers and multi parties may become more complicated or lengthy until the litigants become confident with ADR system. It will be requisite to have computing capability with new levels of accompanying services for the disputes of global online litigants where they approach ODR or traditional litigation methods.

The ADR is under development progress so a rapid series of facilities should be offered to the lawyers, government departments and traders on e-commerce sites who are involved in multi-jurisdiction disputes and are willing to follow the ODR instead of traditional litigation. These services may comprise of exchanging simple complaint and answer ranging from artificial intelligence and blind bidding system to the virtual trial which is proficient to support in bulk documentation, parties with remote location and refined graphic practice.



Background

Since the establishment of Pakistan, the population rate not only grown but also led to increased number of back-log pending cases that overburdened the judiciary from every aspects. The ratio of work load to judges and common man reaches to 10.5 judges per million population. The increase of unresolved cases especially in district and high courts has been of great concern. Based on surveys of some jurists and judges, another 320 years are required to clear out these pending trails and to reduce this time period within the bound period for disposing the pending cases is of principal importance.

In Pakistan, the county should take serious and an inclusive notice of entire legal system with special consideration to deal the back-log problems as disappointment with judicial system has resulted into more number of Jigra or Kangaroo courts. Poor attention has been paid to resolve these problems that intern caused the damage to the rights of litigants and weakened the credibility and basis of democratic order and judiciary system.

The judges should be responsible both for the disputes and administrative affairs of the court, and have to act as a good administrator and manager to handle the judiciary work in a given time period. The absence of good administrative capabilities created a poor situation for managing the legal resource that resulted into bad productivity and quality of judicial system.

Need for a New Look?

Today every department of life has influenced by electronic or e-governance with enhanced

productivity, transparency and reduced administrative red tape and corruption. Development in the field of information technology has made a turning point in the history of human civilization and every walk of life with enhanced efficacy. The supportive application of information technology combined with justice administration, added alarming opinions for the last two or three decades in the western countries.

Human and technology elements are important factors to cause change in all domains of life. Proper use of the technology brings remarkable changes for speedy delivery mechanism of justice with assured quality, transparency and public accountability.

Firstly, technology at Supreme Court level was obligated into services and then the online hearing was applied for the speedy disposing of the cases. In 2019, the Supreme Court of Pakistan successfully launched and started the E-court system for the first time in the judicial history of Pakistan for hearing of cases through video-linked connectivity.

The principal seat for the proceedings of cases through e-court system were initiated at Islamabad, Supreme Court Branch Registry Karachi and Lahore. The advocates argued for the cases through video link that were fixed for hearing at these branches including Quetta. The cases were heard and decided by the Honorable Bench at Principal Seat Islamabad where the project was confined to Murder Appeals after few months.

The Pakistan courts are not new to computers as one low end computer for caveat matching was installed in Supreme Court of Pakistan towards the end of 1995. Soon after, court

computerization process began in Sindh and Lahore High Court. A couple of years ago, all the courts in Punjab were computerized at Tehsil and District level with complete automation of maintaining data filing, disposal of cases, judgment writings, and award of certified copy. In some districts of Punjab, digital production of under trial prisoners was made through video conference including meetings of children and Guardianship being in custody in Lahore. For this purpose, judiciary websites and cause lists of courts from all major cities including Islamabad, Lahore, Sindh, Peshawar, and Quetta are made available online prior to and after case proceedings. There are also available some Law Search engines in the country for legal guidance concerning e-court system.

Barristers and Judges in UK prefer to provide the wig and gown as an existing way of justice to have an approach towards virtual trial or paper free court. In order to have a computerized legal system, computerizing of the courtroom becomes critical as according to Professor Frederick I Lederer who wrote in 1997 as follows;

'The Courtroom is a place of adjudication, but it is also an information hub. Outside information is assembled, sorted and brought into the courtroom for presentation. Once presented, various theories of interpretation are argued to the fact finder who then analyses the data according to prescribed rules (determined by the Judge through research, analysis and interpretation) and determines a verdict and result. That result, often with collateral consequences is then transmitted throughout the legal system as necessary. The courtroom is thus the Centre of a complex

system of information exchange and management. Ultimately, because lawyers and judges deal continuously with 'data', high technology courtrooms exist and virtual courtrooms are possible. [1]

Trial or hearing which is decided by a Judge or Jury, considered as a dispute between two or more parties with arguments usually followed by counsel that presents the evidence to prove the facts in arguments. Witnesses are listened and studied by their behavior. Physical items including photographs, plans, schedules and video evidenced are considered as physical items. The use of IT can support most of these legal processes.

The Court and IT

The use of live evidence as video link became a routine in case of vulnerable witnesses in countries like UK, Australia, Singapore and USA. Evidences served on disk rather than hard copy is more considered in civil and criminal litigation dealing with more complex court cases. Every litigation member has different infrastructure that yielded strange hybrid of preparing evidence both in hard copies in the form of paper distributed to all parties and soft copies on disks being circulated and annotated to counsel and judges.

Many jurisdictions have initiated a considerable move towards the technology application in the courts. Senior Judge Lord Justice Brooke traced the technology progress towards modernization from 1992 till present to the Court 21 at Leeds University UK. High profile cases such as Kevin and Ian Maxwell have been facilitated with ad hoc use of electronic presentation. The Crown Court Program known as CTMP has expended the

use of electronic presentation by cabling the Pilot Courts for the purpose of Electronic Presentation of Evidence (EPE), digital audio recording (DAR), video conferencing and electronic delivery of the trial progress. There has been success in the virtual plea and direction hearing of the trial and the most recent development in civil cases was the launching of an e-filing project called 'money claims online' (MCOL) in February 2002.

The United States does not follow the joint system of Court administration so the progress is based on many local factors. Now it has become conventional to have electronic filing of evidence, file management, legal briefs creation through multimedia, and electronic recording of the court. The Judicial Conference Committee on Technology Automation was released in 1998 with the assessment results of certain technologies that were used in some federal courts. Of these data results, video evidence helped 83% of judges in managing better court proceedings and 90% of Jurors in observing the evidence clearly and monitoring the attorney presentations[2]. A number of Lab Trials has been implemented with remote witness testimony.

For an in-person hearing, all arbitrators, parties and witnesses all are required to travel as it is common in arbitrations or international arbitrations to be based in different countries. Therefore, it can be a difficult issue to be available in multi-person tribunals. Nevertheless, most of the major arbitration institutions follow the arbitration rules by providing open possibilities for the use of technology to deal the matters remotely such as video and telephone hearings. In dispute resolution, video hearing is not an entirely new feature as provided in following article 22 of

ICC Arbitration Rules 2017:

"1 The arbitral tribunal and the parties shall make every effort to conduct the arbitration in an expeditious and cost-effective manner, having regard to the complexity and value of the dispute. [3]

2 In order to ensure effective case management, the arbitral tribunal, after consulting the parties, may adopt such procedural measures as it considers appropriate, provided that they are not contrary to any agreement of the parties". [4] Therefore, to conduct efficient arbitrations and appropriate procedural measurements for further possible cause, both parties and tribunal are required to make efforts as provided in following Article 24 of the ICC Arbitration Rules 2017:

"1 When drawing up the Terms of Reference or as soon as possible thereafter, the arbitral tribunal shall convene a case management conference to consult the parties on procedural measures that may be adopted pursuant to Article 22(2). Such measures may include one or more of the case management techniques described in Appendix IV .

3 To ensure continued effective case management, the arbitral tribunal, after consulting the parties by means of a further case management conference or otherwise, may adopt further procedural measures or modify the procedural timetable.

4 Case management conferences may be conducted through a meeting in person or videoconference, telephone or similar means of communication. In the absence of an

agreement of the parties, the arbitral tribunal shall determine the means by which the conference will be conducted. The arbitral tribunal may request the parties to submit case management proposals in advance of a case management conference and may request the attendance at any case management conference of the parties in person or through an internal representative". [5]

Therefore, an ICC tribunal can use video conference for conducting a case management conference and determining indications without party agreement. However in practice, both tribunals and parties should consult with each other for such matters as provided in Appendix IV of Article 21(1) of the ICC Arbitration Rules 2017 that concerns with 'case management techniques' as follows:

"The following are examples of case management techniques that can be used by the arbitral tribunal and the parties for controlling time and cost. Appropriate control of time and cost is important in all cases. In cases of low complexity and low value, it is particularly important to ensure that time and costs are proportionate to what is at stake in the dispute.

... j) Using telephone or video conferencing for procedural and other hearings where attendance in person is not essential and use of IT that enables online communication among the parties, the arbitral tribunal and the Secretariat of the Court". (Emphasis added)

Therefore, an ICC tribunal can hold both 'case management conference and other hearings without in person attendance. Due to current

situation of COVID-19 outbreak, restrictions are followed on gathering and travelling across the world so therefore, tribunals and parties should understand that it is unauthoritative for any reason to be in person attendance. Even though in practice, hearings with live witness examination are also dealt without in person attendance.

Temporary COVID-19 Protocol-English Civil Courts

A temporary COVID-19 Protocol was issued on 22 March 2020 by the English courts, 'inter alia' as practical guidance for remote hearings by the parties and courts. Additional guidance amenable with open justice principles, is also provided on how to hold the hearings in practice. This protocol lists can be obtained from the White Book, Volume 1 Section AA and also online on the judiciary website [6].

There is considerable increase in conduction of English Court hearings through telephone or video link. Such hearings can be observed by public or press member by contacting the court authorities for indicating fundamental importance associated to open justice system.

Practical Aspects of Video Hearing

Hearings can be more effective by the use of technology like document viewing software that finds the relevant passage amongst thousands of documents with multiple hard copies by pressing just a button and displaying those passage on the screen of court counsels, parties and witnesses simultaneously.

Additionally, many hearings are assisted with the help of real time transcripts and recordings

of proceedings. However, the technology if used ineffectively has the potential to cause procedural unfairness that may lead to obscure the matter of a hearing. Such as PowerPoint presentations can simplify the bulk submissions and voluminous materials but it also has the potential of duplicating the hearing material for tribunal review and understanding. Similarly, it is difficult to ensure the access of relevant technology and the availability of sufficient internet connection to everyone participating in a hearing regardless of their physical location. Another concern being raised is the secure and confidential internet connection for the video based communication that should therefore be addressed by service providers in precise.

