

The Curious Case Of Technology And Crime Prevention: The Indian Perspective

Minakshi Das

Research Associate, Jindal Global Law School, Sonapat, India.
Email: minakshi.ds2888@gmail.com

Abstract: As crimes are becoming more sophisticated and unrestricted in nature, there is a growing demand for better technology to fight crime. Technology to detect crime can be classified into 'hard' and 'soft' technology. This paper further explores the methods used in USA to prevent crime and whether if such methods will be adaptable in a developing country like India. India has a notorious reputation for being a popular heinous crime zone, a trend that is consistently on the rise. The current crime terrain necessitates the use of sophisticated technology to ensure public safety and crime prevention. Given this backdrop, the study emphasizes on the introduction of 'hard' and 'soft' technology to detect crime in India, through various primary and secondary data. I have adopted Delhi, as a sample city to study the crime patterns and provide suggestive theories and strategies that can be adopted to prevent crime.

Keywords: Crime prevention, Surveillance, Technology, Situational Crime Prevention, Hotspots, Urban Crime Pattern, Policing, CCTV, India

1. INTRODUCTION

With the advent of technology, the "torture" inflicted during the investigation upon the accused has diminished considerably. If we take crime as the base, then technology acts as strong pillars to target the crucial aspects of the crime. Technology has helped in solving criminal cases to a great extent. The use of technology has helped fight crime through the medium of CCTV cameras and other hi-tech devices. James Bugler's case was one of the historically acclaimed case, it owe its significance to technology (CCTV Footage). Thus in the 21st century, the rise of technology in the criminal justice landscape signals a remarkable progress in the adjective law of various common law countries. Various soft and hard technologies are changing the face of traditional policing. The idea of this paper is not to suggest replacing man power with gadgets, rather to encourage better usage of technology to arrive at an accurate, efficient result which will further contribute to improve policing all over India. The collaboration of man-power with technology can achieve the required result if adequate training is provided to meet the emerging demands of crime scenes in India and the usage of cost effective methods to fight crime. In this paper, I will first, 'identify the place', 'high crime places', 'times' (hot spots) and relevance of 'urban crime study and policing' for accurate crime analysis. Secondly, I will analyze and identify the role of technology, use of 'soft' and 'hard technology' in achieving the abovementioned aspects i.e. identification of high crime places and hot spots and adoption of situational crime prevention methods and use of technology. Thirdly, I will discuss various initiatives launched in India to fight crime with due consideration to the issues of legality and privacy. Lastly this paper will provide suggestions and recommendations as to how technology can be used cost effectively to identify crime and significantly reduce the crime rate. It is often stated that "technology becomes synonymous with progress" (Corbett and Marx, 1991). The motive of the paper is to analyze methods to prevent and control crime with strategies and research on various places as to why crime arises and how it can be resolved through effective policing and technology.

2. UNDERSTANDING 'THE PLACE'

2.1 Identifying the Place

To detect crime, the foremost obstacle is to identify the place and understand what "place" means. Over the years, several criminology scholars have done substantial work on 'place based crime' by identifying the various geographical units like 'location', 'boundary', 'function', 'control' and 'size'. The idea of this paper is to study the methods involved in place based crime and use of technology applicable in curbing the crime rate in those localities. The identification of crime prevention methods will give constructive ideas to policy makers to take concrete action in formulation of strong policies to prevent and detect crime in a country like India. Focal points of crime (Sherman, Gartin and Buerger, 1989), repeat victimization (Farrell, 1995) and crime presentation by identifying specific places (Eck and Weisburd, 1995) based on these highlighted features, this paper will make an attempt to identify the crime spots in the National Capital Region of India. It is easier to detect crime, if police reforms are made "place-based". Place based strategies help curtail crime by reducing the opportunities to commit crime. Hence, offending becomes riskier and less rewarding for the criminals as a result and they are less likely to be provoked (Clarke, 2008).

The Indian context

To keep a check on the accountability of police in India, first it is important to assess their role towards crime prevention and detection keeping in mind with the population of this country. At present, there is a high requirement of use of technology to help police detect and prevent crime. It is a matter for our policy makers to amalgamate strict preventive methods with technology and the need for a budget allocation for crime study and detection in India. Usually, people who adopt the techniques of 'place-based' crime prevention are 'owners of places' or their representatives' (Eck and Guerette 2012). Several methods can be satisfactorily adopted for crime-based prevention and use of technology after identifying the spots. Places where there is high rate of crime, implementation of vigilance with CCTV, situational crime prevention methods (application after identifying which category of crime is detected-heinous or serious) and checking the geographical unit where crime rate is high and less. This paper identifies crime that have created problem for the public collectively at large and usage of tech-

nology which can be used to bring relief to the public in India. To overcome these obstacles, it is required to identify the various spots and the type of crimes prevalent in our National Capital Region, Delhi. It is pertinent to understand what 'place' means in the context of crime. Places are various locations where the offenders meet the target (Eck and Guerette, 2012). Place in criminology is a concept of Routine Activity Theory (Cohen and Felson, 1979, Sherman et.al., 1989). It has five prominent features namely, location, boundaries, function, control and size (Eck 1994). Clarke and Eck (2005) highlighted 11 environments. However, for pragmatic purposes three major areas will be considered i.e, residential, recreational and commercial aspects. It is important to understand 'functionality' to identify whether the property is used for residential or commercial purposes. Therefore, the mapping of various 'hotspots' (Eck, Gersk and Taylor 2000) and the installation of CCTVs could further contribute to crime prevention on the three conditions mentioned herein.

2.2 High Crime Places and Technology

Collaboration of mapping and use of technology could help us tackle the matter effectively. India is a diverse country and there is a huge influx of people to the Capital Region for various reasons like business, education. The capital acts as a hub of opportunities for students to professionals. Hence, crime detection, considering the geographical location, constant influx of people to this region and growing rate of crime in Delhi will be a challenge for policy makers and the police. Various agencies for crime control (Police in India or other private agencies) has to play a pivotal role by laying a systematic strategy and using new techniques to identify, detect and prevent crime. It has been observed by several criminologists like Smith, Clarke, Braga, Eck, Guerette that if crime is significantly reduced in high crime zones then the effect of it can be witnessed in its nearby locations too. The role of private sectors in designing products against crime specially caters to all classes present in the Indian society. The design should be effective in terms of its use and should be cost effective. Crime in Delhi can be dealt with by introducing products which are 'portable', 'mobile' or 'fitted' (Ekblom 2012). The product introduced to the consumer (general public) for the crime prevention should be designed on certain aspects namely, 'user-friendly', 'cost effective', 'products should be designed in such a way there is a possibility for up gradation', should be adaptive to its 'social, commercial and technological changes' (Ekblom, 2012). Further, considering Delhi as our model city, it is preferred to analyze the research based on various geographical aspect of this city- urban or semi urban or rural. All the measures suggested have to be adaptive in accordance with the nature and location of the places. Introduction of technology based on the crime will be fruitful to tackle the matter, as every State in India is unique and has its own problem. Identifying the distinct issues and looking into the micro level issues will help us identify the common problems.

