

EMERGING TECHNOLOGIES IN POLICING: A STUDY OF POLICE COMMISSIONERATE LUDHIANA

Thesis Submitted for the Award of the Degree of

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By
Ramandeep Singh
Registration Number: 42300172

Supervised By
Dr. Manvendra Singh (UID: 21755)
(Professor)
Department of Government and Public Administration



**LOVELY PROFESSIONAL UNIVERSITY, PUNJAB
2026**

DECLARATION

I hereby declare that the presented work in the thesis entitled "Emerging Technologies in Policing: A Study of Police Commissionerate Ludhiana" in fulfillment of the degree of **Doctor of Philosophy (Ph. D.)** is the outcome of research work carried out by me under the supervision of Dr. Manvendra Singh, working as Professor, in the Department of Government and Public Administration of Lovely Professional University, Phagwara-144411, Punjab, India. In keeping with the general practice of reporting scientific observations, due acknowledgments have been made whenever the work described here has been based on the findings of other investigators. This work has not been submitted in part or full to any other University or Institute for the award of any degree.



(Signature of Scholar)

Name of the Scholar: Ramandeep Singh

Registration No: 42300172

Department/School: Department of Government and Public Administration,
Lovely Professional University, Phagwara-144411, Punjab,
India.

CERTIFICATE

This is to certify that the research work presented in the Ph.D. thesis entitled **“Emerging Technologies in Policing: A Study of Police Commissionerate Ludhiana”** submitted in partial fulfilment of the requirements for the **Doctor of Philosophy (Ph.D.)** degree in the Department of Government and Public Administration is a research work carried out by **Ramandeep Singh, Registration No. 42300172**, is bonafide record of his original work carried out under my supervision and that no part of thesis has been submitted for any other degree, diploma or equivalent course.



(Signature of the Supervisor)

Name of Supervisor:	Dr. Manvendra Singh,
Designation:	Professor
Department/School:	Department of Government and Public Administration
University:	Lovely Professional University, Phagwara-144411, Punjab, India.

ABSTRACT

Policing today has been dramatically changed by emerging technologies in terms of its nature, structure and operation. In today's times, traditional policing methods which are largely driven by manual documentation, physical policing and conventional investigation practices are gradually being replaced or complemented by digital technologies, artificial intelligence (AI), surveillance systems, the use of cyber tools, modern software and platforms for online communication. In the modern era, the police agencies need to adapt new technologies to address modern trends in crime and public order and to improve service delivery. The policing in urban areas in India has been changed dramatically with the introduction of Commissionerate system, digitized policing platforms and technology driven policing practices. The present study analyzes the transformative effect of emerging technologies on policing with special reference to the Police Commissionerate Ludhiana.

The study is focused on understanding the impact of emerging technologies on policing practices, police-public relations, administrative efficiency, crime prevention and investigative mechanisms within the Police Commissionerate Ludhiana. Ludhiana, popularly called the 'Manchester of India' and one of the major industrial cities of Punjab, is an interesting case to look at the issues of urban policing in the rapidly changing socio-economic and technological scenario. Over the past couple of years, the policing system in Ludhiana has been significantly modernized due to the increased urbanization, industrialization, migration, cyber offenses and complicated crime trends. Police Commissionerate Ludhiana has put in place several technological facilities like Crime and Criminal Tracking Network & Systems (CCTNS), Safe City Project, Punjab Artificial Intelligence System (PAIS), Automatic License Plate Recognition (ALPR), Digital Challan System, CCTV Surveillance Network, Cybercrime Units, PCR vehicles fitted with GPS, Mobile Forensic Vans, Citizen Service Apps & Social Media Communication Platforms.

The aim of this research is to evaluate the effect of the emerging technologies on the functions of the police and police-public relations in Ludhiana City. This study also analyzes the current policing system, the shift from traditional to technology-based policing, the impact of capacity development programs on the system, and the role of technological innovations in crime reduction and build community

relationships. The study also examines the issues faced by both the police and the public while adopting new technology and the ways in which technology can enhance the effectiveness of policing.

This research seeks to investigate, how well the Punjab Police, with special reference to the Police Commissionerate Ludhiana, uses technology to prevent and detect crime, as well as how well it handles current issues. Using a combination of primary and secondary data sources, a mixed-methods approach were used to guarantee a comprehensive and nuanced understanding of the topic. To collect primary data, the Police Commissionerate Ludhiana headquarters, specialized units and all police stations were visited. Key informants were interviewed, including Station House Officers (SHOs) and other GOs (Gazetted Officers) posted in Police Commissionerate Ludhiana and also the other police officials, members of the general public of Ludhiana city were interviewed. The study involved a total of 500 respondents, of whom 150 were civilians, who had interacted with the police using emerging technology and 350 were police personnel from the Ludhiana region. Both civilians and police officers were provided structured questionnaires to complete. To collect data from police personnel and officers, stratified random sampling technique were used and to collect data from civilians of Ludhiana city, purposive sampling technique was used. NCRB reports, academic journals, books, case studies, newspapers, official websites, police commission reports and official documents from the Indian government were some of the sources from which secondary data were gathered. The Theoretical support for this study was drawn from the concepts of modernization, the Technology Acceptance Model (TAM), Community-Oriented Policing (COP), Max Weber's Theory of Bureaucracy and Henry Mintzberg's Organizational Theory, which is relevant to public administration and policing systems.

The findings of the study suggest that Ludhiana's conventional police system relied on a slow and tedious system of personal interaction, manual reports, and physical record-keeping. Services like passport verification, police clearance certificates (PCC), complaint registration and official verification made citizens travel to police stations, police units, and police offices. Communication between departments was mostly paper-based and took a lot of time, which is resulting in delays. There were delays and inefficiencies which added to the burden of administration. However, with the advent of modern technology in the functioning of Police Commissionerate Ludhiana, there has been a lot of progress. The study found that the integration of CCTNS, a digital reporting

system, CCTV surveillance, GPS enabled PCR vehicles, e-challan, cybercrime cells, forensic tools and online service portals greatly improved the administration, efficiency, communication and service delivery. Police personnel reported that technology has reduced paper work, improved information sharing and operational interdepartmental coordination. Citizens reported improved access, transparency, civility, and responsiveness of the police.

This study highlights the positive impact of the technologies like CCTV surveillance systems, Safe City Project cameras, ALPR systems and AI-powered software programs such as PAIS on crime prevention, criminal identification and the efficiency of criminal investigations. Emerging technologies have allowed police departments to better investigate cyber fraud, financial crimes, human trafficking, drug related crimes and organized crimes. Use of modern crime analysis tools, CDR/IPDR analysis and digital forensic methods has decreased the response time and enhanced investigative accuracy. The research explains the positive impact of recent technologies on police-public relations in Ludhiana city. The Police Commissionerate Ludhiana has adopted several technology-based, citizen-friendly initiatives, such as PP Saanjh, the 'Know Your Police Station' app, the Khoj Punjab Police app, the Public Grievance Division (PGD) portal and CARE Stations with SOS systems. Facebook, Instagram, WhatsApp, and X (Twitter) are becoming increasingly useful for police-public communication, awareness, grievance redressal and live engagement with the public. There was consensus that technology improves access to police services and police-civil communication and police work becomes more transparent. The research also indicates that most of the respondents perceived an increase in the public's trust and accountability because of these technologies. The installation of CCTV cameras in police stations, the option to file online complaints and the use of social media by the police have all rendered police work more transparent. The use of technology has also removed unnecessary delays in the verification of passports, the issuance of police clearance certificates and the entire RTI process.

The study also identifies challenges posed by the technological modernization of policing. It finds that the police force needs more than just the technology. There needs to be more emphasis on the digital literacy of the police. It is especially problematic when older officers or those with low educational attainment struggle with computers, mobile devices, and software. Many said that the technology

systems significantly increased their workload as they were expected to do both digital and paper work. One of the major challenges of the implementation of technology was identified as language issues and digital illiteracy. Many of the police staff said that they had difficulty with the software and online systems because they were in English. Older police staff were generally resistant to the use of technology and were not willing to complete the tasks as directed by the digital systems. The findings also indicated that younger, graduate police staff were more willing to engaging with technology compared to older staff.

Another key finding of the study is the need for public awareness and public accessibility. Despite online services and technological measures being appreciated by many citizens, a significant part of the population preferred physical interaction with the police. A considerable portion of senior citizens, migrants and low educated participants expressed lack of confidence in the use of online complaint mechanisms and digital application. Some participants mentioned issues with online grievance redressal mechanisms as the delay in responsiveness, issues with the server, no response in follow-up. The study, therefore, asserts that technological policing should be used to supplement traditional policing, not replace interpersonal policing completely. The study also discusses the need for training and building the capacity to advance technology-based policing. It is also revealed that the Police Commissionerate Ludhiana have a district training center at Police Lines, Ludhiana to hold training sessions regularly on CCTNS, iHRMS, E-Sakshya application, cybercrime investigation and emerging technologies etc. However, the findings indicated that training programs were of short duration and limited depth. The majority of participants indicated the need for ongoing support and refresher training in order to use the new technologies. The study, thus, has given emphasis to the need for a comprehensive digital literacy training, in-service training and continuous professional development of the police at all levels/rank.

This research provides an overview of crime trends after the introduction of technology policing. This study reviewed crime statistics from 2015 to 2024. It found that many categories of crime began to decline after different policing technologies began to be employed. Technologies such as Police CCTV, AI Criminal Databases, GPS forensics, digital and cyber transaction tracing, forensic technology and social media monitoring have fortified the investigative and preventative aspects of modern law

enforcement. It can be concluded that technology has improved modern policing practices and the city of Ludhiana's law enforcement capabilities significantly.

It can be concluded that emerging technology is an essential part of modern Policing. Specifically, it has contributed a lot to the working and operation of the Police Commissionerate Ludhiana. The incorporation of new technology, AI based applications, surveillance and online communication has enhanced efficiency, responsiveness, transparency and public engagement by policing. Technology and modern policing practices have strengthened the prevention of crime as well as modernized the practices of policing.

Despite this, the study says that successful technological transformation in policing is not just about the technological infrastructure, it also depends upon human adaptability, institutional preparedness and public participation. The benefits of modernization through technology can only be fully realized if the right or sufficient training, awareness and digital literacy are in place. The study recommends to strengthen digital training programmes for police personnel, simplify the interfaces for online services, increase multi-lingual accessibility, conduct public awareness campaigns and improve infrastructural support for technology-based policing. To achieve the greatest possible efficiency of modern policing efforts, technology systems must be monitored on a continuous basis, there must be regular refresher courses and the community must be involved more extensively.

In conclusion, the study concludes that the experience of Police Commissionerate Ludhiana is a significant model of technological transformation in urban policing in India. The study offers insights into how emerging technologies can benefit policing with tech for more efficiency in crime control and improved relations between the police and the public, with the right infrastructure support and the development of human resources. The findings of the study may be useful to policy makers, police administrators, researchers and scholars of public administration with an interest in smart governance and digital transformation in police agencies and in police reforms.

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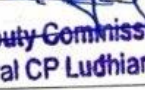
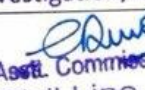
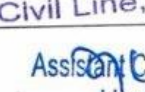
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LIST OF ABBREVIATIONS	
ACP	Assistant Commissioner of Police
ADCP	Additional Deputy Commissioner of Police
ANPR	Automatic Number Plate Recognition
ASI	Assistant Sub-Inspector
ATM	Automatic Transaction Machine
BPRD	Bureau of Police Research and Development
CCTV	Closed Circuit Television
CCTNS	Crime and Criminal Tracking Network & System
CDR	Call Detail Record
CP	Commissioner of Police
Cr.P.C	Code of Criminal Procedure
CVR	Character Verification Report
DCP	Deputy Commissioner of Police
DCR	District Control Room
DDR	Daily Dairy Register
DIG	Deputy Inspector General / Deputy Inspector General of Police
DGP	Director General of Police
DNA	Deoxyribonucleic Acid
DSP	Deputy Superintendent of Police
E-policing	Electronic Policing
FIR	First Information Report
FSL	Forensic Science Laboratory
GIS	Geographical Information System
GO	Gazetted Officer
GoI	Government of India
GPS	Global Positioning System
HC	Head Constable
ICT	Information and Communication Technology
IG	Inspector General of Police
IMEI	International Mobile Equipment Identity
IP	Internet Protocol

IPC	Indian Penal Code
IPS	Indian Police Service
ISP	Internet Service Provider
IT Act	Information Technology Act
JCP	Joint Commissioner of Police
KYC	Know Your Case Scheme
LAN	Local Area Network
MVR	Movement Verification Report / Missing Verification Report
NCRB	National Crime Records Bureau
NDPS Act	Narcotic Drugs and Psychotropic Substances Act
NGO	Non-Gazetted Officers
NOC	No Objection Certificate
NPC	National Police Commission
PC Act	Prevention of Corruption Act
PCC	Police Clearance Certificate
PCR	Police Control Room
PIN	Personal Identification Numbers
PO	Proclaimed Offender
PPMM	Punjab Police Mehla Mittar
PS	Police Station
RTC	Recruit Training Centre
RTI	Right to Information Act
SHO	Station Head Officer
SI	Sub-Inspector
SMS	Short Message Service
SSP	Senior Superintendent of Police
VC	Video Conference

LIST OF PEOPLE CONTACTED FOR VALIDATING CONTENT OF QUESTIONNAIRE			
Sr No.	Name	Designation	Signature
1.	Sh. Snehdeep Sharma, IPS	Deputy Inspector General of Police, Anti-Gangster Task Force (AGTF), Ludhiana	
2.	Sh. Rupinder Singh, IPS	Additional Commissioner of Police, Ludhiana	 Commissioner Police Ludhiana
3.	Sh. Jaskiranjit Singh, PPS	Deputy Commissioner of Police, Rural, Ludhiana	 Deputy Commissioner of Police Rural CP Ludhiana
4.	Sh. Harpal Singh, PPS	Deputy Commissioner of Police, Investigation, Ludhiana	 Deputy Commissioner of Police Investigation, Ludhiana
5.	Sh. Guriqbal Singh, PPS	Assistant Commissioner of Police, Civil Lines, Ludhiana	 Asst. Commissioner of Police, Civil Line, Ludhiana
6.	Sh. Rajesh Sharma, PPS	Assistant Commissioner of Police, Licensing Unit, Ludhiana	 Assistant Commissioner of Police Licensing, Ludhiana
7.	Dr. Manvendra Singh	Professor, Department of Government and Public Administration, Lovely Professional University, Phagwara, Punjab, India, Pin Code-144411	
8.	Dr. Deepak Sharma	Assistant Professor, Department of Government and Public Administration, Lovely Professional University, Phagwara, Punjab, India, Pin Code- 144411	

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

The amazing progress people have made in recent decades gives us plenty of reasons to be hopeful. Life expectancy has risen, wealth is more widely distributed, social welfare systems have improved and productivity per worker has increased dramatically. The general standard of living is higher than ever and levels of technological advancement and prosperity once unimaginable have been achieved. Life today is richer and more complex though not necessarily more difficult as many parts of the world have largely eliminated diseases, tribal conflicts, extreme weather exposure and chronic food shortages.

While it's clear that living standards have steadily improved, there are also growing signs of serious threats to our civilization. Problems are emerging that could divide people, communities and nations, creating tensions that might lead to major social conflict and unrest in the future. War in particular has the power to wipe out entire civilizations within minutes and could destroy humanity altogether in hours. "There are five other major threats to modern society: crime, environmental pollution, running out of natural resources, overpopulation, and social intolerance. These five threats affect each other in different ways and depending on the situation may lead to war" (Wilson & McLaren, 1977). "Concerning, crime rates have climbed up when the population density increases as the gaps between the haves and those who have less continue to widen" (Alemika & Chukwuma, 2005). Given the urgency of these issues, crime is more pressing than others, as it poses an immediate physical threat to life and property. This clearly indicates that society has not done enough to combat criminality and this failure inflicts significant suffering on people, causing them to lose loved ones, property, and peace of mind due to fear and suspicion. The losses directly linked to criminal actions are substantial, but these costs are only a part of the total social cost of crime. As an example, imagine a case where a theft occurs in a retail store. The most obvious loss is the value of the items that were stolen. The indirect losses may be far greater, including the cost of installing additional security measures, legal and administrative expenses for pursuing the

case, a decline in customer trust and loss of revenue due to temporary closure of the business. But when all the other effects are taken into account, they form the total social cost of the crime, showing that the financial damage goes far beyond just the immediate loss.

In India, policing and the role of the police continue to be common topics in everyday conversation, yet they have rarely been examined through the lens of rigorous sociological study. As a result, most people have only a limited or unclear understanding of what the police and policing mean and how they are related.

The concurrent factors contributing to criminality and social disorder are numerous and highly diverse in their interactions, which makes the two concepts complex to analyse, particularly when examined in isolation. Leading factors include genetic inheritance, early childhood experiences, family connections, social interactions, and broader community and institutional influences, all of which shape an individual's personality and behaviour. Criminality, therefore, cannot be prevented by the efforts of one community or agency alone. As much as a crime is described, its relation to the police force is well defined. Many observers of the crime phenomenon notice that the police have been overloaded with most of the roles related to the present level of crime as well as future measures towards tackling the problem. However, the police function is clearly important in evaluating a short range of strategies for addressing the crime issue. This does not suggest that criminality will be less in the next couple of years. As long as there are antisocial elements, the police must try to save society from the ravages of such criminals.

At the beginning of this new millennium, due to increasing complications in civilization, the availability of faster modes of transport, easy access to international telecommunications and sophisticated technologies and advancements ranging from computerization to wireless communications, new dimensions are being added to crime. Van (2013), says that as new technologies continue to develop at really fast, so it's important to keep pace with the changes and make sure they're being used in a way that benefits society. Police duties of today are not what they used to be long time ago although their roles are still to maintain law and order. The mission of the police is the prevention of crimes and keeping of law and order, aiding in traffic control and attending to incidents that may require rescue operations. In performing second tier objectives, the

police provide numerous miscellaneous non-law enforcement services and they are responsible for the enforcement of numerous state and municipal laws, codes, ordinances and regulations. Certain of the laws are meant to protect the 'morals' of the society and in the process of enforcing these laws the police assume the main role of the society in eliminating the immoral behaviour. For regular police officer it is very challenging to be proficient in all the numerous aspects of police work which is why the specialist has been created. Other officers defining the role of specialists in police departments are the laboratory examiner, evidence technician, polygraph operator, personal identification expert, radio technician and fiscally police officer, legal officer, data processing system analyst, police planner, training officer among other personnel that have been hired into police departments since the turn of the century. E-mail, the internet, and cellular services have made illegal transactions increasingly difficult to trace, further adding to the tasks of the police. This has created new challenges for the police force in coping with these developments. The adoption of modern technology by criminals also introduces new complications and additional risks to the peace, safety, and well-being of the public. The enhancement of the utilization of the automobile by the delinquent youth and offenders has raised the crime rate. Road traffic accidents and congestion take a lion share of police time and efforts. Another challenge of the police today is derived from the fact that even as members of the public seek protection from criminals, there is always resistance to the exercise of authority by the police.

The police force has prospects as well as issues for its members in the future as technology progresses globally. Considering that the criminals have embraced modern technology, their use of the same must be understood by the police. Further, technological advancement in social systems is making law enforcement agencies relevant, hence the uptake of emerging technologies. But often it is hard to evaluate their efficiency with the use of these technologies being limited by the ethical norms concerning individual freedom and collective safety. Quite a lot depends on the advancement in technology when it comes to the change in government processes and even the issue of effectiveness. Continuous efforts to understand the impact of new technologies and their effects on society's transformation are vital if we are to ensure organizational health. Efficiency and effectiveness are at the heart of the paradigm shift to new public administration, challenging traditional notions of achieving objectives. In order to assess organizational effectiveness, the importance of sustained efforts to

maintain infrastructure and human resources for long-term organizational effectiveness is underlined by the measurement of outcomes, adaptation to the environment, and system health.

The way in which citizens interact, not only with each other but also with private enterprises, public service providers, and government institutions, is rapidly changing as a result of the emergence of modern technological tools. In the past, people would go to government offices to complete transactions, such as applying for or renewing a passport or driver's license or paying utility bills, in order to obtain certificates. The same exchange, however, can now easily occur at a service centre nearby the person and even over the Internet because of the use of information and communications technologies. Emerging technologies can play a crucial role in transforming the police force from an oppressive agency of government to one that, first and foremost, is concerned with protecting human life and liberty. Many aspects of the functioning and performance of the police can be improved, and response times can be shortened by technology. For example, the time it takes to interact with citizens or engage in additional proactive activities may be reduced by reporting requirements on new IT and mobile computing systems. Better law enforcement public communication occurs through mobile apps and online platforms that promote citizen involvement in crime prevention activities (Cordner & Perkins, 2013).

It is not an easy task to measure how effective police work has been. If there is a high crime rate in a city, does that mean that the police department is ineffective? If there are a few instances of criminal incidences within a city, does this justify the fact that its police are ineffective? Crime in society has several components that are complex in nature compared to one another. The police cannot control all these variables that go into producing crime or even worsening such conditions as social disorganization, anger, poverty, revenge, psychological or biological disorder, and the urge to commit crime. Even the most advanced communicative technologies used by the police have been retrofitted to comply with established organizational structures and traditional policing processes (Manning, 2008). Modern policing agencies have also started funding this technology very heavily on the presumption that it will increase efficiency and efficacy. Therefore, it is seen that the policing agencies all across the world are implementing various new technologies, including GPRS, wireless systems, forensic

science, mobiles, the internet, computers, CCTV cameras, and so on. The future safety of the human race requires the development of new technologies. This should, however, be done in a balanced manner since dangers are associated with these new technologies. Basically, policing agencies look into the ramifications of uses of technology in effectiveness in fighting crimes or creating services for citizens.

According to definition, technology describes the tools, techniques, and systems that apply scientific knowledge to meet human requirements and complete tasks (Bayley & Shearing , 1996). On the other hand, policing stands for the operations that police officers perform in order to achieve the “prevent and detect crime” and “maintenance of law and order”. Police and policing can be defined in two ways: police is the organ of the state, which safeguards people and their possessions, maintains the peace and order, and prevents and investigates crimes, policing, on the other hand, is how the police function. This means that policing is a part of police. Notably, the whole and sole role of maintaining the peace of the society is formally bestowed upon the police. The police employ technology in many practices. It has a strategic role, especially in identifying transnational crime and in combating terrorism, which is a world issue. The ultimate challenge for the police organization is to make utilization of technology in policing within the poor fiscal resource base, and the process of beginning to introduce new technology within the police is very costly in terms of resources, not only in infrastructural but also in financial terms.

The study will underscore the necessity for the police authorities to study and practice emerging technologies on the prevention and detection of crime. However, their efficiency for the police usage remains disputable, therefore creating the need for the evaluation of impact of these technologies for both police and society. The aim of this study is to examine the emergence of cutting-edge technologies in the field of law enforcement and to address a complex research problem that encompasses both opportunities and challenges. The purpose of the study is to identify the specific challenges and benefits associated with the adoption of emerging technologies in policing. For the sake of society, it is then necessary to weigh and determine the benefits of such technologies, as well as possible risks that can be posing. Despite the positive expectations of police agencies regarding what new technologies may bring, there is doubt whether the introduction of such technology will really enhance effectiveness. For

this reason, it is important to critically analyse the new technologies in policing to ensure a secure and more stable future.

1.2 REVIEW OF LITERATURE

It is important to consider the impact and efficiency of emerging technologies in policing. An attempt is made to provide an overview of significant research on the relationship between technologies and policing, some related reviews are produced below in a chronological order.

Egon Bittner (1970) assessed the nature of police work and connected it to courts and the community with which it interacts. The analysis is detailed and quite analytic. Socio-cultural and historic features that impact police operations are evaluated, as are the concepts most citizens have about the police. From these more general views, the discussion proceeded to examine the effects that police organization—that is, the nature of departments, their place within the structure of the city administrative system, and the great deal of autonomy they possess—has upon the policeman. The structure of the police as a quasi-military organization, their morale and code of conspiratorial silence are recalled and integrated along with police potential for the use of force. This monograph does also take into account the future development of police work. Several areas of concern are directly addressed, among which include the upgrading of police practice systems, the structural organization of police, and the overall recruitment and training of police forces. The author squarely addressed himself to the complex issue of the operation of force by the police and gave recommendations that could assist the police. In fact, new paradigms of policework practice are predicted.

Steve (1978) points out that the advancements in military technologies are scrutinized almost as a given, while those in police technologies are scrutinized only, albeit occasionally. In this article, an effort is made to level this imbalance by offering an overview of some contemporary technological advances in policing along with focusing concern on the implications of these technologies effective in systems of socio-political governance. Because the process of sociopolitical control is inherently fascist-oriented, the technology of such management is, in effect, more or less repressive. Since it seems to provide a more or less workable solution to most of the issues of internal control, there is

the danger of its degenerating into a technological solution for lack of political authority where the latter is missing. Politicians are becoming more inclined to pass off their most unsolvable troubles to the police or military, which in turn are brought back later as additional complications.

It examines the social impacts of the vertical and horizontal expansion of these technologies and their contribution in altering the military nature of the society in which they are used. The article concludes that new police technologies promote the establishment and sustenance of totalitarian societies.; they are a real and present danger to civil liberty and human rights, and the real and present danger is set to grow in the future.

Colton (1979) studied the early adoption of computer technology in U.S. police departments using national ICMA surveys, case studies, and interviews. He distinguished between routine systems (e.g., patrol inquiries, crime files, traffic and administration) and non-routine systems (e.g., resource allocation, CAD, AVM/AVL) and assessed them across technical, service and organizational impacts. Regularly used applications made information easier to access and helped streamline administrative work although their effectiveness varied across places. By contrast, less-common systems had mixed results many struggled or failed because planning was weak, training was inadequate, and frontline users were not properly involved. Colton also pointed out some unintended consequences: people experienced information overload, attention shifted toward tasks that were easy to measure, and organizational power subtly shifted. He pointed out that computers tended to strengthen existing ways of working instead of transforming policing. The study therefore stressed the need for careful cost assessments, meaningful training and evaluation of long-term outcomes.

Maurice J. Fitzgerald (1980) described the techniques of investigation as the ones to them, effective criminal investigative methods, which are almost always acquired through practice but are sometimes read. The test plus experience of the basic facts, with the principles and experience in putting these facts into the ideal uses. Most large city police departments, the FBI, and the Department of Defense offer courses of instruction in criminal investigation. In the feat to do so, all the investigation depends on the consent of many individuals. The complaint of the victim and the witnesses should provide the investigator with their cooperation.

Chaturvedi (1982) also tries to classify the nature of police work in today's India and its connection with the community. The subject in this book is not so much to offer information on lower-level complexities of the police in a society that is pledged to a polity liberal democratic as to give attention to the major issues that are consequent to the above commitment and which are undeniable to the shaping of our polity in the future.

Singhvi (1982), without any preambles, jumps directly into the matters of personnel pathology. He pinpoints the processes through which public distrust of the police is created, and these are, of course, not insignificant and cannot be wished away. But how can these sources of public dissatisfaction be eliminated except through radical improvement in the tone of police administration, which is associated with the organizational model and the personnel policies? I agree with his proposal of how a national police policy ought to be articulated, an idea that needs to be taken seriously.

Mukherjee (1988), in an attempt to focus on the causes of crime, pointed out that social exploitation, economic disparities, a lack of opportunities for employment, resources for means of livelihood, and the application of undesirable methods by the politicians in the furtherance of their political goals have brought in a new phase of crime in the existing rural-urban setting. To counter this, he stressed the need for creating a police force with high professional standards, belief in moral principles, capacity, and courage so that people could place their confidence and extend cooperation to the police force.

Sundaram and Rajput (1993) rightly said that the work culture is one of the fundamental causes of development in the country. There is a lot that needs to be done in Indian organizations to enhance the work culture, but there is also a lot of potential to do so. Public service institutions do have the important place to serve the common man in society. Motivation, productivity, and job satisfaction are some of the aspects of business that are greatly affected by it. An organization has a culture of its own with flavors from its surroundings. Of course, they become important when considering organization behavior, as it is a significant field concerning work. One should learn about the imperative of work culture and how it has an aggressive influence on behavior at the workplace. It is pertinent to mention that cultural sustainability exists in every workplace. They are required in order to explain and give reasons about time dedicated towards our

work. Here, it is pertinent to note that work culture requires development and the enhancement of the proper culture, which is necessary to foster. Positive and well-integrated working environments enhance the commitment and retention of the employees.

Bayley & Shearing (1996) shed light on the modern transformations in police systems practiced in developed democracies. They argued that reorganization is occurring in both the business and government sectors and will have mega effects on society particularly regarding matters that concern safety, equality, human rights and accountability. These effects are justified when contending on how they are a trade-off to decisions of the public policy. The agents of restructuring include crime fighting, unsuccessful attempt by the government to fulfill the desire of the society to enjoy security, mass privatization and individualism culture. They subsequently project the future of policing and the policies needed to prevent the adverse effects.

Mathor (1998) has attempted to understand the police administration, the responsibility of police in society, and the issue and concern of police forces, which are vital to train police personnel to fulfil the requirement in the light of the emerging new horizon. Accordingly, this research has compared and contrasted organizational groups, individual development processes, and the topic of the development of human resources through training. They are the various problems, defects, working pressure, and tension a policeman experience in executing his duties. This study pointed out the need for addressing the pathology of endemic corrupt practices in the Indian Police apparatus through orchestrated comprehensive structural revolutions.

Jafa (2001) analyzed the problem and challenges of police administration in the 21st century, organizational and attitudinal reforms, and the information technology revolution. On the basis of the current situation, the author has recommended enhancing the quality of working images, physical development, knowledge, and skills of the police service's personnel. The officers themselves are unaware of the undesirable aesthetic impact of unhealthy and unkempt-looking policemen on the so-called image of the personnel. This is because the poor quality of training and the absolute absence of basic on-the-job training are the causes of the substandard performance of the police. The leadership should post the best in training institutions, which at the moment are jail-like facilities for the incompetent. In the training institutes, modern training aids and modern

methods should be adopted. The technical knowledge and skill should be provided to maximum police personnel. Those harboring an investigative inclination towards cybercrime should be trained to an advanced level with major information technology firms.

Chan et.al (2001), discussed that the police, in general, have adapted well to the information technology era. However, this study has found that information technology has allowed police to do some current activities more effectively, there have not been any dramatic shifts in the performance of the Queensland Police Service (QPS) in disposing of issues of crime and order. Therefore, the argument is that information technology has changed the structural relations of the context of policing in the service to some extent, however, the cultural premises and policing practices are still largely intact. This is a lesson that has been confirmed at the QPS: When you grant police the use of computers, extend the range and quantity of information stored in and on computers, as well as automate many of the previously manual actions, it will not alter how policing is done by the agency. In order for police agencies to obtain a higher value on their investment in IT, there has to be an effort to continuously transform the organizational environment into which the technology is being put. Thus, it is very imperative that while planning for the information technology, the core concept should be to help policing organizations to go where they need to go rather than mere rationalization and thereby fixing the organizations into a set mold.