The most common area in arbitration (including English courts) where videoconferencing has been arranged, include cross-examination of live witnesses and hearing of evidence-in-chief.

One example of the procedural imbalance was observed in hearing where an argument was rejected on the basis of evidences that were provided both in person from one party's witnesses and in the form of video link from counterparty's witnesses as in following Teare J held (at paragraph 16): [7]

"16. In any event, there is the possibility of evidence being given by video link. It seems that is not possible in the Sudan, but would be possible elsewhere; Dubai has been mentioned. No doubt that would take - I think it is said in the skeleton argument - two days and involve expense, but that expense it seems to me would be well within the means of the defendants who have purchased as I say this cargo for \$18 million. Finally I should say in relation to the video link Mr Buckingham

suggested that there would be an imbalance between witnesses who have to give evidence by video link and witnesses who give evidence in person. I am not persuaded that there is such a risk. Perhaps in the early days of video link when the quality of the video link was poor and it was a novelty, perhaps that might have been said, but these days I do not consider that that can be said".

However, the evidence provided in the form of video link was aimed to provide procedural fairness as a substitute if evidence cannot be tested adequately. The purpose of videoconferencing method should be to satisfy the court or tribunal parties about the witness being not trained or provoked by other material or any person.

Furthermore, the effectiveness either of the witness's evidence or the ability of counsel to examine or cross-examine can be undermined by a poor or intermittent Internet connection at either end. There are many examples of English court judgments where judges have felt compelled to make a note of unsatisfactory videoconferencing. For example:

In Jiangsu Shagang Group Co Ltd v Loki Owing Company Ltd [2018] EWHC 330 (Comm), Carr J, discussing the underlying arbitration proceedings, noted (at paragraph 15) as follows:

"15 The hearing spanned a week in July 2016 during the course of which Mr Shen Wen Ming ("SWM") alone gave oral evidence for JSG via (an unsatisfactory) video link from the PRC (and with the aid of an interpreter). SWM was at all material times the Vice President of JSG and also a director of Shagang". [8]

In PEC Ltd v Asia Golden Rice Company Ltd

[2014] EWHC 1583 (Comm), Andrew Smith J held (at paragraph 34) as follows:

"34 However, it is less clear whether anyone other than Mr Narang gave approval: Mr Mirchandani's evidence about this was not assisted because the video-link to India broke down while he was being cross-examined about this. I conclude on balance that Mr Mirchandani probably did not give approval in advance ... ". [9]

Through E-Court Service Center a civil lawyer is electronically allocated to the litigant when he/she brings all the relevant documentary evidence to the center. Once lawyer is identified then he/she files the case according to the predefined procedure. Once the process of filing case is completed the web crawler at e-Court web services is used to track down the land registry record of prosecuting and defendant parties from federal and provincial land records. Moreover, if required it collects data of concerns parties from various databases which includes records from other courts, from different tax services, from criminal databases, from transaction history carried out through banking channels and many other records which can be utilize for effective court proceedings. As soon as the record is obtained from the relevant databases regarding the litigant and defendants it is presented to the judicial officer in the form of certified documentary evidence for case. The judicial officer will use these evidences for examining and cross examining the witnesses and this will ultimately lead to quick outcome of the case.

Implementation Strategy for Pakistan

One of the important reason to support the implementation of Electronic Filing System

(EFS) in Pakistan is that, with the availability of EFS the litigant the law firms (LFs), and lawyers will have convenience of submitting their relevant documents easily online. Once the said system is implemented successfully it will not only ease the process but will expedite the process of document submission to court. This is will further reduce the hassle for people involved in a case. In addition to all the advantages listed above, the EFS will also act as storage of documents for litigant and defendant this will not only minimize the chances of misplacement of record, but will also provide opportunity for the associated parties to simultaneously view the record.

The EFS will be capable of routing the documents to the relevant staff member of registry department so that documents can be further processed. Moreover, the intended new EFS will allow routing of documents to the court as per requirement; this includes approvals sent from Duty registrar to Registry staff and sending back reply to LF who has originated the case.

With the successful implementation of EFS the deficiencies in the current manual system would be highlighted which will be mainly linked with the reduction in the process time of case and will also help in finishing flow of paper to great extent. Another feature that should be incorporated in EFS is online fee deduction; which is required to be paid by the Law firms for submitting documents to the court. With automatic payment deduction the process of filing documents will be rapid, smooth and efficient.

The system should be able to show LFs next case hearing date, the documents which are submitted by LFs, documents provided to them by related parties which include the opponent

parties and court. In addition to this, the system will be capable of providing document service to other Law Firm as well. The newly implemented system will be able to show updated and accurate information regarding a case. Therefore, the EFS will be a source of rapid inspection of the submitted documents and getting the relevant extract of the document just by making few clicks online. The relevant material like books and other documents related to legal research will be available electronically too. Furthermore, when the hearing dates are finalized lawyers will get its confirmation through Short Message System (SMS).

Apart from all the functionalities stated above, the functionality of EFS for registrar will be to give him/her privilege to electronically conduct hearing of cases from chamber.

The Components of EFS

The new Electronic Filing System will comprise of the following listed components:

- There will be one Front End of the system which will be accessible by all the registered lawyers and LFs using internet.
- The system will have one gateway; the purpose of this gateway will be to collect the relevant documents from the concerning parties and to deliver the court documents to the relevant concerning parties. In addition to movement of the document the function of the gateway will be to compute the payable fee for filing of documents, and deduct it automatically.
- Court Workflow: this application will be used for the internal movement of the documents. These systems will be only

available on Computers that are fixed in courts.

- There will be one hearing module, which will be used to conduct online hearing of the cases.
- A stand-alone Key Management System (KMS); this will be used for the issuance of the digital certificates to the registered law firms and lawyers.

Front End Application

The Front-End application of the EFS will be a web application which can be accessed and operated by registered lawyers and Lawyer firms through their personal computer or mobile browser application. Once, the lawyers and LFs are registered; smart card will be issued against their name which they can obtain from their relevant courts. These smart cards will comprise of the digital certificates which shall be issued by Court Certification Authority. With the help of Front-End application, the LFs will be able to see the documents which they have to submit, the documents which have been served on them and any reply or documents issued by court for the relevant cases. Moreover, it will have schedule the upcoming hearing which can be witnessed from the Electronic Filing System installed at Law firms. And this will be visible at every case level. The Front-End of the system will be equipped with File and serve system, this feature will be used to serve documents on other parties by just making few clicks.

The format that will be using for serving the document will be Portable Document Format (PDF). In order to serve a document or file a document on other part there will be an online

template available on the Front End of the system, the law firms would be required to fill those template and then will send it to the party insuring that the document sent is in PDF form. The submission of documents can vary from a single document to multiple documents, and every document needs to be signed digitally using the smart cards which were issued to the lawyers and LF initially by court. The significance of submitting digitally signed document is to ensure authenticity of the document and to avoid non-repudiation.

The Gateway

The Gateway act as an intermediary system where the submissions are check by running some validations in order to ensure that the valid document is submitted by the LF. Once, the validation process is successfully completed then comes the feature of calculating the fee for the document submission and once this all is done the relevant department is identified and document(s) will be sent to it. Moreover, the responses which are received from the court are then redirected to LF and lawyers. The Gateway will be able to perform the following functions.

- (a) An automated process for validating submitted documents.
- (b) Execution of important rules.
- (c) Automate document routing process in Courts.
- (d) Calculation of stamp and document filing fee.
- (e) To effective transfer information from back End to Front end and vice versa.

Court's Workflow Application

The work process of court should be incorporated in the EFS. The system should have a workflow of routing the documents from LFs to parties and from parties to the Courts. The system should be able to manage the submitted documents and should be able to generate reports based on the statistics. The new system will store the documents in form of jukebox. Moreover, the new system will have feature of showing electronic file, which can be used for easy retrieval of data, upcoming hearing schedule and any other development related to case should be part of this system.

Hearing Module

One of the important modules of EFS will be Hearing Module; this feature will be designed to facilitate job of registrars and Judges to conduct hearing in their respective chambers which would be paperless. This module of the system will be installed on a desktop located in chamber of Judges and registrar. The Hearing module will comprise of two screen one first screen the judge will be able to see complete case file of hearings which have been fixed earlier by registrar and the second screen will be used to list all the documents related to case. In addition to all this, there will be a feature of downloading the complete case documents so that respective judge and registrar can download all the case related documents and read the case at home.

Key Management System

As discussed earlier that each LF and lawyer will be issued digital certificates to sign digital certificate in this regard courts will act as an independent certification Authority. The role

of this Key Management system will be as follow:

- (a) The role of this system will be to generate or cancel an already issued digital certificate.
- (b) It should be linked to a central database which will have record of all issued certificates.
- (c) This system should comprise of web-based portal which will allow LFs and lawyers to request and receive the smart cards and digital signature.
- (e) This web-based portal will allow LFs to generate their independent private-public key for sharing of information.

Web Information Service

The Web information service should be developed as all in one system which would comprise of network of multiple electronic services for the legal sector of Pakistan. In order to cover major portion of legal practices the web Information system will have at least following 6 modules:

- Litigation
- Conveyancing
- Corporate Law
- Intellectual Property
- Legal Research
- Integrated Law Office.

A Judicial Administration computerization program, constituting of wide range of network infrastructure facility should be implemented to facilitate multiple applications and link of system with external systems. For paperless communication an Electronic bulletin should be setup so that the important announcement/messages could be conveyed.

Technology court should be established; these courts will be fully equipped with all the technology aspects required for court proceeding like availability of multimedia, facility for digital recording and availability of paperless record. For the effective discussion of ex parte matter, the system should be equipped with remote chamber where people from legal experts can raise their concern through video conferencing. In addition to all this a Judicial Officer's bulletin board should also be incorporated in this system just as another step towards paperless environment in court system.