2.3 Hot spots

A hot spot is defined as an area consisting of a cluster of crime (Eck, Chaaney, Cameron, Leitner and Wilson, 2005). The first hot spot experiment was conducted in 1988 by the Minneapolis Police Department. The objective of this experiment was to correct the shortcomings of an experiment which was undertaken by the Kansas City Police Department in

1971. The primary difference between the two experiments was the area covered for the purposes of patrolling by the police. The findings of the Kansas experiment showed that police patrolling had minimal or no effect on street crimes. (Miyazawa and Miyazawa, 1995). The experiment thus failed to recognize the importance of police patrolling in detecting and preventing crime. The omnipresence theory is based on the reasoning that crime could happen anytime anywhere whereas the hot spot experiment conducted by the Minneapolis police chose to focus on smaller tight areas of dense crimes. (Buerger, Cohn and Petrosino, 1995). The experiment started with classifying the types of crime into "hard" and "soft" crime. "Hard crime" included crimes such as rape, theft and assault, whereas soft crimes were mere acts of disturbance to public order such as drunkenness (Sherman and Weisburd, 1995). A hot spot was then identified combining addresses which reported many hard crime calls and a considerable number of soft crime calls. (Buerger et.al., 1995, Braga, 2005). A small cluster (hot spot) was then formed using addresses which reported frequency of calls for reporting hard crimes and a substantial number of soft crime calls. In the hot spot areas, the level of patrol was doubled; it resulted in lesser number of calls. (Sherman and Weisburd, 1995). Following the Minneapolis experiment, similar experiments have been conducted over time shows that such focused patrolling and policing can help significant reduction of crime (Braga 2005). It has been argued that focusing on hot spots which generate half of the crime can help in significant reduction and prevention of crimes. (Sherman and Weisburd, 1995, Braga 2005). Situational opportunities for the offenders are obstructed by police presence and focus on these high crime places. (Weisburd 2013). Several crime theories such as street, neighbourhood, place theories have helped in defining a hot spot and understanding why and how crimes are concentrated in these hot spots (Eck et. al., 2005). Hot spot policing can be considered as a good lead when it comes to identifying zones in the urban areas where inconsistent crime takes place. For effective results, engage police in those specific hotspots by increasing their presence and enable arrest, if needed (Weisburd and Braga, 2006). Hotspot has shown tremendous progress and contributed in reducing crime (Braga 2008; Braga and Bond, 2008; Ratcliffe, Taniguchi, Groff and Wood, 2011; Weisburd and Eck, 2004). Thus, even if for short term, police with the help of soft and hard technology can track the offenders faster and analyze the crime that are taking place in the neighborhood. However, attention and due diligence is required to act cautiously so that the crime does not shift from the hotspot to a different location. It has to be understood here that crime analysis is not about understanding one particular crime rather it is to observe the activities that are creating a problem at various level. Problem is defined by Clarke and Eck (2005) as "a set of harmful events in a community that members of the public expect the police to expect". Hence, for an easy analysis the model provided by Boga and Santos (2011) is commendable, as there are problems when the question of applicability and practice arises. To deduce such pragmatic issues they suggested that 'problem' can be segmented into various classifications. The deduction can be done on the basis of various checks like 'immediate problem', 'short-term problem' and 'long-term problem'. These categories will help us evaluate whether a problem is serious and calls for immediate remedy or is it a repeated pattern or has the activity been witnessed in a particular region for several months, seasons or years. Such 'risky place' (Clarke and

Eck, 2005) are given attention, it will be easy to identify the places which are providing opportunities and thereupon act on them and preferably suitable investment can be made on technology that can be adopted to solve and detect crime. A pragmatic investment will help the police solve and detect crime in Delhi in a smoother manner.

3. SITUATIONAL CRIME PREVENTION METHODS AND USE OF TECHNOLOGY

The Situational Crime Prevention is aimed at attacking the offender's motivation (Clarke and Cornish, 1983). It aims to bring changes to the "near" causes of crime over "distant" causes of crime (Clarke, 2008). 'Target hardening' is the key method for preventing crime. There are certain theoretical perspectives which have worked extensively by precisely studying the means and methods to prevent crime. The situational methods can be broadly studied under various heads namely 'The Rational Choice Perspective' (RCP), 'The Routine Activity Approach' (RAA) and 'Crime Pattern Theory' (CPT). The questions that attract our attention are if these theories can be put forward for practical use in an Indian set up? If these theories can blend into the Indian scenario and effectively be used for practical purposes with the help of technology? To identify the practical approach the elements of each theory have to be understood. Hence, each aspects of situational crime prevention methods has to be looked into, as the theories suggest as to why crime occurs and if these methods can be successfully used for effective purposes to control crime with 'hard' and 'soft technology'.

3.1 Rational choice theory (RCT)

The Rational Choice theory or Choice theory was brought forward by Clarke and Cornish (1983) to identify criminal behavior through 'situations' and 'types of decisions' (Smith and Clarke, 2012). The RCP deals with crime that fits a particular purpose; it considers the decisions of the offender before committing a crime. An offender commits a crime based on the benefits to be acquired from the act. Rational choice helps us question as to why certain offenders are drawn to commit certain crime. Its main focus is on the opportunities an offender gets to commit crime and the benefits he would reap for behaving in a certain manner. (Ministry of Children and Youth Services, Ontario). This theory based on utilitarian perspective is not fully qualified to control crime as this is based on 'presumption of offender rationality' and it has been tested on grounds of 'rationality' as acts of violence like vandalism and riots cannot be judged, offences like sexual abuse is also not an outcome of rational evaluation, most crimes are accounts of thrill seeking purpose only hence, rationality is doubtful in such cases. Further, crimes are mostly the result of emotional drives and over measured calculations (Cornish and Clarke 1986) of perspectives on offending. Therefore, from the above observations though criminals look into various opportunities to derive maximum benefits, it is not always 'rational'. This theory based on its assumptions fails to bring the required outcome as it can be contested on the grounds of 'rationality', that is crime is 'calculated' and 'deliberate'. Thus, the desired result cannot be guaranteed. Thus, the outcome that is expected from the usage of technology to detect and prevent crime will not be fulfilled.