Chan (2001), in their research, Chan draws on the case study of Australia to examine the impact of information technology on law enforcement practice. The case that the field of law enforcement has been influenced by major changes due to technological progress is made. For example, technology has reshaped the importance of technical and communicative resources, institutionalized accountability through built-in reporting formats and procedures, and reorganized operational policing daily routines. Despite the continued cultural dominance of law enforcement's policing style and anger towards management and other agencies over their demands, information technology is gradually altering deeply ingrained assumptions about police practices.

Nunn (2001) traces how advanced surveillance and identification technologies biometrics, digital and thermal imaging (FLIR), GPS and satellite monitoring migrated from defence research into municipal policing, with diffusion

favouring cities that have the resources and technical staff to operate them. He outlines a taxonomy of these tools and illustrates their operational use (e.g., DNA indexing, digital image enhancement, FLIR), noting unresolved legal and policy questions around practices such as thermal imaging. The article's core contribution is conceptual: it shows how these "machine systems" reconfigure urban space and enable new forms of spatial control (e.g., video surveillance and automated dispatch), producing a "machinic vision" that abstracts people and places into data and raises ongoing concerns about privacy and everyday urban life.

Deflem (2002) discusses the underexplored role of technology in organizing police institutions and its impact on internationalization. Historical data analysis reveals that technological advances significantly facilitated international police operations but also contributed to cross-border criminality, justifying international strategies. The author emphasizes the dual role of technology in providing means for police independence and enhancing opportunities for transnational criminals. The conclusion highlights the implications of emphasizing efficiency over legality and rights, as international police cooperation, driven by technology, may overlook normative questions. It also explores the delicate balancing act of modern policing between crime control effectiveness and due process concerns. The author delves into the historical and contemporary dimensions of technology's impact on international policing, highlighting its dual nature as both a facilitator of efficiency and a potential challenge to legal and constitutional safeguards.

Singh (2002) highlighted the problem of granting amnesty to police personnel charged with human rights abuses in Punjab during militancy days. It assumed the color of a public affair in the light of assembly elections in the respective state. The author opined that development around it eased human rights and national security as the two were mutually exclusive rather than embarking into forgetting that there is some ground leveled with their common principles of constitutional democracy and rule of law.

Chakraborty (2003) described that the idea of community policing has already existed for a long time. This notion has now gained momentum and the success stories of various community policing programs have emboldened the various countries. Community policing, hence, seeks to bridge the disconnection between the policemen and the society to the point of becoming comrades of the society they occupy. That is, the

individual policeman as an individual officer, ought to know something about every member of the community and the members of the community ought also to know something about him. He argues that one important precondition for the achievement of any community policing project is the capacity of its sponsors to market the project to its consumers. For this, it is essential that the beneficiaries are well defined and well sold to.

According to **Choudhory 2003**, social and economic changes are taking place in India. It can therefore be argued that efficient policing is a prerequisite for the continuity of growth in the economy and social AR section. The deployment of effective scenario planning would help to ascertain the principal drives that would affect the future that is visualized of the policing. Perhaps working in conjunction with other sectors, the police have to develop the improved models of criminal justice relevant to the 21st century in India.

According to **Iyer (2003)**, police have been shown to have a bad perception. Reasons are many, including the dual system of the control of law and politics. The police force should report to both the law and people. Police need to be protected from interferences by being delegated some independence with an adequate measure of prescriptive freedom. Some of the pressure points that need to be developed regarding the police are based on people-friendly aspects.

Raghavan (2003) established that India had a severe terrorist issue, particularly in the north-east region and in the north-western state of Jammu and Kashmir. Somewhat related to this, there were strained relations between the majority Hindus and the large Muslim population. Civil unrest between Hindus and Muslims in Gujarat in early 2002 provoked explicit allegations of governmental complicity as well as bias by the police. Even though the Indian Police Service has become more professional while approaching terrorism, the religious neutrality of the Indian Police hence remains questionable. The above image problem is exacerbated by a political context that encourages police allegiance to the ruling political party. It has also helped create an ambience of corruption, which lowered the standards of personal integrity among top policemen. Lack of political will presents the greatest.

Pattavina (2005) integrated the expanding corpus of study in criminal justice and information technology over the previous few decades. The author analyzed

the lessons that have been drawn from the past, the current status of IT in the various criminal justice system components, and the problems that still need to be overcome.

Marks and J. Fleming (2006) in their article discuss the role of police unions in regards to the call for democratic policing as espoused. From the perspective of the authors, it is important for the police to reflect on the assumptions of democracy, as they expect the police to act democratically; the latter should be provided with experience of acting democratically at their workplace. In other words, if police are supposed to be protecting democracy, then they cannot be deprived of democracy, which includes the right to strike and the freedom of association. The authors argue that the police unions serve a genuine forum for facilitating social justice networking and for simply exercising and encouraging democratic practice.

Tankebe, J. (2008) stated that the efficacy and trust of the citizens are proportional. This bond will be maintained so long as people believe that the cops are neutral. The reforms of democracy also assist in making the people have some form of trust in the police. These changes increase the ability of the police force to provide policing services in a more justified and effective way.

According to **Whitehead and Farrell (2008)**, one of the challenges that policing still faces is the wave of mobile phone theft that has been in operation since the mid-1990s. The rate of growth in this decade might be a cause of concern, yet another wave could be on the verge of occurrence. Mobile phone smart wallets are smart phones that are integrated with smart technology and the prospect of detecting theft and financial crime and therefore the appeal of theft is bound to rise with smart wallets. To prevent a possible crime issue, the process of policing should start a conversation with the manufacturers before the issue sets in.

Umranikar (2009) has described the aspects of a healthy work environment at police stations. He stated this with conviction that there is a need for increased attention to be given to police culture. Culture can be occupation-related, especially one that offers an economic framework for the entire day. The police subculture features authoritarianism, suspicion, racism, hostility, insecurity, conservatism, and cynicism, and all these are held by social scientists to be generally true. Policemen from the word go are trained not to discuss anything concerning their work with anyone outside the police force. Therefore, the concept of police culture receives intensive

training and socialization within the organization. Police socialization can be described as the process through which new members of the police gain orientations of their work group, including values, behavior patterns, attitudes, and action characteristics. This is because of the police culture, the police stations received the fear from the sides of the public. Policing in India was said to have been in relation to the police station as a unit. The structure and authority of police have been described in relation to the police officer of a police station. Therefore, the analysis of the structure of work and the culture of work at the police station in question becomes pertinent. In order to accomplish the difficult mission, the police must have enough human resources, technical equipment, and technologies. Today's criminals, through the information and communication revolution, possess mobility, speed, and global networks. However, we can also reach the conclusion that, unless the police force has all the required tools to oppose the contemporary criminal network, society is to become increasingly insecure. To further improve the existing no-win situation of the police, the police must undergo reforms from within. The logical setting for these reforms would be a police station, as it is shown in the picture below.

Byrne & Marx (2011) studied the numerous technical innovations that can be implemented to help decrease crime in general and police-led crime control in particular. Having recapped the studies on the level of adoption in the US, they present the current technological changes and analyze the statistics of the impact, both positive and negative, of some of the newer technologies to crime prevention and police efficiency. Those who supported and those who opposed what is currently known as the second technology revolution raised three very critical issues which they debated: (1) militarization of crime prevention and policing (2) coercive and non-coercive technology (3) control of crime prevention and policing by the public and the private sector.

Police Executive Research Forum (2012) highlights how proactive crime prevention through community involvement and technological developments has replaced reactive crime response as the primary means of policing in the United States during the past couple decades. The report highlights the notable decline in crime rates, mostly crediting this achievement to technical advancements such as license plate readers (LPRs) and Comp Stat. It does, however, also recognize the difficulties brought on by financial limitations and certain legal problems related to the application of specific technology,

such as GPS tracking. They discuss how technology has had a significant impact on contemporary policing, highlighting the ways in which it has transformed police operations, from improving information availability to facilitating predictive policing. It foresees further development in the area and an increase in the need for innovative researchers and problem solvers who can successfully use technology to lower crime. It also calls into question the affordability and effectiveness of different technical fixes and draws attention to the contradictory impacts of economic pressures on the use of technology in law enforcement.

Custers (2012) analyzed the spread of investigative technologies in government agencies, namely, law enforcement agencies in the Netherlands, as well as identified barriers and additional needs. The study drew on a survey of 30 organizations as well as subsequent interviews and included such tools as DNA profiling, fingerprints, CCTV, GPS tracking, data mining, and network analysis. Results indicated that the more traditional forensic applications, such as fingerprints, DNA, and GPS locators, were considered the most effective tools and the most used, whereas CCTV and wiretapping presented volumes of data that could be cumbersome to tackle. Most of the agencies stated that there were obstacles such as the lack of clarity of the legislation, the expenses involved, insufficient personnel, and low understanding of the new technologies. Notably, 50 percent of the organizations failed to assess the strengths of the technology they had adopted, which was a matter of concern in terms of an evidence-based approach towards decision-making. The article determined that despite being an essential part of contemporary policing, technology has its advantages undermined by an inefficient evaluation process, ambiguous legislation, and instantiated organizational reluctance. Custer stressed the importance of performing more systematic evaluations and having more systematic legal and policy frameworks so that no matter how well the new technology may improve investigative results, policymakers have adequate legal and policy frameworks to integrate into the investigative process.

Hekim et al. (2013) In order to examine whether information technologies affect the way US law enforcement agencies deal with criminal cases, a cross-sectional study was carried out. To examine the relationship between dependent and independent variables using an index variable that was created by using survey items as an independent variable and the clearance rate of Part I offenses as an outcome variable,

bivariate and multivariate analyses were performed. The analysis showed that there is no strong correlation between the clearance rate and the use of information technology in departments. However, given that the independent variable of this study first evaluates whether or not a specific type of information technology is being used by responding police forces, caution should be exercised in interpreting such results. Furthermore, the research shows that where it would be most effective, information technology should go to areas of law enforcement. In addition, it argues that process reviews should be carried out in order to ensure the proper use of IT by law enforcement agencies.

Pradeep, N. C. (2013) emphasized that police institutions must adapt to the changing needs of society in India, given the rapid changes in the country's socioeconomic structure. The study investigated the variables influencing the spread of innovation in Indian law enforcement. The “Cyberabad” and “Trichy” Police Commissionerates in the states of Andhra Pradesh and Tamil Nadu of India were selected for this purpose and the spread and implementation of community policing in these two states were discussed and evaluated in sequence. Thus, it shown that in order to implement the discovered innovation – the ideology of community policing – people, mainly middle and lower-level staff, have to know the ideology well and be trained in it in order to become the agents of the change. It also found that the arrangement and the leadership within that park of law enforcement to a great extent determined the diffusion of innovation in that sub-section.

According to **Sharma and Marwah (2013)**, increasing cooperation within society to address the insecurity inside and prevent crime is perceived as the ultimate solution for the rising security issue. This can only be done by creating trust, distrust where there is none, and constant efforts by fostering the dialogue culture. However, this dialogue must start at the community level with community policing initiatives that must be charted and conducted with a purposeful and focused approach. The present study further describes and assesses the strategy and activity of the public and community relations practices currently being done through the Chandigarh police. The study notes that these practices have yielded marvelous returns by emerging as useful things to influence trust and fill voids that exist between the public and police. But to enhance the essence of effective interface problems between the public and police force, issues like

corruption, unprofessionalism, low morale among the Chandigarh police force, and inter-strata conflicts need to be addressed on priority.

Tombul and Cakar (2015) offer a narrative overview of how police agencies are adopting information technologies to prevent and investigate crime, arguing that criminals' own turn to digital tools has compelled law enforcement to prioritize technological capability. They catalogue "recently developed" tools, social-network analysis, GIS and crime mapping (including risk-terrain modelling), biometrics (fingerprints, DNA), facial and speech recognition, social-media policing, acoustic gunshot detection (ShotSpotter), and CCTV and illustrate their use with cases such as the Boston Marathon investigation and the 2011 Vancouver riots, where public uploads supplied valuable digital evidence. Additionally, it describes organizational factors that affect results. These factors include attitudes of officers, training needs and concerns about data protection. According to the study, the importance of technology is that it may not directly help the reduction of crime yet it can increase police efficiency in when well-matched with daily duties and administration. It is mainly a descriptive piece and draws on previous research and examples rather than testing effectiveness. It ends by calling for more proactive, technology-driven strategies in policing. Overall, it provides a useful overview of the field and makes the case for adoption, but it does not assess which technologies actually lead to measurable improvements in outcomes.

Chawla (2016) investigated the latest targeted cyberattack on MP police and CBI websites. These cyberspace eminences have succeeded in the attacks, and although stealing private information from such government agencies has undermined the public's trust in the government. As for the author, it was suggested that, regarding general personnel, certain guidelines should be provided. The incidental utilization of IT frameworks will be addressed by occasional CSAs and the modification of organization-specific TLAs. This will lead to improved efficiency and more production.

In his study, **Gupta (2016)** describes professionalism in law enforcement and its relation to diverse factors—such as stress management, citizen perception, or humans' rights—and so on. It details the issues that police do face in India, calls for a cultural change and for going deep to transform their professionals, factors such as training, recruitment, and selection, the law reform, or human rights protection. First, the conclusion directs attention to the management view on police work and the reciprocal

interrelation between police conduct and societal conduct. To meet the challenge of the 21st century, this article emphasizes the ongoing reform, which is in line with democratization, modernization, and police appreciation of autonomy.

Kapoor (2016) studied the growing use of mobile phones and WhatsApp, looking at how these tools shape everyday communication as well as their emerging role in policing. The study highlighted that while such platforms are at times misused for criminal activity, they also create valuable opportunities for community participation, quick crime reporting, and faster sharing of information by the police. Kapoor claimed that police departments need to establish clear instructions in order to make a safe and responsible use of these platforms. However, the research did not explore how such use might affect long-term concerns such as privacy, data protection and the management of digital evidence, which remain important for further research.

Byrne & Hummer (2017) focus on the adoption of technology and the practices of police forces concerning the technological aspect of policing. Different papers explain how modern tools and gadgets, including surveillance systems, body-worn cameras, and forensic uses, are used in policing to improve crime fighting and efficiency. However, the positive impact of these technologies includes the following drawbacks: the effectiveness of these technologies in implementation and assessment depends on the culture and climate of the police agencies. Some of the issues include the establishment of criteria to test for uniformity in achievements and the handling of the fact that outcomes are often subjective. Previous studies have stressed the importance of clear objectives and a strong policy as a foundation for delivering technology-enhanced solutions that can increase the communities' trust and legitimacy. Thus, the ever-widening organizational activities and realities, management systems, and general health of police agencies are significant factors in the effectiveness of technological advancements in police work.

Sandeep Kaur (2017) says that they also have a public responsibility to ensure that everything done by the police is appropriate. The public, in return, constructs their stand with regard to these actions. What is really regrettable in 'Police Image' is that no matter how elaborate defenders of police officers try to get, the public has every reason not to listen to them. A hostile attitude of the public neither hears nor sees anything right and thus excludes the police from very vital cooperation from the public. Crime that occurs goes unrecorded; knowledge regarding suspicious individuals

or events is concealed; and evidence from those who observed the circumstances is unavailable. As such, from the discussion above, it appears quite clear that the police-public interface bears a close relationship with the sort of opinion that the public holds about the police. As per this study, it becomes clear that while the public rightly assumed that police had the capability and capacity to solve the major crimes, they had no faith in working police.

Boateng, F. D., & Wu, G. (2018), conducted a study with police officers from two different countries to examine the potential effects of perceived organizational support on officers' behaviour and sense of effectiveness. China and Ghana were these two nations. Compared to Chinese police, Ghanaian police officers were viewed as having higher organizational support and a greater sense of effectiveness. These Ghanaian police officers did not rely on public opinion and had a very positive self-image. Conversely, police personnel in China heavily relied on the opinions of the general public. Ghana had greater conviction rates than China due to its police officers' superior performance and conduct.

Sarah Jane Fox (2018) describes the history of policing technology in detail, focusing primarily on surveillance and closed-circuit television (CCTV). It presents the historical background and attitude towards these technologies and states that, despite the increased use of these technologies, people do not trust the police services. The review points at the duality of trust, something that drives technological evolution, and yet if mistrust is formed, it hinders development. It explores the advent of such innovations as drones that may be useful to police administrations but at the same time entail legal questions on their usage and governance. The current review also underscores the importance of a more balanced approach to such issues since the advantages of innovation cannot be waved off, but there are also potential negative reactions from the public that should be guarded against. This means that it is important to enhance legitimacy, be clear and transparent, and ensure that there is consistent regulation to help deal with such issues.

Majumder & Mitra (2019) looked into the difficulties of using technology for law enforcement in their research. Furthermore, effect of technology on the police forces of Bhubaneswar and Guwahati, two cities in eastern India, the primary data was gathered through in-person interviews with fifty police officers working under

the police commissionerate. To sum up, the authors conclude that there is a factor for justice in the fulfillment of technology. It is a humble effort to try to discover how the police in the two cities are presently exploiting technology and how much more can be done in the future to tackle the new trends in criminal activities.

Pareek and Shah (2019) in this article discuss the challenges the author has to face while designing and implementing software for police forces, the user-centered design approach, and frequent interaction with the end user. The intended software to be developed is called the “ePolice Station,” which will integrate the police departments’ administrative work and provide the police inspector with a control panel. The modules used in the software were developed to socialize with police officers at the station and what they require in the line of duty. The software was designed to be user-friendly and feature-rich to promote adoption. Data-driven insights, performance evaluation tools, and the ability to make better decisions all contribute to the software’s success. All in all, this development process highlighted the need to consider human factors when designing and implementing software.

Rai & Sharma (2019) the literature review addresses SCADA (Supervisory Control and Data Acquisition Systems), their components, and their historical evolution. This review therefore emphasizes the significance of SCADA in the management of electric power generation and supply. SCADA systems are extremely important therefore in order to safeguard the electricity grid so that it is secure and reliable. The review discusses some of the issues encountered in the security of SCADA systems, especially by present-day cyber threats. The review highlights the variety of research efforts and solutions proposed to enhance SCADA security, including integrating AI for threat detection and management. Overall, this review emphasizes the need to address SCADA security vulnerabilities so that critical infrastructure, such as electricity networks, can be protected.

Banerjee, Roy, and Dawn (2020) in their research work Crime Dynamics and Distribution of Asansol Durgapur Police Commissionerate, Paschim Bardhaman District explained the causes of criminal activities in the society and how the police force can use the information to detect crimes in urban centers.

Manes (2020) offers a doctrinal and case-study analysis of secrecy surrounding police surveillance technologies and the “anti-circumvention” rationale the claim that public disclosure would help criminals evade detection. Using Stingrays (cell-site simulators) and mobile x-ray vans as extended examples, the article traces a common life cycle: adoption in secrecy, years of fragmentary disclosures, and only belated judicial or legislative oversight. This secrecy is sustained through tools such as FOIA Exemption 7(E) and the law-enforcement techniques privilege, along with prosecutorial tactics like obfuscating or mischaracterizing technologies in warrant papers, “parallel construction,” and even dropping cases to avoid disclosure. The result, Manes argues, is an information asymmetry that impedes courts (e.g., the Seventh Circuit’s Patrick case) and discourages legislatures from setting public rules, entrenching a form of self-regulation by police. He concludes that the anti-circumvention logic now justifies more secrecy than it warrants and recommends narrowing those secrecy doctrines and requiring public notice and comment before agencies deploy novel investigative tools. The article is U.S. focused and not empirical, it does not quantify harms or compare jurisdictions, pointing to a need for systematic evaluation of transparency ordinances and cross-national frameworks.

Shahid et al. (2021) outline the problems with the Front Desk (FD) project's implementation and use in the Punjab police force, along with their fixes. It also emphasizes how the Punjabi police operate both with and without FD, how crucial FD is to the police department's ability to handle grievances, and analyzes the actual nature of crimes. It addresses numerous facets of police department misconceptions and errors made by Punjabi police officers, and it makes several recommendations for improving the department's appearance.

Bindu & Singh, (2021) The author addresses the urgent problem of cybersexual assault against women in India, emphasizing the ways in which it is becoming more common and the different forms it can take online. Cybercrimes such as virtual rape, morphing, cyberbullying, and cyberstalking affect women most especially as compared to men. These include legislative gaps, patriarchy, and a preemptive fear of being blamed for the actions of others, which are legal and cultural, respectively. However, more women are falling victims to cybercrimes; there is a deficit in reporting and investigation of such cases, and many of them are unreported or unrecognized. In order to effectively address cybercrimes against women, the author

highlights the need for awareness, appropriate training for law enforcement officials, improved legal requirements, and the formation of support structures.

Laufs and Borrion (2022) highlight a systematic review of the roles of technological advancement in the current policing system in the paper. This review provides an overview of policing technologies, their efficiency in modern policing, and the measure of ethically or socially desirable use of such technology. These are as follows: The requirement for connectivity between a system and other systems, The limitation of resources The area of trust among the members of a community in the use of new technologies. The literature highlights that the use of technologies for learning has to be balanced and sensitive and highlights the issues of data privacy, fairness, and data ownership. Further, the review shows that translating requirements for habitation and socially acceptable solutions require the participation of citizens and further analysis of institutional police politics.

Agarwal (2023) discussed the use of AI is in criminal cases. Another way in which using artificial intelligence (AI) negates human rights is that AI is far from absolutely non-biased or highly secure in terms of safekeeping people's identifiable information. According to the researcher, the topic of minority rights is timeless in India, and when concerns about AI's potential to violate these rights surface, its extensive and unheard-of deployment will only fuel the flames. Notably, compared to the US or the UK, India uses AI in criminal investigations much less frequently; therefore, the negative effects have not yet been seen. India's system can be improved by learning from the mistakes made by other nations. The study has addressed every concept and has also included some recommendations and advancements in other nations with relation to the use of AI in criminal investigations.

Wienroth (2023) outlines the significance of understanding and managing the integration of technology in policing practices. Which highlights the necessity of examining the systemic, social, institutional, and situational contexts to evaluate the usefulness and legitimacy of technologies used in policing. It also accepts that there is a lack of literature specifically addressing the operational approach of technology in crime, border, and societal police surveillance and tries to provide the reader with various studies on the subject. Important themes here are technological knowledge construction and its implications for the processes of policing and the concomitant organizational cultures,

and technology in the construction of policing legitimacy. The contributions address various features and uses of technology, such as drones, AI, forensics, and social media applications, as well as various methodological perspectives adopting social studies of science and technology and sociology/criminology frameworks.

1.3 POLICIES

International Policies on Police Reforms

The Australian Federal Police (AFP) in their booklet titled “POLICING FOR A SAFER AUSTRALIA, STRATEGY FOR FUTURE CAPABILITY (March-2017)”, have used different technological inventions in improving the policing proficiency. In matters concerning data, the AFP has been made easier through digitization since it can handle large volumes of information electronically. This shift has enabled handling of more of big data used in provision of crime predictive analysis and combating of crime. Accessibility or connection through use of the internet and effective use of 4G and 5G Telecommunication has also enhanced communication and transfer of information, although has brought about insecurity through cybercrimes. Advanced technologies like 3D printing and nanotechnology on material have enabled the making or changing of materials in several ways, thus presenting a huge challenge where advanced crime prevention skills and advanced intellectual property protection are needed. In addition, the augmentation technologies such as the virtual and augmented reality alongside machine to brain interfaces have increased the efficiency and capabilities of the law enforcers in types and degree of interactions in their line of duty.

In the United Kingdom, the National Policing Digital Strategy 2025–2030, produced by the NPCC (National Police Chiefs’ Council) and APCC (Association of Police and Crime Commissioner), sets out a revised vision for digitally enabled policing. Building on the earlier 2020–2030 plan, it adjusts priorities in response to advances in technology and emerging security challenges. The refreshed strategy sets out five main ambitions, to keep public protection at the heart of policing, to improve the experience of citizens, to provide officers and staff with modern digital tools, to deepen collaboration with the private sector and to embed a whole-system approach that links policing with wider government and society. These ambitions are supported by seven key

enablers, which include greater use of data and analytics, replacement of outdated systems, interoperability between technologies, stronger security and resilience, development of digital and data expertise, alignment of priorities across policing bodies and the creation of an open marketplace to minimize duplication and dependence on single vendors. Responsibility for delivering the strategy rests with the NPCC, the APCC and the Home Office via the Police Digital Service. The strategy gives particular weight to ethical safeguards, stressing the protection of privacy, the promotion of equality and the responsible use of artificial intelligence. Viewed as a whole, it provides a framework for UK policing that shows how technology can be used to modernize policing without sacrificing accountability, transparency and public trust.

National Policies on Police Reforms

The Information Technology Act, 2000, approved by the Indian Government has given legal recognition to electronic records and digital signatures paving way for electronic governance. It deals with such matters as cybercrime and electronic business; it accredits legal agreements to electronic deal and communications. The Act also describes the offenses, the penalties, and the procedure in cases of cyber criminals as well as the computer related crimes such as unauthorized access, theft of data, identity theft and the like. It switches powers to the government to set up the certification authorities of digital signature and outlines the roles of the network service providers on the information network. Subsequent amendments have enhanced the Act to better address the growing technological advancement and cyber dangers.

Substantial change in the provision of the existed IT Act of 2000 at 2008 through the **Information Technology (Amendment) Act, 2008**. These changes were expressed to respond to the rising threats and concerns in the area of cyberspace, computer criminality and information security. The Act brought the new sections to prevent different sorts of cyber offenses, such as identity theft, cyber terrorism, and child abuse material. Secondly, it was an enactment that gave legal backing to electronic signatures and thus boosted the legal structures of e-commerce and electronic transactions. The amendments also laid down sections for data protection and privacy to offer stronger protective barriers to prevent unauthorized access to the individuals' data. They are changes that are congressionally required because of the change in the face of

technology that calls for updated laws to shield both individuals and businesses in the new age.

Model Police Act, 2006, The State Government shall establish and provide other technical support bureaus and services which shall work under the Director General of Police, to promote police efficiency. These are the formation of forensic science laboratories at the state and regional levels and mobile forensic science units for all the districts along with requisite equipment and scientific personnel. Replacement of scientific equipment and supplies are necessary at the correct determined intervals. The responsibilities for inspiring the application of science and technology in all policing functions and for supporting up to-date technologies for policing activities are vested with the state government.

State Policies on Police Reforms

“Government of Punjab, Department of Home Affairs and Justice (Home-VI Branch) vide its Gazette Notification No. S.O. 21/C.A.2/1974/S.2/2024 dated 15-03-2024 notified 28 Cyber Crime Police Stations for investigating cases of Cyber Crime in the Districts/Police Commissionerates of Punjab”. In the Standing Order No. 2 of 2024 for Cyber Police Stations contain various provisions that are currently proposed with the objective of optimizing the work of cyber police stations. This order provides the guidelines on handling of cybercrime related cases, protection of evidence, and coordination with other law enforcement agencies and other counterparts in the cyberspace. This has placed much focus on functional education involving officers, the incorporation of high-end technology equipments and instruments, and a strict compliance with legal and ethical practices as far as cybercrime related cases are concerned. The order also specifies the allocation of the administration as well as the reporting systems within the cyber police stations in order to guarantee the accountability of the forces in charge of the stations.

According to **MANUAL OF FORENSIC SCIENCE LABORATORY**, which is available on Punjab police official website, Manual of Forensic Science Laboratory, Punjab contains the detailed procedure of the working of the Forensic Science Laboratory set up by the Govt. of Punjab in the year 1976. The operationalization

of the laboratory was dated 1981 and was majorly involved in analysing crime scenes and other samples picked from across the state. In these manuals, there is a distinction that went through all the divisions of the laboratory such as biology, chemistry, toxicology, serology, and photography among others and all these sections were equipped with scientific instruments and techniques to be used in the analysis of specified forms of evidence. Moreover, it defines the processes on how to receive and store exhibits as well as how to dispatch them, hence legal evidence handling goes through various procedures in order to be genuine and above board. The laboratory plays a significant part in ensuring that suspects are connected to crimes by analysis therefore assisting the law enforcement services in their investigations.

1.4 THEORETICAL FRAMEWORK

In the field of policing, the meaning of the concept of a theoretical framework can be elaborated by various interdisciplinary theories that contribute to the understanding of law enforcement practices and their effects on society. One such prominent theoretical framework is as follows:

Technology Acceptance Model (TAM): This research adopts the Technology Acceptance Model (TAM), which is an information system theory that Fred Davis formulated in 1989 (Davis, 1989). TAM is actually a well-known model that describes why people adopt a new technology and why they use it. The theory suggests that technology adoption is primarily influenced by two key factors:

1. **Perceived Usefulness (PU):** According to Davis, PU is “the extent to which an individual thinks that utilization of a specific system would be beneficial to his/her performance of tasks at the workplace.” Perceived usefulness in the context of policing is defined as the level of police personnel’s confidence that the available emerging technologies will enhance the achievement of optimum results in their tasks. For instance, GIS as a tool and predictive and biometric systems assist in the ability to estimate crimes, manage resources, and conduct efficient investigations comprehensively.
2. **Perceived Ease-of-Use (PEOU):** According to Davis, PEOU could be defined as “the extent to which a person perceives the usage of a specific system to be easy.” In policing, this construct refers to the ability of officers to learn and conduct

themselves in new technologies. Mobile data terminals, real-time crime centers, and body-worn cameras agreed that since officers must like and use the technology, easy-to-use tools would be embraced by the officers.

According to TAM, these two factors are proposed to determine a person's attitude towards the use of technology as well as his or her intention to use technology in his or her daily life, and therefore ultimately determine the technology usage behaviour.

Application of TAM to Policing

From the discussion of TAM, it is clear that this conceptual framework offers quite a helpful perspective from which to assess the implementation of novel technologies in the context of policing. Modern policing more and more depends on high-tech means to prevent and control crime, protect the population, and encourages confidence among citizens. Nevertheless, the use and efficient implementation of such technologies depend on the degree to which the officers consider the technologies helpful and easily incorporable into the working environment.

This model is most appropriate for considering proactive policing where technologies like AI, drones, and ALPRs are very useful. TAM also facilitates knowing about the police personnel's receptiveness to these tools and trying to groom themselves as per changes that technology wants to bring.

Role of TAM in the Study by employing TAM as the theoretical foundation, this research seeks to explore the following dimensions:

- 1. Acceptance of Emerging Technologies:** What is the level of utility and ease that police personnel in Ludhiana associate with emergent technologies?
- 2. Impact on Policing Practices:** Finally, to what extent do these perceptions affect the adoption of technologies for both proactive and reactive policing?
- 3. Barriers to Technology Adoption:** What challenges do police personnel face in adopting new technologies, and how can these barriers be mitigated?