As per the proposal submitted to Court's IT committee; the main feature of this EFS will be promotion of paperless environment within courts of Pakistan. The new system will enable LFs to electronically submit their case relevant documents to court and vice versa. The EFS will also allow them to see schedule for upcoming hearings. It is expected that upcoming system will also have a feature of providing document services to LFs. This will allow processing of documents for showing the comprehensive information services.

E- Filing Portal

For filing documents electronically to court the services of E-filing portal will be undertaken. This storing and filing of documents should be carefully dealt by carrying out proper legislation for transfer of information in this regard the upper courts like high court and supreme courts should define standard rules. The fundamental purpose of E-filing and E-recording should be to store data and retrieve data to and from the system by just entering the valid credentials. The system will have an additional feature which can be used for submitting documents to recorder to clerks.

Electronic Filing/Electronic Process Applications E-Filing Application - RTF and PDF

For formally submitting documents to E-filing system the following file format should be ensured

- Any document which contains electronic receipt and needs to be stored shall be stored in .PDF format.
- The E-filed report should have a information regarding the pre-formatted cover sheet which was earlier used for case proceedings.

Mark-up Language (.XML)

- The purpose of this document will have an alternative for eradicating the paper file submissions.
- To facilitate the system which uses the third-party applications.
- For every submission there is generally a category which ranges from moderate to high complexity

E-Process Application - RTF and PDF

Its in general an application for introducing the following features which:

- A system which still works with the printed version of the email document utilized in case file.
- A system which can be used for providing the information to entities who are not linked to court or case directly.
- The cases which are generally categories as low complexity cases should generate System Review Checklist - RTF and PDF format.
- The purpose of this checklist is only to provide information regarding cases.
- The purpose of the checklist is to ensure

that all the required standards required for court cases are listed.

How to Use

General Instructions

- In order to discourage the culture of email for filing a case, the lawyer must file their respective client's case using E-filing system website instead of using email.
- There is compulsion for the lawyers to submit the due record in either PDF format, doc format (which should facilitate reading of doc files which are linked with MS office 97 or later)
- Lawyers must submit, in addition to their briefs and petitions, any appendices.
- Court has started the E-filing facility. The stathe one bus of e-filed cases will be regularly updated on SMS and email address of concerned Advocate or party-in-person.
- It is notified that the facility of E-filing of urgent cases in High Court has been starred on E-filing portal developed by E-committee of Court. This portal is being used by court for E-filing. Link of e-filing portal is available on the web site of court in top bar on home page.
- E-filing of urgent cases shall be made in accordance with the Guidelines already issued for the purpose along with this office order No. dated.
- E-filing portal will be directly integrated with online payment facility of court fees.
- Before e-filing, the Law Firms, Advocates or party in person shall be required to create his/her user account on the e-filing portal. Smart Cards shall be issued for said purpose. Detailed guidelines for user creation are available on the web site of Court.

- The Advocate account creation process shall be verified by one Time Password' which will be sent on Mobile Number and email address of concerned Advocate registered in the data base of court. Some advocates may have changed their mobile number or the registered email address may not be in use. To meet such situation, an option 'Advocate Details', is made available on the web site of court where the advocates can see their registered email address and mobile number.
- If any change in mobile number or email address is required, the advocates may send email for the same along with a copy of their Bar Council Enrolment certificate or Bar Association Identity card having Bar council enrolment number.

Conclusion

The ongoing COVID-19 situation has compelled both courts and arbitral tribunals to hold virtual hearings, to a far greater extent than has ever been experienced before. As a result, the general level of exposure to videoconferencing technology will lead to a greater level of understanding of and competence in the use of such technology amongst Judges/arbitrators, counsel and parties. It seems inevitable that there will be greater use of video hearings and the online aspects of dispute resolution not just during the course of the stringent 'lockdown' situation currently being experienced around the world but also, possibly, thereafter. There is always an opportunity in every crisis and the need is the mother of invention.

Modern technology, allows courts to enhance the administration of justice, realize significant time saving, cost savings, and meet the justice

delivery system expectations of today's court participants. Numerous solutions are available to meet each court's unique needs, resource persons and funds are also available for implementation.

We'll have to develop a software and E-portal to achieve the goals mentioned above for which we have very competent IT experts available in Pakistan and it can be done in few weeks. The Supreme Court and High Court Rules have to be framed to cater to the needs of this technology. IT committees will have to be established to supervise and administer this system at all court levels. More importantly we'll have to impart training to Lawyers, Judges, Prosecutors, Court Administrators, Staff and Investigating agencies at the Judicial Academies, Law Schools and Bar Councils/Associations by way of continuing legal education. And also encourage and register service providers to help lawyers, who are not acquainted with computers to help them with E-filing. This new system can be introduced by way of pilots in a class of cases and then extended to other cases with requisite changes on the basis of experience gained. Room was not built in a day but was built alright.

The information technology has established a smooth path in the field of judiciary across the country. Following this, the right of equality and liberty with fair reasonable procedure have been guaranteed in the article 25 and 10 of the constitution respectively. Article 10A determines the civil rights and obligations against a person and he shall be entitled to a fair trial and due process if charged with any criminal activity.

Further development of artificial intelligence such as imposing of proper sentence in a

criminal case and rapid clearance of trials through appropriate use of software, are required to be reassessed.

Lawyer, distribution of law and judiciary along with disruptive and emerging electronic legal information (ELI), can become the basis of legal challenges. ELI may contribute as an integrated electronic civil procedure, substantive law, e-document filings or evidence and electronic information of court cases. It has the capability of transforming the present cornerstones to virtual presence by facing the high costs, delay and complexity challenges..

Soon everyone will be required to translate all legal texts into digital language understood by computers or similar systems. The law being constant is required to be understood in digital procedure for finding out the degree of deviation if present. The presence of too much deviation may lead to consider a person as deviant that intern needs proper rehabilitative steps or even penal actions are taken for constitutional purpose such as making rule of law as reality.

Adaption of ODR techniques to emerging technologies has eased the path to online resolution of disputes with increased number of complexities. It is essential to provide trusted operating solutions with secure environment for the disputes that are based on matters with extreme commercial sensitivity. Therefore, it is critical to have 'back office' and 'front office' technology functions with similar development such as the use of artificial intelligence and blind bidding by consumers and litigants who convinced to turn to ODR for their differences settlement.

The establishment of Virtual Courtroom with significant progress has led the ODR into critical stage where consumers and litigants trust this alternate from for resolving their disputes. This trust can be achieved by the association of global network and ODR community that will enable the online resolution of complex disputes through introduction of emerging technologies.

References

- [1] Frederick I Lederer, The Courtroom as a Stop on the Information Superhighway, Reform, Spring 199, at 4,4
- [2] Courtroom Technology Draws Positive Response. The Third Branch (admin OFF of the US Cts, Washington D.C.) Aug 1998 at 9.
- [3] Article 22, ICC Arbitration Rules,2017.
- [4] Article 22,ICC Arbitration Rules,2017.
- [5] Article 24, of the ICC Arbitration Rules, 2017.
- [6] <https://www.judiciary.uk/coronavirus-covid-19-advice-and-guidance/>
- [7] Hanaro Shipping v Coffia Trading EWHC 4293 (Comm), Teare J. [2015]
- [8] Jiangsu Shagang Group Co Ltd v Loki Owning Company Ltd. EWHC 330 (Comm), Carr J, [2018]
- [9] PEC Ltd v Asia Golden Rice Company Ltd .EWHC 1583 (Comm), Andrew Smith J, [2014]



Correlates of Criminal Behavior

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Abstract:

This review paper traces the ardently debated correlates of criminal behavior and its associated factors. A short overview of crime and criminality has been discussed. Systematic relationship of crime and criminal behavior is enlightened that how certain factors within a system including ecological, macro-level or social and micro-level or individual factors affect an individual personality that eventually will contribute to criminal acts such as robbery, homicide, child abuse and sexual assault etc. Emphasis on different mechanisms established between an individual and environmental factors settled during life developing process has been reviewed that may cause a crime to occur. Positive or negative correlations between crime and other factors such as biological, religiosity, political and psychological factors have been observed. The findings of these correlates on an individual and society exposed outcomes of crime and criminal activity.

Keyword: Crime, Causes of Criminal Behavior, Correlation of Criminal Factors and Crime.

1. Introduction

Crime is an action or an omission against the norms of a society that is outlawed and punished by the law in the form of fine or imprisonment. Common examples are homicide, rape and child abuse, robbery, drunken driving and failure to tax payments. Nevertheless, many renowned criminologists like Sampson and Laub (1993); Gottfredson and Hirschi (1990) have just studied and observed that concentrating on essential features of all criminal behaviors is the key aspect of understanding crime rather than emphasizing on particular criminal activity. As

an alternative, we are required to identify the common factor in all of types of crime rather than understanding them as separate crimes. However, in past most of the crime researches have been conducted on the politico-legal factors instead of behavioral description [1, 2].

The behavioral description or characterization of crime is centralized on criminality in the form of certain personality sketch or profile that may result into most frightening categories of crimes including murder or assault etc. The purpose of all criminal behaviors is to gain material or symbolic resources by using force, deception or secrecy. According to Gottfredson and Hirschi (1990), criminality is a smart

deliberated and intentional behavior described as self-interest, insignificance towards grief and desires of others and little self-discipline. Spontaneous people are more attractive towards smart behavior of criminality by having instant satisfaction via comparatively easy or modest tactics that normally can be dangerous and thrilling. As a result, they cause pain or distress to the victims by contributing insufficient and miserable benefits as they frequently affect the family and friends, and professions. Therefore, it is declared that the variability of absenteeism of an individual in a sample is same as those of serious assault, drug use and vehicle accidents. In this scenario, criminality has a tricky association with other legal crimes. For example, some criminals simply may represent themselves as business people whose dealings are in the form of illegal activities like tax cheats, prostitutes and drug suppliers etc. These types of criminals psychologically may not be differentiated from other ordinary citizens who more or less may commit small legal crimes once throughout their lives. However, a large number of legal crime is committed by individuals through common criminal scheme [2].