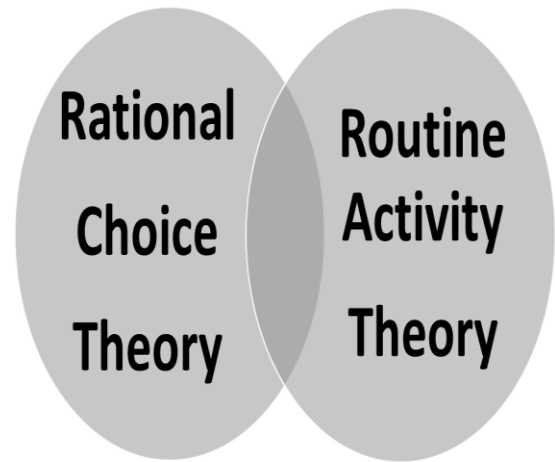
3.2 Routine activity approach (RAA)

In Routine Activity Approach, the idea behind the theory is that it targets the situations of crimes. The brainchildren behind this theory were Cohen and Felson (1979). Their work aims at a micro-level to identify various criminal activities and understand the changes in the crime rate pattern (Cohen and Felson, 1979). It is based on preventive motive over offender's motive, the three elements noticed by Cohen and Felson (1979) are 'offender', 'target' and 'guardian'. This particular theory has been used in studying various criminal offences like sexual crimes (Tewksbury and Mustaine, 2001), robbery (Tseloni, Witterbrood, Farrell and Pease 2004) and cybercrime (Miro, 2014). From this theory it has been established that the three factors that are essentially associated with a crime event; is a motivated offender, suitable target and occurrence of crime increases in the absence of a capable guardian. It can be controlled based on the situation. There are three main aspects of this theory which are identifying the 'crime event', the aspect of it which can be controlled and if any incentives can be used to get them to act. In addition to it, Cohen and Felson (1979) conducted a detailed study on four important factors –value, visibility, accessibility and inertia (or VIVA) and why some targets are considered suitable or attractive than others. Criticism of this theory is on the aspect of 'moral legitimacy'. Akers (1997) has highlighted that it fails to answer on premises to identify factors like "who are the motivated offenders?", "What are their various characteristics?" and "Why certain individuals are more motivated than others to commit crime?" (Miro, 2014) However, it has effectively explained 'crime analyses and 'prevention' and thus, it can be strategically applied on situational prevention. The use of technology on macro-level victimization can be successfully ascertained based on the concept of 'capable guardian'. Hollis-Peel, Reynald, Bavel, Elffers and Walsh (2011) have provided a flexible definition to comprehend 'guardianship' in the light of 'physical' or 'symbolic' presence of an individual. CCTV which is used to detect crime is operated by people, to study crime analysis. In this scenario, it is operated by people but their presence is not physical at the crime site.

3.3 Crime pattern theory (CPT)

The third theory which is covered by the scheme of Situational Crime Prevention is Crime Pattern Theory (CPT). It is one of the most acclaimed theories which were introduced by Brantingham and Brantingham (1992). They elaborately provided how environmental criminology and crime pattern can help prevent crime. Crime Pattern Theory emphasizes on crime pattern through six major concepts that is, 'nodes', 'paths' and 'edges' along with it also focuses on 'crime generators', 'crime attractors', 'crime neutral areas' and 'fear generators'. This theory is an amalgamation of rational choice theory and routine activity theory. Understanding the crime pattern and using suitable technology to prevent crime by 'target selection', 'location of crimes in public transport', 'crime targets in urban spaces' etc. It has been noticed, that CCTV and Street Lighting has positive effect on crime prevention in India and USA. The crime pattern theory will help us understand the hotspots around Delhi. It will help policing overcome the traditional mode by locating the crime zones as per their characteristics namely 'crime generators', 'crime attractors' and 'crime neutral places' (Brantingham and Brantingham, 1995) for effective patrolling. Such study will help us use sophisticated technology in a specified area. This evaluation will also help police as-

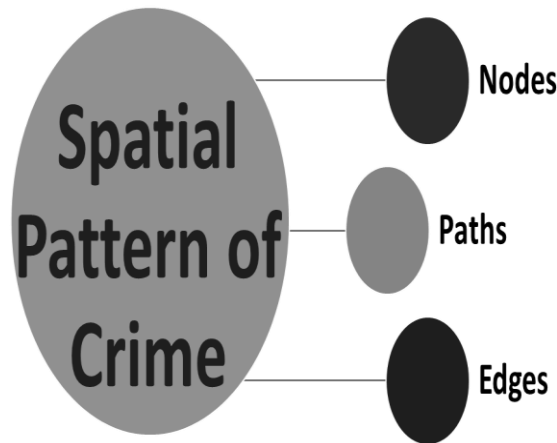
certain as to why certain places crime is attractive to criminals, rampant residential burglary and prostitution is often seen in certain urban areas. Crime mapping and data analysis will help effective policing. Hence, 'handlings', 'guardianships' and 'management' could be substantially initiated in such 'crime generator' zones either through area manager or community policing. The role of hard technology can be invested in 'crime generator' zones by installing CCTV and Street lighting. Further, a clear understanding on why certain places are crime neutral and the potential reasons behind it will also help to develop techniques to effectively curb the crime rate. Introduction of such research will help reduce crime significantly. However, police has to be watchful in this scenario to prevent crime displacement to block opportunities (Barr and Pease, 1990). The biggest fear of crime prevention is 'displacement' and 'diffusion' (Eck, 1993). Thus, crime analysis should be done through these theories with the help of latest gadgets to prevent situational crimes.