Expanding the TAM Framework for Policing

While TAM provides a robust theoretical base, this research also considers additional constructs relevant to the policing context, such as:

- **Organizational Support:** Training, leadership and resource allocation as a determinant of manager's technology implementation.
- **Trust in Technology:** The confidence levels that polymers possess about the dependability, security, and other renditions of technology.
- **External Influence:** The moderating role of technology acceptance in technology application in policing: The influence of public expectations, legal frameworks, and societal trends.

The TAM constructs provide the framework to examine the technological acceptance patterns in the Police Commissionerate Ludhiana. Consequently, by selecting perceived usefulness and ease of use as two key factors, many research has attempted to offer guiding principles on how some of the emerging technologies can be applied in policies in a way that can improve policing results and public safety.

Community-Oriented Policing (COP): Community-Oriented Policing (COP) highlights the importance of efficient collaboration between the community and the police to respond proactively to problems (Goldstein, 1990). Community-oriented policing aims to foster partnerships between the police agencies and the public, which they are supposed to serve. The essence of this approach is to make changes that are preventive, active, community-oriented, and based on trust. The COP framework is premised on the notion that crime fighting entails the involvement of people in society, particularly the police. Thus, positive relations and consequent proper communication promote the generation of clear and efficient techniques for resolving the unique problems of the population that hinder criminals and increase safety.

Max Weber's Theory of Bureaucracy: Understanding the Theory of Bureaucracy by Max Weber therefore offers the initial point of view for addressing the organizational framework and utility of police departments in relation to resolving the issue of the newest technologies. This means that, according to Weber, organizational structure must be of the bureaucratic type, which is characterized by the existence of a well-defined vertical chain of command as well as written and understandable rules of functioning and a clear division of work (Weber, 1947). When it comes to police technology, Weber's principles can inform the strong policy frameworks needed to launch and regulate new technologies and tools within police practices.

Henry Mintzberg's Organizational Theory: The work of Henry Mintzberg, which includes the Organizational Theory, is a good source for finding out how the police department can fit emergent technologies into its existing structure. Mintzberg's works show the importance of the configurations of an organization and the roles of managers, which are important in the implementation of new technologies (Mintzberg, 1979).

1.5 RESEARCH GAP

A limited amount of study has been done on the technologies and software used in policing. The majority of studies conducted so far have concentrated on the public-police interface, police-public relationship, working of the police, policing in India, use of force in police, community policing, work and stress in police personnel, etc. In the last ten years, police departments have been equipped with a wide range of sophisticated tools through the integration of emerging technologies. This has allowed them to track, monitor, and even forecast crime patterns using advanced methodologies. In addition to transforming law enforcement capacities, this technological advancement has ushered in a new era of proactive, data-driven methods for crime prevention and response. There is a limited study on emerging technologies in policing, with special reference to the Police Commissionerate system. In new-age policing, comprehending the impact of technological advancements is crucial. This kind of research is indeed necessary for studying and comprehending how these technologies have been impacting society and policing. The study is an attempt to fill this gap in the existing literature.

1.6 RESEARCH OBJECTIVES

1. To study the existing system of policing in Ludhiana city.
2. To critically examine the conventional and new technologies used by Punjab Police in the Police Commissionerate Ludhiana.
3. To analyze the capacity building and training of police personnel in the Police Commissionerate Ludhiana to use new technologies.
4. To assess the impact of new technologies on police-public relations within the Police Commissionerate Ludhiana.

5. To evaluate the transformative impact of emerging technologies on crime reduction in the region.

1.7 SCOPE OF THE STUDY

Policing is a very broad field and includes many different agencies working for the maintenance of law and order as well as to investigate crimes. It is very difficult to work on the whole issue of police in this field due to its dynamism and complexity. This study therefore limited its scope to emerging technologies in the Police Commissionerate of Ludhiana, Punjab State.

1.8 SIGNIFICANCE OF THE STUDY

In matters such as the maintenance of law and order, the prevention and detection of crimes, and traffic legislation, it is assumed that technology will make a positive contribution to police efficiency. Preventing and detecting crime can be made easier by the adoption of new technologies. Tools that make law enforcement safer for citizens and police could also be made available. As it facilitates greater coordination and allows investigators to be flexible and skilled in administration, it can enhance the effectiveness of police management.

1.9 PERIOD OF THE STUDY

The 21st century saw rapid and dramatic shifts in how technology was used in government and society. The way people think and act has been transformed by technology. The police are no exception to this technological progress, as the way in which law enforcement agencies maintain law and order and prevent and detect crime has been transformed by changes in society. Thus, the range of the research is limited from 2015 to 2025, which is the mid part of the second and mid part of the third decade.

1.10 LOCALE OF THE STUDY

The study was confined to Ludhiana, a city in the Indian state of Punjab that is known for its rich history, which dates back to the reign of the Lodhi dynasty.

“Ludhiana city was founded in the time of Lodhi dynasty which ruled in Delhi from 1451-1526 A.D. The legend goes that two Lodhi Chief Yusaf Khan and Nihand Khan were deputed by Sikandar Lodhi (1489-1517 A.D.) to restore order in this region. They camped at the site of present city of Ludhiana which was then a village called Mir Hota. Yusaf Khan went across the river Sutlej in Jalandhar Doab to check Khokhars who were plundering the Doab and made a settlement at Sultanpur while Nihand Khan stayed back and founded the present city at the site of village Mir Hota. The new town was originally known as Lodhi-ana, which means the town of Lodhi’s. The name later changed to the present name Ludhiana. Ludhiana is now a District Headquarter with Parliamentary Constituency of the same name. It is one of the biggest Municipal Corporations of the State. It is spread over about 310 km². The city stands on the Sutlej’s old bank, 13 km south of its present course. Over the years, the city has turned out to be a vibrant kaleidoscope of different cultures and activities. The city has developed a variety of traits and qualities which are perceptible in various forms. Ludhiana is one of the fastest-growing cities in India and its population according to provisional figures of 2011 Census was 3498739. The population increases substantially during the crop harvesting season due to migration of labourers from states like Uttar Pradesh, Bihar, Orissa and Delhi. Ludhiana has got the highest per capita vehicles in India. Every three months, more than 10,000 new vehicles are added. The problem of vehicular traffic congestion in the city is acute. The city has a number of railways over bridges (ROBs) and fly overs at different strategic places to ease the traffic congestion.” (<https://ludhiana.nic.in>)

Ludhiana is also referred to as the ‘Manchester of India’. It is now a significant business and industrial center in northern India, known for its textiles and manufacturing industry. It also has a unique place in the world in terms of industry, cycle parts, and hosiery. In the Indian state of Punjab, this is the largest and most populated city. Despite this, the rate of crime continues to increase at a rapid pace, and it is becoming increasingly difficult for police to maintain order. People are more aware of the use of technology, and the media is more proactive. To this end, it is important to find out how new technology affects law enforcement. In view of the above, the Police Commissionerate Ludhiana was selected as the study area.

1.11 RESEARCH QUESTION

Following are the research questions:-

1. What were the traditional methods used by the Ludhiana Police for maintaining records and handling documentation?
2. What new gadgets or tools have the Ludhiana Police started using recently?
3. What positive changes have occurred since the Ludhiana Police began using new technology?
4. What challenges have the Ludhiana Police faced when implementing new technology?
5. Do police officers find it easier to perform their duties with the help of technology?
6. Do the residents of Ludhiana feel more connected to the police now that they are using technology?
7. How do the new gadgets help the Ludhiana Police prevent crimes and apprehend criminals?
8. In what ways has the use of new technology improved policing in Ludhiana?
9. How do Ludhiana police officials receive training to use new technology in their work?
10. What strategies can be implemented to enhance the effectiveness of technology in maximizing safety, security, and police-public relations?

1.12 RESEARCH METHODOLOGY

This study aims to thoroughly examine how well the Punjab Police, with special reference to the Police Commissionerate Ludhiana, uses technology to prevent and detect crime, as well as how well it handles current issues. Using a combination of primary and secondary data sources, a mixed-methods approach were used to guarantee a comprehensive and nuanced understanding of the topic.

Primary Data Collection

Sampling Design: To collect primary data, the Police Commissionerate Ludhiana headquarters, specialized units, and all police stations were visited. Key informants for

the study were interviewed, including Station House Officers (SHOs) from different police stations and other GOs (Gazetted Officers) posted in Police Commissionerate Ludhiana.

Respondent Selection: The study involved a total of 500 respondents, of whom 150 were civilians and 350 were police personnel from the Ludhiana region. To ensure a varied viewpoint, the police officer sample included members from various ranks and units. People were chosen at random from different areas of the city.

Data Collection Tools: Both civilians and police officers were provided structured questionnaires to complete. The purpose of these questionnaires was to collect quantifiable data on attitudes, experiences, and views about the Ludhiana Police Department's effectiveness, its use of technology, and its level of satisfaction. To collect data from police personnel and officers, stratified random sampling technique were used. Qualitative insights were obtained through structured and semi-structured interviews with employees and senior officials, conducted both formally and informally. To collect data from civilians of Ludhiana city, purposive sampling was used.

Pilot Study: Pilot research was carried out to pre-test the questionnaire before the main survey. This helped ensure the clarity and applicability of the instruments, clarified any confusion and improved the questions. The final survey tools were refined using input from the pilot study.

Secondary Data Collection

Sources of Secondary Data: NCRB reports, academic journals, books, case studies, newspapers, police commission reports and official documents from the Indian government were some of the sources from which secondary data were gathered. Press releases and reliable websites on the internet also contributed to the secondary data

Data Extraction and Analysis: In order to provide context, historical perspective, and comparative views, secondary data were meticulously gathered, arranged, and examined. The data collected from secondary sources supplemented and enhanced the primary data, allowing a thorough comprehension of the development and effectiveness of the Ludhiana Police.

Table No.1.1 shows the sources and tools used during the data collection process.

<u>Table No. 1.1</u>		
Research Methodology		
Primary Data		
Sr No.	Tool for Data Collection	Number of Respondents
1.	Questionnaire was administered to the police personnel of the Police Commissionerate Ludhiana. (Stratified random sampling technique were used.)	340
2.	Questionnaire was administered to the citizens of Ludhiana city. (Purposive sampling was used.)	150
3.	Interviews were conducted with higher officials of the Police Commissionerate Ludhiana, including SHOs and GOs.	10
Total Respondents		500
Secondary Data		
4.	Gore Committee Report on Police Training	
5.	National Crime Records Bureau (NCRB)	
6.	Second Administrative Reforms Commission Fifth Report on 'Public Order'	
7.	Eight Reports of National Police Commission	
8.	Press Release of Police Commissionerate Ludhiana	
9.	Website of Police Commissionerate Ludhiana	
10.	Social Networking Sites like Facebook, Instagram, Twitter	

11.	Journals
12.	Books
13.	Newspapers
14.	Internet

The data analysis was carried out using average and percentage statistical techniques and the results were presented in tabular form and pie charts.

1.13 LIMITATIONS

Technology is changing, and new innovations are emerging all the time. Since it may not be possible to take into account the most recent technological developments in law enforcement while studying, this research could become outdated very rapidly. Limiting access to data, financial resources, and cooperation with law enforcement agencies may hinder a comprehensive assessment of the impact and effectiveness of emerging technologies, which could affect their intensity and scope. Due to differences in resources, infrastructure, and socioeconomic factors, the effectiveness of new technologies for policing may differ from one jurisdiction to another. The findings of the research may not be universal, and in view of the unique nature of each jurisdiction as well as its particular challenges and needs, it would have been difficult to establish a general picture of results for different police environments.

CHAPTER -2

EVOLUTION AND FUNCTIONING OF THE POLICE COMMISSIONERATE IN PUNJAB AND LUDHIANA

The police system in India can be said to be very historical, as it is the age of India itself. The Indian police are not a recent formation and have come to its present shape, phase and form, passing through different social, political and cultural phases. The present-day police force seems to be a new, rather bizarre complex of various aspects of the ancient, Mughal and British police systems. The structure of police in India was reformed by the National Police Commission signed by the Indian Government in 1977, chaired by Mr. Dharam Vira. It has a broad term of reference to include the police organization, its mandate, its responsibilities, its responsibilities to the society, its relationship with the society, political influence on the police, and cases of abuse of powers, assessing the performance of the police. This was the first commission appointed at the national level right from the time of independence. The National Police Commission, between 1979 and 1981, submitted eight comprehensive reports, indicating that the scope of reforms proposed for the existing police system was both extensive and diverse (Chouhan, 2018).

Unfortunately, none of the major recommendations given were implemented by any government. In 1996 this influenced two former Directors Generals of Police (DGPs) to petition the Supreme Court through Public Interest Litigation (PIL) to compel governments to adopt the NPC recommendations. The Government had formed a committee under the chairmanship of Shri J.F. Ribeiro, IPS (Retd.), on 25th May 1998 on the instructions of the Supreme Court of India in the case of Prakash Singh vs Union of India and others regarding implementation of the recommendations of the National Police Commission. The Ribeiro Committee presented two reports in the Supreme Court in 1998 and 1999 respectively (Ministry of Home Affairs, 2013). The first report was submitted in October 1998 and the second in March 1999, both contained ten recommendations each (Commonwealth Human Rights Initiative, n.d.-a). Thereafter, the Government of India (Ministry of Home Affairs) established the Padmanabhaiah Committee on Police Reforms in January 2000. The Committee included four members along with a former Union Home Secretary, two were retired policemen and two were serving officers, alongside the

Chairman. Other sections of society were not represented in the Committee. In October 2000, the Committee submitted its report to the Central Government (Commonwealth Human Rights Initiative, n.d.-b).

It was the realization of the long-pending need to replace the 145-year-old Police Act of 1861 that prompted the establishment of a Committee of Experts, under the chairmanship of Dr. Soli J. Sorabjee, in September 2005 to draft a new Police Act capable of responding to the increasing challenges of policing and fulfilling the democratic aspirations of the people. It is also known as the Police Act Drafting Committee (PADC). The Committee consisted of six non-official members and four ex-officio members in addition to a full-time Secretary. The Committee was granted an extension until 31 October 2006 (Ministry of Home Affairs, Government of India, 2006). At the same time, little has ever been done on the ground to enhance policing or facilitate the implementation of recommendations made by any of these committees or commissions. But it took the Court a decade more, and it was only in 2006 to deliver the verdict. In a decision known as the Prakash Singh case, the Supreme Court has ruled that change has to occur. The government ordered the states and union territories to conform to seven mandatory directives that would initiate the reform process. These directives were an amalgamation of all the strands of improvement produced since 1979. The Court expected the prompt compliance of the orders given either through proclamations or new police regulations. First of all, the Court itself supervises the act of all states and Union Territories compliance (Commonwealth Human Rights Initiative, 2010).

This chapter thoroughly examines the Police Commissionerate Ludhiana through an organizational assessment of the structure and operational procedures as well as functional analysis. This section examines the police structure, including their administrative levels as well as their jurisdiction boundaries, along with their main responsibilities in law enforcement duties for Ludhiana City. The analysis includes a discussion of the legal aspects that control police work together with a description of specialized units that serve to maintain law and order.

2.1 POLICE COMMISSIONERATE SYSTEM IN INDIA

The British Government came to realize that the district system could not work well in metropolitan areas that had different types of police problems. Therefore,

another system, i.e., the commissionerate system of policing, was introduced by the British Indian government in 1856 to Chennai and Kolkata. Mumbai adopted it a year later in 1864. The implementation of the police commissionerate system throughout Indian states occurred step by step. During the pre-independence era, four police commissionerates began operating in India when Bombay and Calcutta and Madras and Hyderabad established their posts. The first two police commissionerates appeared in Ahmedabad along with Delhi after independence in 1960 and 1978, respectively (Singh, 2022).

As cities continue to develop, the Commissionerate system is required to uphold public safety and adapt to the evolving needs of urban areas. In heavily populated urban areas, a specialized system is needed to address the unique issues that cities have, like crime and traffic control. Large cities frequently face issues with law and order as well as other issues like teacher agitations, communal riots, labour agitations, agitations over government-passed laws. The policing requirements of metropolitan cities are very diverse compared to those of rural areas. Citizens in urban areas expect swift, immediate and highly coordinated responses. The level of expectation regarding policing standards is higher in cities and the state of affairs changes rapidly. Due to the dense population, any delay in response often results in greater loss of life and property. Consequently, police administration in cities should differ significantly from that in rural areas because of variations in the scale and nature of problems. The Superintendent of Police system, therefore, finds it difficult to function effectively, as delays arise from the separation of powers. Under the Commissionerate system, however, the Commissioner acts as a magistrate and possesses powers of regulation, control and licensing. This system enables prompt handling of law-and-order situations due to such powers. Police performance depends on effective resource utilization and operational independence for which accountability is maintained in terms of outcomes. The Commissionerate system provides the necessary freedom and resources to achieve this (Singh, 2022).

The Government of India has established the National Police Commission (NPC) on 15th November 1977. The National Police Commission (NPC) was tasked with carrying out a thorough analysis of the Indian police structure, taking into account the key developments since the enactment of the Indian Police Act of 1861, the report of the 1902 Police Commission and the changes that occurred after India gained independence. The

terms of reference of the NPC were not overwhelmingly broad, but they covered a rather extensive area: a revision of the role and efficiency of the police as an authority in law enforcement and as the authority responsible for the protection of the constitutional rights of citizens.

In 1981, sixth report of the National Police Commission suggested the Commissionerate system for cities with a population of five lakh or more, as well as for areas with unique circumstances (National Police Commission, 1981). The police commissionerate system which was proposed in 2004 by a police reforms committee led by R.S. Mooshahary recommended its adoption for effective management of law and order in State capitals and cities with population over one million. In this system, the Police Commissioner is responsible for managing the entire city police force and directly answerable to the State government (Ministry of Home Affairs, 2005). In this system, the Commissioner of Police is fully responsible for the role of policing the city/area. The main differences between district and Commissionerate systems are that the Commissioner of Police is not subordinate to any other officer in the organizational structure aside from his departmental heads in the organization and the government, while the District Superintendent of Police is generally under the supervision and direction of the District Magistrate. Under various acts, the Commissioner of Police has the authority to exercise and carry out the functions of both an Executive and a District Magistrate. But in Senior Superintendent System, Deputy Commissioner has the authority to exercise and carry out the functions of both an Executive and a District Magistrate. The Commissionerate system, which is thought to be the most powerful policing framework, is crucial in densely populated cities. It is generally accepted that states with greater literacy rates and populations with a broad understanding of the law and their fundamental rights are better suited for this kind of system. A Superintendent of Police (SP) in the Senior Superintendent Police system is in charge of the police force within the police district, while a commissioner of police, ranking as high as IG (Inspector General of Police) or DIG (Deputy Inspector General of Police) is in charge of the force inside a commissionerate. The Police Commissionerate System increases efficiency by consolidating decision-making and streamlining operations. The system has the mandate to improve the effectiveness and efficiency of the police force. This ensures better allocation of resources, faster responses to emergencies and more organized policing (Srivastava & Kumar, 2024).

Successful foreign models have shown that a centralized command structure may improve operational efficiency, foster prompt decision-making, and fortify community engagement. In addition to increasing the general efficacy of law enforcement in large cities, the Police Commissionerate system is also encouraging increased accountability, openness and public trust in the entire system. This allows the creation of specialised units for addressing specific problems in cities such as drug trafficking, cybercrimes and criminal offences. According to a former DGP, the Commissionerate System in Lucknow has made police work more efficient by allowing decisions to be taken faster and coordination to become smoother (Hindustan Times, 2025). The Police Commissionerates system now exists in 75 cities of India.

Detail of 75 Police Commissionerates in India has been produced in Table No. 2.1

Table No. 2.1: The details of Police Commissionerates in India

Sr No.	Name of the State	Total Number of Police Commissionerate	Name of Police Commissionerate/City
1.	Andhra Pradesh	02	1. Visakhapatnam
			2. Vijayawada
2.	Assam	01	1. Guwahati
3.	Delhi	01	1. Delhi
4.	Gujarat	04	1. Ahmedabad
			2. Vadodara
			3. Rajkot
			4. Surat
5.	Haryana	03	1. Faridabad
			2. Gurugram
			3. Panchkula
6.	Karnataka	06	1. Bengaluru

			2. Mysuru
			3. Mangaluru
			4. Hubli-Dharwar
			5. Belagavi
			6. Kalaburagi
7.	Kerala	06	1.Thiruvananthapuram
			2. Ernakulam/Kochi
			3. Kozhikode
			4. Kollam
			5. Thrissur
			6. Kannur
8.	Madhya Pradesh	02	1. Bhopal
			2. Indore
9.	Maharashtra	11	1. Amaravati
			2. Aurangabad
			3. Mumbai
			4. Nashik
			5. Navi Mumbai
			6. Pune
			7. Solapur
			8. Thane
			9. Nagpur
			10. Mira Bhyander Vasai Virar (MBVV)
			11. Pimpri- Chinchwad

10.	Nagaland	01	1. Dimapur
11.	Odisha	01	1. Bhubaneswar–Cuttack
12.	Punjab	03	1. Amritsar
			2. Ludhiana
			3. Jalandhar
13.	Rajasthan	02	1. Jaipur
			2. Jodhpur
14.	Tamil Nadu	09	1. Chennai
			2. Trichy
			3. Salem
			4. Tiruppur
			5. Coimbatore
			6. Madurai
			7. Tirunelveli
			8. Avadi
			9. Tambaram
15.	Telangana	09	1. Cyberabad
			2. Hyderabad
			3. Karimnagar
			4. Khammam
			5. Nizamabad
			6. Rachakonda
			7. Ramagundam
			8. Siddipet

			9. Warangal
16.	Uttar Pradesh	07	1. Lucknow
			2. Agra
			3. Kanpur
			4. Gautam Buddha Nagar
			5. Ghaziabad
			6. Prayagraj
			7. Varanasi
17.	West Bengal	07	1. Asansol-Durgapur
			2. Barrackpore
			3. Kolkata
			4. Bidhannagar
			5. Chandan Nagar
			6. Howrah
			7. Siliguri

Source: From various states police official web sites e.g <https://police.assam.gov.in/>, <https://delhipolice.gov.in/>, https://police.gujarat.gov.in/dgp/CMS.aspx?content_id=47, and so on.

2.2 POLICE COMMISSIONERATE SYSTEM IN PUNJAB

The Indian Constitution has provided that police and public order are state subjects, but the Indian Constitution also provides some provisions on which the central government can interfere in some situations, or it can perform some special functions in police affairs. The Centre owes it to itself to defend states against internal anarchy and ensure that the affairs of every state are conducted as per the Constitution (Constitution of India, Article 355). Police being a state subject, all the states and union territories of India have their own individual police force. While today only a few states have their own

police acts, the organization of the state police forces can be relatively similar throughout the United States. But there are minor differences now in the structure and functions of the police, which have been brought about partly by historical reasons before the independence, partly by the State Police Commissions, and partly by the emergence of democracy at the district level and below. State governments control all matters concerning the strength and arms of political forces and expenses required therefor in the course of the year and also possess various administrative prerogatives and sanctions. They also set out precise guidelines concerning the management and functioning of their respective police forces, which are captured in the police manuals/regulations of the various states.

In accordance with a 2010 notification of the Punjab Government, “it has established for the municipal areas of Amritsar, Jalandhar and Ludhiana and their adjoining areas, comprising the Police Stations, a police system to be known as the City Police Commissionerate from the Superintendent of Police system”. After implementing the Police Commissionerate System in Ludhiana city in 2010, Sh. Ishwar Singh, IPS was the first Police Commissioner of Ludhiana and Dr. Sukhchain Singh Gill, IPS was the last Senior Superintendent of Police in Ludhiana city. The detail of Police Commissioners posted in Ludhiana Commissionerate has been produced in Table No. 2.2:

Table No. 2.2: Detail of Police Commissioners in Ludhiana City;

Sr No.	Name of Police Commissioner	From	To
1.	Sh. Ishwar Singh, IPS	16-02-2010	22-07-2011
2.	Sh. Sharad Satya Chauhan, IPS	22-07-2011	31-12-2011
3.	Sh. Ishwar Chander, IPS	31-12-2011	23-03-2012
4.	Sh. Ishwar Singh, IPS	23-03-2012	13-06-2013
5.	Sh. Paramjit Singh Gill, IPS	13-06-2013	18-11-2013
6.	Sh. Nirmal Singh Dhillon, IPS	18-11-2013	19-02-2014
7.	Sh. Paramjit Singh Gill, IPS	19-02-2014	01-04-2014
8.	Sh. Sanjeev Kalra, IPS	01-04-2014	29-05-2014

9.	Sh. Rakesh Kumar Jaiswal, IPS	29-05-2014	21-06-2014
10.	Sh. Parmod Ban, IPS	21-06-2014	06-08-2015
11.	Sh. Paramraj Singh Umranagal, IPS	07-08-2015	30-03-2016
12.	Sh. Jatinder Singh Aulakh, IPS	30-03-2016	17-03-2017
13.	Sh. Kunwar Vijay Pratap Singh, IPS	17-03-2017	25-04-2017
14.	Sh. Rajender Namdeo Dhoke, IPS	25-04-2017	08-04-2018
15.	Dr. Sukhchain Singh Gill, IPS	08-04-2018	10-09-2019
16.	Sh. Rakesh Aggarwal, IPS	10-09-2019	21-08-2021
17.	Sh. Naunihal Singh, IPS	21-08-2021	22-09-2021
18.	Sh. Gurpreet Singh Bhullar, IPS	22-09-2021	09-04-2022
19.	Sh. Kaustubh Sharma, IPS	09-04-2022	12-11-2022
20.	Sh. Mandeep Singh Sidhu, IPS	12-11-2022	21-11-2023
21.	Sh. Kuldeep Singh Chahal, IPS	21-11-2023	23-05-2024
22.	Sh. Nilabh Kishore, IPS	23-5-2024	08-06-2024
23.	Sh. Kuldeep Singh Chahal, IPS	08-06-2024	29-03-2025
24.	Sh. Swapan Sharma, IPS	30-03-2025	Till Date

Source: List of Commissioners of Police posted in Commissionerate Ludhiana, Prepared by the researcher during primary data collection.

The detail of Police Commissioners posted in Amritsar Commissionerate has been produced in Table No. 2.3:

Table No. 2.3: Detail of Police Commissioners in Amritsar City;

Sr No.	Name of Police Commissioner	From	To
1.	Sh. Varinder Kumar, IPS	15-02-2010	06-09-2010

2.	Sh. Parmpal Singh Sidhu, IPS	06-09-2010	22-07-2011
3.	Sh. R.P Mittal, IPS	22-07-2011	06-08-2012
4.	Sh. Ram Singh, IPS	06-08-2012	23-08-2013
5.	Sh. Jatinder Singh Aulakh, IPS	25-08-2013	30-03-2016
6.	Sh. Amar Singh Chahal, IPS	30-03-2016	18-10-2016
7.	Sh. Lok Nath Angra, IPS	18-10-2016	07-01-2017
8.	Sh. G. Nageswara Rao, IPS	07-01-2017	26-04-2017
9.	Sh. S. S Srivastava, IPS	26-04-2017	10-09-2019
10.	Dr. Sukhchain Singh Gill, IPS	10-09-2019	22-08-2021
11.	Sh. Vikram Jeet Duggal, IPS	22-08-2021	22-09-2021
12.	Dr. Sukhchain Singh Gill, IPS	22-09-2021	09-04-2022
13.	Sh. Arun Pal Singh, IPS	09-04-2022	13-11-2022
14.	Sh. Jaskaran Singh, IPS	13-11-2022	01-03-2023
15.	Sh. Naunihal Singh, IPS	01-03-2023	22-11-2023
16.	Sh. Gurpreet Singh Bhullar, IPS	22-11-2023	10-06-2024
17.	Sh. Ranjit Singh Dhillon, IPS	10-06-2024	26-09-2024
18.	Sh. Gurpreet Singh Bhullar, IPS	26-09-2024	Till Date

Source: List of Commissioners of Police posted in Commissionerate Amritsar, Prepared by the researcher during primary data collection.

The detail of Police Commissioners posted in Jalandhar Commissionerate has been produced in Table No. 2.4:

Table No. 2.4: Detail of Police Commissioners in Jalandhar City;

Sr No.	Name of Police Commissioner	From	To
1.	Sh. Gaurav Yadav, IPS	15-02-2010	23-08-2013

2.	Sh. Ram Singh, IPS	23-08-2013	18-11-2013
3.	Sh. Ishwar Singh, IPS	18-11-2013	29-05-2014
4.	Dr. Kunwar Vijay Pratap Singh, IPS	29-05-2014	07-08-2014
5.	Sh. Yurinder Singh Hayer, IPS	07-08-2014	30-03-2016
6.	Sh. Arpit Shukla, IPS	30-03-2016	02-04-2017
7.	Sh. Parveen Kumar Sinha, IPS	03-04-2017	29-09-2018
8.	Sh. G.P.S Bhullar, IPS	29-09-2018	21-08-2021
9.	Dr. Sukhchain Singh Gill, IPS	21-08-2021	22-09-2021
10.	Sh. Naunihal Singh, IPS	22-09-2021	09-04-2022
11.	Sh. Gurpreet Singh Toor, IPS	09-04-2022	31-05-2022
12.	Sh. Gursharan Singh Sandhu, IPS	02-06-2022	13-11-2022
13.	Dr. S. Boopathi, IPS	13-11-2022	22-01-2023
14.	Sh. Kuldeep Singh Chahal, IPS	22-01-2023	20-11-2023
15.	Sh. Swapan Sharma, IPS	20-11-2023	23-05-2024
16.	Sh. Rahul S., IPS	23-05-2024	08-06-2024
17.	Sh. Swapan Sharma, IPS	08-06-2024	22-02-2025
18.	Ms. Dhanpreet Kaur IPS	22-02-2025	Till date

Source: List of Commissioners of Police posted in Commissionerate Jalandhar, Prepared by the researcher during primary data collection.