Crime in this regard describes a wide range of criminal activity with the fact that each individual tends to be specialized not only in one type of crime but also has the tendency to be stable for a long period of time in committing crime with increased severity. Such as executives as compared to others are more impulsive by being self-centered and careless when committing white collar crimes. Human resources for which crime is committed, can be of material, symbolic or

hedonistic value. For example, theft crimes involve property as material resource taken from an individual without his or her will. Similarly, those involve in committing narcotics trafficking and gambling crimes, try to gain money as a material resources. Sexual assault and drug abuse crimes involve hedonistic resources to obtain pleasurable feelings. Likewise, political crimes involve terrorism or election deception to have power or prestige as symbolic resources [2].

Correlations of Criminal behavior discover the links between specific crimes and non-criminal factors. These non-criminal factors are identified through study of criminology based on crime dynamics that involve the use of correlational data. The correlational data help to identify certain factors associated with specific criminal behavior. Such criminal behavior leads to cause specific crimes that can leave diverse emotional, mental, physical and material effects on the crime victims [1]. These effects are terrible and more tragic that indirectly damage the society. Prevention of crime through criminal justice system interfere our private lives by threatening personal freedoms and individual rights. Moreover, crime persuades mistrust, bias and destruction of social unity [2].

2. Systematic Relationship of Criminal Factors and Crime

Systematic process of nature is a composite of individual, ecological and societal factors and their interactions lead to criminal behavior during life development. More simply, interactions of our personal behaviors,

physical environment and interactions with other institutions, groups and people can intensely influence the intellectual, physical and emotional attributes that we develop. This systematic connection can affect the transmission of traits from generation to generation that are associated with increased crime rates. To understand the systematic association of criminal factors that cause crimes, we must know the individual components of that system and their effects as follows;

2.1. Geographical or Ecological Factors

Geographical or ecological factors involve associations of people and their activities with physical environment including topography, crowding, population, neighborhood quality and residential mobility, bar and alcohol density, temperature and pollution, tourist and recreational prospects [1,2]. These elements as described in table 1, can affect the physical and emotional development of people lives as well as their feelings the way they experience from moment to moment, such as to feel fear or anger or being in dark lonely parking portion or tranquil park contrary to a crowded subway.

Ecological factors further provide that what sort of opportunities can exist for a crime to occur as they involve the interactions of people with the ways directed by physical environment. In a physical setting, human routine activities can have significant effects on crime opportunities i.e. when and where to happen. A crime can only occur in the absence of capable guardianship such as physical barriers or people where a motivated offender meets a property, illicit substance, victim or

behavior [2].

2.2. Macro-level or Societal Factors

Macro-level or societal factors describe the systematic interactions between different social groups. They explain how a society is structured through relative distribution of the population and flow of information or resources or people among the groups. Societal factors incorporate the diversity and heterogeneity of different groups of society and their beliefs, behaviors and economic relations, such as racial, cultural, ethnic and prolific as an immigrant [2].

Countries with diverse ethnic/racial geographical areas are subjected to higher crime rates as compared to uniform areas with homogeneous populations. However, this phenomenon is different for different countries. Likewise, immigrants found to have higher crime rates among such populations. Crime rates based on immigrants vary with respect to the country of origin as some regions have lower while the native born have higher crime rates [1]. Both the concepts about the immigrants to have tendency to commit crime and to commit more or less crime than that of native born vary geographically. For example, census data within the United States show less number of imprisoned immigrants for a crime than those who were native born residents. The census data count for total number of immigrants residing both legally and illegally in an area irrespective of their nationality status [4].

AFFECTS OF	ON		
	<i>Ecological Factors</i>	<i>Microlevel Factors</i>	<i>Macrolevel Factors</i>
<i>Ecological Factors</i>	X	<ul style="list-style-type: none"> -Environment reinforces (& perhaps counteracts) temperamental propensities. -Pollution hazards degrade learning, cause hyperactivity, etc. -Exposure to danger increases aggressiveness and/or fear. -Deviant models provide opportunities to learn deviant behaviors. -Criminal opportunities increase temptation. -Overcrowding may increase hostility. 	<ul style="list-style-type: none"> -Physical resources provide economic opportunities. -Geographic barriers reinforce class/ethnic boundaries and self-interestedness. -Ecological interactions drive population-level evolution of culture.
<i>Microlevel Factors</i>	<ul style="list-style-type: none"> -Routine activities of individuals affect opportunities for crime. -Individuals can modify local environment. -Individual historical and genetic variation assures some variation between the abilities, motivation, and strategies of interacting individuals. 	X	<ul style="list-style-type: none"> -Individual variation provides grist for evolutionary processes. -Individual actions change average payoffs for criminal and noncriminal behaviors. -Individuals form interest groups to change government.
<i>Macrolevel Factors</i>	<ul style="list-style-type: none"> -Government modifications of built environment channel population movement and change location of criminal opportunities. -Sociocultural heterogeneity creates more opportunities for crime. -Weak regulation or guardianship creates opportunities for crime. 	<ul style="list-style-type: none"> -Cultural beliefs influence parenting styles and parental behavior. -Economic inequality creates pressures for crime via poverty and greed. -Poverty increases child developmental risks by creating strains on parents, & degrading education and health care. -Unequal access to information and education creates power inequities. 	X

Table 1: Examples of important direct effects that can produce interactions among ecological, micro-level, and macro-level factors associated with crime [2].

On the other hand, socioeconomic factors measure three variable of socioeconomic status including occupational level, years of education and income (or property) that correlate negatively with large crime rates other than illegal drug use. Crime has an inverse relationship probably with higher

parental socioeconomic status whereas higher unemployment frequency and unstable employment have relatively positive correlations with criminality [1, 24]. Similarly, it is considered that low socioeconomic status correlates positively with higher level of anxiety that eventually effects the mental and psychological stress. The increase in stress level will intern correlate with the tendency of committing crime [25].

The idea of low level of income and education,

high income inequality and population under the poverty line is inconsistent and shows a positive relationship with crime rate in said area [1]. A study from Sweden completed in 2013 shows that neighborhood deprivation has little effect on crime rate as compared to observed and unobserved family or individual level factors living in economically deprived areas have higher correlations with crime rates [26]. According to a World Bank study, “inequality and crime rates have positive correlations within and specifically between countries that reflects the interconnection from inequality to crime rates, although other determinants of crime are controlled” [27].

2.3. Micro-level or Individual Factors

Crimes are actually committed by the individuals and the factors always have association with criminal act. Crime can have involvement of other ecological and societal factors but the individual factors are measured as the central cause of crime. The individual or micro-level factors defines the driving force behind a person's actions that motivates him/her to commit a crime. Motivation is not limited only to what “I want” but it includes what a “person could,” what “it will cost,” what “he/she will get,” and “if it is wrong or right.” Motivation involves the process of goal formulation, assessment of costs and benefits, and application of internal controls on behavior. All these components may vary among the individuals, time and situations. For example, sometimes rational decision making and other times emotions like greed or lust or anger can influence a person's motivation. Similarly, some people have more motivation value for different objects or activities and some for cost or benefit calculations.

Motivation becomes more effective factor if opportunity is available for a person to commit a crime. Opportunity can influence the motivation and lay people would consider the motivation if opportunity as an offer is provided to them. As a consequence, both motivation and opportunity enhance the tendency of person at a particular time to commit crime. Some people is motivated with criminal opportunities offering extremely small rewards while others exploit if provided relatively enormous criminal opportunities and few do not commit crime irrespective of rewards [2].

The work of Cohan and Machalek (1988) on evolution of crime and criminal strategies states that disadvantage as well as advantage can motivate people to commit crime. The past institutional scandals show that people take the advantage of prominent skills and status that can provide profitable criminal opportunities and motivate them to commit crime without fear of being caught and punished. Most of politicians and business people are less impulsive or thrill seeking but they are more motivated than street criminals by taking and offering enormous opportunities of bribes. On contrary, scientific scandals are infrequent with no motivation or opportunity and the main profit to obtain is status e.g. publishing papers. Data forging and plagiarism are included in criminal activity where the fake experiment is replicated and complain is placed by the victim of plagiarism if the idea of data is important. Publishing of faked paper is a criminal act that is highly public because the name attached on the paper is easily caught.

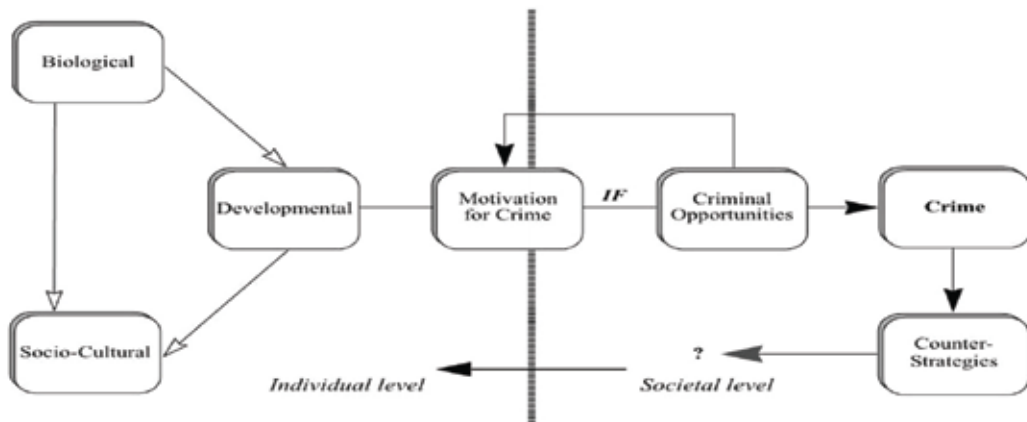


Figure 1: Systematic interactions between individual and societal factors that cause crime [2].

Individual factors are hypothesized to determine motivation behind the criminal act of a person. Motivation is the outcome of interactions between socio cultural, biological and developmental factors at a particular time over a course of person's life. Similarly, interactions between socio-cultural and biological factors result into psychological factors. However, some criminologists do not consider simple criminal behavior as reasonable description of motivational factors. Interactions between socio-cultural, biological and developmental factors can affect the motivation force that obtain resources by using fraud, force or secrecy in the presence of an opportunity. A crime can occur if the person has required tendency to commit it in the presence of sufficiently high motivation and an attractive opportunity. The interactions between three types of factors i.e. individual factors, motivational and opportunity associated with criminal act are illustrated in figure 1.