Crime Pattern Theory: Characteristics of Rational Choice Theory and Routine Activity Theory (3)

Based on Brantingham & Brantingham 1982 (Crime Pattern Theory):

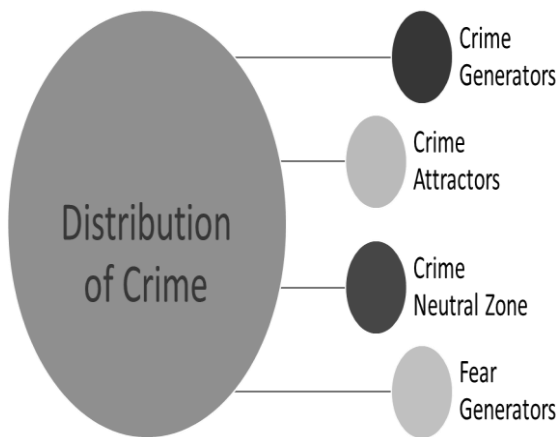
Crime Pattern Theory Pictorial Diagrams- Spatial Pattern of Crime (1) and Distribution of Crime (2):



Spatial Pattern of Crime	
Nodes-Feature: centrally located-	Areas: Homes, works, recreational places, shopping malls
Paths- Feature: brings awareness areas to focus-	Areas: Streets, foot-paths
Edges-Feature: physical or perceptual-	Areas: Physical edge- a river or highway, perceptual edge- commercial district ends and residential district begins
Distribution of Crime	
Crime generators- shopping mall, schools, recreational zones,	
Crime attractors- red light areas, car parks	
Crime neutral zones- no crime zone, safe heaven. Experiences crime occasionally only (reason- local insiders)	
Fear generators- a sense of fear is generated (reason- no offender thus no target, end result no crime)	

Spatial Pattern of Crime- Nodes, Patterns and Edges: (1)

(Tablet based on Gok, O. 2011)



Distribution of Crime- crime generators, crime attractors, crime neutral zone and fear generators: (2)

4. USE OF 'SOFT' AND 'HARD TECHNOLOGY'

Hard and soft technology could be used for two basic agenda that is, purpose and security. After 'identifying place' and 'high crime places' use of technology and its effectiveness can be studied and applied according to the requirement to assure maximum safety for the public. Hard technology would include CCTV, Street lighting, metal detectors etc. Soft technology would include profiling, crime mapping, crime analysis etc. Its applicability totally depends on the crime and where it occurs. The sample city for the purpose of this paper- Delhi, common crime that is witnessed in the city is property crime and sexual offences. For such offences, criminologists have adopted situational crime prevention (SCP) methods. Blending of these theories and right usage of "soft and hard" technology will show effective results.

4.1 Urban Crime Study and Policing

From the above analysis it can be concluded that understanding urban crime pattern will help effective policing. The huge influx of people every year to the capital, in search of greener pasture settles mostly in the urban and sub-urban areas of Delhi. Thus, a strong unit of policing should be created with the help of the selected high caliber cadets. To secure the lives of citizens, there are tremendous responsibilities on the

state agents. An efficient and effective policing can be ensured with the help of technology and observing the urban crime pattern to generate awareness amongst the citizens. Such amalgamation will help in tracking the offenders, operative patrolling, increase the probability of tracking offenders, and improve the mode of investigation which will make arrest and crime easier. Such improvement in the techniques of the crime prevention will act as deterrence for the others from committing crime (Sherman, Gottfredson, Mackenzie, Eck, Reuter and Bushway 1997; Weisburd & Eck, 2004). To comprehend police science and crime study, it is essential to study crime in urban setting and the 'environmental opportunities' it provides to the motivator (Boggs, 1965). The areas which accommodate offenders are not the zones of high crime areas. Rather, the breeding grounds of crime are centrally located business zones in urban areas (Pittman and Hardy, 1964). Whereas, the higher criminal felonious or delinquent rate is more in lower class neighborhoods (Merton, 1957). Therefore, to understand the pattern of 'environmental opportunities' social area should be classified on certain capacities namely 'social rank', 'urbanization' and 'segregation' (Shevky and Bell, 1955). A scrutiny into certain features of the area like why certain regions are attractive for criminals and the various 'environmental opportunities' that tempt and lure the offenders is very necessary. The crucial factors can be effectively studied based on certain essential deciding factors to commit crime namely, profitability that an offender might gain from the region and attractiveness of the areas which host people of high social ranks. With the assistance of such a study, a pattern can be evaluated and understood. Further crime control and prevention methods can be applied by the usage of soft and hard technology. Such investment to effective policing and use of technology will deliver a fruitful result. It is noticeable that policing in America has tremendously changed not just in their thinking but also practice (Weisburd and Braga, 2006). The credentials for bringing positive effects are particularly due to the effective use of technology and the assessment on crime pattern study. The amalgamation has brought about drastic changes in the policing scenario. Hence, it is important to estimate and study 'what works' to prevent and control crime (Sherman et al., 1997; Skogan and Frydl, 2004; Weisburd and Eck, 2004).

4.2 Understanding technology and crime

To understand the collaboration of technology, with regard to crime analysis and prevention, it is important to put a check on technology used so far and the result we have arrived at by using the already existing technology. The type of crime depends on various factors which are highlighted in the above mentioned theories with their distinctive features. The various upcoming technologies that will help crime control is necessary to be studied. CCTV and street lighting has proved to be the most effective for public safety all over the world. CCTV to locate criminals and identifying them (Hooke, 1997) and street lighting significantly contributed to safety as it insured detection of criminals with improved visibility, especially in UK (Painter, 1994). To meet the demands of consumers in fear, various advanced technology are welcomed in the market. Technology such as LOJAC, a transmitter which is used to detect vehicles if they are stolen should be used for easy detection of stolen vehicles in India. (Clarke and Harris, 1997). There are many cost effective technology which helps in detecting mobile phones if stolen (Policing Today, 1997). The government

should take initiatives for making these technologies readily available to the citizens. Systematic monitoring of location should be installed for people who are under a restricting order or a bail. Similarly such location tracking devices can be used on patients of Alzheimer disease (Schor, 1995). Vapor detectors to detect bombs has been of great help in Canada (Aviation Week and Space Technology, 1991), similar technology should be used in India to fight terrorist threat and attacks. For drug detection, magnetic resonance imaging (MRI) plays a pivotal role in drug detection (Shaw, Magnuson, Sheldon and Burnett, 1995). Investigation no longer resorts to torturous means to the accused with the development in forensics namely DNA testing and fingerprints (Connors, Lundregan, Miller, and McEwen, 1996). 'Heartbeat Detectors' to detect criminals hiding in automobiles or escapee from custody (Grabosky, 1998). Police in India is over burdened with a host of responsibilities and in the eyes of law they play a major role when it comes to investigation. To reduce the work load and fast effective measures investment has to be made in the technological and IT security sectors. Investors should be encouraged to fight, control and prevent crime. Based on the primary data collected by conducting interviews, it was observed that India faces challenges with technology. The four major facets that needs consideration are first legal aspect, secondly crime detection is expensive we should emphasize on using cost effective technology, thirdly technology to suit the means and purpose for crime prevention and lastly, transparency as this will ensure accountability (Grabosky, 1998) in the policing system of our country. The following tables provides an overview on Hard and Soft Technology used in USA and India:

USA	
Hard Technology	CCTV, Street lighting, metal detectors, police protection device to be improved, computers in squad cars, video in patrol cars (Byrne & Rebovich 2007), metal detectors, offender and citizens Identification through biometric and fingerprints, gunshot location devices, breath analyzers, drug testing, devices to detect weapons.
Soft Technology	<ol style="list-style-type: none"> (Byrne and Rebovich, 2007) Sex offender registration, profiling potential offenders, crime mapping, hot spots, crime analysis (COMSTAT), technologies to monitor communications (phone, mail, internet), gunshot location devices, facial recognition software used in conjunction with CCTV, software programs for prevention of identity theft, protect data privacy. Tools to monitor location and movement of population (at- risk), specially mentally ill offenders and sex offenders, GIS mapping program, sex offender's restrictions on movement (Mandelstam, Mulford, 2008) For identification of sub group of offenders introduction of risk assessment tools (Byrne, 2009) Monitoring transactions and communications through electronic goods such as cell phones, internet, social media sites to check drug crimes, human trafficking, sex crimes and financial crimes. (Soghoian, 2011) Record Management system (RMS) for data collection and improve traditional policing to understand crime pattern and crime wave, Computer aided dispatch systems (CAD), Mobile Data Terminals (MDTs), Problem Orientated Policing (POP), Community Orientated Policing (COP) (Modern Policing)

India	
Hard Technology	CCTV, Street Lighting, Metal Detectors, Global Positional System (GPS), Geographic Information System (GIS), Intelligent Sensors, Information and Communication Technologies (ICT), Radio frequency Identification (RFID), E-identification Card (EIDs), Breath analyzers, C4i System, X-ray machines at the airports, Drones with night vision camera.
Soft Technology	Crime Criminal Information system (CCIS), Crime and Criminal Tracking Network and Systems (CCTNS), Nat grid, NCTC, CMS, Hot spots, crime mapping, Aarakshi, e-cops (e-computerized operations for Police Services), Delhi Police Test App.

It is evident from Table 1, 2 and 3 that crime trend is increasing and police is overburdened considering the number of police personnel (manpower) employed to fight crime and the responsibility of safety and security entirely on police. The idea is not to replace manpower by gadgets but simply encouraging the police to work in collaboration with technology to achieve required result. The biggest challenge seen in India is revamping the traditional policing mode and equipping them with effective, sophisticated technology thus, the structural model of policing in India has to be understood and accordingly adopt methods and techniques of crime prevention. Policing has been constantly seen in bitter light and criticized for not delivering the expected result. Thus, it is a matter of concern for the government and various efforts to deliver improved results (Chaudhury, 2003; Krishnamorthy 2003). The primary duties of police in India are to maintain public order, play pivotal roles in investigating criminal matters, identify issues that might lead to a criminal act, crime prevention and crime control, to work with other agencies, patrolling, reducing opportunities for commission of crime, preventing citizens from personal harm (Sethi, 2013) maintaining law and order, management of traffic (Chaturbedi 2006; ICTD 2007). However, the role of police in India is not limited only to the above named features, they are over burdened with other miscellaneous features namely 'police station management', 'VIP band bust and crowd handling', 'crime handling', 'crime analysis', 'look after grievances and complaints lodged' and 'technology management', further they are expected to play a crucial role during disasters, accidents and natural calamities (Kumar, 2012). Thus, it can be noticed that police system in India has been given different roles and duties. They have to perform many duties in the evolving society. To meet the required demands, India is in dire need of investment in technology. Crime control and prevention is the prime motive of the government and the police is burdened with responsibilities to reduce crime. This is possible if proper training and cost effective methods are applied to reduce the burden on the police. The Police in India is facing a host of issues namely 'inadequate techniques and poor service delivered', 'police do not pay heed due to meager amount of salary and slow career progress', 'lack of information systems for better functioning of the policing system', 'providing quick remedy and immediately transmitting information to various agencies', 'repeat entry of the identical data' and 'limited analytical and capacity to analyze information' (Kumar, 2012). These problems are overshadowing their performance and limiting them from reaching the desired result. It is true that criminals are advanced than police when it comes to applying and using technology (Sethi, 2013). Thus, effective policing can be welcomed if modern technology and strategies are implemented as it will save time and money. Effective training is the need of the hour, the National Crime Record Bureau (NCRB) is the only governmental agency that provides a detail study of crime statistics by providing appropriate, elaborate and updated **information** on criminal data and records. Information Communication Technology (ICT) is a term used for a host of technologies used in India to 'gather', 'store', 'retrieve', 'process', 'analyse' and 'transmit' information (Sethi, 2013). These functions are carried on by various existing soft and hard technology. With the adoption of soft and hard technology crime prevention and detection has helped the investigation process and significant results.

5. THE INDIA PERSPECTIVE WITH SPECIAL ATTENTION TO DELHI

The substantive law and adjective law of the country namely Indian Penal Code and Code of Criminal Procedure identify various types of crimes and recommends the punishment for the various crimes. Crimes are classified into cognizable (arrest without warrant, serious in nature) and non-cognizable (arrest with warrant), bailable and non-bailable and summons and warrant case. The most prevalent crimes in India are murder, rape, kidnapping and abduction, dacoity, robbery, burglary, theft, riots, criminal breach of trust, cheating, counterfeiting, arson and auto theft. It can be observed from the Crime Statistics report by National Crime Records Bureau (NCRB) by Ministry of Home Affairs that the crime rate is increasing exponentially. With the increasing crime trend, it can be seen from the annual report of the NCRB that the highest figures of crime are mostly on 'crimes committed against property', 'economic crimes', 'offences committed against women' and 'crimes against body'. (NCRB 2013) The tables below will represent the crime trend in Delhi. The data collected is from National Crime Records Bureau Statistics Report, 2013.