2.3 FUNCTIONING OF POLICE COMMISSIONERATE, LUDHIANA, PUNJAB

2.3 (a) History

“After the 1857 War of Independence, which the British referred to as the Sepoy Mutiny (Gadar), the Company Government formed a three-member committee

consisting of Sir Henry Lawrence, John Lawrence, and Mr. Mansel to formally establish a police department in Punjab. Based on the recommendations of this committee, the framework for creating the Punjab Police Department was prepared. On March 22, 1861, the British formally established the Punjab Police, appointing Mr. George Hutchinson as the first IGP (Inspector General of Police) of Punjab. Today, in independent India, this post is referred to as the DGP. In 1862, the office of Punjab Police Ludhiana was established inside the English police camp located in Ludhiana's Lodhi Fort. Along with this, the Punjab Police Training Academy was also established inside the Lodhi Fort in Ludhiana. However, due to space constraints in the fort, this training school was relocated to Phillaur in 1890. It is noteworthy that the famous Punjab Police Training Academy in Phillaur has been operational since that time. In 1870, two police stations were established in Ludhiana city: one at Chaura Bazaar, named Kotwali Police Station, and the other a short distance away, named Sadar Police Station. The heads of these police stations were given the rank of Inspector. In these two historic police stations in Ludhiana, a maal khana (storehouse) was established. These maal khans were set up to securely store weapons and items seized during cases. In 1936, a new police line was constructed in Ludhiana's Civil Lines area. The inauguration of this newly constructed police line was done on February 29, 1936, by IGP Sir John Murray Hewitt and Chief Commissioner Revenue and Police. Earlier, the police line was located inside Lodhi Fort in the Qila Mohalla area. Even today, the Ludhiana Police Line is situated at the same place where it was built by the British.” (Ludhianvi, M. U., 2021)

2.3 (b) Police Strength in Police Commissionerate, Ludhiana

The city police strength and ratio is presented in Table No. 2.5. It indicates that a total of 4195 posted strength as of 4th February, 2025 excluding the Commissioner of Police, 02 Deputy Commissioner of Police, 07 Addl. Deputy Commissioner of Police, 19 Assistant Commissioner of Police, 61 Inspectors, 90 Sub-inspectors, 289 Assistant Sub-inspectors, 460 Head Constables, and 3266 Constables posted in Police Commissionerate Ludhiana. Other than these 275 Punjab Home Guards (PHGs), who are also affiliated with district police. For gazetted officers this strength and ratio are not based on the available posts, as there are many sanctioned or unsanctioned posts in the Police Commissionerate Ludhiana for gazetted officers, which are discussed next.

Table No. 2.5: Police Administration in Police Commissionerate Ludhiana

Sr No.	Rank	Number of personnel
1.	Commissioner of Police	01
2.	Deputy Commissioner of Police	02
3.	Addl. Deputy Commissioner of Police	07
4.	Assistant Commissioner of Police	19
5.	Inspectors	61
6.	Sub-inspectors	90
7.	Assistant Sub-inspectors	289
8.	Head Constables	460
9.	Constables	3266
TOTAL		4195

Source: Prepared by the researcher during primary data collection.

In the Police Commissionerate of Ludhiana, the total strength as per sanctioned is 5182, while the posted strength is 4195. But out of them, 37 vacancies for SIs, 93 for ASIs, 623 for head constables and 243 for constables are available. The sanctioned, posted, and vacant posts are described under table no. 2.6.

Table No. 2.6: Detail of sanctioned strength and posted strength in Police Commissionerate Ludhiana

Sr No.	Rank	Sanctioned Strength	Posted Strength	Vacancies
1.	Commissioner of Police	01	01	-
2.	Deputy Commissioner of Police	02	02	-
3.	Addl. Deputy Commissioner of Police	06	07	+1
4.	Assistant Commissioner of Police	18	19	+1
5.	Inspectors	54	61	+7
6.	Sub-inspectors	127	90	37
7.	Assistant Sub-inspectors	382	289	93

8.	Head Constables	1083	460	623
9.	Constables	3509	3266	243
TOTAL		5182	4195	987

Source: Prepared by the researcher during primary data collection.

In the year 2010, when the Police Commissionerate System was implemented in Ludhiana city, only one officer of SSP rank was initially posted within the Commissionerate of Police Ludhiana, referred to as DCP. However, due to subsequent changes, today there are 6 officers of SSP rank in the city, known as JCP or DCP. The growing population and changing crime patterns have resulted in the creation of numerous new posts, leading to a consistent increase in the number of gazetted officers stationed in the city. The current details of available posts of the gazetted officers in Commissionerate Ludhiana are as follows in Table No. 2.7:

Table No. 2.7: Detail regarding posts of gazetted officers in Police Commissionerate Ludhiana

Commissioner of Police, Ludhiana	
SSP/JCP/DCP Rank	
1.	Joint Commissioner of Police, Head Quarters
2.	Joint Commissioner of Police, City
3.	Joint Commissioner of Police, Rural
4.	Joint Commissioner of Police, Law & Order
5.	Deputy Commissioner of Police, Traffic
6.	Deputy Commissioner of Police, Investigation
ADCP/SP Rank	
1.	Addl. Deputy Commissioner of Police, Head Quarters
2.	Addl. Deputy Commissioner of Police, Zone-I
3.	Addl. Deputy Commissioner of Police, Zone-II
4.	Addl. Deputy Commissioner of Police, Zone-III
5.	Addl. Deputy Commissioner of Police, Zone-IV
6.	Addl. Deputy Commissioner of Police, Industrial Security
7.	Addl. Deputy Commissioner of Police, Investigation

8.	Addl. Deputy Commissioner of Police, Special Branch
9.	Addl. Deputy Commissioner of Police, PBI
10.	Addl. Deputy Commissioner of Police, Operation
11.	Addl. Deputy Commissioner of Police, Traffic
ACP/DSP Rank	
1.	Assistant Commissioner of Police, North
2.	Assistant Commissioner of Police, Central
3.	Assistant Commissioner of Police, South
4.	Assistant Commissioner of Police, Industrial Area-B
5.	Assistant Commissioner of Police, West
6.	Assistant Commissioner of Police, Civil Line
7.	Assistant Commissioner of Police, Industrial Area-A
8.	Assistant Commissioner of Police, East
9.	Assistant Commissioner of Police, PBI Cyber Crime & Forensic
10.	Assistant Commissioner of Police, Traffic-1
11.	Assistant Commissioner of Police, Traffic-2
12.	Assistant Commissioner of Police, Detective-1
13.	Assistant Commissioner of Police, Detective-2
14.	Assistant Commissioner of Police, Command Centre
15.	Assistant Commissioner of Police, Special Branch
16.	Assistant Commissioner of Police, Licensing Unit
17.	Assistant Commissioner of Police, Financial Crime
18.	Assistant Commissioner of Police, PBI NDPS
19.	Assistant Commissioner of Police, PBI Homicide & Forensics
20.	Assistant Commissioner of Police-PBI Economics Offence
21.	Assistant Commissioner of Police, Head Quarters
22.	Assistant Commissioner of Police, PBI Special Crime
23.	Assistant Commissioner of Police, PBI Crime against Women & Children
24.	Assistant Commissioner of Police, Emergency Response System
25.	Assistant Commissioner of Police, Technical Support Unit

Source: Prepared by the researcher during primary data collection.

2.3 (c) Organisational Structure of Police Commissionerate, Ludhiana

Every state is led by the Director General of Police (DGP), who is accountable to the state government for the management of the police force and for giving policy advice to the government on any matter relating to the police force. The DGP is another police rank that forms the top organ of the police force. Police organizational structure reflected policing hierarchy with police constables on the lower end of the company and the Director General of Police on the upper end of the organizational structure. To sum up, the corporate style of work in India is still hierarchical, where Indian Police Service (IPS) officers, who are generally recruited from the state civil service, perform supervisory jobs in cognation with their rank. “Upper subordinates,” which include such rankings as Inspector, Sub-Inspector and Assistant Sub-Inspector, work mostly at the police station level, while the police constabulary including Head Constables and Constables etc., are assigned law and order, guard, gunman, patrolling and other various duties.

A hierarchical order of police administrative office is given in Table No. 2. 8. The total number of zones in Police Commissionerate Ludhiana is 4 and 8 sub-divisions. There are 28 police stations, 1 women's police station and 1 Cyber Police Station.

Table No. 2.8: Zones, Sub-divisions & Police Stations/Police Posts in Police Commissionerate Ludhiana

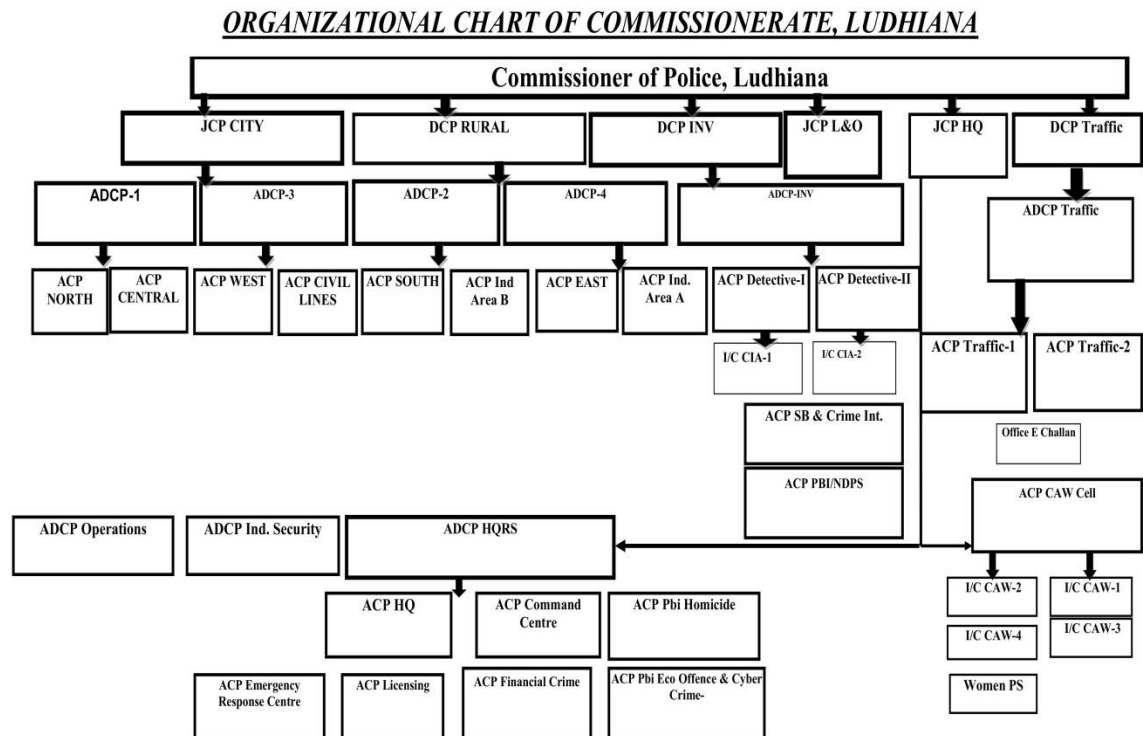
Sr No.	Particular	Number
1.	Zone	04
2.	Sub-divisions	08
3.	Police Stations	28 + 1 (Women) + 1 (Cyber) = 30
4.	Police Posts	35
5.	Traffic Zones	06
6.	PCR Zones	04

Source: Prepared by the researcher during primary data collection.

The Ludhiana Police is presently headed by a Commissioner of Police holding the rank of Deputy Inspector General of Police (DIG) or Inspector General of Police (IG). The Deputy Commissioner of Police Investigation looks after crime and the Joint Commissioner of Police Law & Order looks after the law & order aspects. Traffic is looked after by the Deputy Commissioner of Police Traffic, whereas security

arrangements, the crime against women cell, trainings, and other administrative work are looked after by the Joint Commissioner of Police Headquarters. The organizational structure of Police Commissionerate Ludhiana is shown in Figure No. 2.1.

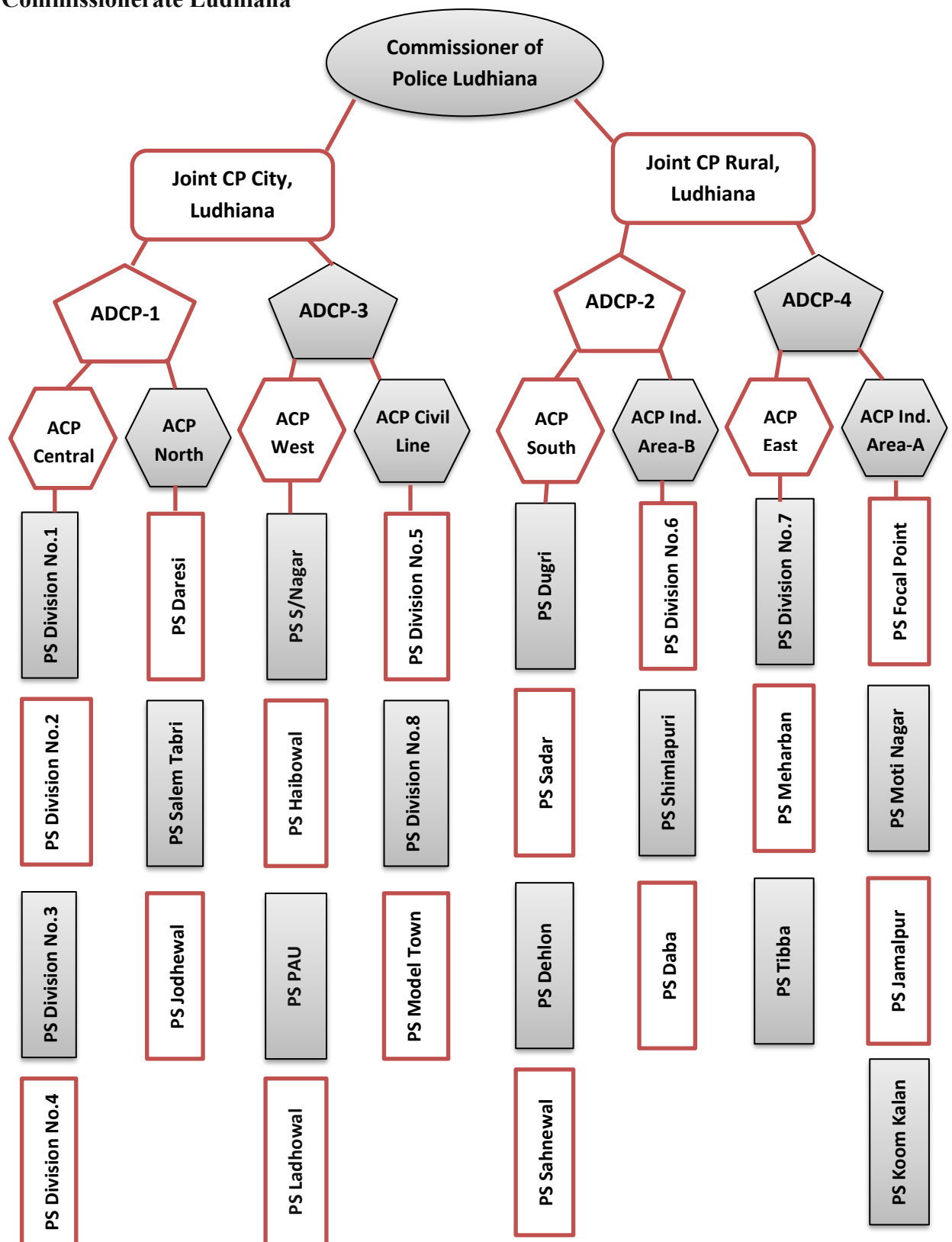
Figure No. 2.1: Organisation Chart of Commissionerate Ludhiana



Source: Prepared by the researcher during primary data collection.

The Joint Commissioner of Police City & Rural is the top supervisory office of police stations, sub-divisions and zones. Ludhiana city police stations were earlier divided under the supervision of four Addl. Deputy Commissioners of Police (Zone-1,2,3 & 4) and these Addl. Deputy Commissioners of Police reported to the Commissioner of Police, Ludhiana, but at present the Police Stations of Ludhiana city are divided into two parts under the supervision of the Joint Commissioner of Police City and Joint Commissioner of Police Rural and then they are divided into four zones under the supervision of Addl. Deputy Commissioners of Police (Zone-1, 2, 3 and 4) and, after that, eight sub-divisions under the supervision of Assistant Commissioners of Police (Central, North, West, Civil Lines, South, Industrial Area-B, East and Industrial Area-A). The organizational structure of police stations has been produced in Figure No. 2.2:

Figure No. 2.2: Organizational Structure of Police Stations in Police Commissionerate Ludhiana

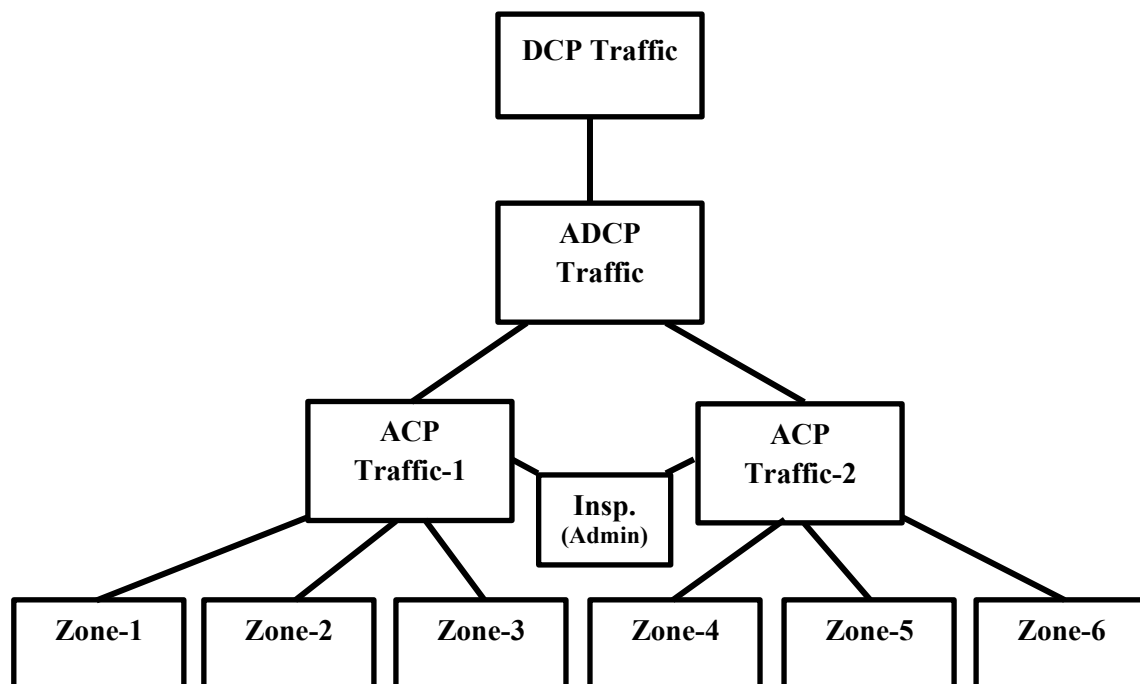


Source: Prepared by the researcher during primary data collection.

2.3 (d) Traffic Police in Police Commissionerate, Ludhiana

55

Figure No. 2.4: Organizational Structure of Traffic Police in Police Commissionerate Ludhiana



Source: Prepared by the researcher during primary data collection.

2.3 (e) Special Wings/Units of Police Commissionerate, Ludhiana

The Commissionerate can often be divided up into several units and branches, each in charge of particular policing responsibilities. While the Traffic Police are in charge of managing traffic and maintaining road safety, CIA unit is dedicated to criminal investigations. With the ever-increasing population and evolving crime patterns, the Ludhiana city Police Commissionerate undergoes continuous modifications. In addition, Ludhiana City has established a number of other units, including the EO Wing, AHT Unit, CAW Cell, Women Police Station and the Cyber Crime Cell. Public relations and community trust-building are encouraged through Saanjh and Community Policing.

In the Commissioner's office, there are several administrative units and branches dealing with department internal affairs & records and it also has public dealing units and branches. Table No. 2.9 shows the list of these public dealing units and branches of the Ludhiana Police Commissionerate:

Table No. 2.9 : Name of Unit/Branch

- District Control Room
- Shaanjh Kendars
- CPRC
- Woman Police Station
- Crime Against Women Cell (Zone-1, 2, 3 & 4)
- Traffic Control Office
- E-Challan Branch
- PCR
- Crime Branch-1, 2 & 3
- Anti-Narcotic Cell-1 & 2
- Special Branch
- Economic Offence Wing
- Anti-Human Trafficking Unit
- Technical Support Unit
- Cyber Crime Unit
- Social Media Cell
- Court of DCP-cum-Executive Magistrate, Ludhiana
- Finger Print Bureau
- PO Staff
- Prosecution Cell
- Arms Licensing Unit
- Miscellaneous Branch
- Safe City Control Room
- Community Policing Resource Centre (CPRC)
- RTI Branch
- Summon Staff
- Covid Cell
- Election Cell
- Punjab Police Mehla Mittar (PPMM)
- Public Complaint Branch

Source: Prepared by the researcher during primary data collection.

CHAPTER -3

CHANGING TRENDS IN POLICING

The police maintain their essential status as a state enforcement authority across different eras, from ancient times to the British era through today. The State's core duty lies in preserving public order alongside maintaining rule of law among all its multiple responsibilities. Good governance depends on this fundamental component because public disorder combined with lawlessness leads citizens to lose faith in their government and undermines its authority. In prior times, police units held the main responsibility of enforcing law alongside maintaining state sovereignty. Modern-day economic transformations alongside social progress and rising globalization and communication technologies strain social peace to the brink of social disruption of societal bonds. Under these circumstances, the police force encounters extraordinary challenges. A transition into the new world economy requires immediate changes in traditional police methods because multiple factors render outdated police policies.

New technology applications play an essential role in reshaping the police force from a despotic government instrument into a protector of citizen's existence and freedoms. Technological advancements have revolutionized every social expression throughout the entire domain of society, thus transforming law enforcement mechanisms and procedures. Society's customs have changed and technological developments along with crime control realities push the formation of new criminal activities. The society's evolving pattern requires new strategies for criminal control. Modern technology was adopted by police as a new way to do their jobs. The changing conditions of society caused by new technological developments require policing agencies to adopt modern technological gadgets for achieving their goals of crime prevention and detection.

International police organizations would focus persistently on the learning and implementing of novel technology. The introduction of modern technologies creates substantial advantages, including standard of life advancements along with life expectancy gains and economic expansion, which exceeded pre-modern world expectations. While they provide substantial value, they challenge basic human concepts about existence; simultaneously, they produce possible hazards that demand solutions.

This chapter presents a comprehensive evaluation of the technical innovations at Police Commissionerate Ludhiana while studying conventional police procedures against modern technological solutions. It assesses the technological implementation of the Ludhiana Police Commissionerate, including crime detection measures and prevention methods. The chapter analyses the development initiatives that aim to enhance police personnel skills for proper technology usage. Furthermore, the chapter evaluates the training methods and their outcomes to verify the preparedness of modern law enforcement agencies for current law enforcement needs.

3.1 MEANING OF TECHNOLOGY AND NEW TECHNOLOGY

Technology applies scientific knowledge along with tools and techniques to address problems as well as boost efficiency and human life quality (Arthur 2009). A broad selection of innovations begins with basic tools all the way to digital systems, which influence multiple areas like communication systems, healthcare services and law enforcement operations. According to Rogers (2003), new technology contains the most recent developments that modify current operations or establish fresh capacities. These modern technologies fuse automated systems and artificial intelligence and big data analytics and the Internet of Things for better efficiency and decision outputs (Brynjolfsson & McAfee, 2014). In the context of policing, new technologies such as predictive analytics, facial recognition and digital forensics are transforming traditional law enforcement practices, making crime detection and prevention more effective (Chan, 2001).

3.2 HISTORICAL BACKGROUND

Throughout centuries, policing has gone through remarkable development driven by technology, which shaped the methods used by law enforcement. The development of primitive tools, which began in ancient times, through modern digital solutions has transformed police methods for maintaining efficiency and effectiveness in law enforcement. At their beginning, law enforcement systems operated with human monitoring and made do with batons and swords as their weapons. When societies grew larger and criminals developed complex methods of crime, the need for advanced instruments forced the incorporation of new technological solutions. The Telegraph and Communication Revolution brought the telegraph as one of the pioneering technological

advancements of policing at the start of the 19th century. The telegraph system allowed police departments to maintain instant contacts that enabled swift responses to take place during incidents (Deflem & Chicoine, 2014). Telephone network systems added in the late 19th and early 20th centuries improved the speed of police communication channels. The Bertillon system introduced the fingerprint identification system as part of criminal identification through anthropometric measurements in the late 19th century. The fingerprinting technology replaced the Bertillon system after its proven unreliable nature became evident. Sir Francis Galton published his landmark research about fingerprint uniqueness in forensic science during 1892 (Galton, 1892). The technological approach offered efficient criminal investigator tools that reduced the incorrect identification of criminals. The 1930s became an important milestone when two-way radios were installed in police patrol cars for the first time as radio communication technology started to appear in law enforcement applications. The new technology made emergency interagency coordination possible between on-scene officers and central police offices (Geller, 1992). Policing became faster in response because patrol vehicles enhanced mobility throughout the expanding automobile age. Police departments started using computers during the late twentieth century. Modern policing during the 21st century has experienced fundamental changes through the implementation of CCTV alongside GIS and facial recognition technology, which substantially boosted crime prevention alongside crime detection capabilities (Kaplan, 2015).

3.3 TECHNOLOGICAL EVOLUTION IN INDIAN AND PUNJAB POLICE

Indian modern policing began during British colonization through British efforts to form established police organizations. The Indian Police Act of 1861 established organized crime management through traditional enforcement techniques and maintenance of social order. The adoption of new technologies moved at a sluggish pace throughout the first decades (Bayley, 1983). During British rule, India relied on personnel maintaining physical records while officers used traditional verbal methods for communication. Telegraphs followed by telephone systems became available to improve police unit coordination as time passed (Arnold, 2000). After 1897, India recorded one of its major police milestones by creating the inaugural fingerprint identification bureau in Calcutta (Kolkata). The fingerprint-based system completely changed police

identification practices, causing other forces throughout India to adopt it (Kumar, n.d.). The Indian law enforcement establishments underwent systematic technological development following independence since 1947 by adopting police radio systems and forensic facilities with evidence storage databases. In 21st century, the focus shifted towards computerization, which resulted in the Crime and Criminal Tracking Network & Systems (CCTNS) development under guidelines of National e-Governance Plan (NeGP) (Agrawal et al., 2016). The Punjab Police organization leads India in the implementation of advanced policing technologies. The police force of this state has accepted modern surveillance methods alongside forming cybercrime units and implementing intelligence-based policing because of its long experience with terrorism and organized criminal elements (Gill, 1999).

Punjab Police uses digital solutions for maintaining a system that handles FIR reporting in addition to vehicle location tracking and active crime documentation. The increasing number of cyber threats motivated Punjab Police to create separate wings focused on online fraud prevention and the prevention of hacking incidents and identity theft. Through Saanjh Kendars and smart city surveillance projects, Punjab Police has improved their relationship with the public as well as their ability to prevent crimes.

3.4 NEED OF NEW TECHNOLOGIES IN POLICING

Modern policing methods based on traditional approaches are insufficient to handle the current-generation of societal challenges which grow more complex each day. The policing practices of the past have shown ineffectiveness against present day criminal activities including, cybercrimes, computer-related offences, cyber stalking, terrorism and criminal groups that operate through organized crime structures. Based on the crime reports of the National Crime Records Bureau (NCRB), India, the data on cyber-crimes reported in the Commissionerate Ludhiana between 2015 and 2023 (Table No. 3.1) indicates an increasing, but not constant, trend in the data over this period. The first phase (2015-2016) was characterized by relatively low reported cases, which suggests that people did not report these cases or have less awareness of cyber-related offences. There is a noticeable rise in 2017 and minor fluctuations come between 2018 and 2020, indicating a slow increase in cybercrime cases and the growing utilization of the internet and digital provisions.

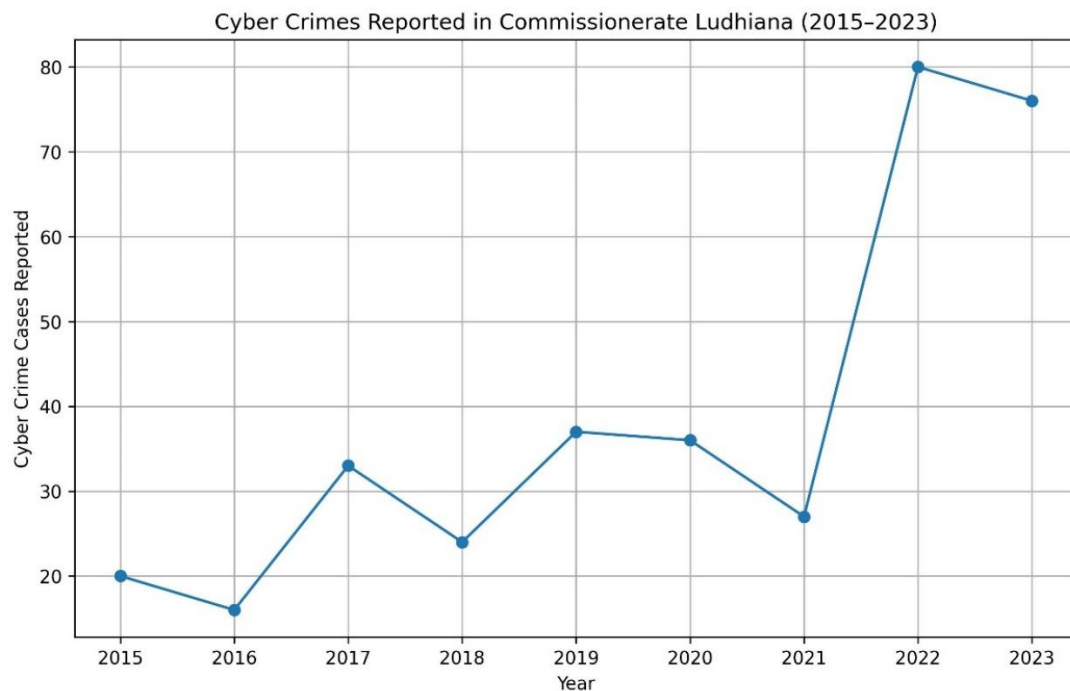
In 2021, the number of reported cases decreased slightly which can be explained by underreporting, administrative limitations, or changes in policing priorities during the pandemic time. However, a noticeable increase in the number of cybercrime cases can be observed in 2022, when the highest number of reported cases was recorded throughout this period. This notable growth indicates higher digital transactions, increased awareness of the population, better reporting systems and additional emphasis on cyber-crimes. Despite a slight decrease in 2023, the volume of cases is significantly increased than previous years, which means that cybercrime has become an ongoing and increasing problem of urban policing in Ludhiana. Figure No. 3.1 presents a line graph showing case reported related to cyber crimes in the Commissionerate Ludhiana from 2015 to 2023.

Table No. 3.1: Cyber Crimes Related Cases Reported in Commissionerate Ludhiana from 2015–2023.

Sr No.	Year	Case Reported
1.	2015	20
2.	2016	16
3.	2017	33
4.	2018	24
5.	2019	37
6.	2020	36
7.	2021	27
8.	2022	80
9.	2023	76

Source: National Crime Records Bureau (NCRB), *Crime in India – Additional Tables*, 2023, Government of India, (<https://www.ncrb.gov.in/crime-in-india-additional-table.html?year=2023&category=>)

Figure No. 3.1: Cyber Crimes Related Cases Reported in Commissionerate Ludhiana from 2015–2023.