3. Correlates and Causes of Criminal Behavior and Crime

What influences an individual to commit a

crime and how an individual becomes a criminal who is grown up in a stable adoptive home. The answer of this question depends on various factors that are highly correlated with criminal behavior including early age involvement as projecting subsequent, youthfulness and gender [1,2]. Likewise, inequality, poverty, inadequate socialization and disrupted families all appear to be significant correlates of crime in the presence of criminal opportunities. Such generalized findings may support the primary correlates of crime but still the causative importance and relationship between different variables remain significant argue among several academic disciplines and criminologists. Issues regarding variable interactions and their level of analysis should be considered. As many variables are inter-correlated so it is not easy to solve this problem with better correlational studies. Such as African Americans who engage in extreme criminal behavior, are enormously affected by racial discrimination, family disruption and poverty. The correlation data alone is not sufficient to identify the most important variable or direct cause of crime. To understand the correlates of criminal behavior, generational analysis of key causes of crime is necessary as followings;

3.1. Importance of Early Life Practices

Early life experiences can strongly influence in the development of individual's criminality as these characteristics are obtained sequentially. The growing cognitive, emotional, physical

and social effects of sequential events begin from the time of development and result into characters or individualities at any juncture of life as described in detail in figure 2.

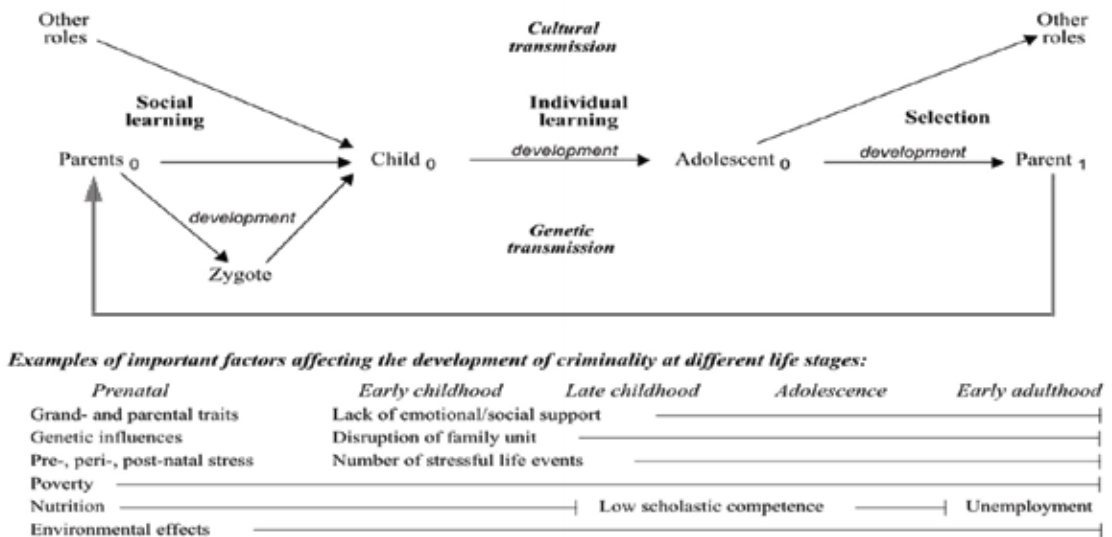


Figure 2: Human life cycle, acquiring traits that influence individual behavior over life time depends upon interactions between genes, social, environmental factors, and individual learning during development, examples of important factors correlated with development of criminality at each stage [2].

Some individuality is characterized by self-interest and careless towards the need and griefs of others to obtain resources by using force, fraud or deception [2]. tendencies and parent's ability to manage with the problematic behavior of a child. According to Werner and Smith (1992), economic hardships, serious caregiving shortfalls, family disruption, and neighborhood with high crime rates put the children at higher risk of crime [2].

Some basic and significant developmental factors associated are parenting, family supervision, education achievement, poor diet, maternal smoking in pregnancy, pre and postnatal stress, birth complications and low birth weight [1,2,8]. Environment as an important factor may increase or delay a child's effort to survive with irregular Parent child relationship and poor family management are strongly associated with antisocial behavior of a child e.g. crime. Children with low parental monitoring, larger family size or birth order, marital or family discord, drug and alcohol usage in family, and maltreatment, tend to have low parent child relationship and are more susceptible to poverty and crime [1,8,31]. For example, a child grown up in a disrupted family where alcohol and drug usage is common may have

more exposure to high alcohol, illegal drug use and sexual intercourse at early age. These correlated factors may put them into social isolation, gang membership or criminal groups and multiple sexual partner in their adolescence [1]. Similarly, children associated with factors such as school bullying and disciplinary problems, nightly enuresis, low grade, absenteeism school, and dropping out of school, are unlikely to succeed in school and exposed to poverty [1,8,9].

These factors are often transmitted from generation to generation and the associated risks can be shielded by other factors like educated mothers, presence of caregiving in the form of older siblings or grandparents, and easy temperaments. The associated risk and protective factors of these antisocial behavior fluctuates depending on life stage, social environment and gender [2].

3.2. Biological Factors

The second and third decades of life are most frequently involved to cause crime. Males as compared to females are more exposed to commit violent crime and reoffend. They are more involved in property crime excluding shoplifting as it is committed equally by both genders. Criminals have low arousal measures such as low skin conductance and heart rates. Particular criminality such as sexual crimes are positively correlated with muscular body type [1]. Genetic factors such as age and sex both strongly correlates with criminal behavior. Criminals found to have low 5-HIAA levels and low monoamine oxidase activity named as “warrior gene” which are strongly associated with violent crimes [1,4]. Additionally, gene CDH13 is earlier associated with increased risk of violent crime such as substance of abuse [4]. Apparently, all of these propensities are correlated as majority of the individuals in

Finland commit violent crime under the impact of alcohol or drugs. Though, genetic profile is unlikely formative but it can increase the possibility of crime in the presence of correlated factors. According to Ferguson statement, our genes, brain anatomy and biology can influence a large portion of our behavior in relation with violence or aggression. On the other hand, it would be a massive overstatement if to call these alleles as “violence genes”. However, it becomes harder to control violent urges when these genes are present in combination with other associated factors but they definitely do not encode a life of crime [5].

3.3. Religion

A negative correlation has been found between religiosity and criminality such as a meta-analysis in 2001 stated that criminal behavior of an individual can be moderately affected by religious beliefs and activities but the assessment of that studies of religion on crime impact varied because of differences in theoretical and practical approaches. This suggested that the religion practiced in different ways that may influence the results of findings [10]. In addition, it is stated by few researchers that influence of religion is not liable but most of them especially youth have supported the effects that change by quantity and type of offense, social or religious context, therefore, signifying complex correlation between religion and criminality. Participating in religious measures was found to be a determined and independent inhibitor of crime in adult when other factors including social ecology and secular constraints are monitored [11].

An individual is less likely to be associated or involved in criminal activities who has high religious saliency and attends or highly

involved in religious services [1,10]. Similarly, people are less likely to have criminal behavior than those who do not contribute to traditional religious beliefs [1,13]. Another 2012 study proposed that crime rate decreases with belief in hell and increases with belief in heaven, and suggested them stronger correlations than other factors identical to income inequity or national prosperity [12]. Different researches and studies concluded that no sufficient data has been found to indicate any negative correlations between religion and crime and drug use [13,14]. Similarly, any possible criminal factors may not be correlated entirely to relatively nonreligious groups or atheists who have been found with lower imprisonment rates than common public in the United States. Likewise, different types of low religious groups also have not been distinguished with criminal correlations [15].

3.4. Political Beliefs

According to a 2016 study, political beliefs have been found to be correlated with non-violent crime between white individuals e.g. white women. This suggested that non-violent criminal behavior can be positively associated with some groups as liberal self-classification as compared to conservative self-classification [16].

3.5. Psychological Behaviors

Basic psychological factors associated with criminal behavior are childhood conduct disorder and adult antisocial personality disorder [1, 17]. Other correlated factors include minor and clinical depression, family depression, attention deficit hyperactivity disorder, schizophrenia and suicidal tendencies [1,18]. According to 1995's American Psychological Association report, correlation between IQ and crime was regarded as small as -0.2 and appeared to be reduced when other

typical sociological correlates were controlled [19]. Arthur Jensen who cited data in his book "The g Factor: The Science of Mental Ability (1998)" and stated that IQ and crime was negatively associated among races between 80 – 90.

Learning disability such as slow reading development may be an associated factor with crime that shows a considerable difference between IQ and academic performance [1]. However, it has been noted that the IQ effect is proportional to socioeconomic status and is not easy to control it though many methodological considerations are being run [20]. It is evident that other prefunding factors including substance abuse and wellbeing that prohibit fundamental interpretation are applied to simplify this small relationship [21]. Based on recent meta-analysis, populations only with higher risk such as poverty are found to have this relationship without direct effect and fundamental explanation [22]. Similar longitudinal study represented that school performance can mediate this relationship [23]. A number of personality traits including impulsivity, sensation seeking, low self-control, psychoticism, low altruism and empathy, and childhood aggression [1].

3.6. Analysis of Biosocial Criminology and Environmental Factors

Biosocial criminology as an interdisciplinary field explore both biological and environmental factors in order to describe crime and antisocial behavior. Whereas, sociological theories have ruled modern criminology and potential assistance of genetics, evolutionary psychology and neuropsychology have been recognized by biosocial criminology [32]. Violent behavior persuaded either by severe, acute or chronic low-grade stress, has correlation with

abnormalities in three prime monitoring systems of body as follows;

- Serotonin systems
- Catecholamine systems
- Hypothalamic pituitary adrenocortical axis [33].