Number of complaints received by Police and Cases registered under IPC (Indian Penal Code) and SLL (Special & Local Laws) during 2013: Table 1

Delhi	Complainants				
	Oral	Written	Distress Call over Phone	Case Registered Under IPC	SLL
	75265	467806	8904862	80814	6616

Total Cognizable Crimes in Delhi from the year 2008-2013 (crime trend): Table 2

Year	2008	2009	2010	2011	2012	2013
Total Cognizable Crimes	44573	45247	45994	47212	47982	72090

Incidence and Rate of Total cognizable crime (IPC), 2013: Table 3

Delhi	Total Incidents of Cognizable Crime	% Contribution to All India Total	Mid-Year Projected Population	Rate of Total Cognizable Crime
	80184	3.0	197.14	406.7

Technology (Hard and Soft)	Usage/Role/Benefits	Success Rate
CCTV	Tracking, locomotion of criminals, identifying criminals, recognizing suspects, corroboration, gathering evidence, helped in court cases, effective monitoring and maintaining public order, tranquility, surveillance of various locations, locating victims.	Effective
Street Lighting	Urban and Rural (fear of crime reduced in such areas)	Effective
Radio Frequency Identification	Effective result arrived by preventing movement of unauthorized materials (with the help of electromagnetic and radio frequency helps in identification of object/person/animals). Tremendous result in assuring public safety.	Unknown
E-identification	Government issued identity card. Helps in identifying person quickly, digital signature –prevention of cheating, fraud, bank account number, driving license number, passport number, PAN	Effective
Biometric Technology	Fingerprint reader helps in recognition and definite information of suspects. Tremendously revolutionized identifying and effective security measures.	Effective
GPS and GIS	Helps to keep a check, track, report and quick action.	Effective
Electronic Transport	Registration on motor vehicles, issuing driving license, tax fee collection, pollution control (It will help prevent heinous crime like rape in public transport GPS, Camera and Electronic transport)	Unknown
Intelligent Sensors	Cameras in car to record events. Frequent use makes it cost effective. Prevent accidents in road, smooth traffic control.	Unknown
E-cops (Andhra Pradesh Police)	Computerized networking among various police stations. Status of FIR can be checked through e-cops from any place. Keeps the complainant aware of the status.	Effective
CCIS (Criminal Information System)	Keeps record of database – crimes, criminals and property crimes. With the help of three modules- Data Extraction Module, Crime Analysis Module and Data Information and Comparison Module.	Unknown
CCTNS (Crime and Criminal Tracking System)	Maintains transparency and accountability of the Police Stations and police officers, effective services, improves	Unknown (Project proposed 19.06.2009)

	policing, enables senior police to manage the police force, beneficial in keeping track of investigation and cases, it reduces manual work load and efficient and accurate record keeping.	
CIPA (Common Integrated Police Application)	Developed with multilingual for India. Management of public order and various criminal movements, transparency, accuracy, accessibility to be ascertained with CIPA Project, reduction in manual work, removal of erratic record keeping, status of the cases can be tracked, hassle free reports, makes investigation easy.	Unknown

From the table, it is evident that there is a motive to prevent crime, but it will produce effective results only if used with certain strategies. Situational methods have to be adopted, certain geographical regions, reasons for crime zones and crime neutral zones have to be studied. Guardianship, management and handlings could be assured with operative use of technology. Policing in India has to invest in Information and Communication Technologies, technical skills programs have to be initiated and the police has to try and achieve crime prevention goals by playing a proactive role by understanding the crime data and pattern and merge technology for accurate detailing (Kumar 2012). Along with technology there is an urgent need for strategies to be adopted to reduce crime. As criminals are advanced in using technology and they have always taken advantage of new technologies (McQuade, 2005) and thus police need to adopt technologies with new features, some basic changes need to be considered in India before trying to prevent crime completely. Our enforcement officers are two steps behind the criminal and therefore it is important that the police have to use updated technology to curb crime. (Corcoran, Wilson & Ware 2003; Ozkan 2004). The drawback of CCIS (Criminal Information System) is that it fails to analyze on 'hot spots', 'crime zones' and 'crime trends' and provides information on 'crime data' only (Gupta, Chandraand and Gupta 2006) For effective policing, the significance of 'hot spots' and 'understanding crime pattern' cannot be ignored. After crime mapping, CCTV has to installed and monitored. Delhi police has adopted digital technology and C4i system which functions with GPS will be installed in crime mapping software in the police control room to detect crime in Delhi (Sharma, 2013). Crime mapping is an important aspect to identify place and started out as an aid for criminal study theorists to illustrate their projects. In 1829, the first crime map was created to study the patterns in criminality (Kenwitz, 1987; Weisburd, 1997). Studying crime maps gave rise to certain conclusions that areas with high rates of property crime had fewer of personal crimes. In America, the first police department which used mapping was the New York City Police Department (Weisburd and McEwan, 1997 and Harries, 1990). They were simple maps which demonstrated crimes in a particular area in early 1900s. Initially the maps which were used by the Police Department were the maps which could be pinned to the wall. The manual maps could not be updated easily and could only display a limited area and data. The development in the crime mapping always went hand in hand with the sociological angle

of understanding the reasons for crime commission and the social characteristics of the crime. Thus, similar practice should be encouraged in India to detect and prevent crime. Use of crime maps has been useful for the enforcement bodies and also the public. A crime map keeps the public aware of the crimes occurring in their locality and they seem to be more careful. Recently in the light of the rising number of crimes in Delhi, a public interest litigation (PIL) was filed by Nandita Dhar (Nandita Dhar v. U.O.I) regarding the safety of women and crimes against women in Delhi. The Delhi High Court ordered the Delhi Police to submit a chart of crimes in specific areas in Delhi. Specific police stations have now been identified as high crime zones. The Delhi High Court thereafter has ordered the police to take steps in respect of those identified problem areas. Crimes against women has been a serious threat to the women in Delhi. Rape is rampant in Delhi, the crime mapping has helped the police check on areas that are unsafe for women in Delhi. The crimes are classified as rape, eve-teasing and molestation. West Delhi and Malviya Nagar

recorded the highest crimes against women in 2013. However, Saket in South Delhi and Tilak Marg in Central Delhi had no such criminal records available. Crime Map showed that Delhi's rural areas are most unsafe for women (Sultan 2014). There is an urgent need to study why some areas are 'crime generator zones' while some are 'crime neutral' zones for women. Increasing policing and women policing are the immediate solutions however, it is time to use physical technology to detect, constantly monitor and promote surveillance in these areas by installing CCTV, Street Lights and cameras on public transport. However as a preventive measure, women in India also resort to pepper spray in absence of effective state agencies to curb crime. It is imperative for India to conduct such research studies where innovation can help crime prevention and improve police performance. Such positive results will have a huge impact on Indian Policing and transform the system, which is otherwise deemed problematic and seen in negative light.