Source: National Crime Records Bureau (NCRB), *Crime in India – Additional Tables*, 2023, Government of India, (<https://www.ncrb.gov.in/crime-in-india-additional-table.html?year=2023&category=>)

Overall, the trend highlights the importance of improved infrastructure in cyber policing, the constant capacity building of the law enforcement agencies staff and the advancement of awareness among the population in order to effectively tackle the changing nature of cybercrime.

Internet accessibility allows criminals to establish illegal operations through digital systems, which include fraudulent actions and system infiltrations as well as personal identity theft activities. Troublesome cyber threats within law enforcement demand specific advanced cyber defence measures in addition to digital forensic capabilities and cybercrime investigative teams (Deflem, 2017). The implementation of body-worn cameras, drones and real-time GPS tracking has improved officer accountability and situational awareness. These technologies assist in gathering evidence, de-escalating conflicts and ensuring public trust in law enforcement operations (White, 2014). The rise of terrorism and transnational crime networks has compelled governments

to adopt advanced surveillance systems, biometric identification methods and integrated intelligence-sharing frameworks. The technology combination of Automated License Plate Recognition (ALPR) and drone surveillance serves as fundamental equipment in counter-terrorism law violations (Lum et al., 2016). Modern police technology applications, together with surveillance of social media and digital governance platforms, have enhanced the connection between police departments and communities. Through technological advancements, citizens have obtained the ability to submit crime reports as well as verify the progress of their cases and obtain live alerts, which promotes both police transparency and community enforcement collaboration (La Vigne et al., 2011).

3.5 EMERGING TECHNOLOGIES AND POLICE COMMISSIONERATE LUDHIANA

Police Commissionerate Ludhiana has taken numerous steps to enhance infrastructure, human resource capabilities and traffic management. Through technological advancement, Police Commissionerate Ludhiana has obtained a number of high-tech devices to match emerging city requirements in modern times. Many thousands of protesters gather in the city during periodic demonstrations and protests. Such massive mob movements demand specific anti-riot vehicles to manage these circumstances effectively. Personal life faces a major threat from cyber-crimes, which has led to the emergence of this new criminal activity. The adoption of modern technologies in different fields has allowed Ludhiana Police to handle these situations effectively. Next, this research study outlines all key technologies employed by the Police Commissionerate Ludhiana, based on primary data collected by the researcher.

3.5 (i) Safe City Project

The Safe City Project in Ludhiana City started in 2016 as a CSR initiative of the Police Commissionerate Ludhiana before its Annual Maintenance Contract (AMC) joined the Smart City Project in 2022. Presently 1700 cameras operate at different locations across the Police Commissionerate area as part of the Safe City Project. These security cameras provide coverage throughout every section of the city. These cameras are linked to the Safe City Control Room at Police Lines Ludhiana, where police personnel monitor city activities 24/7. Through the Safe City Project, the Police Commissionerate Ludhiana develops a technologically advanced crime-fighting initiative

to aid city crime prevention. These surveillance cameras assist in solving 90% of the crimes that occur in Ludhiana. Additionally, these cameras assist in vehicle theft detection, law and order enforcement, traffic management and overall city supervision.

Figure No. 3.2: Safe City Project in Police Commissionerate Ludhiana



***Source:** Photo taken by the researcher during primary data collection.*

3.5 (ii) CCTV Cameras in Police Stations

The installation of CCTV cameras throughout all police stations in Police Commissionerate Ludhiana aims to establish professional excellence and combat police corruption. The surveillance system operating inside the police station monitors the entrance doors and provides monitoring of the duty officer's room, lock-up, record room, corridors and SHO's room. The recorded footage from these CCTV cameras helps facility monitoring alongside evidence recovery and long-term information collection, which benefits the department during court cases/inquiries.

3.5 (iii) Control Room

Emergency management and public assistance in Ludhiana City function through the citywide Ludhiana Police Control Room. The Ludhiana Police Control Room operates continuously to guide fast dispatches of police teams for both law and order situations as well as distress calls and criminal occurrences. The control room operates

with contemporary communication tools and surveillance equipment, which allows staff members to manage emergencies through dedicated helpline numbers like 112 for general emergencies, 181 for women's safety and 1091 for the women's helpline. The control room performs an essential function to protect public security through its ability to detect live incidents and send assistance throughout Ludhiana swiftly.

Figure No. 3.3: District Control Room, Police Commissionerate Ludhiana



***Source:** Photo taken by the researcher during primary data collection.*

3.5 (iv) Use of Computers in Police Stations and in offices

Today computers exist in every setting, which enables law enforcement to achieve higher operational effectiveness in police stations and offices. The system reduces paper processes while managing digital records and enabling digital FIR as well as reporting generation and maintaining different lists. Computers enable more efficient policing. Implementing CCTNS (Crime and Criminal Tracking Network & Systems) and digital platforms allows police personnel to retrieve current data, resulting in enhanced communication and joint operations. Salary software and additional digital tools enabled police administrations to perform their tasks more efficiently, which enhanced overall policing effectiveness.

Figure No. 3.4: Police personnel using Computers in Police Stations of Police Commissionerate Ludhiana

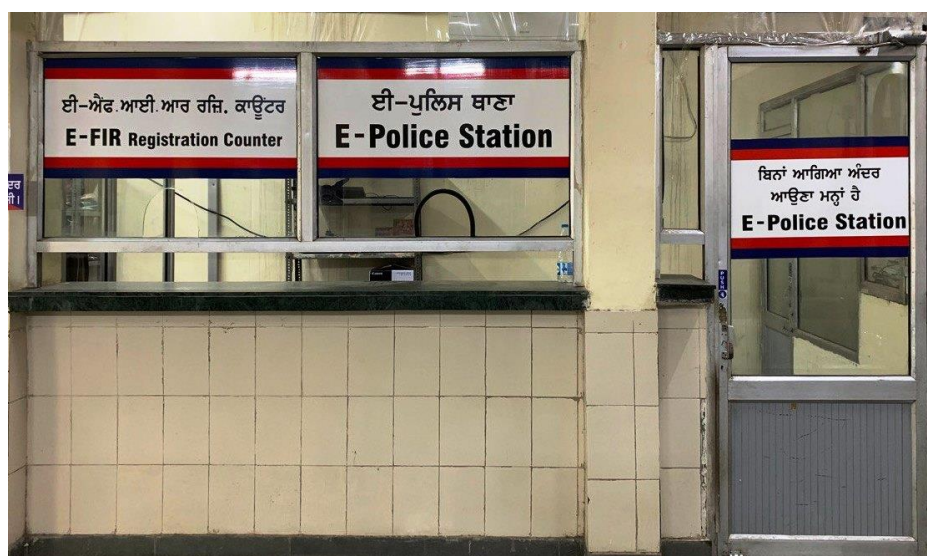


Source: Photo taken by the researcher during primary data collection.

3.5 (v) E-Police Station

Punjab Police is developing an e-FIR application for the citizens of Punjab in order to provide them the facility to register online FIRs in case of stolen motor vehicles. In this regard, Police Commissionerate Ludhiana has established an e-police station at the Commissioner of Police office.

Figure No. 3.5: E-Police Station in Police Commissionerate Ludhiana



Source: Photo taken by the researcher during primary data collection.

3.5 (vi) Use of technology in Investigation

The police investigations in Ludhiana use modern technology to increase their work efficiency as well as improve their analysis precision. The police department makes substantial use of mobile phones and digital evidence tools alongside tablets, pen drives, hard drives, laptops and digital evidence tools for data collection and forensic analysis. The documentation process is supported by printers and scanners and electronic devices benefit from advanced forensic instruments that extract essential evidence. The implementation of these technologies has brought substantial progress to investigative operations, crime detection and law enforcement operations in Ludhiana.

3.5 (vii) Cyber Crime Police Station & Help Desk, Forensic Lab, Technical Support Unit

In Ludhiana City, a dedicated Cyber Crime Police Station and a Cyber Forensic Lab have been established to tackle cyber-related offenses effectively. Law enforcement agencies track and analyze cyber threats with the help of advanced tools installed in the facilities that perform digital forensics, cyber investigation and data recovery. The Help Desk for Cyber Crime provides citizens with support to report cases involving digital crimes as well as cyber fraud, harassment and financial scams. The initiatives serve as vital mechanisms to build cybersecurity measures while enabling quick responses to cybercrimes in Ludhiana.

Technical Support Unit (TSU) in Police Commissionerate Ludhiana functions as an essential resource that delivers complex digital and technical evaluation services for investigation officers. This unit enables forensic investigation by providing essential data consisting of Call Detail Records (CDRs) together with IP addresses while defining mobile tower locations and multiple digital traces to track suspects. Through modern forensic tools, the unit supports investigation strength by analysing social media activity, email path evidence and encrypted communication messages.

Figure No. 3.6: Cyber & Forensic Lab in Police Commissionerate Ludhiana



***Source:** Photo taken by the researcher during primary data collection.*

Figure No. 3.7: Cyber Crime Help desk in Police Commissionerate Ludhiana



***Source:** <https://www.tribuneindia.com/news/ludhiana/comprehensive-protective-measures-need-of-hour/>*

Figure No. 3.8: Technical Support Unit (TSU)



Source: Technical Support Unit (TSU) Police Commissionerate Ludhiana

https://www.facebook.com/photo.php?fbid=897525642399062&set=a.362972085854423&type=3&mibextid=wwXIfr&rdid=FlRkZD5XzOxmeYzu&share_url=https%3A%2F%2Fwww.facebook.com%2Fshare%2F18oGWSyYv5%2F%3Fmibextid%3DwwXIfr#

3.5 (viii) Mobile Forensic Van

The Police Commissionerate Ludhiana has a mobile forensic van that is highly useful for collect and analyse evidence at crime scene. This mobile van is fitted with wireless sets, forensic kits and cyber tools.

Figure No. 3.9: Mobile Forensic Van, Police Commissionerate Ludhiana



***Source:** Photo taken by the researcher during primary data collection.*

3.5 (ix) Finger Print Branch

The Fingerprint Branch of Police Commissionerate Ludhiana serves an essential part in forensic investigations and crime detection operations. The main tasks of this branch are collecting, analysing and matching fingerprints from crime scenes to assist in identifying suspects and solving cases.

3.5 (x) CCTNS

The Central Crime and Criminals Tracking Network (CCTNS) operate as a Government of India National e-Governance plan Mission Mode Project. The system began operation in 2009 with the goal to improve both the criminal justice system and police functions under digital governance (Singh & Gulzar, 2019). CCTNS operates in every police station throughout the Police Commissionerate Ludhiana. The registration processes of DDRs and FIRs now run exclusively through CCTNS because police staff operates the system 24 hours per day.

3.5 (xi) iHRMS

Through its integrated Human Resource Management System approach, iHRMS provides streamlined administrative processes for officers and employees. Through iHRMS, personnel now use the system to submit their leave requests, which simplifies administration procedures and decreases paperwork. GPF management, annual property returns (APR), digital service book and annual confidential report (ACR) submission are among the many services that the system provides to increase efficiency.

Figure No. 3.10: iHrms Portal

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Departments Organizations 228

Registered Offices 42865

Registered Employees 509095

Current Employees 365831

Total Visitors 197442441

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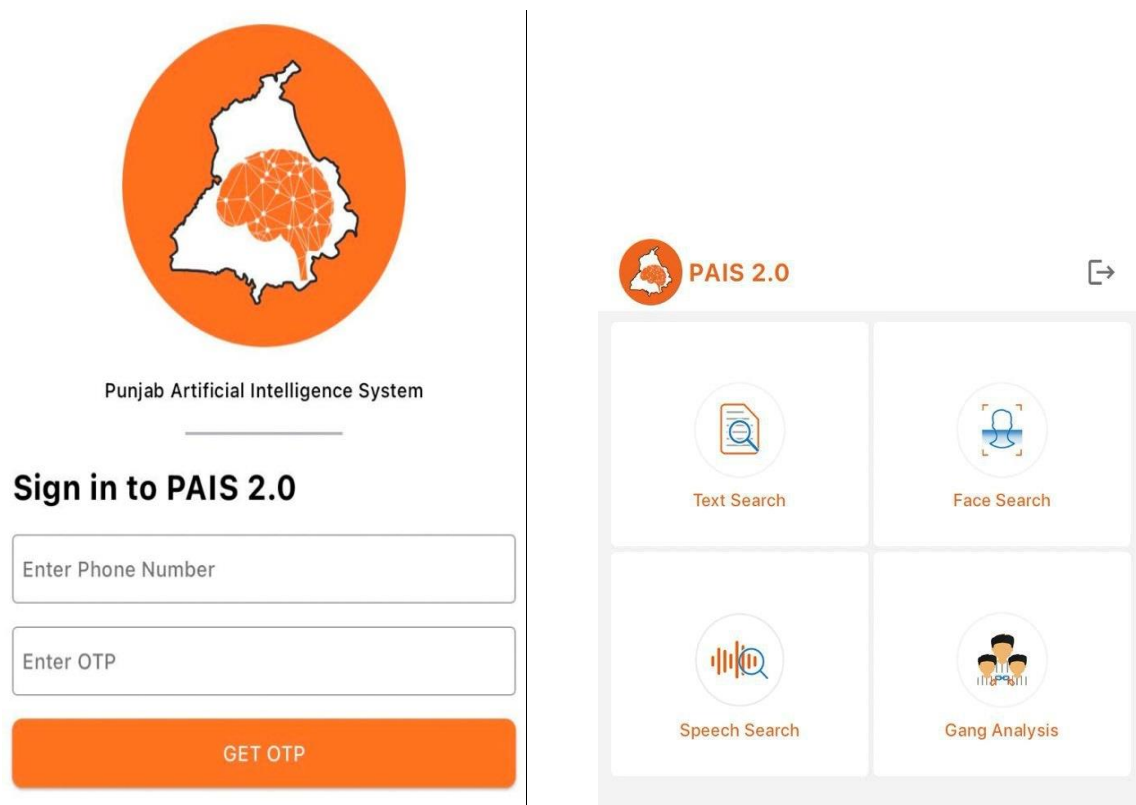
Source: <https://hrms.punjab.gov.in/>

3.5 (xii) Punjab Artificial Intelligence System (PAIS), an AI based app

The advanced AI application named Punjab Artificial Intelligence System (PAIS) functions to improve crime detection alongside investigation processes. Through this system, Ludhiana Police gains the ability to track down suspects using facial recognition technology or through name registration, address and date of birth information. Through its functionalities PAIS enables police personnel to examine an individual's FIR records and identify gang affiliations, which produces more efficient and intelligent policing systems. The app system has transformed policing into a modern

practice because investigators now use artificial intelligence technology to speed up and boost the accuracy of their crime detection work.

Figure No. 3.11: Punjab Artificial Intelligence System (PAIS), an AI based app



Source: https://play.google.com/store/apps/details?id=com.staqu.vigilante.punjabpolice&pcampaignid=web_share.

3.5 (xiii) Training School at Police Line

To keep police personnel updated with the latest technologies, new laws and other developments, a district-level training school has been established at Police Lines, Ludhiana, under the Police Commissionerate Ludhiana. In addition to dedicated training rooms, the facility includes a modern conference hall equipped with advanced technologies. Lectures and meetings are conducted in this hall with the help of a projector and other audio-visual aids.

Figure No. 3.12: Training School at Police Line of Police Commissionerate Ludhiana



Source: Photo taken by the researcher during primary data collection.

3.5 (xiv) GPRS in PCR Vehicles

In the Police Commissionerate Ludhiana, GPRS systems have been installed in all vehicles deployed for patrolling duties. Live updates from patrolling vehicles become possible through this technology for control rooms and senior officers to track. The system enables real-time vehicle tracking and it facilitates senior officials monitoring police officers during their assignments.

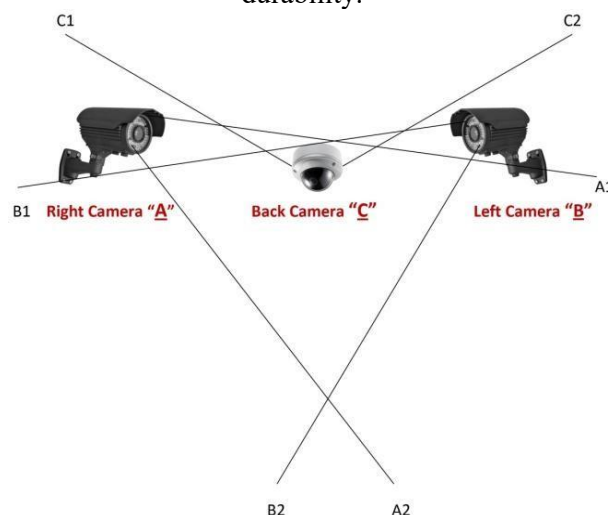
3.5 (xv) Vehicle Mounted Cameras

In Ludhiana, police vehicles under the Police Commissionerate are equipped with surveillance cameras. The video surveillance systems track both outside surroundings and monitor how police officers perform their work within the vehicle. As Ludhiana is a major city, it frequently hosts protests, religious functions, road marches and various law and order duties. At such occasions, vehicle-mounted cameras can be deployed to create full video records, which can be reviewed later if needed.

Figure No. 3.13: Vehicle Mounted Cameras



3 IP Bullet CCTV Cameras have been installed on each vehicle on a metallic frame specially designed to provide strength and long-term durability.



How CCTV Cameras covered the area.



One Dome Camera has been installed inside the Vehicle.



CCTV footage from these Cameras as can be seen on a screen installed inside the vehicles and can also be seen at a remote location through the internet.

Source: Photo taken by the researcher during primary data collection.

3.5 (xvi) Towing System in Police Commissionerate Ludhiana

According to the 2011 Census, Ludhiana is the most populated city in Punjab and being an industrial hub, it witnesses a continuous influx of people. This heavy movement leads to significant traffic and parking issues in the city. In such conditions, some individuals park their vehicles in 'No Parking' areas, resulting in traffic congestion. To address this problem, the Traffic Police Ludhiana has established a towing facility at Police Lines, Ludhiana. It allows for the efficient towing of vehicles parked in prohibited areas. Citizens can retrieve their vehicles from these auto pound points after paying the compounding fee and towing charges.

Figure No. 3.14: Towing System in Police Commissionerate Ludhiana

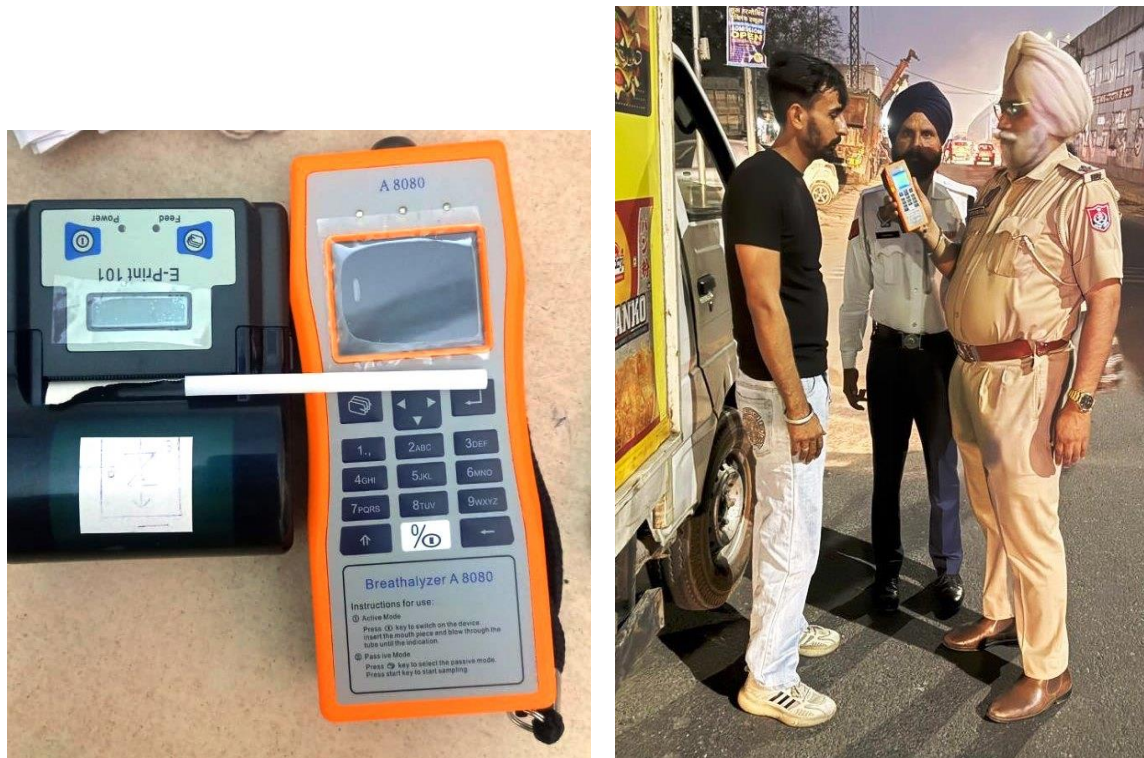


Source: Police Commissionerate Ludhiana, Photo taken by the researcher during primary data collection.

3.5 (xvii) Alco Sensor

The traffic police use Alco-sensor devices, which check driver blood alcohol concentration levels through breath sample analysis. The devices allow immediate detection of drivers who are drunk, thus helping avoid traffic accidents and protect road safety. The frequent use of Alco-sensors for testing serves as a preventive measure against driving under the influence of alcohol.

Figure No. 3.15: Alco Sensor



Source: Police Commissionerate Ludhiana, Photo taken by the researcher during primary data collection.

3.5 (xviii) Digital Challan Machines

The Ludhiana Traffic Police continues its efforts to improve road traffic management and enforces traffic rules through challans, or traffic fines, when violations occur. Before this system was adopted, the general public encountered problems with paying their challans because they needed to go to RTO offices or courts multiple times for payment. The Traffic Police under Police Commissionerate Ludhiana has implemented digital challan machines to resolve this matter. The new digital challan system allows citizens to do their fine payments through an online platform directly from their homes, thus eliminating manual visits and waiting in lines.

Figure No. 3.16: Digital Challan Machines



Source: Police Commissionerate Ludhiana, Photo taken by the researcher during primary data collection.

3.5 (xix) Speed radars

Police Commissionerate Ludhiana tracks over-speeding through speed radar devices for identifying vehicles traveling above defined speed limits. The police immediately issue traffic challans to vehicles detected exceeding speed limits. The initiative maintains road safety through its implementation to reduce dangerous driving in urban areas.

Figure No. 3.17: Speed radars

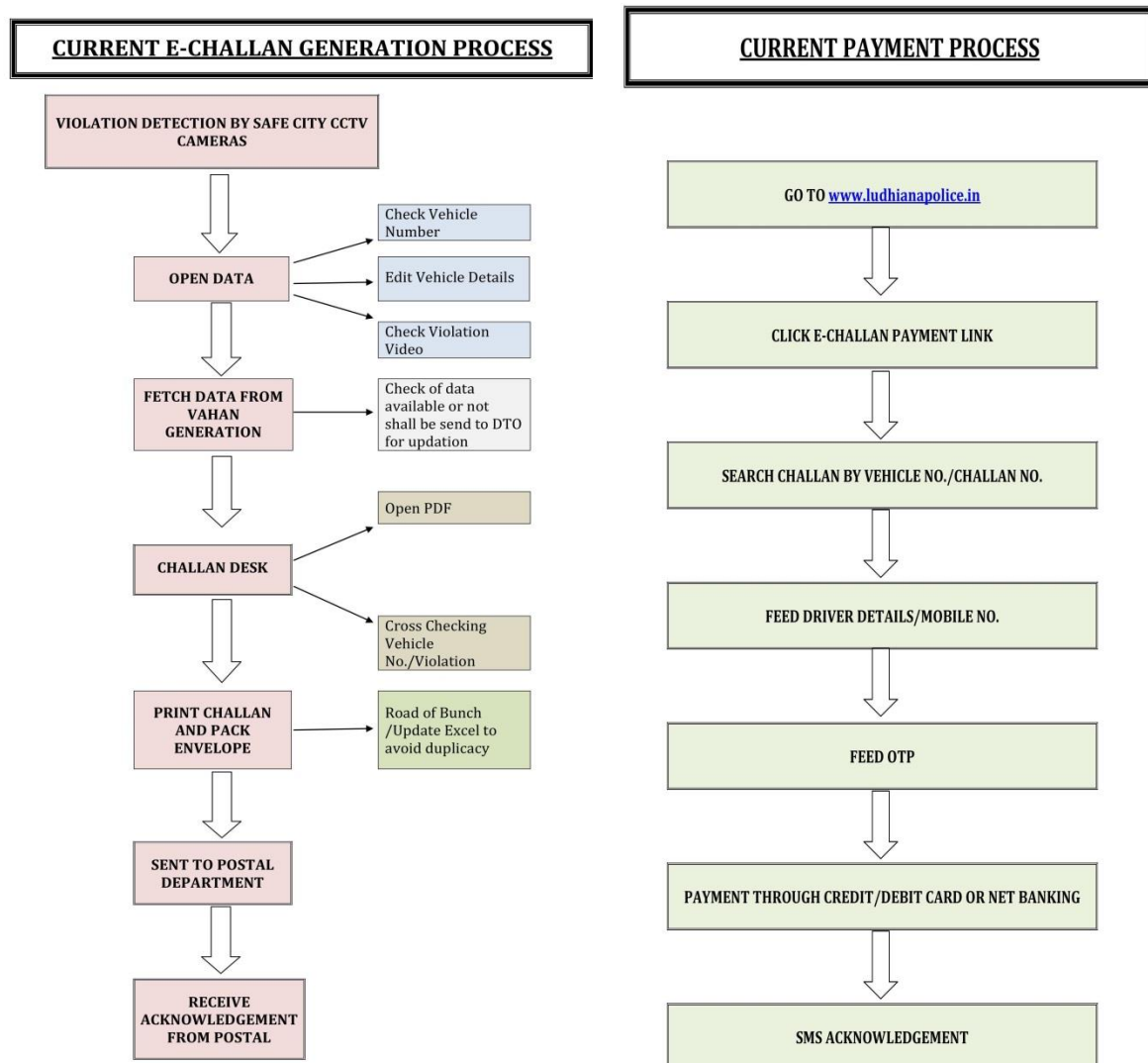


Source: Police Commissionerate Ludhiana, Photo taken by the researcher during primary data collection.

3.5 (xx) E-Challan

By using Automatic Number Plate Reader (ANPR) the Police Commissionerate Ludhiana has established e-challaning as a new system to enhance traffic signals and rules compliance. The city uses CCTV cameras installed throughout its territory to detect traffic violations, including red light violations and major intersection rule violations. The generated e-challans are sent by post to the registered address of violators who need to pay the associated fine. The scheme enhances accountability while motivating people to monitor traffic rules with greater responsibility.

Figure No. 3.18: E-Challan



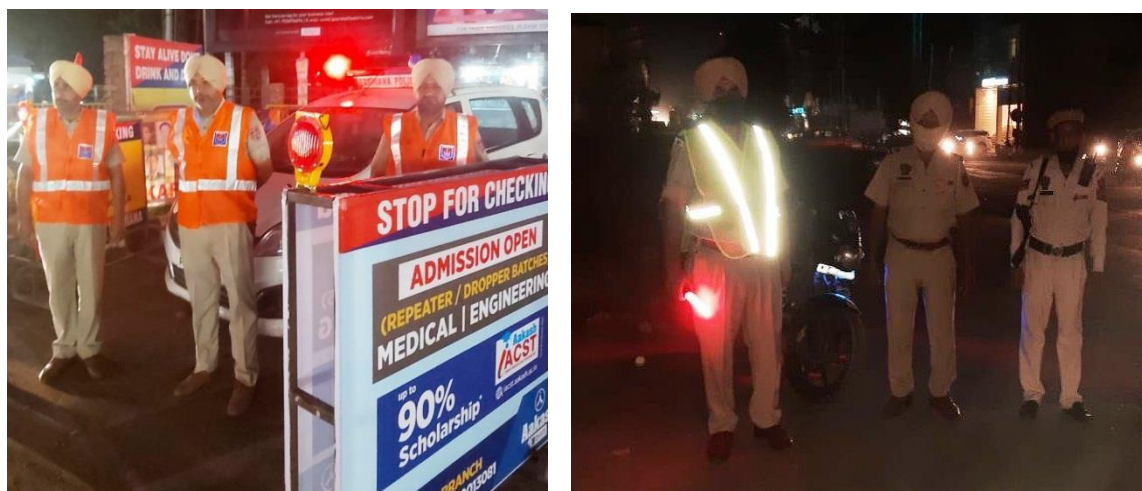
Source: Prepared by the researcher during primary data collection.

The traffic official said that if the e-challaning points are announced to residents, they will simply choose other routes and continue committing the offense. Therefore, the traffic police are not making the e-challan points and stretches public. The officer added that the challan would be sent to the registered owner of the vehicle. In addition, the option of paying the challan online is also available. The official further stated that failure to pay the fine on time will result in the challan being forwarded to the concerned court (Times of India, 2025).

3.5 (xxi) Flasher Lights, Light Batons & reflective jackets

During late-night traffic regulation and naka checking, Ludhiana Police use flasher lights, light batons and reflective jackets to warn approaching motorists about the barriers placed to slow down vehicles. These tools improve the visibility of police personnel, ensuring their safety while managing road duties at night.

Figure No. 3.19: Flasher Lights, Light Batons & reflective jackets

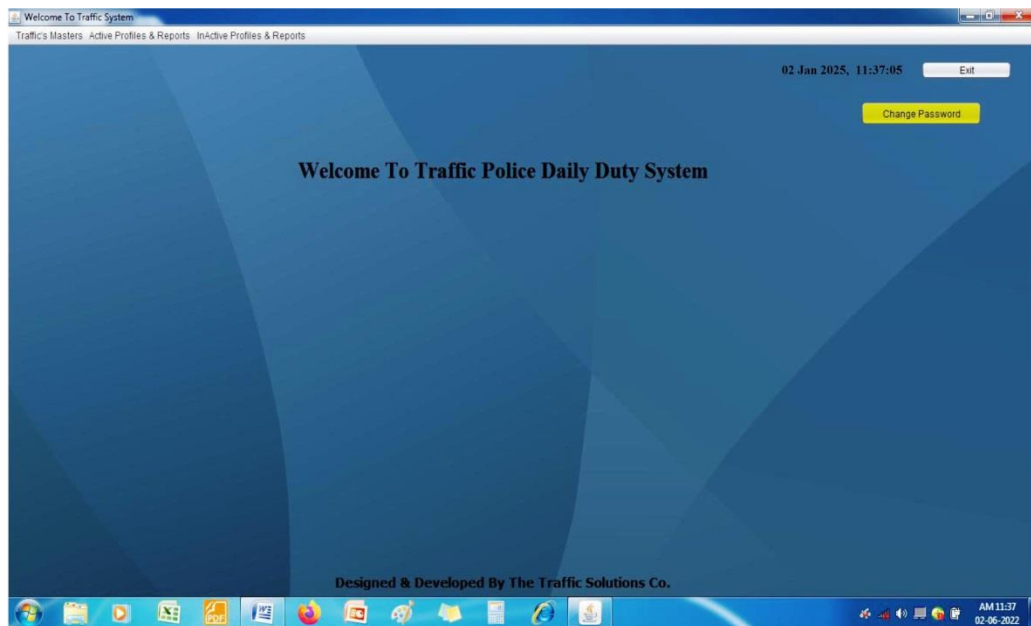


Source: Police Commissionerate Ludhiana, Photo taken by the researcher during primary data collection.