According to environmental theory that exposed the connection between crime rate and lead exposure, has been associated with increase in former and later causes of crime. United Nation News Center published a report in 2011 and stated that removing of the leaded petrol from the developing countries with the effort of United Nations resulted into annual benefits of \$2.4 trillion, fewer premature death of 1.2 million, developed intellect and fewer crimes of 58 million. The same study was done by the California State University and then the executive director Achim Steiner of U.N. Environment Program (UNEP) discussed that the elimination of leaded petrol is a great achievement and effort with similar removal of foremost deadly diseases which has often fluttered the attention of media and global leaders [34].

4. Conclusion

This review paper exploits the correlation between criminal behaviors and their associated factors. Different researches and studies argued that ecological approach should be considered to understand crime. It explained that how this approach can be useful to describe association between ecological, micro and macro-level factors and criminal behavior developed over the time. The interaction and evolution of these behavior can influence individual development across generation. Applying the conceptual and well established techniques of biological knowledge provide a general view of human behavior. This sequentially explains the crime as cultural trait that developed as a result of

dynamic interactions between individuals and physical environment. Evolutionary and ecological dynamics should be considered for crime control strategies analysis. Such dynamics including protection and prevention strategies are important for crime control but will have partial efficiency. To improve social assets of adult, preventive strategies seem to be promising with limited control for crime as it is difficult to change the major behavioral styles of individuals developed in early life. From a theoretical point of view, strategies developed to describe childhood origins of crime across many generations seem to be proficient. Considering the need and suffering of others, the culture of our society should be changed by becoming less impulsive and dependent on intimidation.

5. References

- [1] E. Lee, B. Kevin, W. John. (2009, April 1). "Handbook of Crime Correlates." Academic Press.
- [2] P. V. Murphy (1985). "Crime and Criminality". Pp. 16(284-306).
- [3] R. Greg. (2019). "Experiments in Criminology: Improving Our Understanding of Crime and the Criminal Justice System". Annual Review of Statistics and Its Application, vol. (6), pp. 37–61.
- [4] J. Tiihonen, M. R. Rautiainen, H. M. Ollila, E. Repo-Tiihonen, M. Virkkunen, A. Palotie, et al., (June 2015)"Genetic background of extreme violent behavior, "Molecular Psychiatry, vol. 20 (6), pp. 786–792.
- [5] H. Melissa. (2014). Two genes linked with violent crime [Online]. Available: <https://www.bbc.com/news/science-environment-29760212>

- [6] The Independent News. (2017, Feb. 27). Immigrants less likely to commit crimes than those born in the US [Online]. Available: <https://www.independent.co.uk/news/world/americas/immigrants-commit-crimes-us-united-states-born-america-donald-trump-alien-weekly-list-a7548956.html>
- [7] "Congressional Apportionment - Frequently Asked Questions". Retrieved November 13,2019.
- [8] M. Emily and T. Adam (2011, June). "Unintended Pregnancy and Taxpayer Spending". Perspectives on Sexual and Reproductive Health, vol. 43 (2), pp. 88–93.
- [9] Mother Jones News. (2017, Mar. 6). Sick Kids Are Just the Beginning of America's Lead Crisis [Online]. Available: <https://www.motherjones.com/environment/2016/02/lead-exposure-gasoline-crime-increase-children-health/>
- [10] B. Colin, and W. Bradley. (2001, February). "If You Love Me, Keep My Commandments: A Meta-Analysis of the Effect of Religion on Crime". Journal of Research in Crime and Delinquency, vol. 38 (1): 3–21.
- [11] E. T. David, C. Francis, D. R. Gregory, B. Velmer. (1995, May). "Religion and Crime Reexamined: The Impact of Religion, Secular Controls, and Social Ecology on Adult Criminality". Criminology, vol. 33 (2), pp. 195–224.
- [12] S. Azim and R. Mijke. (2012, June). "Divergent Effects of Beliefs in Heaven and Hell on National Crime Rates". PLOS ONE, vol. 7 (6).
- [13] B. Brent. (1997, May). "An Examination of a Reciprocal Relationship Between Religiosity and Different Forms of Delinquency Within a Theoretical Model". Journal of Research in Crime and Delinquency, vol. 34 (2), pp.163–186.
- [14] Z. Phil (2009, December). "Atheism, Secularity, and Well-Being: How the Findings of Social Science Counter Negative Stereotypes and Assumptions". Sociology Compass, vol. 3 (6), pp. 949–971.
- [15] Adherents.com. Prison Incarceration and Religious Preference [Online]. Available: <https://www.adherents.com/>
- [16] W. J. Paul, B. Kevin, M. M. Alden, C. Eric. (2017, February). "Political ideology predicts involvement in crime". Personality and Individual Differences, vol. 106, pp. 236–241.
- [17] W. James and P. Joan (2002). Crime: public policies for crime control [Online]. Available: https://books.google.com.pk/books?id=DJfaAAAAMAAJ&redir_esc=y
- [18] F. Seena and G. Martin (2006, August). "The Population Impact of Severe Mental Illness on Violent Crime". American Journal of Psychiatry, vol. 163 (8), pp. 1397–1403.
- [19] C. Francis, G. Paul, J. G. Roger, W. J. Paul. (1997, October). "Crime and the Bell Curve: Lessons from Intelligent Criminology". Crime & Delinquency, vol. 43(4), pp. 387–411.
- [20] M. Daniel and C. Joshua. (2013, November). "What is the effect of IQ on offending?". Criminal Justice and Behavior, vol. 40 (11), pp. 1280–1300.
- [21] F. James. (2012, January). "The relationship between lower intelligence, crime and custodial outcomes: a brief

- literary review of a vulnerable group". *Vulnerable Groups & Inclusion*, vol. 3 (1), pp. 14834.
- [22] T. Maria, F. David, P. Alex, L. Friedrich, D. Matthew, M. Joseph, et al., (2016, June) "Intelligence as a protective factor against offending: A meta-analytic review of prospective longitudinal studies". *Journal of Criminal Justice*, vol. 45, pp. 4–18.
- [23] M. J. Marie, P. Travis, M. Jeff (2004, September). "Rethinking the IQ-delinquency relationship: A longitudinal analysis of multiple theoretical models". *Justice Quarterly*, vol. 21 (3), pp. 603–635.
- [24] Morgan (2010, May). Why do Celebrities get away with Crimes? [Online]. Available: www.knowswwhy.com
- [25] B. Andrew, J. P. Garofalo, Y. A. Marie (1999, December). "Socioeconomic Status and Chronic Stress: Does Stress Account for SES Effects on Health?". *Annals of the New York Academy of Sciences*, vol. 896 (1), pp. 131–144.
- [26] S. Amir, L. Niklas, D. O. Brian, H. Johan, F. Johan, L. Paul, et al., (2013, August). "The impact of neighborhood deprivation on adolescent violent criminality and substance misuse: A longitudinal, quasi-experimental study of the total Swedish population". *International Journal of Epidemiology*, vol. 42 (4), pp. 1057–1066.
- [27] F. Pablo, L. Daniel, L. Norman. (2002, April) "Inequality and Violent Crime". *The Journal of Law and Economics*, vol. 45 (1), pp. 1–39.
- [28] B. Fiona and R. Amanda. (2012, April). "Violent Crime". In Morgan, Rod; Maguire, Mike; Reiner, Robert (eds.). *The Oxford Handbook of Criminology*, pp. 563–594.
- [29] W. Bradley, E. C. Avshalom, M. Terrie, M. Richard, S. Phil. (February 1999). "Reconsidering the relationship between SES and delinquency: Causation but not correlation". *Criminology*, vol. 37 (1), pp. 175–194.
- [30] M. J. Mitchell (2009, August. 18). 21st Century Criminology: A Reference Handbook [Online]. Sage. pp. 57.
- [31] C. Diana, S. Eleanor, D. Erika, H. Isabelle (2009, March). "Unintended pregnancy and associated maternal preconception, prenatal and postpartum behaviors". *Contraception*, vol. 79 (3), pp. 194–198.
- [32] W. Anthony and B. Kevin. (2013, January). "Biosocial Criminology". *The Ashgate Research Companion to Biosocial Theories of Crime*. Ashgate Publishing, Ltd. ISBN 978-1-4094-9470-6.
- [33] W. Kenneth G and L. Debra. (2003, August). "Effects of the Transcendental Meditation Program on Neuroendocrine Abnormalities Associated with Aggression and Crime". *Journal of Offender Rehabilitation*, vol. 36 (1–4), pp. 67–87.
- [34] United Nations News Centre. (2011, Oct. 27). Phase-out of leaded petrol brings huge health and cost benefits – UN-backed study [Online]. Available: <https://news.un.org/en/story/2011/10/393292-phase-out-leaded-petrol-brings-huge-health-and-cost-benefits-un-backed-study>



Role of Artificial Intelligence in Cybersecurity Improvement

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Abstract:

In recent years, the importance of cyber security and personal privacy protection has increased significantly. To protect computer systems from attacks several solutions have been proposed by researchers and many cybersecurity tools have been developed. However, with the increase in the complexity of hacking attempts, the old traditional ways to counter malwares cannot be relied upon. This paper introduces the need for the development of innovative cybersecurity skills and how many security systems like Intrusion Detection System (IDS) can be improved using Artificial Intelligence (AI). AI is used by nearly every company around the world to optimize and enhance their system safety. In this paper, advance cybersecurity solutions for intrusion detection systems enhanced with the use of artificial intelligence are discussed. The advantages and disadvantages of existing methods are explained and some promising future directions are also discussed.

Keyword: Artificial Intelligence, Cybersecurity, Security, Intrusion Detection, Attacks, Threats, AI.

1. Introduction

Artificial intelligence (sometimes called machine intelligence) can be defined as the ability of computers to perform tasks that are associated with intelligent beings. AI has shown tremendous growth in the last 20 years. AI can be categorized into 1) weak AI 2) strong AI. Strong AI is where the machine could have common sense, self-awareness, and creativity (human-like intelligence). Weak AI is performing intelligent human processes without really understanding the process that is being done. Also, weak AI completes a task where strong AI completes multiple intelligent

tasks. Existing systems are all weak AI systems, where strong AI still does not exist.

AI has many techniques such as machine learning, deep learning, speech recognition, natural languages processing etc. AI can be used in many areas including but not limited to healthcare, gaming, problem solving, finance, education, self-driving cars, cybersecurity and many more.