Name of the Area (Outskirts of Delhi)	Number of Domestic Violence Cases	Number of Sexual Assault Cases
Bawana	NA	113
Kanjhawala	318	176
Nihal Vihar	305	NA
Ranhawla	281	122
Najafgarh	NA	214
Chhawla	211	NA
Bindapur	NA	123
Kapashera	92	NA
Sangam Vihar	NA	201
Badarpur	NA	144
VijayVihar	395	NA
KN Katju Marg	75	NA
Bhalswa Dairy	289	124
Burari	414	211
Alipur	210	NA
Narela	NA	253
Shahbad Dairy	NA	124

Source: (Sultan 2014)

Various mobile phone applications were launched to provide immediate remedy to help women in India however, results of these apps whether effective or not are yet to be analyzed. (Times of India, 2014a)

Delhi Police aims to place approximately 10,000 cameras all over the city by 2015. To analyze the feasibility of the project of installing CCTVs in the city, it sent a high level team to Surat (a well-planned city in the state of Gujarat) to study the CCTV system installed based on the PPP (Public-Private partnership) mode. It also urged the public to participate more in the installation of CCTVs to make it a successful project. (Delhi Police, 2014) Various crimes have been solved and accused identified by the Delhi Police with the help of CCTV Cameras. A team of burglars were caught by the Delhi Police in May 2014. The burglars stole LCD TVs from shops. The Crime Branch collected information and obtained CCTV footage (Delhi Police, 2014a). With the help of the CCTV footage, the burglars were identified and caught. Similarly in August 2014, two pick-pockets were identified with the help of CCTV cameras in market areas (Delhi Police, 2014b). Recently, the Delhi Police cracked a murder case and identified five minor boys who were accused of stabbing another boy in a south Delhi market area. The brutal murder was captured on a CCTV Camera which was placed in a shop. (NDTV, 2014a). More recently, in November 2014, a gang of robbers who had committed five robberies in a small span of time were nabbed with the help of CCTV Camera again. Identification clues captured on the CCTV Camera were the number plate of the vehicle of the robber, clothes and shoes of the robber. Interes-

Mobile Apps launched	How it works/ Its functions
VithU	Sends an alert to registered phone numbers when the power button is pressed
Scream Alarm	Screams in a woman's voice
Smart 24x7 which	Sends panic alerts to emergency contacts, records videos and takes photographs during panic situations and transfers these information to the police.
Women Safety Shield Protection	Takes a picture and sends an alert with the picture along with the location.
Suspects Registry	Latest location is sent to the emergency contacts. Another feature of this app is that it takes pictures and uploads it to the facebook page of the App
bSafe	Emergency contacts can follow the user through a live GPS, makes the phone ring with a fake call.

CCTV is one of the primary technology which has been used by the Delhi Police to track criminals and it has been effective in detecting crime. Several instances of high profile crimes and terror attacks forced the Government to take steps towards updating technologies used by law enforcement agencies.

tingly the robbers were caught on the CCTV Cameras twice out the five robberies. (The Hindu, 2014a, The Times of India, 2014b) As the rate of crime and security issues in the National Capital Region are increasing, the need for adopting technologies to keep crime at bay is being felt more than ever. The Police, Civic agencies and even the public have taken steps to install CCTV cameras at various area, transportation and institutions as well. Incidents like the Delhi Gang Rape and more recently the rape of a minor girl in a public school have pushed the public and civic agencies to new methods to curb and prevent crime. The Municipal Corporation of Delhi is now in the process of installing approximately 600 cameras in schools (NDTV 2014b). The Delhi Transport Corporation has also installed cameras in 200 buses for the safety of women. Most of the residential associations are increasingly becoming aware of the need of CCTV to prevent and solve crime. The CCTV camera project is one such project funded by the residents of Civil Lines (a residential colony in North Delhi). 67 cameras were installed at various points of entry and exit of the colony. (The Hindu,2014b). These cameras are connected to the main control room and the videos will be available in real time which would enable the police to monitor areas on an immediate basis. The following table gives us the details of the number of CCTVs cameras installed by the police, the residents and civic agencies:

District (Delhi)	CCTVS set up by the residents	CCTVs set up by the police	CCTVs set up by the Civic Agencies
South-West	549	236	53
South-East	546	397	30
South	1900	450	372
Central	540	240	NA
North-West	2400	237	NA
North-East	500	70	24
North	1057	420	NA
East	4000	350	327
West	1595	174	NA

(Source: Business Standard, 2014)

In addition to above mentioned technology, the Delhi Police launched a mobile application in February 2014 to enable users to file complaints of lost/missing articles. B.S Bassi, the Commissioner of Delhi Police taking a lead in updating the technologies used by the Delhi Police was behind the idea of developing the application. Four software solutions companies were hired for developing the application- M/s ACSG Consulting & Development Pvt. Ltd., M/s P.C. Solutions & M/s Microsoft and M/S Himalayan I.T. Solutions Pvt. Ltd. (The Times of India 2014c). This App is redundant to the extent of solving crimes as its main purpose was to make it convenient for the public in cases where it is mandatory to file a police complaint for reissue of documents or identity cards. (Delhi Police, 2014c). This has considerably reduced the burden of both the police and the public. Once the complaint is filed, the application generates a digitally signed document which can be used for the reissue of document. More than 5 lakh complaints have been lodged on the app which shows an inclination of the public to abandon the traditional methods and adopt technology as a mode to lodge complaints (NDTV 2014c). The department in a view to make the system more transparent and efficient has also started WhatsApp services to report traffic violations and instances of corruption. (The Times of India, 2014d) The police department is in the process of developing a mobile application which will provide for instant messaging services.

The public would have the option of sending information regarding the commission of a crime including images and audio. A non-cognizable report will be generated automatically. (Economic Times, 2014). This application will not only help in early reporting of crime but with the options of sending key information to the police such as images, time and place of commission, it would also aid in solving crime efficiently and rapidly.