3.5 (xxii) Saanjh Duty Software

In Police Commissionerate Ludhiana, the "Saanjh" software is used to assign traffic duties. All employee details and duty points are fed into the system and with a single click, duties are randomly assigned to personnel across various locations. The purpose of using this system is to ensure transparency and fairness so that duties are allotted impartially as per the software, eliminating any scope for favoritism or bias.

Figure No. 3.20: Saanjh Duty Software



Source: Screenshot taken by the researcher during primary data collection.

3.5 (xxiii) Water Cannon & Anti-riot Vehicle

In Police Commissionerate Ludhiana two important vehicles ‘Varun’ and ‘Vajra’ are used to maintain law and order and to control crowds during riots. The two vehicles feature advanced technology that enables them to efficiently handle law and order situations while maintaining effective crowd management. The water cannon vehicle 'Varun' operates by spraying high-pressure water to disperse crowds and the 'Vajra' possesses anti-riot gear for efficient mob management and control.

Figure No. 3.21: Water Cannon & Anti-riot Vehicle





Source: *Police Commissionerate Ludhiana, Photo taken by the researcher during primary data collection.*

3.5 (xxiv) Walkie-Talkie

Walkie-talkies serve as necessary equipment that enables police officers in Ludhiana to maintain constant connection with each other. The devices have been placed in both PCR vehicles and police station vehicles, as well as in the Safe City control room and police stations and several critical locations. The devices facilitate quick, direct communication that enhances police coordination immediately whenever emergencies arise and enables more effective daily operational management.

3.5 (xxiv) Meetings through Video Conference (VC)

Previously, the police department rarely used video conferencing for meetings, preferring to hold most of them in person. However, with the onset of the COVID-19 pandemic in 2019/2020, there was a significant increase in the use of video conferencing for meetings within the police department. Nowadays, most meetings are conducted through video conferencing.

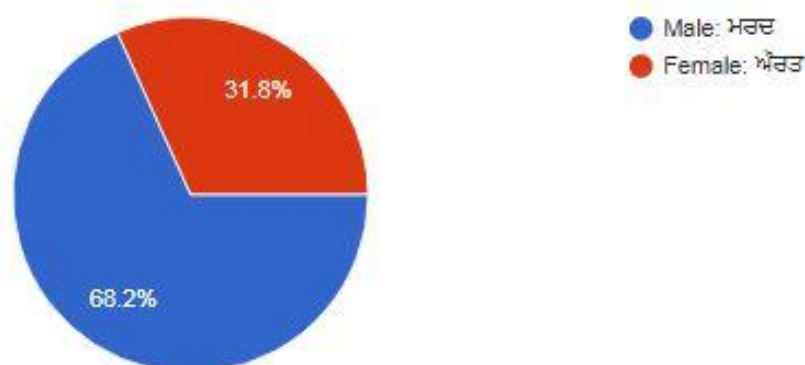
3.6 EMPIRICAL INSIGHTS FROM POLICE PERSONNEL ON EMERGING TECHNOLOGIES IN POLICING

To understand the perspectives on emerging technologies in policing, it was essential to collect data from a diverse group of police personnel. To collect data from police personnel and officers, stratified random sampling technique have been used.

(a) Gender-wise Distribution

Both male and female police officers made up the participant group to gain balanced insights. Most of the surveyed police officers were male (68.2%), however, respondents from both genders contributed essential feedback to the research findings.

Figure No. 3.22: Gender of Respondents

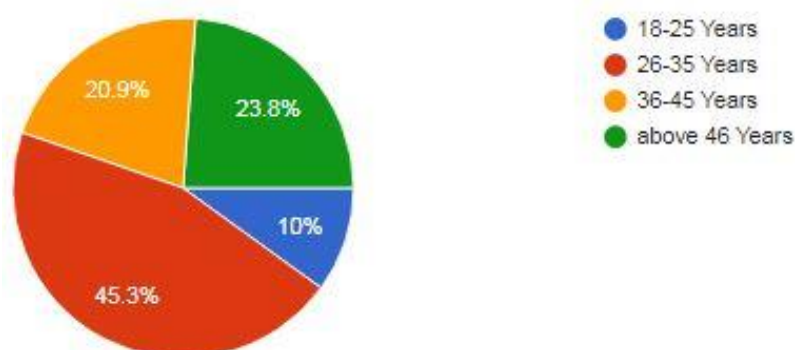


Source: Based on Primary Data.

(b) Age-wise Distribution

The research included police personnel from different age groups to evaluate how generations perceive technology adoption. Newly graduated police officers demonstrated quick learning of modern technology systems; however, senior officers contributed important insights about transitioning between traditional police methods and modern procedures.

Figure No. 3.23: Age of Respondents



Source: Based on Primary Data.

(c) Rank-wise Distribution

The research included police personnel from different ranks, starting at constable up to inspector and beyond. Operational experiences differed across the demographic spectrum because different police ranks perform distinct duties that determine how technology is integrated and received in actual fieldwork.

Figure No. 3.24: Rank of Respondents

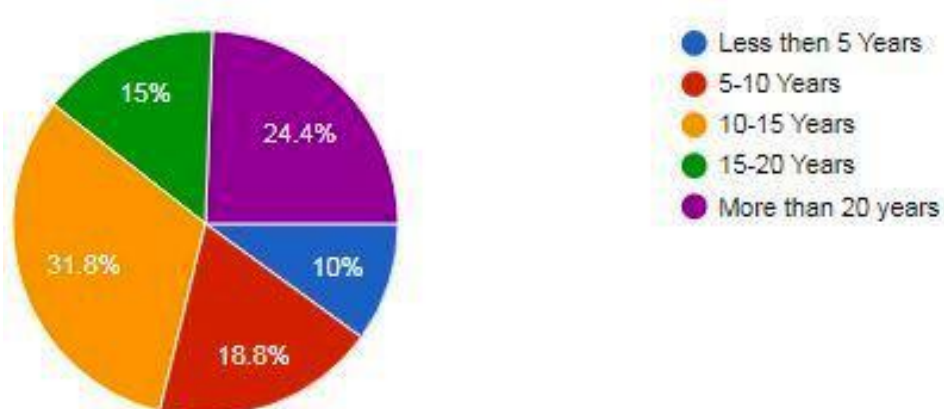


Source: Based on Primary Data.

(d) Years of Service

The research incorporated police officials with different years of service who ranged from new recruits up to officers near retirement age.

Figure No. 3.25: Years of Service of Respondents



Source: Based on Primary Data.

The Police Commissionerate Ludhiana demonstrated successful acceptance of technology by creating a technological environment for the city. The police gallery saw additions of modern devices such as safe city cameras and speed radars, as well as digital traffic challan machines, cyber police stations and AI-based software such as PAIS. Research indicates that technology adoption relates systematically to educational processes. A lack of proper training or education about technological applications made employees struggle to integrate new systems into their work. The acquisition of technological tools becomes simple, but changing employee behaviour toward new equipment remains one of the most challenging tasks. Among 340 respondents, 41 (12.1%) were postgraduates, while 84 (24.7%) respondents were graduates. Most of these postgraduates and graduates belonged to the newly recruited category. 49 (14.4%) were matric and below matric and these employees are those who were near their retirement. 166 (48.8%) of them were 12th pass, thus indicating this qualification stood among the most commonly held by police personnel. Table No. 3.2 shows the educational standards among Police Commissionerate Ludhiana police employees remain at a minimal level.

Table No. 3.2: Educational Qualification of Police Personnel

Educational Qualification	Frequency	Percent (%)
10 th or Below 10 th	49	14.4
12 th	166	48.8
Graduation	84	24.7
Post-Graduation	41	12.1
Total	340	100

Source: Based on Primary Data.

The above table shows that 63.2% of police personnel are 10th or 12th pass, which results in communication difficulties when using the English language. When the researcher asked, is the English language a barrier to using new technology? Then 45 (13.2%) respondents strongly agreed and 206 (60.6%) agreed (Table No. 3.3) and they confessed that technological systems with English language created difficulties during their interaction.

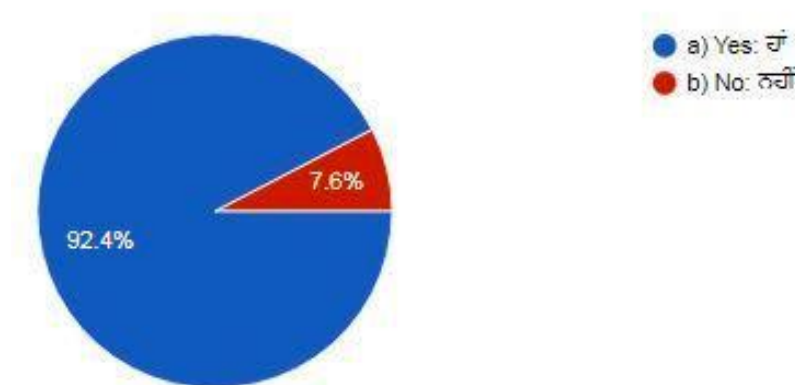
Table No. 3.3: English Language Barrier to Using New Technologies

Type of Response	Frequency	Percent (%)
Strongly Agree	45	13.2
Agree	206	60.6
Neutral	44	12.9
Disagree	35	10.3
Strongly Disagree	10	2.9
Total	340	100

Source: Based on Primary Data.

Knowledge of computers holds essential importance in modern society. Figure No. 3.26 reveals that among the 340 respondents, 92.4% know how to operate computers, but 7.6% of employees are unable to operate computers.

Figure No. 3.26: Knowledge of Computer



Source: Based on Primary Data.

During police personnel interviews, a fact that came to notice was that 71.2% of respondents acknowledged that new technological applications have made their tasks heavier instead of reducing their workload. The police personnel stated their workloads were already too high, but the introduction of new technology created a much heavier burden. A few police officers shared that the traditional method of submitting written leave forms has now been replaced by the iHRMS platform, which they find challenging to use. The police personnel explained that investigators formerly needed to

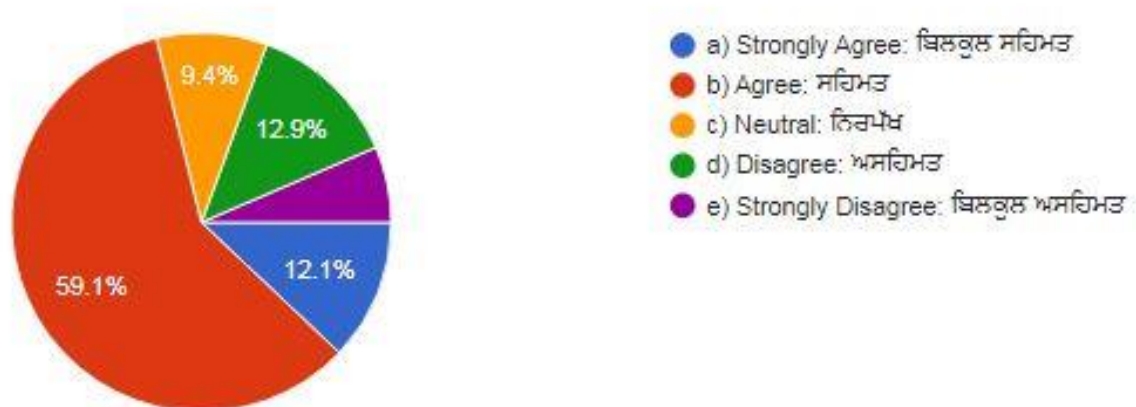
create paperwork but recently must enter their work into CCTNS systems as well. The system caused police officers to perform their duties two times, which led to extra workloads. New technologies receive resistance from police officers when used in their workflows. The study showed that 12.1% of respondents strongly agree new technology usage is difficult, followed by 59.1% who somewhat agree to this (Table No. 3.4). 9.4% of respondents were neutral on this query, whereas 12.9% and 6.5 % somewhat disagreed and strongly disagreed with this. Figure No. 3.27 presents the frequency distribution.

Table No. 3.4: Difficulties in Using New Technologies

Type of Response	Frequency	Percent (%)
Strongly Agree	41	12.1
Agree	201	59.1
Neutral	32	9.4
Disagree	44	12.9
Strongly Disagree	22	6.5
Total	340	100

Source: Based on Primary Data.

Figure No. 3.27: Difficulties in Using New Technologies



Source: Based on Primary Data.

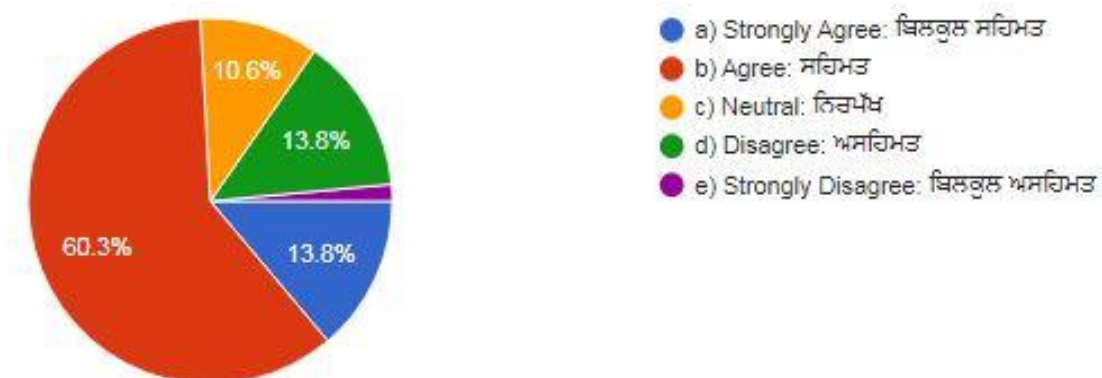
It has been revealed by police personnel that educational qualifications stand as a key barrier to operating advanced technological gadgets, as 13.8% strongly agreed, whereas 60.3% agreed with this statement. Only 1.5% strongly disagreed and 13.8% disagreed with this assertion and 10.6% were neutral (Table No. 3.5 & Figure No. 3.28). Graduate police personnel indicated that operating computers and entering data does not appear difficult to them. These employees find it interesting because the technology saves time while producing accurate results quickly. The young employees enjoy working with modern technology such as computers because they find new systems easy to command, but at the same time, they do feel that language remains the greatest challenge in effectively doing their work. Less-educated employees struggle to understand computers because the system functions in the English language and they also face major difficulties working on apps because all internet tools operate only through the English language. Several senior-age respondents said they avoid adopting present-day technologically advanced gadgets because of multiple factors. Education stands out as a key reason discouraging employees from developing an interest in learning new technologies. Employees nearing retirement believe they lack the ability to adapt to computer-based systems and suggest that they be assigned responsibilities aligned with their current expertise and traditional methods of operation.

Table No. 3.5: Educational Qualifications are a Barrier to Using New Technologies

Type of Response	Frequency	Percent (%)
Strongly Agree	47	13.8
Agree	205	60.3
Neutral	36	10.6
Disagree	47	13.8
Strongly Disagree	05	1.5
Total	340	100

Source: Based on Primary Data.

Figure No. 3.28: Educational Qualifications are a Barrier to Using New Technologies



***Source:** Based on Primary Data.*

3.7 ASSESSMENT OF THE ADOPTION AND IMPLEMENTATION OF CONVENTIONAL AND NEW TECHNOLOGIES IN POLICE COMMISSIONERATE LUDHIANA

Technological advancements have significantly transformed policing practices everywhere and the Police Commissionerate Ludhiana is no exception. To critically examine the transition from conventional methods to new technology-driven approaches, it is important to understand the level of awareness, frequency of usage and perceived effectiveness among police personnel. During the survey, an effort was made to find out how new technologies have replaced conventional methods, along with an assessment of their effectiveness compared to traditional systems. The survey also focused on understanding how police personnel are adopting these technologies in their daily work and how effective they find them in improving policing operations. When the researcher asked the respondents about the effectiveness of the current policing system, 76.8% rated the existing system as effective and 17.1% found it very effective. Table No. 3.6 & Figure No. 3.29 shows that more than 93% of police personnel are satisfied with how policing operations are being carried out, reflecting a generally positive outlook towards the present policing model. During interviews, senior officials stated that traditional practices such as the beat system, patrolling duties, handwritten reports and radio communication are still in use, but the integration of modern technologies such as

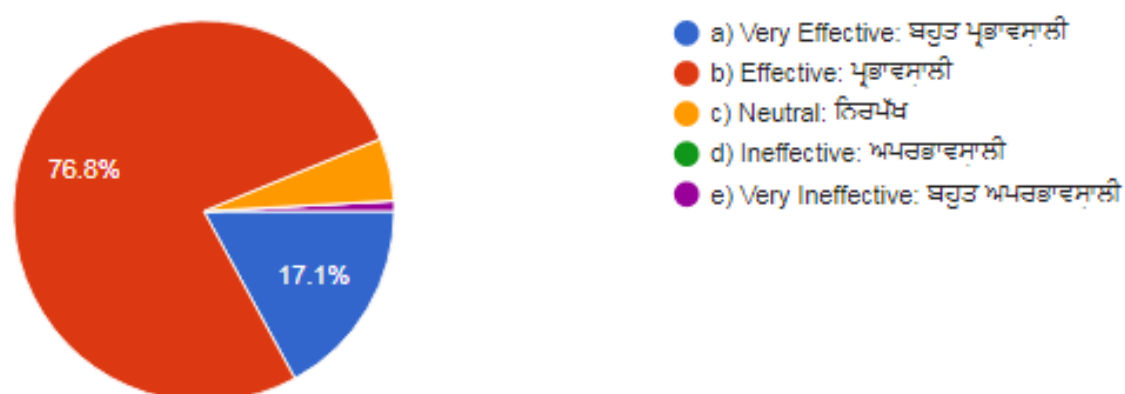
CCTNS, CCTV cameras, computers and surveillance systems has added significant value to police operations.

Table No. 3.6: Effectiveness of the Current Policing System

Type of Response	Frequency	Percent (%)
Very Effective	58	17.1
Effective	261	76.8
Neutral	18	5.3
Ineffective	0	0
Very Ineffective	3	0.9
Total	340	100

Source: Based on Primary Data.

Figure No. 3.29: Effectiveness of the Current Policing System



Source: Based on Primary Data.

These days, the Police Commissionerate Ludhiana uses a number of new technologies and devices in police stations and investigative procedures. 91.8% of respondents confirmed that police personnel are aware of the technologies implemented in the Commissionerate, including the devices and systems in use (Table No. 3.7). Additionally, 92.1% reported using new technologies in their daily operations or official duties, such as computers, mobile applications, emails and software (Table No. 3.8 & Figure No. 3.30). The policing staffs demonstrate frequent use of modern technology, which indicates how deeply technology has woven itself into their professional routines.

This also reflects a clear departure from conventional paperwork, handwritten reports and file-based record-keeping towards digitized operations.

Table No. 3.7: Awareness Regarding New Technologies

Type of Response	Frequency	Percent (%)
Yes	312	91.8
No	28	8.2
Total	340	100

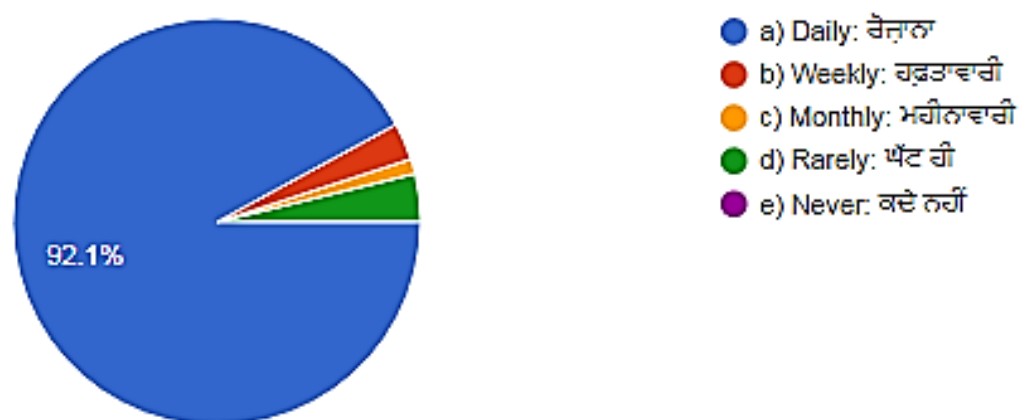
Source: Based on Primary Data.

Table No. 3.8: Frequency of the Use of New Technologies

Type of Response	Frequency	Percent (%)
Daily	313	92.1
Weekly	10	2.9
Monthly	4	1.2
Rarely	13	3.8
Never	0	0
Total	340	100

Source: Based on Primary Data.

Figure No. 3.30: Frequency of the Use of New Technologies



Source: Based on Primary Data.

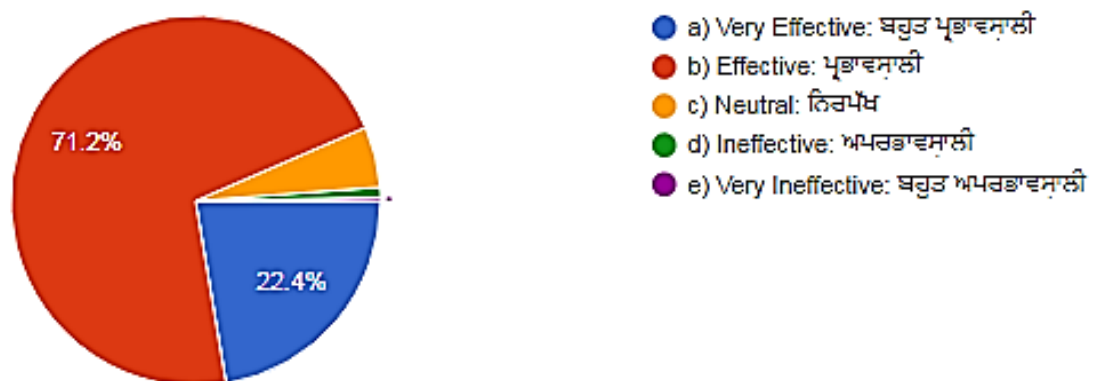
The elevated rate of technology usage indicates that police departments have transitioned from manual operations to digital methods of record-keeping, communication, reporting and field coordination. This signifies a substantial transformation in the operational mind-set, particularly within a force historically grounded in conventional systems. When asked about the effectiveness of new technology in improving work efficiency, 71.2% of the respondents marked it as effective and 22.4% as very effective (Table No. 3.9 & Figure 3.31). Police personnel expressed that tools such as FIR registration via CCTNS, reports and information sending/receiving through e-mails and computerized systems have helped reduce paperwork and save time. Some officers, particularly those in older age brackets or with lower educational qualifications, reported difficulties in adapting to the newer system.

Table No. 3.9: Impact on Efficiency

Type of Response	Frequency	Percent (%)
Very Effective	76	22.4
Effective	242	71.2
Neutral	18	5.3
Ineffective	3	0.9
Very Ineffective	1	0.3
Total	340	100

Source: Based on Primary Data.

Figure No. 3.31: Impact on Efficiency



Source: Based on Primary Data.

The traffic police in Commissionerate Ludhiana began using body cameras in 2017 during their duties. With the introduction of these cameras, a 90% drop in cases of misbehaviour towards police officers was observed. Individuals who had claimed police officers issued incorrect challans formerly minimized such accusations due to the implementation of body cameras by traffic police. The cameras, which were attached to the police uniforms, also curtailed incidents where violators used influential contacts or political pressure to evade penalties (Hindustan Times, 2017). However, the use of these cameras was limited to a short period and was not maintained consistently. As a result, when the researcher asked to respondents whether body-worn cameras are currently in use, only 8.2% confirmed their usage, while 91.8% denied it (Table No. 3.10). This suggests that although body-worn cameras are acknowledged as effective tools for enhancing transparency, accountability and citizen engagement, their actual implementation in Police Commissionerate Ludhiana remains limited.

Table No. 3.10: Use of Body-Worn Cameras

Type of Response	Frequency	Percent (%)
Yes	28	8.2
No	312	91.8
Total	340	100

Source: Based on Primary Data.

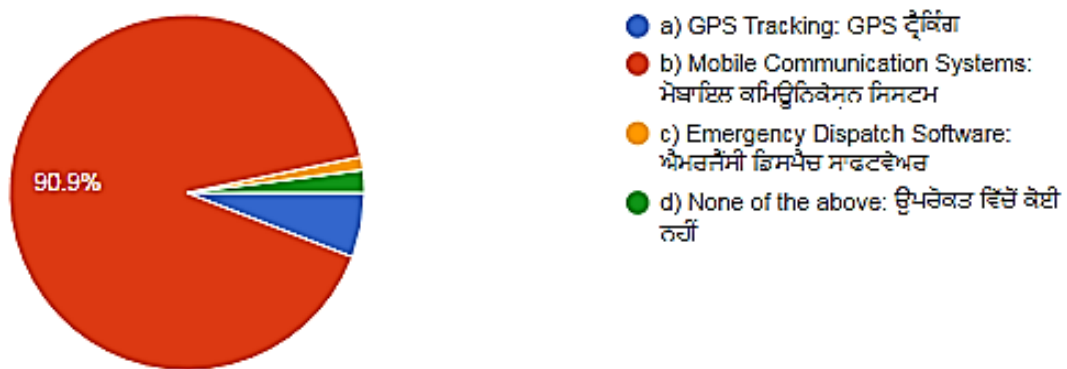
During the interview, police personnel say that with the rise of mobile and internet, communication has changed a lot. Because officials have modern technology, they are in constant contact with their offices around the clock. Mobile phones have become an important communication tool within the organization. Mobile phones can access much of the data required for crime detection and prevention through the internet. When questioned about the technologies used for emergency response, 90.9% of respondents identified the mobile communication system as the most effective tool (Table No. 3.11 & Figure No. 3.32). Mobile communication has improved response times and enabled quicker coordination during crises. Other technologies such as GPS tracking and emergency dispatch software were acknowledged but to a lesser extent, indicating that mobile communication has become the backbone of field response mechanisms.

Table No. 3.11: Technology in Emergency Response

Type of Response	Frequency	Percent (%)
GPS Tracking	20	5.9
Mobile Communication	309	90.9
Emergency Dispatch	4	1.2
None of the above	7	2.1
Total	340	100

Source: Based on Primary Data.

Figure No. 3.32: Technology in Emergency Response



Source: Based on Primary Data.

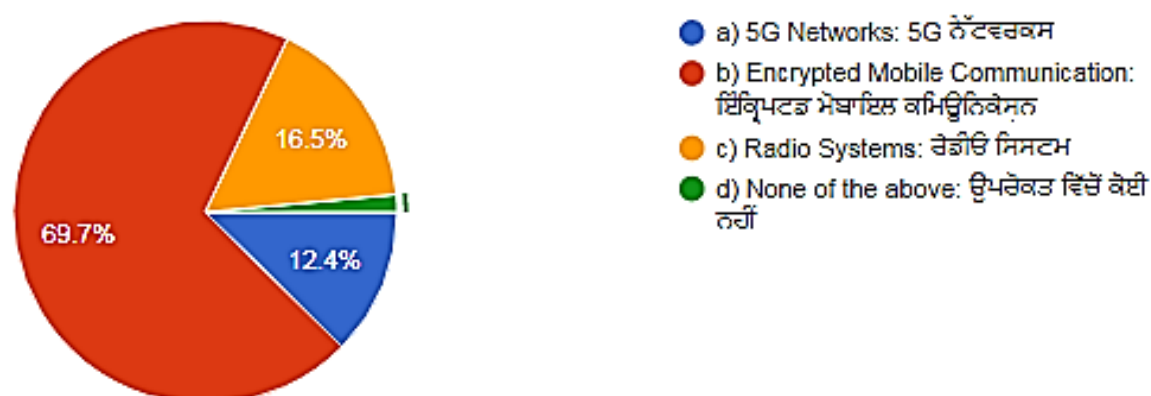
Similarly, the survey results show that a majority of 69.7% of participants rely on encrypted mobile communication for operational communication, but 16.5% depend on conventional radio systems and another 12.4% use 5G networks (Table No. 3.12 & Figure 3.33). Mobile communication remains the most popular platform since organizations continue to trust the radio system for its easy operation and emergency reliability. The growing interest in faster networks reflects a shift towards modernizing the force's communication systems.

Table No. 3.12: Technology for Real-Time Communication during Operations

Type of Response	Frequency	Percent (%)
5G Networks	42	12.4
Encrypted Mobile Communication	237	69.7
Radio Systems	56	16.5
None of the above	5	1.5
Total	340	100

Source: Based on Primary Data.

Figure No. 3.33: Technology for Real-Time Communication during Operations



Source: Based on Primary Data.

For the query regarding the biometric system, a large majority of 81.2% stated that the biometric system remains inactive throughout Police Commissionerate Ludhiana (Table 3.13). The results show that the biometric system remains underutilized across Ludhiana. During interviews with key officials, it was found that the traditional methods are still in use for attendance of police personnel at police stations. Specifically, the roll call attendance is recorded manually in the Rojnamcha register or in the Crime and Criminal Tracking Network & Systems (CCTNS), indicating the continued reliance on conventional processes.

Table No. 3.13: Use of Biometric System

Type of Response	Frequency	Percent (%)
Faster Identification	24	7.1
Enhanced Security	9	2.6
Both a and b	31	9.1
Not used	276	81.2
Total	340	100

Source: Based on Primary Data.