Adding artificial intelligence techniques to security systems can reduce the threats of cybersecurity tremendously. As data acquisition is getting hugger in size, to a point it is difficult for humans to handle, as well as storage capabilities and computing power

increasing there is a need for a comfortable and efficient way to handle all of this. So, organizations and experts are using AI with machine learning to reduce the data processing in milliseconds which will lead the organizations to quickly identify threats and recover from them.

Artificial intelligence techniques can be also utilized to improve the access control and the authentication procedures used in different systems. As the saying each coin has two sides so does artificial intelligence. AI can be used to do good as mentioned previously and it can be used to steal private information and perform huge dangerous attacks. This risky side of AI arises due to the possibility of manipulating AI methods so that it can perform in a preferable way to the attackers [1]. In this paper, we'll cover how AI improves cybersecurity in terms of intrusion detection, as well as, provide some future directions for AI and cybersecurity.

2. Cybersecurity and Usage of Artificial Intelligence

Cyber Threats have grown beyond the point where people can control them. Since humans cannot possibly handle the amount of data to be used in security threats detection and prevention systems [1]. Therefore, it became necessary to automate threats management. Furthermore, as threats are dynamically evolving, developing software with classic fixed techniques for effectively defending against such attacks became difficult. In fact, malwares and viruses often change their signatures, which is considered one of the main challenges for cybersecurity. As a result, when a new kind of attack surfaces, common security solutions often fail to detect and prevent

these intelligence threats, as it cannot be matched to previous patterns. Thus, it is evident that the detection and prevention of intelligent attacks can be achieved only by an intelligent tool [1], [2]. So, this issue can be handled by applying techniques of artificial intelligence that play an essential role in cybersecurity. AI can be a powerful tool in detecting and fighting the latest security threats. Therefore, employing AI in cybersecurity can improve its performance and help in building a solid defense against new attacks.

AI offers numerous methods for cybercrime detection and prevention such as neural networks, deep learning, intelligent agents and immune systems, pattern recognition, machine learning, fuzzy logic, etc. [3], [4]. These mechanisms depend on simulating human behavior to take an appropriate decision. They are able to analyze huge amounts of data and learn continuously from those data to adapt to changes and new security threats. This type of learning makes it possible to design automated detection systems. AI algorithms could help not only providing threats detection, but also take proactive actions to remediate certain situations. Moreover, they can defend against security attacks and categorize malware and threats, eventually protecting computer systems.

3. Intrusion Detection and Classification Techniques using Artificial Intelligence

Although computer networks within organizations provide communication and facilitate business transactions, this interconnectivity among computers can be exploited by malicious users to misuse resources and launch

security attacks. Intrusions are one of such attacks that pose a severe risk in computer systems and networks environment. Several intrusions can compromise the security objectives namely, availability, integrity and confidentiality. To stop such attacks, a number of intrusion detection systems (IDS) have been designed [5]. IDS is an effective technique to detect, prevent and react to the computer attacks [6]. The main goal of IDS is to detect the anomaly and suspicious behavior of the host or network and report it and consequently enable administrators to avoid it in the future [7]. However, the continuously growing attacks pose critical challenges to develop an adaptive and flexible IDSs. Therefore, in order to detect new intrusions, researchers have employed artificial intelligence techniques in the intrusion detection system to improve its work. AI techniques play a notable role in the development of IDS. AI-based IDS is capable of learning and recognizing new attacks by analyzing a large amount of data.

In fact, there are three types of intrusion detection techniques namely, statistical, knowledge-based and artificial intelligence-based techniques, as illustrated in figure 2. Statistical techniques use a statistical model for defining the observed behavior of the system. While knowledge-based IDS techniques use expert system to capture the observed behavior [7], [8]. On the other hand, AI based IDS techniques used to determine a suitable classification model to recognize normal and abnormal behavior. In this paper, we will focus on the third type which based on using some approaches such as genetic algorithm, neural network, fuzzy logic, artificial immune system, etc. for intrusion detection. An overview of the applications of these AI

techniques to intrusion detection is discussed in the following subsections.

3.1 Neural Networks (NN)

Neural Network (NN) mimics the human brain to create an information processing system which consists of large number of interconnected nodes (neurons) working with each other to solve a specific task. The output of each node is weighted and processed to fed as an input to all other nodes in the next hidden layer. The self-learning process that generated by the architecture of neural networks makes it capable of capturing highly complex and non-linear relationships between data [9].

NNs can extract the patterns, detect the relationships in data and learn through experience in order to gather knowledge. The idea behind the application of NNs in IDSs is to include an intelligent agent in the system that is able to disclose and analyze the normal and abnormal behavior of system users. If properly designed, NN can address many problems of other approaches. The main advantage of NN is its ability to infer solutions from collected data without having any prior knowledge of the regularities in these data. This in combination with their ability of generalization from learned data which enables NN to detect and classify unknown attacks and different types of the known attacks. Further, once an attack recognized by NN, it cannot take place in the future. The speed is also another advantage of the neural network. All these properties have made NN an appropriate method for intrusion detection. In order to apply this method to IDS, data representing attacks and non-attacks should be introduced to the NN to adjust network coefficients automatically during the training phase [6], [7], [8], [10].

In the last few years, many researches have investigated the application of NNs to intrusion detection [11]. One of the most recent studies has been prepared by Yaser A. Jasim [12]. In this work, the Backpropagation Neural Network is used due to its ability and speed to recognize packet patterns obtained from the network to detect intrusion of the system. Many attacks feature have been extracted and analyzed of both standard and unusual packets. The analyzing results of these packets have been used to learn the NN on the pattern of both types of packets using standard Backpropagation algorithm. The experimental results show that the system can recognize the standard packets from the unusual ones and also classify them into different five types with efficiency reaches 100%.

Another approach is proposed by A.Alhello and Kaur [13] to generate artificial neural networks (ANNs)-based model which is able to detect intrusions in a system and to give alerts. In this work, data of 100 datasets have been trained to learn ANNs. The results prove that this model is a robust model for intrusion detection.

In order to overcome the low detection rate, high rate of false positives and other defects of IDS, a new intrusion detection algorithm based on a fuzzy neural network is presented by Liang [14]. This algorithm classifies objects and recognizes normal and abnormal behaviors. It is demonstrated through extensive experiments that the proposed model is feasible, effective and has a better generalization. In addition, the rate of correct intrusion detection is increased, and the false detection rate is reduced.

3.2 Genetic Algorithm (GA)

The genetic algorithm is an optimization technique to find approximate solutions to search problems. It begins with a set of random or selected solutions called chromosomes. The entire set of these chromosomes forms a population. The algorithm works iteratively which enables the chromosomes to improve during these iterations or generations. Eventually, the best solution is generated [20], [21]. The GA has been extensively employed in the domain of intrusion detection to recognize normal network traffic from anomalous one. Each time there is a new attack, the GA-based IDS will update itself automatically to detect new malicious activities. This makes the GA for better than any technique presents in the intrusion detection field [7].

Many researchers have used GA for intrusion detection in different ways [22]. Some researchers have used it directly to derive classification rules, while others use it to select convenient features, while different techniques of data mining are then used to obtain the rules [6]. Gupta and et al. [23] developed a robust intrusion detection using GA to detect the network intrusions. This study aims to develop IDS which adapt itself with changing time. The initial population of GA includes the previously detected attacks. The selected chromosomes consist of those attack patterns which have a high probability to change in the new patterns. Therefore, this enables the system to detect new attack pattern. The results show that the system is very helpful in detecting different types of attacks on the network.

Another approach is suggested by Pawar and Bichkar [24]. They used GA with variable length chromosomes for intrusion detection. In

this work, fewer chromosomes are used for rule generation, since each one is a complete solution to the problem. Each of these chromosomes will have a limited number of rules. After the classification rules have been generated, the fittest rule is taken for the purpose of detection. Then, this rule is used to classify normal and abnormal behavior. Using fewer chromosomes reduces the search space. Further, the experiments prove that the suggested approach is effective in network intrusion detection. A combination of GA and fuzzy logic technique is presented by Jongsuebsuk et al. [25] for intrusion detection. The aim of this work is to detect new or unknown network attack types. The fuzzy system generates fuzzy rules which later are used by GA to make them able to learn new types of attacks by themselves. After the training phase, the system with the obtained rule can detect network attacks. The results show that the Fuzzy GA is able to detect new and unknown attack types with low false positive rate and high accuracy.

3.3 Fuzzy Logic (FL)

Fuzzy logic deals with reasoning that is approximate rather than exact and fixed. Its variables values may range between 0 and 1, and its truth value may range between completely false and completely true. Fuzzy logic builds on a set of human language rules provided by the user. Then, these rules are converted to their mathematical equivalents in order to make strict decisions. Due to its simplicity and flexibility, fuzzy logic techniques have been employed in the area of computer security, especially in intrusion detection. The fuzziness concept helps to smooth out the abrupt separation of usual behavior from unusual behavior. Fuzzy logic

can handle problems with incomplete and imprecise data. Therefore, it is able to represent those imprecise forms of reasoning in some areas where firm decisions should be made in undefined environments like intrusion detection [6], [15], [16].

Recently, several researchers around the world focused on fuzzy rule learning for efficient intrusion detection using data mining techniques. Yu and Wu [17] proposed a novel model based on naïve Bayes classification (a data mining technique) to classify system call sequences of privileged processes as “anomalous” or “normal” to detect anomaly intrusions. The frequency of each system call is provided as the basis of the classifier. The probabilities ratio of a sequence generated from a process and not from the process is provided as the input to a fuzzy system for the purpose of classification. The results show that the suggested model can effectively detect most of the intrusion traces with a low rate of false alarms.

Another fuzzy model based on data mining techniques has been proposed by Chapke and Deshmukh [18]. This model is developed with the aim of improving the intrusion detection rate of the existing IDS using C4.5 data mining technique, which is a modified version of the Apriori algorithm. Moreover, it aims to generate alerts and detect all types of malicious users. The analysis of performance results in higher detection rate and lower false positive rate when compared with other systems.