6. PRIVACY CONCERNS AND THE USE OF TECHNOLOGY

As discussed earlier, the use of technology in prevention and detection of crime is very pertinent as crime becomes sophisticated. CCTVs have shown invaluable assistance in solving many crimes all over India, even where the actual crime scene does not have a CCTV camera, footage from places close to the scene of crime have helped solve crime (Centre for Internet and Society, 2011) There have been many debates surrounding use of technology by the state and privacy concerns. Privacy is often defined as the right to determine for oneself, what information, to what extent, to whom about them are being transmitted to other and also a right to control how it is being used by others. (Westin, 1967, Flaherty, 1986) Electronic surveillance undoubtedly helps in the solving crime and also helps in making evidence against crime stronger. However, there has to be an appropriate balance between the usage of technology and the privacy rights of the public. (UNODC, 2009). Article 21 of the Constitution states that 'No person shall be deprived of his life or personal liberty except according to procedure established by law'. Right to privacy has been included in Article 21 as an inherent fundamental right by interpretations given by the Supreme Court of India (Kharak Singh v. State of U.P). In Kharak Singh, unauthorized visits by the police in pursuance of surveillance under the U.P Police regulations were an invasion of privacy and a common law right of a person. (Gupta,A. 2010, Centre for Internet and Society,2011) . India has also ratified the International Covenant on Civil and Political Rights. Article 17 of the ICCPR states that, "1. No one shall be subject to arbitrary or unlawful interference with his privacy, family, home or correspondence, nor to unlawful attacks on his honour and reputation 2. Everyone has the right to the protection of the law against such interference or attacks." The problem lies in the fact that technology can also lead to unnecessary surveillance infringing the fundamental rights of the citizens. In the case of Malak Singh v. State of Punjab & Haryana & Ors., the question of privacy and the duty of the police to prevent crime came up before the Supreme Court of India. Section 23 of the Punjab Police Rules which allowed the police to enter names into a surveillance register was challenged to infringe privacy and hence a violation of the fundamental rights. The court although upholding the constitutional validity of the Section delved into the question of privacy and stated that, "But all this does not mean that the police has a licence to enter the names of whoever they like (dislike?) in the surveillance register; nor can the surveillance be such as to squeeze the fundamental freedoms guaranteed to all citizens or to obstruct the free exercise and enjoyment of those freedoms; nor can the surveillance so intrude as to offend the dignity of the individual". In India, in areas of privacy and what should be the limit of privacy is often judged by the criteria of compelling public interest (Govind v State of MP). The problem arises because of the lack of concrete privacy legislation in India and vagueness in the judgments. (Acharya, B, 2013).

There is therefore a great need for legislation on privacy focusing on what compelling public interest means and till what extent can technology be used to prevent and detect crime without infringing the basic privacy rights of an individual. Even if data is collected by the police through usage of technology, it is necessary that the data should be used only to the extent of crime control and detection.

7. FINDINGS AND RECOMMENDATIONS

Crime prevention and control from various primary and secondary data and interviews conducted, it can be concluded that police study and training is the need of the hour. A varied number of challenges await the police system. Technology will help us understand and speed up the investigation process. However, sufficient training and manual work has to be discouraged for speedy effective policing. The technology that the police mostly resort to are phone records, CCTV footage, fingerprints and DNA testing. At this point it is important to evaluate how far technology has helped in crime detection in India. As per our findings, technological evidence in India will be helpful in criminal investigation and crime detection only where the usage is in consonance with the law. Section 65 B of the Indian Evidence Act, 1872 mandates that a certificate should accompany such evidence describing the manner in which it was produced giving the particulars of the device involved in the production of that record. The rules laid down under Section 65 B of the Indian Evidence Act are not followed which makes the evidence redundant and non-admissible in court. Thus, such situations challenging in India and needs to be modified and watched so that new sophisticated technology can be used for crime detection and prevention. In a recent case in September 2014 *Anvar v. P.K. Basheer*, 2014, the Supreme Court again reiterated that the requirements under Section 65B were mandatory and therefore some CDs could not be admitted in evidence since the requirements under the same were not satisfied. It also is an issue of privacy for example, for tapping phone, a permission is required the Home Secretary. These provisions of law are overlooked compromising on the privacy rights of individuals.

Recommendations:

Some basic changes need to be put in place before trying to prevent crime completely. Our enforcement officers are two steps behind the criminal and therefore it is important that the police have to use updated technology to curb crime. The officials have to be trained, the CCTV footages are sometimes too grainy or out of context to be useful as evidence. Police has to be trained to use such technology in a useful way. Investigation is done in sloppy methods. Lawyers face issues when it comes to producing evidence based on CCTV camera and from pragmatic standpoint they face issues. Through the interviews conducted, one of the renowned criminal lawyer narrated the woes faced due to poor detection on CCTV. The lawyer's client's husband was killed in the most brutal manner and there was a CCTV camera at a nearby house which recorded the accused coming and getting out of the road and one of them wearing the deceased's t-shirt while leaving. The law was not followed under the Evidence Act for producing the footage as evidence and hence the purpose of technology was again defeated. Best of evidences are reduced to nothing by the breakdown in the moral fiber. Street lighting, police patrolling and CCTVs are indeed helpful but only when the basic protocol and steps are followed. The officials falter in these

basic protocols of using technology. Crime is expensive, apart from the procedural loopholes that are faced in the courts during court proceedings. Police departments need to be free from paper work and it can be done by investing on Information and Communication Technology (ICTs) to meet the current requirements (Kumar, 2012) as investigation is the first step of procedural law and smooth and correct detection reduces the work load on court and helps them in arriving at an accurate conclusion during evidence process. Proactive policing can be encouraged if crime data is regularly analyzed and training on technical skills and knowledge is the first step for effective police policing. It is observed that police officials are not adequately trained in terms of crime detection and also with respect to the existing technology. As it has been established earlier that criminals use technology tactfully, our police should be trained to meet the evolving situation.

8. CONCLUSION

It is evident that the rising crime trend in India cannot be overlooked. Crime prevention has to be assisted with sophisticated technology and there should be a proper balance between the application of technology and the effective results. Research should be conducted in criminology sector to study and analyze crime, crime patterns and understanding the 'place' better and to study what makes Delhi an attractive 'place' to commit crimes? Such research should be collaborated with police science, so that police officials are better equipped to prevent and control crime. Technology is a good means to prevent and control crime but should be designed and strategized based on the geographical locations, on the hot spots using crime mapping, identifying the problem oriented places. Cost of crime is high hence emerging technology should be used with certain plans and models keeping a check if such experiments are helpful in that particular region. The growing population, diverse nature of the country and huge influx of people to the capital is a growing concern. Along with a host of other problems, increase in crime is a major concern. The idea is not to replace or drop human employment, rather to merge technology (hard and soft) with man power and adopt strategies to prevent and control crime in the crime generators.

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