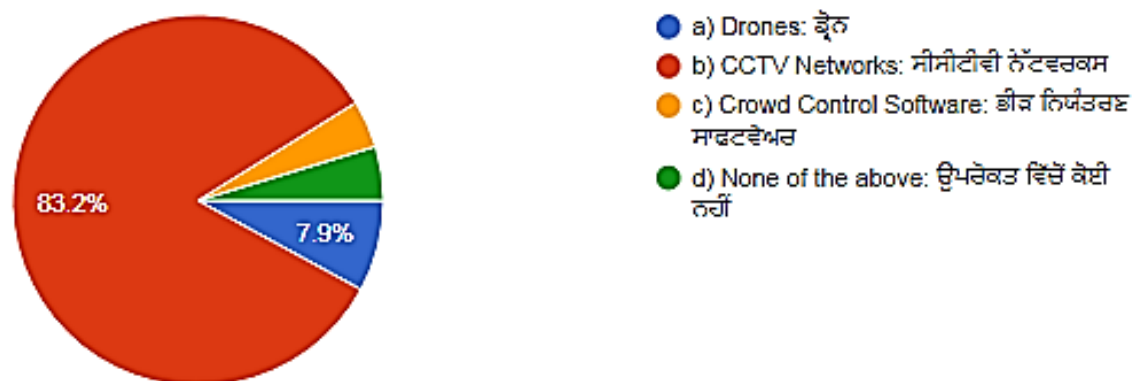
During the survey, 83.2% of respondents indicated that CCTV cameras are mostly used to manage large-scale public gatherings and events in the city. The data reveals that police forces heavily depend on CCTV surveillance systems to manage crowds, recognize potential threats and monitor incidents in real-time. Although police forces employ CCTV networks extensively for crowd management (83.2%), the survey results show that they do not effectively use drones (7.9%) and crowd control software (8.8%) (Table 3.14 & Figure No. 3.34).

Table No. 3.14: Technology for Public Event Management

Type of Response	Frequency	Percent (%)
Drones	27	7.9
CCTV Networks	283	83.2
Crowd Control Software	14	4.1
None of the above	16	4.7
Total	340	100

Source: Based on Primary Data.

Figure No. 3.34: Technology for Public Event Management



Source: Based on Primary Data.

In comparing emerging technologies with conventional policing methods, respondents showed a strong preference for modern tools over traditional policing methods as emerging technologies proved more reliable according to 80% of respondents and much more reliable according to 17.1% of respondents (Table No. 3.15). This indicates a rising trust in emerging technologies such as new methods of investigation, digital record-keeping, mobile phones, computers, AI-based software, CCTV cameras and forensic tools. Conventional methods of human intelligence, along with informant networks and community interaction, retain their essential role, especially for solving challenging, emotionally complex investigations. Therefore, to achieve comprehensive, effective policing, it is necessary to combine traditional police practices with emerging technologies in a well-balanced manner.

Table No. 3.15: Reliability of Emerging Technologies over Conventional Methods

Type of Response	Frequency	Percent (%)
Much More Reliable	58	17.1
More Reliable	272	80
Less Reliable	8	2.4
Much Less Reliable	2	0.5
Total	340	100

Source: Based on Primary Data.

3.8 CAPACITY BUILDING AND TECHNOLOGICAL TRAINING OF POLICE PERSONNEL IN COMMISSIONERATE LUDHIANA

The speed with which emerging technologies are adopted in policing systems requires eternal capacity building and special training for law enforcement officers. According to the Gore Committee Report on Police Training, if police are not properly trained in science and technology today, twenty years later, there will be many policemen who struggle to deal with the challenges of the future (Gore Committee, 1973).

Punjab Police provides world class training to its employees in different training centres. To train its personnel, Punjab Police has established several training centres across the state. The centres provide different kinds of training, such as basic recruiting, regular in-service courses, specialized units and commando operations. Punjab Police Academy (PPA), Phillaur; Police Recruits Training Centre (PRTC), Jahan Khelan, Hoshiarpur; Recruit Training Centre, Punjab Armed Police (PAP), Jalandhar; Commando Training Centre (CTC), Bahadurgarh, Patiala; and In-Service Training Centre (ISTC), Kapurthala are the main training centers of Punjab Police. In this research, the focus will be on the capacity building and technological training of police personnel in Commissionerate Ludhiana to use new technologies.

There is a training school located at Police Lines, Ludhiana, including a district training lab and a conference hall. The district training centre regularly organizes training sessions on various subjects such as CCTNS, iHRMS, the E-Sakshya app, new laws, emerging technologies in policing and other relevant areas as per the evolving needs of modern policing for the police personnel who are posted in Police Commissionerate Ludhiana. Additionally, professionals from the fields of forensics, senior police officers and doctors are asked to share their knowledge with police officers to help improve their professional skills and mental health. All ranks up to the level of inspector attend workshops or modules at the district training school on topics such as human rights, cybercrime, computer-related offenses, bank fraud and recent amendments in the law. Discussions revealed that while the Police Commissionerate Ludhiana started several trainings on new technologies, following up and providing in-depth training remains a challenge. The study found that 70.3% of respondents had received training on new technologies, such as CCTNS, mobile apps and computers, whereas 29.7% had not

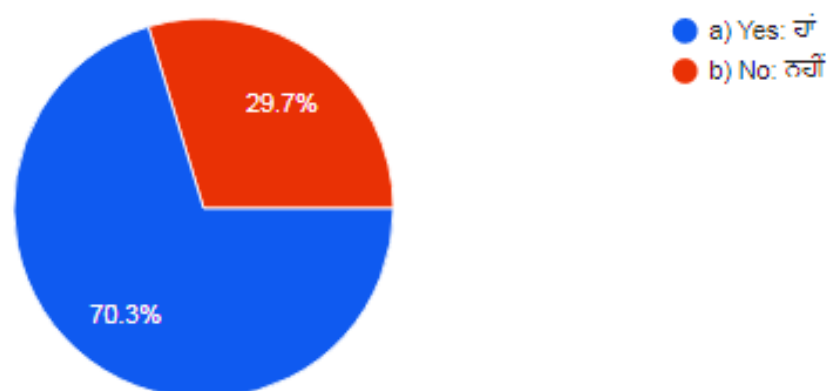
received any such training (as shown in Table No. 3.16 & Figure No. 3.35). This indicates that, despite training efforts, nearly one-third remain untouched by these initiatives.

Table No. 3.16: Participation in Technology Training

Type of Response	Frequency	Percent (%)
Yes	239	70.3
No	101	29.7
Total	340	100

Source: Based on Primary Data.

Figure No. 3.35: Participation in Technology Training



Source: Based on Primary Data.

64.1% of respondents revealed that the training was average, while 7.6% found it excellent and another 7.6% said it was poor. Only 19.7% of respondents described the training as good. This clearly indicates that, despite training efforts, the impact remains modest (Table No.3.17 & Figure No. 3.36).

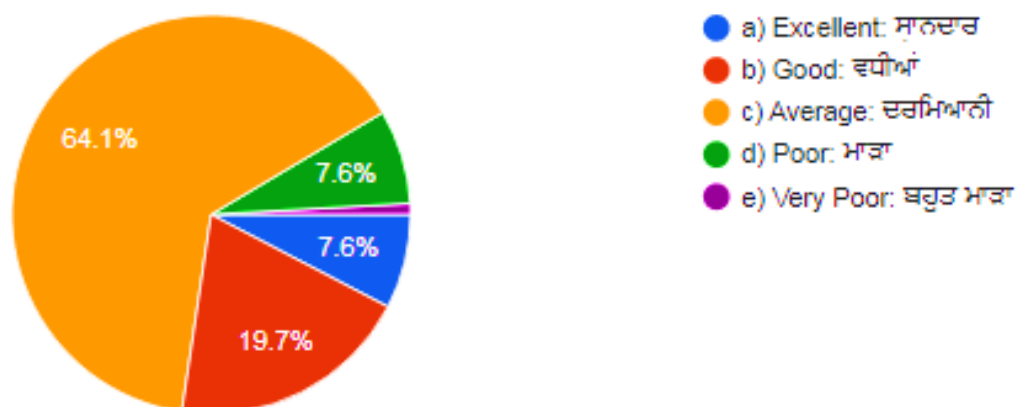
Table No. 3.17: Quality of Training

Type of Response	Frequency	Percent (%)
Excellent	26	7.6
Good	67	19.7
Average	218	64.1
Poor	26	7.6

Very Poor	3	1
Total	340	100

Source: Based on Primary Data.

Figure No. 3.36: Quality of Training



Source: Based on Primary Data.

In response to the researcher's query regarding the use of Virtual Reality (VR) in training within the Police Commissionerate Ludhiana, 81.9% of respondents stated that VR-based training is not currently in use (Table No. 3.18). During interviews with senior-age group police personnel, it was revealed that most of them were not aware of virtual reality.

Table No. 3.18: Use of Virtual Reality (VR) in Training

Type of Response	Frequency	Percent (%)
Crime Scene Simulation	33	8.9
Officer Training in Crisis Situations	21	6.2
Driving Simulations	10	3
Not used	276	81.9
Total	340	100

Source: Based on Primary Data.

When the researcher inquired about whether the duration of training was sufficient to understand and effectively use new technologies, respondents indicated that

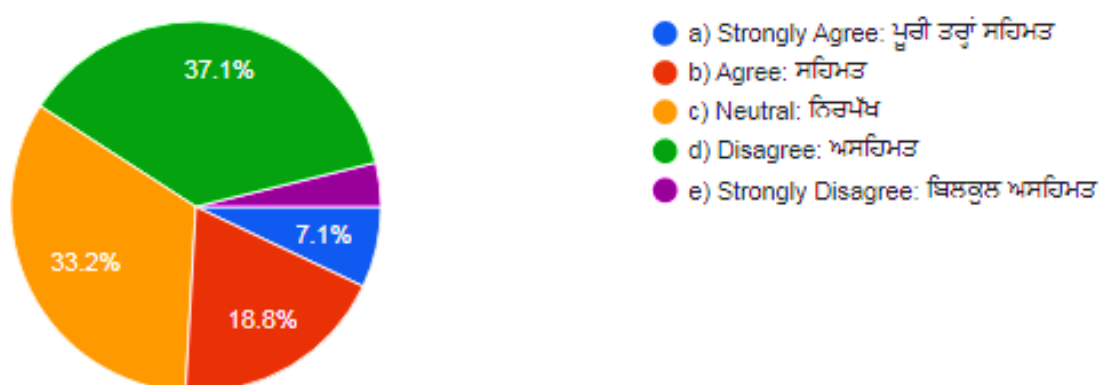
the training provided was either limited in depth or too short in duration. Only 7.1% strongly agreed and 18.8% agreed that the training duration was adequate. However, a significant 33.2% remained neutral, while 37.1% disagreed and 3.8% strongly disagreed (Table No. 3.19 & Figure No. 3.37). Several respondents stated that they were unable to learn computer usage within the stipulated time and found it difficult to grasp the technical aspects of various technologies in such a short period. Police personnel aged above 46 years expressed that they now find it challenging to learn and adapt to new technologies.

Table No. 3.19: Sufficiency of Training Duration

Type of Response	Frequency	Percent (%)
Strongly Agree	24	7.1
Agree	64	18.8
Neutral	113	33.2
Disagree	126	37.1
Strongly Disagree	13	3.8
Total	340	100

Source: Based on Primary Data.

Figure No. 3.37: Sufficiency of Training Duration



Source: Based on Primary Data.

The majority of respondents (60%) reported feeling neutral about their confidence in using new technologies after undergoing training. Only 10.3% described

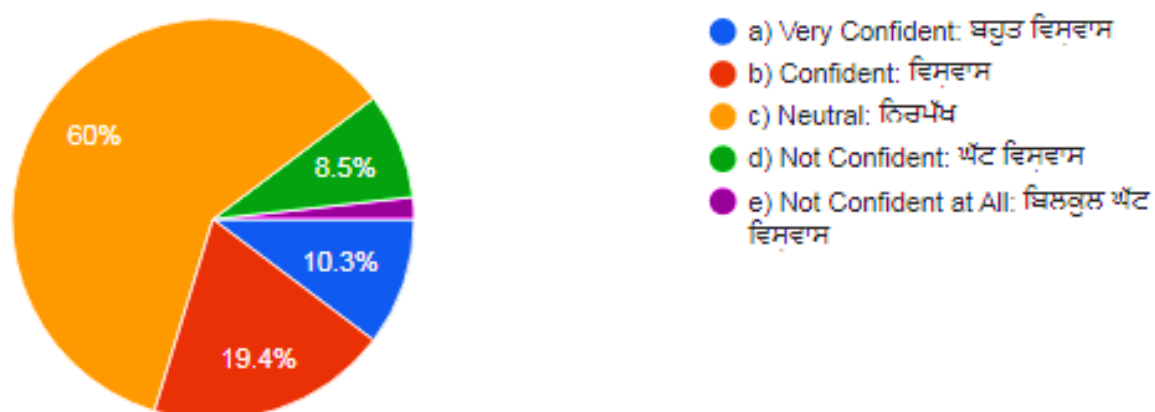
themselves as very confident and 19.4% as confident, whereas 8.5% reported being not confident and 1.8% not confident at all (Table No. 3.20 Figure No. 3.38). These results reflect a direct correlation between insufficient training and the hesitancy or inability of personnel to effectively deploy digital tools in the field.

Table No. 3.20: Confidence in using New Technology after Training

Type of Response	Frequency	Percent (%)
Very Confident	35	10.3
Confident	66	19.4
Neutral	204	60
Not Confident	29	8.5
Not Confident at All	6	1.8
Total	340	100

Source: Based on Primary Data.

Figure No. 3.38: Confidence in using New Technology after Training



Source: Based on Primary Data.

Most of the officers (72.1%) indicated that they occasionally require additional support or refresher training, while 19.7% stated that they need it frequently to keep up with new technologies, as shown in Table No. 3.21 & Figure No. 3.39. This suggests that although initial training may be adequate, continuous support and periodic

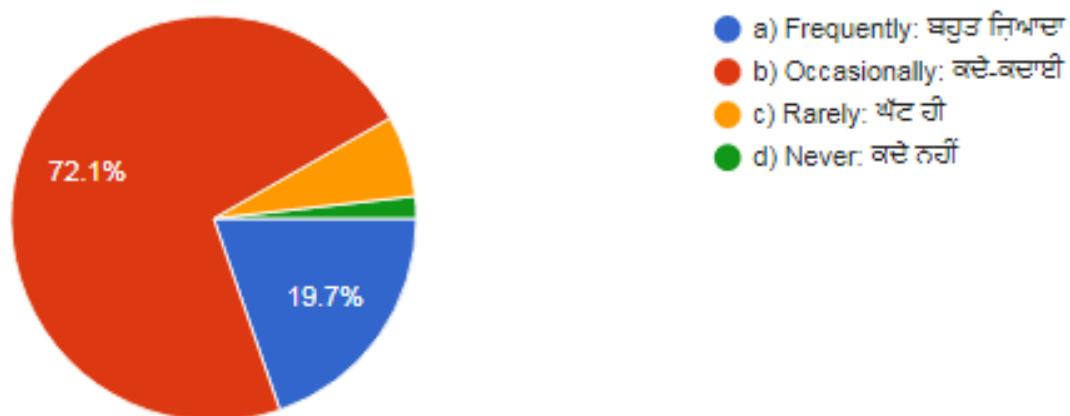
refresher courses are important to ensure that personnel remain proficient and confident in using new technologies.

Table No. 3.21: Need for Additional Support or Refresher Training

Type of Response	Frequency	Percent (%)
Frequently	67	19.7
Occasionally	245	72.1
Rarely	22	6.5
Never	6	1.7
Total	340	100

Source: Based on Primary Data.

Figure No. 3.39: Need for Additional Support or Refresher Training



Source: Based on Primary Data.

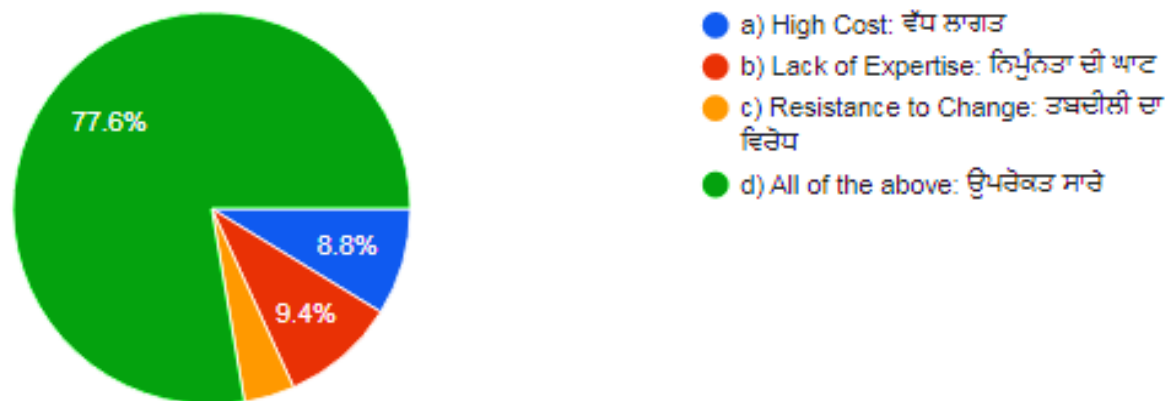
Police departments face several problems when trying to incorporate new technologies, including low budgets, high costs of advanced technical equipment, shortages of skilled personnel and institutional resistance to change. According to survey, 77.6% of respondents saw high cost, lack of expertise and resistance to change as the biggest barriers to implementing these strategies (Table No. 3.22 & Figure No. 3.40). The study points out that financial, thinking difficulties, cognitive and differences in culture are holding back the use of new technologies.

Table No. 3.22: Challenges in Implementing Emerging Technologies

Type of Response	Frequency	Percent (%)
High Cost	30	8.8
Lack of Expertise	32	9.4
Resistance to Change	14	4.1
All of the above	264	77.6
Total	340	100

Source: Based on Primary Data.

Figure No. 3.40: Challenges in Implementing Emerging Technologies



Source: Based on Primary Data.

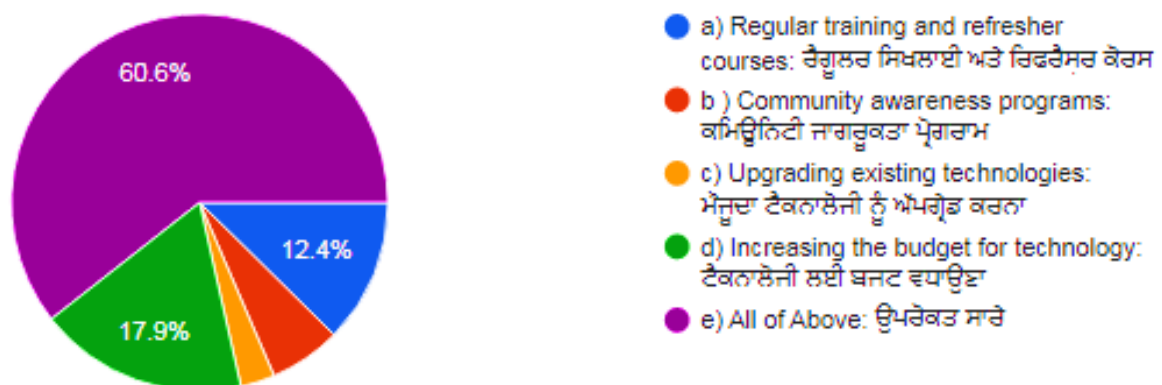
More than 60% of the respondents strongly felt that regular training and refresher courses, community awareness programs, upgrading existing technologies and increased budgets to support technology advancement were important. 17.9% respondents pointed to the need for a higher technology budget, while 12.4% emphasized regular training and refresher courses as key to improving the effectiveness of technology in police work (Table No. 3.23 & Figure No. 3.41). According to the findings, respondents understand the importance of a well-planned and adequately funded technology strategy to improve policing outcomes.

Table No. 3.23: Strategies to Enhance Technological Effectiveness

Type of Response	Frequency	Percent (%)
Regular training and refresher courses	42	12.4
Community awareness programs	21	6.2
Upgrading existing technologies	10	2.9
Increasing the budget for technology	61	17.9
All of Above	206	60.6
Total	340	100

Source: Based on Primary Data.

Figure No. 3.41: Strategies to Enhance Technological Effectiveness



Source: Based on Primary Data.

3.9 EVALUATION OF TRANSFORMATIVE IMPACT OF EMERGING TECHNOLOGIES ON CRIME REDUCTION IN THE REGION

During the research, it was observed that police personnel in the Police Commissionerate Ludhiana are using many kinds of technologies, including CCTV, cyber cells, a forensic science lab team, a mobile van, mobile phones and various kinds of

software in their regular duties. The interview with the higher official suggests that crime prevention and faster detection are the reasons they rely on new technology. Its useful results have prompted officers to adopt new technologies. Police officials stated that technological tools are essential for addressing crimes such as murder, robbery and rape. By using this technology, police can now look into financial crimes, drug crimes, internet-related crimes and human trafficking crimes differently. Modern gadgets and technology have changed the way crimes are viewed and addressed. Communication has become easier both within the organization and with agencies outside.

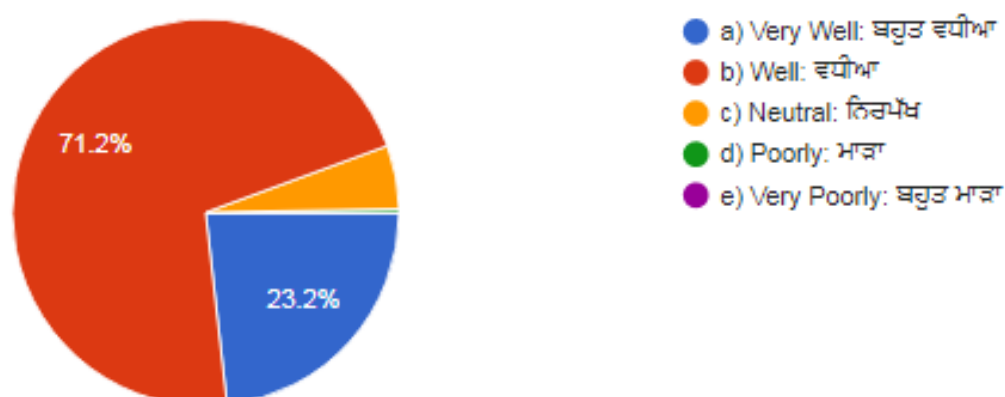
Police performance is evaluated in modern policing by looking at their success in controlling crime through prevention, detection, prosecution and conviction. Relying only on crime figures to judge the performance of police is not sufficient. Various factors determine if there will be an increase or decrease in crime, some of which may be outside the control of the police. Even if statistics vary, judging both the police response and actions is important to give a true assessment of how things are handled. When the researcher asked respondents how well new technologies help in crime prevention and investigation, 94% of the respondents, of which 23.2% said very well and 71.2% said well, found new technologies to be helpful (Table No. 3.24 & Figure No. 3.42). This widespread agreement indicates that emerging technologies are significantly enhancing both preventive and investigative capacities.

Table No. 3.24: Effectiveness of Technology in Crime Prevention and Investigation

Type of Response	Frequency	Percent (%)
Very Well	79	23.2
Well	242	71.2
Neutral	18	5.3
Poorly	1	0.3
Very Poorly	0	0
Total	340	100

Source: Based on Primary Data.

Figure No. 3.42: Effectiveness of Technology in Crime Prevention and Investigation



Source: Based on Primary Data.

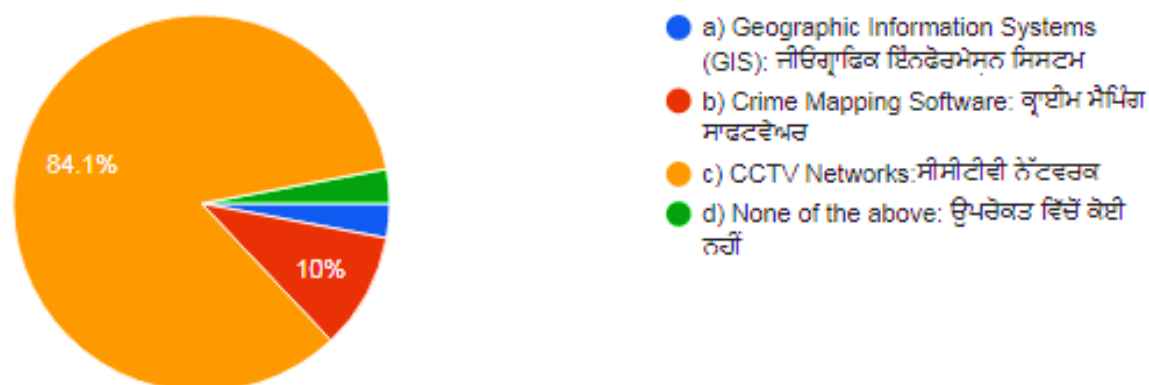
84.1% of the respondents reported using CCTV networks, indicating their dominant role in field investigation and crime pattern recognition (Table No. 3.25 & Figure No. 3.43). Ludhiana police mostly use CCTV cameras to map and analyze crime scenes in real time. This suggests that CCTV cameras are being actively used for surveillance. During interviews, senior officials revealed that the cameras installed in the city under the Safe City Project are very useful, often helping in the detection and tracing of criminal activities.

Table No. 3.25: Crime Mapping Technologies Used

Type of Response	Frequency	Percent (%)
Geographic Information System (GIS)	10	2.9
Crime Mapping Software	34	10
CCTV Network	286	84.1
None of the above	10	2.9
Total	340	100

Source: Based on Primary Data.

Figure No. 3.43: Crime Mapping Technologies Used



Source: Based on Primary Data.

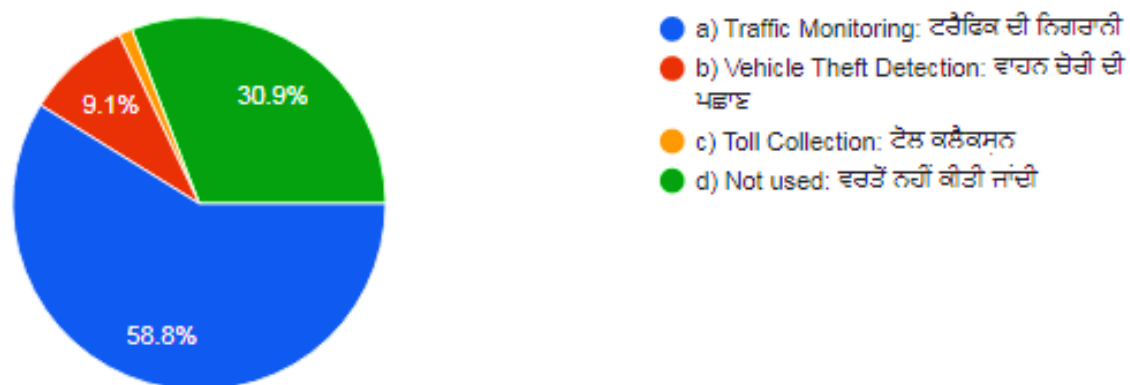
During the research, it was found that Ludhiana Police are using several emerging technologies within the city to prevent crime and maintain law and order. Among these emerging technologies, Automatic License Plate Recognition (ALPR) plays an important role. ALPR is used to issue traffic challans to those who break traffic rules and also to trace vehicles involved in any criminal activities. In the Police Commissionerate Ludhiana, access to ALPR is available at the Traffic Online Challan Office and the Control Room under the Safe City Project. However, during the interviews with respondents, it was surprisingly revealed that 30.9% of individuals were not even aware that ALPR technology is being used in the Ludhiana Commissionerate. Meanwhile, 58.8% stated that it is used for traffic monitoring and according to 9.1%, ALPR is used to identify stolen vehicles in the city (Table No. 3.26 & Figure No. 3.44).

Table No. 3.26: Use of Automatic License Plate Recognition (ALPR)

Type of Response	Frequency	Percent (%)
Traffic Monitoring	200	58.8
Vehicle Theft Detection	31	9.1
Toll Collection	4	1.2
Not used	105	30.9
Total	340	100

Source: Based on Primary Data.

Figure No. 3.44: Use of Automatic License Plate Recognition (ALPR)



Source: Based on Primary Data.

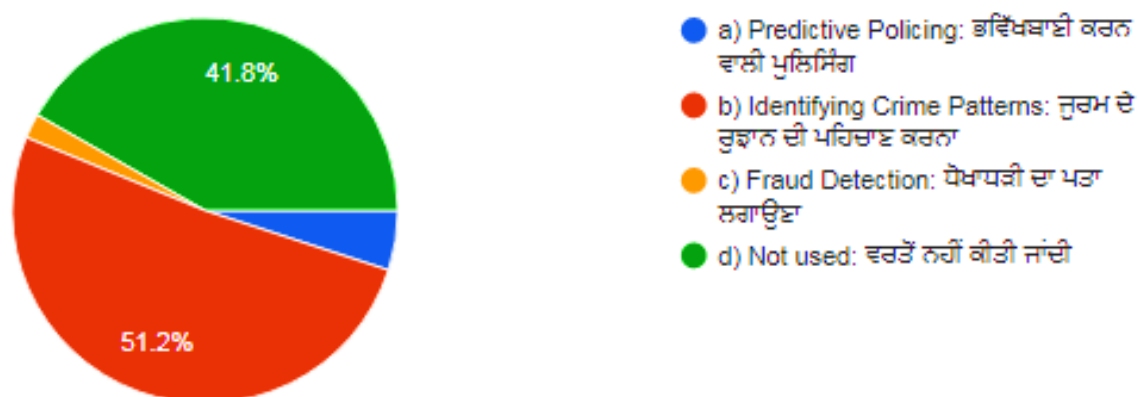
When the researcher inquired about the role of artificial intelligence (AI) in crime analysis within the Police Commissionerate Ludhiana, 41.8% of respondents stated that artificial intelligence (AI) is not used in the Ludhiana Commissionerate, 51.2% believed that AI is being used to identifying crime patterns (Table No. 3.27 & Figure No. 3.45). Interviews with senior officials revealed that the Ludhiana Police Commissionerate utilizes AI-based software called Punjab Artificial Intelligence System (PAIS). This software helps to obtain complete details of suspects and criminals through facial recognition. It maintains a complete database of criminal records, including FIRs filed against individuals and the dates of their incarceration. This software proves to be highly useful in identifying accused individuals during routine checks and investigations.

Table No. 3.27: Role of AI in Crime Analysis

Type of Response	Frequency	Percent (%)
Predictive Policing	17	5
Identifying Crime Patterns	174	51.2
Fraud Detection	7	2
Not used	142	41.8
Total	340	100

Source: Based on Primary Data.

Figure No. 3.45: Role of AI in Crime Analysis



Source: Based on Primary Data.