A combination of some AI techniques is another manner which followed by many researchers to improve the performance of IDS. For example, Dixit and Ukarande [19] presented

improved IDS based on fuzzy logic and neural network. The fuzzy system used a defined set of rules to classify the test data as normal or anomalous and detect the intrusion behavior in the network. Whereas neural network trains and tests the data for intrusion detection. The evaluation depicts the effectiveness of the proposed model in terms of obtaining good precision in attack detection.

3.4 Artificial Immune System (AIS)

AIS is inspired by the biological immune system which transform the biological models and functions of the immune system into mathematical models in order to help solve problems [26]. Basically, AIS is based on a number of algorithms. The negative selection is one of the most significant of these algorithms that fits naturally into the field of intrusion detection due to its ability to differentiate between self and non-self. In the case of anomaly detection, the algorithm provides a set of exemplar pattern detectors trained on normal patterns that detect anomalous or unseen patterns.

To construct the detection set, Shen and Wang [27] used the negative selection algorithm to generate random immature detectors. Then, these immature detectors are compared with the normal network parameter patterns. If there is a matching between a random pattern and a normal pattern, the immature detector will be rejected and deleted. Those which do not match any normal patterns will be kept as mature detectors. In the detection stage, a monitored network parameter pattern is compared with mature detectors in the detection set. If it is matched with any mature detector, then an intrusion is detected. The experiments prove that the system has an excellent

detection accuracy.

To achieve higher accuracy in intrusion detection, a new detector generation algorithm for AIS based intrusion detection is proposed by Tabatabaefar et al. [28]. In this work, negative and positive selection algorithms are used to generate antibodies for both types normal and attack records in order to save normal samples. Immature detectors are generated and then trained for each type separately. Simulation results show that the presented algorithm improves the detection rate and reduces the detection time.

Although AI techniques achieved excellent results in terms of improving the intrusion detection systems, they have some limitations that can affect the intrusion detection performance [29].

4. Future Directions

Using AI in cybersecurity is often mentioned in papers. However, most of these papers used preexisting AI techniques and applied them to different aspects of security such as intrusion detection. This may work in a few cases due to some limitations of AI techniques as we mentioned before. Therefore, new AI tools will have to be developed in the future to fit the specific needs of security.

Many new AI tools could be inspired from existing ones to be suitable for security. This makes AI useful to solve other security issues. Thus, not only AI can improve security but also security can be an area of development of AI.

5. Conclusion

Security threats have become so varied and smart, that traditional techniques don't seem to be a viable approach anymore. So, it became necessary to automate threats management using AI techniques. Therefore, we intended to provide the most important effective solutions by discussing many AI techniques that have proven their effectiveness and success in detecting security attacks and threats, and these methods have been compared to clarify the advantages and disadvantages for each one. There are multiple levels of connections between AI and cybersecurity. In this paper, we have introduced some levels of these connections between both fields in order to improving intrusion detection systems. The demand for utilizing these connections to enhance the performance of the cybersecurity and intelligent aspect of applications from different domains should encourage experts from these two fields to cooperate their efforts in this intersection.

Ultimately, we must be aware that though artificial intelligence plays an essential role to improve security performance, it is a double-edged sword. Artificial intelligence can become a risk to security since it can be exploited by attackers to launch attacks.

6. References

- [1] E. Tyugu, "Artificial Intelligence in Cyber Defense," in 3rd International Conference on Cyber Conflict, 2011, pp. 95–105.
- [2] A. N. Jaber, M. F. Zolkipli, H. A. Shakir, and R. Mohammed, "Host Based Intrusion Detection and Prevention Model Against DDoS Attack in Cloud Computing," in International Conference on P2P, Parallel, Grid, Cloud and Internet Computing, 2017, pp. 241–252.
- [3] Z. Siddiqui, M. S. Husain, and S. Yadav, "APPLICATION OF ARTIFICIAL INTELLIGENCE IN FIGHTING AGAINST CYBER CRIMES: A REVIEW," vol. 9, no. 2, pp. 118–122, 2018.
- [4] A. Jaber and S. Rehman, "FCM – SVM based intrusion detection system for cloud computing environment," Cluster Computing, vol. 6, pp. 1–11, 2020.
- [5] S. Anwar, A. Karim, J. Zain, and Z. Inayat, "A Static Approach towards Mobile Botnet Detection," in 2016 3rd International Conference on Electronic Design (ICED), 2016, pp. 563–567.
- [6] G. Kumar, K. Kumar, and M. Sachdeva, "The use of artificial intelligence based techniques for intrusion detection: A review," Artificial Intelligence Review, vol. 34, no. 4, pp. 369–387, 2010.
- [7] A. Gupta, B. Singh Bhati, and V. Jain, "Artificial Intrusion Detection Techniques: A Survey," International Journal of Computer Network and Information Security, vol. 6, no. 9, pp. 51–57, 2014.
- [8] A. Jahan, "Intrusion Detection Systems based on Artificial Intelligence," International Journal of Advanced Research in Computer Science, vol. 8, no. 5, pp. 705–708, 2017.

- [9] B. Subba, S. Biswas, and S. Karmakar, "A Neural Network Based System for Intrusion Detection and Attack Classification," in 2016 Twenty Second National Conference on Communication (NCC), 2016.
- [10] A. P. S, G. P. U, and S. K. K, "ARTIFICIAL INTELLIGENCE TECHNIQUES FOR CYBER SECURITY," International Research Journal of Engineering and Technology (IRJET), vol. 5, no. 3, pp. 122–124, 2018.
- [11] A. N. Jaber, M. F. Zolkipli, M. A. Majid, and S. Anwar, "Methods for Preventing Distributed Denial of Service Attacks in Cloud Computing," Advanced Science Letters, vol. 23, no. 6, pp. 5282–5285, 2017.
- [12] Y. A. Jasim, "Improving Intrusion Detection Systems Using Artificial Neural Networks," Advances in Distributed Computing and Artificial Intelligence Journal, vol. 7, no. 1, pp. 49–65, 2018.
- [13] A. A. Z. A. Alhello and H. Kaur, "APPLICABILITY OF NEURAL NETWORK IN INTRUSION DETECTION AND PREVENTION," International Journal of Advanced Research in Computer Science, vol. 8, no. 7, pp. 494–499, 2017.
- [14] H. Liang, "An improved intrusion detection based on neural network and fuzzy algorithm," Journal of Networks, vol. 9, no. 5, pp. 1274–1280, 2014.
- [15] P. Sarathi Bhattacharjee and S. Ara Begum, "Fuzzy Approach for Intrusion Detection System: A Survey," International Journal of Advanced Research in Computer Science, vol. 4, no. 2, pp. 101–108, 2013.
- [16] N. B. Idris and B. Shanmugam, "Artificial intelligence techniques applied to intrusion detection," in Proceedings of INDICON 2005: An International Conference of IEEE India Council, 2005, pp. 52–55.
- [17] Y. Yu and H. Wu, "Anomaly Intrusion Detection Based Upon Data Mining Techniques and Fuzzy Logic," in IEEE International Conference on Systems, Man, and Cybernetics, 2012, pp. 514–517.
- [18] P. P. Chapke and R. R. Deshmukh, "Intrusion Detection System using Fuzzy Logic and Data Mining Technique," in Proceedings of the 2015 International Conference on Advanced Research in Computer Science Engineering & Technology (ICARCSET 2015) - ICARCSET '15, 2015, pp. 1–5.
- [19] M. Dixit and R. Ukarande, "Network Traffic Intrusion Detection System Using Fuzzy Logic and Neural Network," International Journal of Synthetic Emotions, vol. 8, no. 1, pp. 1–17, 2017.
- [20] S. N. Pawar, "INTRUSION DETECTION IN COMPUTER NETWORK USING GENETIC ALGORITHM APPROACH: A SURVEY," International Journal of Advances in Engineering &

- Technology, vol. 6, no. 2, pp. 730–736, 2013.
- [21] P. G. Majeed and S. Kumar, “Genetic Algorithms in Intrusion Detection Systems: A Survey,” *International Journal of Innovation and Applied Studies* ISSN, vol. 5, no. 3, pp. 2028–9324, 2014.
- [22] A. N. Jaber, M. F. Zolkipli, S. Engineering, L. T. Razak, and O. Hanshal, “A CONCEPTUAL MODEL USING THE ELLIPTIC CURVE DIFFIE – HELLMAN WITH AN ARTIFICIAL NEURAL NETWORK OVER,” in *The National Conference for Postgraduate Research*, 2016, pp. 534–540.
- [23] N. Gupta, N. Pareek, and K. Pandey, “Genetic Algorithm based Network Intrusion Detection System,” *International Journal of Advanced Research in Computer Science*, vol. 2, no. 6, pp. 480–484, 2011.
- [24] S. N. Pawar and R. S. Bichkar, “Genetic algorithm with variable length chromosomes for network intrusion detection,” *International Journal of Automation and Computing*, vol. 12, no. 3, pp. 337–342, 2015.
- [25] P. Jongsuebsuk, N. Wattanapongsakorn, and C. Charnsripinyo, “Network intrusion detection with Fuzzy Genetic Algorithm for unknown attacks,” in *The International Conference on Information Networking 2013 (ICOIN)*, 2013, pp. 1–5.
- [26] A. C. Enache and V. Sgârciu, “Designing RealTime Anomaly Intrusion Detection Through Artificial Immune Systems,” in *ECCWS2016- Proceedings for the 15th European Conference on Cyber Warfare and Security*, 2016, pp. 333–342.
- [27] J. Shen and J. Wang, “Network intrusion detection by artificial immune system,” in *IECON Proceedings (Industrial Electronics Conference)*, 2011, pp. 4716–4720.
- [28] M. Tabatabaefar, M. Miriestahbanati, and J. C. Gregoire, “Network intrusion detection through artificial immune system,” in *11th Annual IEEE International Systems Conference, SysCon 2017 - Proceedings*, 2017.
- [29] C. Modi, D. Patel, B. Borisaniya, H. Patel, A. Patel, and M. Rajarajan, “A survey of intrusion detection techniques in Cloud,” *Journal of Network and Computer Applications*, vol. 36, no. 1, pp. 42–57, 2013.

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