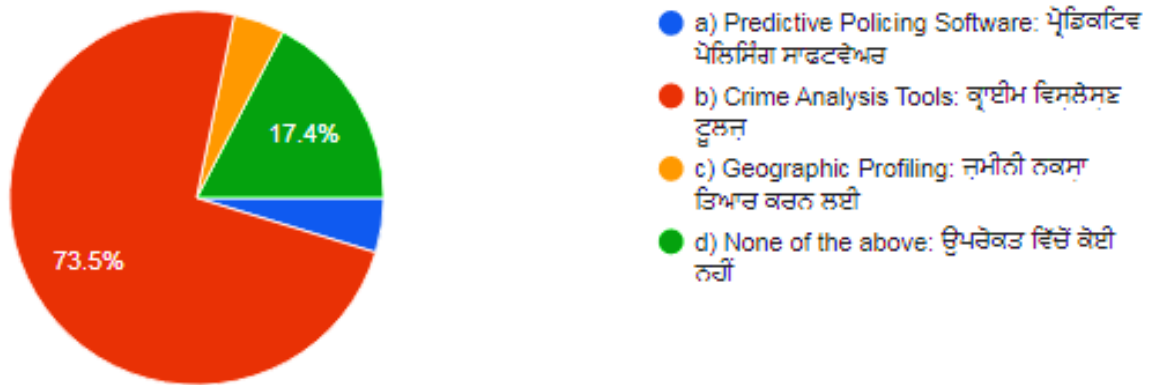
73.5% of the respondents stated that the Ludhiana Police uses crime analysis tools to examine criminal activities based on historical data. In contrast, 17.4% of respondents discussed that no such tools play a part in their activities (Table No. 3.28 & Figure No. 3.46). During the interview, an Assistant Commissioner of Police (ACP) level police officer mentioned that analysis tools are used in the Police Commissionerate Ludhiana to analyze CDRs (Call Detail Records) and IPDRs (Internet Protocol Detail Records) in relation to crime investigation. These tools are primarily used by the Technical Support Unit, which processes the data and shares relevant information with the concerned police stations.

Table No. 3.28: Used of Technology to Analyze and Forecasting Criminal Activities based on Historical Data

Type of Response	Frequency	Percent (%)
Predictive Policing Software	16	4.7
Crime Analysis Tools	250	73.5
Geographical Profiling	15	4.4
None of the above	59	17.4
Total	340	100

Source: Based on Primary Data.

Figure No. 3.46: Used of Technology to Analyze and Forecasting Criminal Activities based on Historical Data



Source: Based on Primary Data.

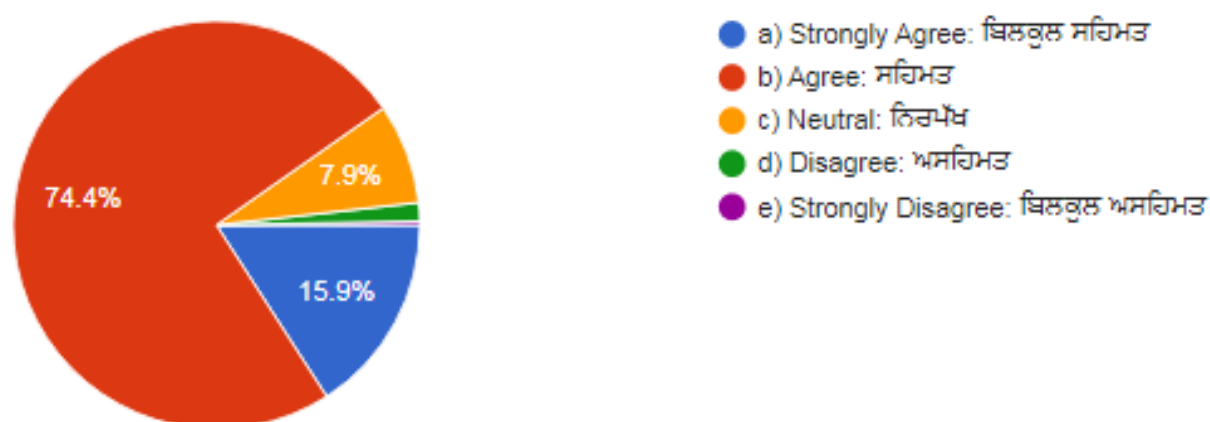
According to 90.3% of the respondents, the adoption of emerging technologies has contributed to a reduction in the crime rate in Ludhiana. Among them, 74.4% agreed, while 15.9% strongly agreed with this view (Table No. 3.29 & Figure No. 3.47). Police stated during the interviews that the use of technology has greatly contributed to fewer crimes being committed. They mentioned that technology is crucial for solving crimes. Modern surveillance cameras are capable of detecting suspicious behavior and many other technological tools assist the police during investigations, field operations and in maintaining law and order.

Table No. 3.29: Emerging Technologies in Policing Contributed to a Reduction in Crime Rates in Ludhiana

Type of Response	Frequency	Percent (%)
Strongly Agree	54	15.9
Agree	253	74.4
Neutral	27	7.9
Disagree	5	1.5
Strongly Disagree	1	0.3
Total	340	100

Source: Based on Primary Data.

Figure No. 3.47: Emerging Technologies in Policing Contributed to a Reduction in Crime Rates in Ludhiana



Source: Based on Primary Data.

To examine year-wise crime trends within the Police Commissionerate of Ludhiana and to conduct an in-depth evaluation of the transformative impact of emerging technologies on crime reduction in the region, the researcher collected ten years of crime data from Ludhiana city. Information pertaining to offenses registered under various sections of the Indian Penal Code (IPC), as well as under local and special laws, was obtained. The last decade represents a significant transitional phase for the police department, marked by the gradual integration and adoption of modern technologies into routine policing activities. During this period, various technological tools and platforms were introduced in the department. The introduction of new technologies allowed law enforcement agencies to change their practices for preventing, detecting and investigating crimes.

The compiled data covers general criminal activity, including those registered under the IPC and local and special law. The following categories of crimes have been included:

IPC Section(s)	Offence Description
302 IPC	Murder
304 IPC	- Culpable Homicide Not Amounting to Murder
307 IPC	- Attempt to Murder

IPC Section(s)		Offence Description
325 to 326 IPC	-	Grievous Hurt
328 IPC	-	Causing Harm by Poison, etc.
364/365 IPC	-	Kidnapping or Abduction with Intent to Confine
363/366 IPC	-	Kidnapping or Abduction for Marriage/Other
376 IPC	-	Rape
379 to 382 IPC	-	Theft and Related Offences
392 to 394 IPC	-	Robbery and Attempt
395 to 399 IPC	-	Dacoity and Preparations
454 to 460 IPC	-	House-breaking and Lurking Trespass
411/412 IPC	-	Dishonestly Receiving Stolen Property
419/420 IPC	-	Cheating and Impersonation
406/409 IPC	-	Criminal Breach of Trust
332 IPC	-	Voluntarily causing hurt to deter public servant
353 IPC	-	Assault or criminal force to deter public servant
186 IPC	-	Obstructing a public servant in discharge of duty

Local & Special Law

Act Name		Description
NDPS Act	-	Narcotic Drugs and Psychotropic Substances Act
Arms Act	-	Possession, manufacture, or sale of arms
Excise Act	-	Regulation of Liquor, Illegal Distillation etc.
7 EC Act	-	Essential Commodities Act – Section 7
PC Act	-	Prevention of Corruption Act
Explosive Act	-	Use or Possession of Explosives

Table No. 3.30: General Crime from year 2015 to 2024 (Last Ten Years)

Sr No.	Offence	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
1.	302 IPC	73	64	59	53	56	52	46	58	56	56
2.	395 to 399 IPC	32	24	23	21	20	21	12	23	13	19
3.	454 to 460 IPC	228	200	314	354	309	215	293	301	269	153
4.	304 IPC	11	08	14	15	14	05	12	10	18	28
5.	307 IPC	68	86	55	57	51	80	52	64	70	63
6.	325 to 326 IPC	200	169	59	57	67	80	69	65	63	57
7.	328 IPC	06	01	02	05	01	00	00	03	00	01
8.	364/365 IPC	58	24	37	32	13	16	12	24	22	30
9.	363/366 IPC	217	143	162	222	195	119	138	125	104	220
10.	376 IPC	101	86	104	129	116	97	122	142	101	96
11.	379 to 382 IPC	573	565	1178	1335	1508	1214	1520	1182	1060	1057
12.	392 to 394 IPC	17	08	15	14	12	14	05	11	09	10
13.	411/412 IPC	161	171	229	250	228	145	348	457	346	202
14.	419/420 IPC	451	335	327	392	351	220	257	341	312	369
15.	406/409 IPC	37	40	26	44	28	16	14	22	26	29
16.	332/353/186 IPC	50	29	31	67	34	22	26	22	18	27
17.	Other IPC Cases	1729	1763	2636	2998	2292	2568	2766	1903	1635	1437

18.	NDPS Act	488	351	509	495	560	259	359	687	610	468
19.	Arms Act	37	45	35	29	20	22	32	45	31	37
20.	Excise Act	433	685	999	897	733	807	382	413	224	232
21.	7 EC Act	17	11	13	20	06	10	10	14	04	01
22.	PC Act	04	06	03	03	02	05	01	01	04	04
23.	Explosive Act	00	00	01	00	00	00	00	02	03	00
24.	Other Local & Special Law	841	725	949	981	753	754	590	874	938	620
TOTAL		5832	5539	7780	8470	7369	6741	7066	6789	5936	5216

Source: Based on Primary Data.

The data from the past ten years (Table No. 3.30) shows a noticeable shift in crime trends, especially after the introduction of modern policing technologies. Between 2015 and 2024, total IPC and special law cases peaked in 2018 with 8,470 reported incidents, followed by a steady decline, reaching 5,216 cases in 2024. This aligns with the gradual introduction of digital tools such as mobile data analysis, CCTV cameras, the Safe City Project, CDR analysis, forensic laboratories and GPS-based location monitoring. Offences like robbery (395–399 IPC) decreased to only 19 in 2024 as compared to 32 in 2015. Housebreaking cases (454–460 IPC) dropped from 354 in 2018 to 153 in 2024. Similarly, technology played a vital role in solving serious crimes like kidnapping and dacoity. These decreases show that emerging technologies are not only contributing to quicker investigations but they are even serving as prevention. In general, the incorporation of technology has enhanced efficiency, outreach and accuracy of the policing within the city.

To elaborate on how emerging technologies can be used effectively in current policing, a few case studies were gathered through interviews with police officials and by conducting fieldwork at the Police Commissionerate in Ludhiana. These real case criminal investigations depict the ways police agencies are taking advantage of

technologies such as call detail record (CDR) analysis, IMEI tracking, GPS locations, CCTV surveillance and digital transaction analysis to trace, investigate and resolve complex cases. All the examples reveal how the adoption of the emerging technologies has increased the effectiveness, accuracy and speed of police investigations in real-life conditions.

In the biggest robbery case, information was received that there had been a robbery at CMS Info Systems Limited and a huge amount had been looted by the culprits, who were carrying arms and sharp-edged weapons. In this regard, an FIR under sections 395, 342, 323, 506, 427, 120-B IPC and 25 Arms Act 1959 was registered against 8-10 unknown accused for committing robbery of Rs. 8.49 crore at CMS Info Systems Limited. During the investigation, it was found that 9-10 unknown persons along with sharp-edged weapons had entered the CMS office and after overpowering the CMS staff, they took about 8.49 crores in cash along with three .12 bore guns from the security guards deployed in the office and fled in the CMS cash van. It was a well-planned robbery because they entered the premises stealthily, stole the DVRs and then cut the wires of the alarm/sensor that used to open the door. Immediately the crime scene was secured and forensic teams were called to the spot. To ascertain the numbers of the accused and their vehicles used in the commission of the crime, CCTV footage of the entire route used by the accused was checked. Since GPS of the cash van was enabled, its route was analysed point-wise by looking at all the latitude and longitude locations of the CMS cash van, after that, the CMS cash van was recovered. During the search of the van, 9 bags of colour black marked CMS and 3 iron trunks with 7 casts and 3 rifles .12 bore were found. Apart from this, CDRs of ex-employees or recently joined employees like drivers, custodians, security guards, etc., were analysed and verified. CCTV cameras installed in the adjoining villages and link roads were watched and footage was analysed. The record of the criminals of the surrounding area was verified. Consequently, with the help of emerging technologies such as CCTV footage, CDRs and other modern technical tools, the case was cracked within 60 hours, leading to the arrest of 18 accused persons and recovery of Rs. 7,14,00,700/-.

Apart from this, there are few other examples that reveal that emerging technologies have increased the effectiveness and speed of police investigations in real-life conditions. A case dealing with robbery, criminal intimidation and common intention was registered under Sections 392, 506 and 34 of the IPC. In this case, the accused

booked an OLA cab online, forcibly removed the driver from the vehicle and fled with it. The mobile phone of complainant was left in the stolen car, which was later used by the accused to communicate with their close contacts. By analysing the call detail records (CDRs) of the stolen phone, two suspects were traced and arrested. The stolen car was also successfully recovered, showing how emerging technologies play an important role in the investigation of such cases.

This case was registered under sections 392, 34, 411, 473, 120-B IPC and sections 25, 51 Arms Act-1959. It involved an armed robbery at a jewellery shop. The store was looted by three assailants using a motorcycle and they fled away. As per the analysis of CCTV footage, they stopped at a petrol pump on their way and made a Paytm transaction, while refuelling. The information relating to this online transaction was obtained and analysed by investigators, which led to the identification and arrest of the accused. The case shows how digital payment data and video surveillance can be used as important tools in modern criminal investigations.

A case related to the discovery of an unidentified dead body found in a garbage dump was registered under Section 302 IPC (murder) and Section 201 IPC (causing disappearance of evidence). The mobile phone of the deceased was analysed during the investigation. For more than one year, the IMEI number of the mobile phone was monitored by investigators, eventually the phone was found with one of the friends of the deceased. Upon investigation, the friend confessed to the murder, citing financial dispute as the motive and admitted to disposing of the body in the garbage to destroy evidence.

In a murder case registered under Sections 302 IPC (murder), 201 IPC (causing disappearance of evidence) and 34 IPC (common intention), investigators are greatly dependent on technical surveillance. Mobile tower data (based on CDRs) and GPS-based location tracking of every individual connected to the deceased were deeply examined. The mobile tower location of one of the suspects coincided with the location of the crime scene. During the investigation, the suspect confessed to committing the murder. Location-based evidence and data were a significant aspect in proving that the suspect was at the crime scene and this fact led to the confession.

This case was registered under sections 386 and 506 of the Indian Penal Code (IPC), which pertain to extortion by putting a person in fear of death or grievous

hurt and criminal intimidation, respectively. In which an individual demanded a ransom of Rs. 30,00,000 by falsely associating himself with a known gangster. During the investigation, technical methods, including call detail records (CDRs) analysis and IMEI tracking, were employed, which led to tracing the communication patterns and location of the suspect. The accused was identified and apprehended in time with the help of this technological intervention.

This case was registered under section 395 IPC, related to dacoity, in which a gang was involved in stealing cloth through a Bolero pickup truck from various factories. The CCTV cameras, which are installed under the safe city project, were very crucial in helping to trace the movement of the vehicle and the identification of the suspects, resulting in their arrest.

This case is registered under Sections 363 and 366A IPC, related to kidnapping and inducement of a minor girl for illicit purposes. The minor girl was lured by two young men and taken away with them after switching off their mobile phones to evade detection. During the investigation, the police tracked newly activated phone numbers obtained by using ID proofs of the suspect. A detailed analysis of the call detail records and location made it possible to locate and rescue the girl from Jammu and Kashmir. This case shows how a digital identification trail can be useful in monitoring criminals.

Conclusion

The results suggest that the Police Commissionerate Ludhiana has made notable strides in integrating emerging technologies into its policing practices. The use of technologies like CCTV surveillance, CCTNS, ALPR, PAIS, CDR analysis, GPS tracking, mobile forensic tools and cyber forensic facilities has improved crime prevention, investigation and law enforcement efficiency. Most respondents recognized the value of these technologies and how helpful they can be in reducing crime. A further study of the last ten years of crime data and different case studies also highlight that the use of emerging technologies has significantly enhanced the speed, accuracy and effectiveness of policing in Ludhiana, thereby enhancing the overall police performance and public safety.

CHAPTER - 4

EMERGING TECHNOLOGIES AND POLICE-PUBLIC RELATION

The main concern of people in society is that the government they have should be good and fair. A government can only be considered good when its systems and sub-systems of governance are efficient, economical, ethical and equitable. In addition, the process of governing should be fair and citizen-friendly. To have these and other attributes of good governance, the administration system should also be responsible and responsive, in addition to ensuring transparency and public participation, as stated by A. N. Tiwari (Tiwari, 2004). When it comes to police-public relations, they are not considered good from a social perspective. In fact, the police are often accused by the media and the general public of brutality and misuse of power. The common citizen also dislikes the police, who are seen as insensitive, unethical and unfriendly. Stern measures need to be taken to eliminate these social boundaries in order to establish and sustain a peaceful and harmonious relationship between the police and the citizens. The citizens do not wish their police to be a state in itself or a social welfare service agency that gives education or provides medicines, etc. What people truly expect is that the police should enforce the law and themselves operate within its boundaries. Max Weber, in this regard, described the state as an organization holding the "monopoly on the legitimate use of physical force." Physical force should be used only when other peaceful means have failed (Mitropolitski, 2011).

The police have continued to face numerous challenging issues. Maintaining public order at all times is no easy task, especially in a country like India, which is both vast and culturally diverse. To their credit, despite several difficulties, the police have been fairly effective in maintaining social order. However, they are often perceived as slow, inefficient, arrogant and unpredictable, in other words, not responsive or sensitive to the needs of the community. When the nature of the job is considered, the police need the active cooperation of the people in order to achieve most of their tasks. The police cannot be everywhere to monitor the unscrupulous and mischievous elements. They require the support of people in the society to ensure law and order and maintain

social harmony. The police would want the citizens to serve as their eyes and ears. It is not a new concept in India to get the people involved in the administration of criminal justice, as the police have always been a part of it. In ancient India, citizens took part in the government with the help of popular assemblies known as the Sabha and the Samiti (Singh, 2020). Police were considered a tool of oppression under alien rule. They did not make any serious attempts to seek voluntary cooperation from the people (Bowling et al., 2004). As a result, the perception of the police grew as an agency of the rulers, from whom the citizens preferred to maintain distance. It was commonly said, "neither enmity nor friendship with the police is good."

The emergence of new technological tools is rapidly changing the way citizens interact, not only with one another but also with businesses, government departments and public institutions. In the past, citizens used to visit government offices to carry out transactions, such as obtaining a certificate, applying for or renewing a passport or driving license or paying utility bills. Now, however, these interactions have become easier and more accessible through emerging technologies. Citizens can complete the same tasks at nearby service centres or even online. With the introduction of emerging technologies, the police have adopted a more specialized and professional role in crime prevention and the maintenance of law and order. The use of modern technological tools such as CCTV, GPS systems, the internet (including social networking platforms like WhatsApp, Facebook, Twitter, Instagram, etc.) and other new devices has helped build public trust in police functioning. These emerging technologies have reshaped the patterns of interaction between the police and society and influenced the orientation, effectiveness and overall image of the police. As a result, the police force has become more interactive and responsive to the social dynamics of the community (Demir, 2009). This chapter is an attempt to assess the impact of new technologies on police-public relations within the Police Commissionerate Ludhiana, based on responses from the general public of Ludhiana city.

4.1 PERCEPTION OF POLICE BEHAVIOUR

Citizens must feel free and comfortable when approaching the police. The existing stigma and sense of embarrassment associated with interacting with the police, rooted in colonial-era perceptions, continue to have a negative impact on society. A significant number of crime victims hesitate to contact the police, even when they need

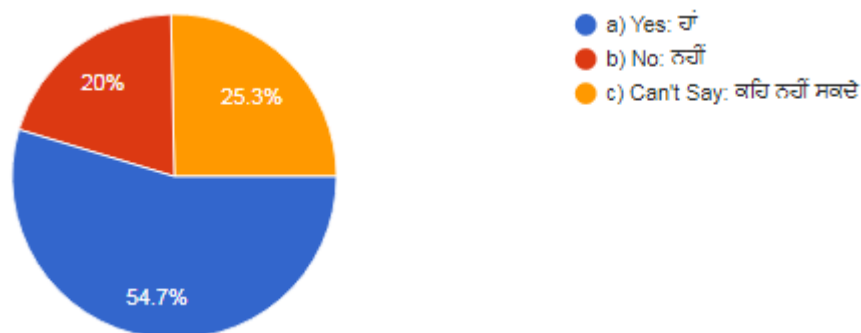
assistance, simply because they lack confidence that the police will respond helpfully (Usman, 2019). Encouraging public participation in policing can greatly improve police-public relations. The police cannot always monitor or track the movement of new individuals entering an area. However, the public can play a very important role by staying vigilant and reporting such information to their local police station. This kind of community cooperation can strengthen policing efforts and help reduce the risk of crime. Table No. 4.1 shows that a majority of respondents (54.7%) said police help citizens when required, suggesting that the presence of police is generally seen as supportive in times of need. But around 20% of people said they disagreed and another 25.3% chose can't say. This suggests that while some citizens feel the police are helpful and timely, others may have had slow or disappointing experiences. Because of these mixed views, many people still aren't sure if they can fully trust the police. Figure No. 4.1 shows its frequency distribution.

Table No. 4.1: Police Help Citizens When Required

Type of Response	Frequency	Percent (%)
Yes	82	54.7
No	30	20
Can't Say	38	25.3
Total	150	100

Source: Based on Primary Data.

Figure No. 4.1: Police Help Citizens When Required



Source: Based on Primary Data.

The relationship between politicians, bureaucrats, criminals and even the police is often referred to as an uncomfortable truth in the Indian context. Corruption has

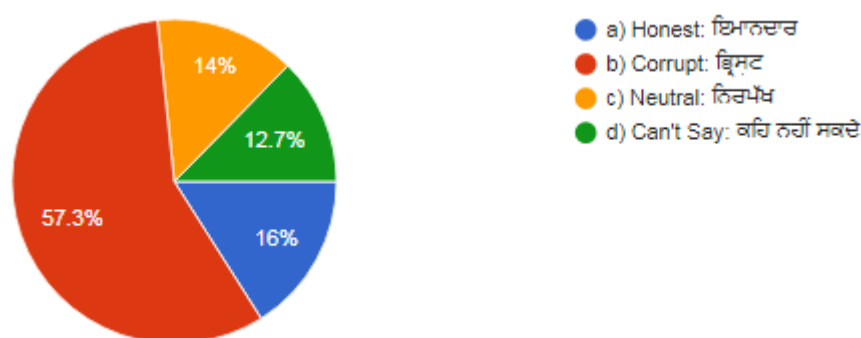
deeply penetrated almost every sector. All branches of administration are riddled with examples of corrupt practices and even the judiciary has not remained untouched by this menace. In such a situation, the right to know and the demand for transparency in public administration have become too important (Dakolias & Thachuk, 2000). Transparency means that citizens should be able to understand the reasons, facts, logic and basis behind administrative decisions. When the researcher asked respondents how much they trust the honesty of the police, 57.3% said they believe the police are corrupt. Only 16% considered the police to be honest, while the remaining respondents were unsure, 14% chose neutral and 12.7% selected can't say (Table No. 4.2 & Figure No. 4.2). These responses show that many people fear the police, possibly because of their image of being corrupt. A large number of people are also unsure or doubtful about how honest the police really are. Only a few respondents said they truly believe the police are honest. This lack of trust, whether based on real experiences or public opinion, makes it harder for citizens to cooperate with the police. The police should make extra efforts to rebuild this trust. During the research, several cases of corruption were found in Ludhiana city, one of which involved a gazetted rank officer.

Table No. 4.2: Is Police Corrupt or Honest

Type of Response	Frequency	Percent (%)
Honest	24	16
Corrupt	86	57.3
Neutral	21	14
Can't Say	19	12.7
Total	150	100

Source: Based on Primary Data.

Figure No. 4.2: Is Police Corrupt or Honest



Source: Based on Primary Data.

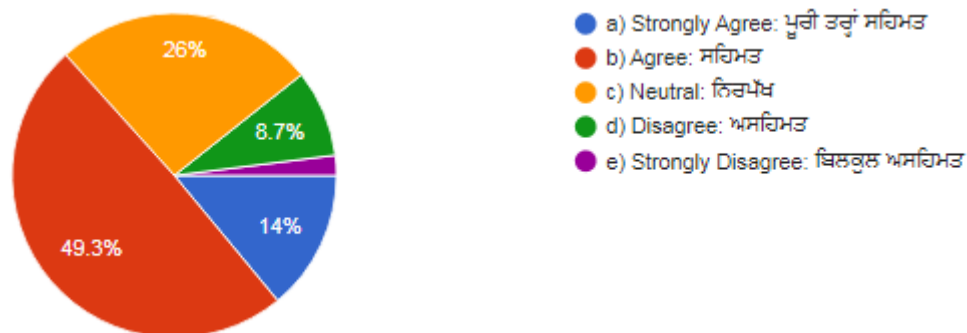
It is the perception of many people that some police officers violate the law more often than ordinary citizens. This could be due to misuse of power, poor accountability, or incidents that go unpunished. When people see such activities, it creates a sense of unfairness and weakens their trust in the system. If the law enforcers themselves are seen bending the rules, it becomes harder for the public to respect or follow them. In response to the question on this issue, 49.3% of respondents agreed and 14% strongly agreed that the police violate the law more often than the average citizen. Meanwhile, 26% remained neutral, 8.7% disagreed and 2% strongly disagreed (Table No. 4.3 & Figure No. 4.3).

Table No. 4.3: Police Violate the Law more than the Average Citizen

Type of Response	Frequency	Percent (%)
Strongly Agree	21	14
Agree	74	49.3
Neutral	39	26
Disagree	13	8.7
Strongly Disagree	03	02
Total	150	100

Source: Based on Primary Data.

Figure No. 4.3: Police Violate the Law more than the Average Citizen



Source: Based on Primary Data.

4.2 PUBLIC INTERACTION AND EXPERIENCE WITH POLICE THROUGH EMERGING TECHNOLOGIES

Police action has often been labelled as violent, inconsiderate, merciless, dishonest, illegal and a violation of human dignity. Disturbing scenes of police action on public roads, such as inhuman lathi-charges, acts of brutality and the beating and torture of even women, children, the elderly and persons with disabilities, can regularly be seen on television across all parts of the country. The police-public interface plays a crucial role in the functioning of police at every level. It must be understood that not only is crime increasing at an unprecedented rate, but it is also becoming more organized, violent and technology-oriented. The fight against crime is becoming very challenging and both the police and the public must recognize that this battle cannot be left solely to the police, it is a shared responsibility (Tyler & Fagan, 2008). Crime cannot be completely removed from society, it can be controlled. To achieve this, the police and the community must build a strong, cooperative relationship and work together toward the common goal of crime prevention and control. The educated and active nature of the citizens in Ludhiana keeps the Police Commissionerate on its toes, constantly encouraging them to perform better.

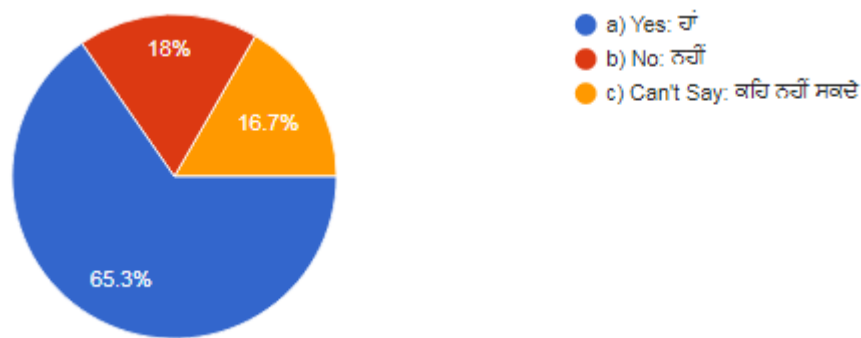
Police is exposed to society at nearly every step of its operations. The police cannot effectively carry out any part of their duties (whether it is reporting an incident, investigating a case, arresting an accused person or conducting a search) without the cooperation of the public. There are very few police activities in which members of the community do not play a role. In fact, the community's involvement in investigations is multifaceted, they not only assist in ongoing investigations but also provide intelligence that helps prevent crime. Considering the fact that citizen involvement and engagement are highly significant, the Police Commissionerate Ludhiana has taken several steps, including engaging with community representatives and introducing new applications to facilitate citizen services. When the researcher asked citizens whether they were aware of the new technologies being used by Ludhiana Police, 65.3% of respondents stated that they were aware, 18% reported they were not aware and 16.7% responded with 'can't say' (as shown in Table No. 4.4 and Figure No. 4.4). These results indicate that a majority of the city's residents are aware of the new technologies adopted by Ludhiana Police, such as CCTV cameras, the online complaint facility, the RTI portal and other digital services.

Table No. 4.4: Awareness about New Technologies being used by the Ludhiana Police

Type of Response	Frequency	Percent (%)
Yes	98	65.3
No	27	18
Can't Say	25	16.7
Total	150	100

Source: Based on Primary Data.

Figure No. 4.4: Awareness about New Technologies being used by the Ludhiana Police



Source: Based on Primary Data.

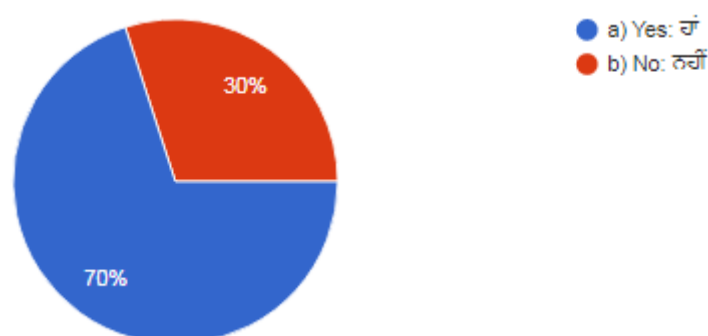
Concerning the influence of new technologies, during interviews with police staff, one senior officer told the researcher that in today's times, people have lost trust in one another. They tend to place more trust in machines than in human interactions. Therefore, it is assumed that the less direct contact the police have with the public, the better the relationship tends to be, in other words, it's about maintaining indirect contact. Table No. 4.5 & Figure No. 4.5 indicates that the majority of respondents (70%) answered 'Yes' to the question of whether they had interacted with police personnel using new technologies such as online platforms, mobile phones and online reporting systems. 30% of respondents reported that they had not interacted through these means.

Table No. 4.5: Interaction with Police Personnel using Technologies

Type of Response	Frequency	Percent (%)
Yes	105	70
No	45	30
Total	150	100

Source: Based on Primary Data.

Figure No. 4.5: Interaction with Police Personnel using Technologies



Source: Based on Primary Data.

While most of the respondents interacted with police personnel using new technologies, it is quite surprising that when the researcher asked them about their experience with police while using these technologies, less than half of the respondents expressed satisfaction. About 38% reported a positive experience and 8% a very positive one, whereas 27.3% remained neutral, 25.3% had a negative experience and 1.4% reported a very negative experience (Table No. 4.6 & Figure No. 4.6). During the interviews, one citizen mentioned that he had submitted a complaint online through the Public Grievance Division (PGD) Portal and then waited almost a month, when he did not receive any phone call or update regarding his complaint, he had to personally visit the office of the Commissioner of Police and hand over a hard copy of the complaint to ensure further action. A senior police officer acknowledged such delays, explaining that such delays sometimes occur due to online server problems or because the officials handling the portal are also engaged in essential law and order duties. This reflects that

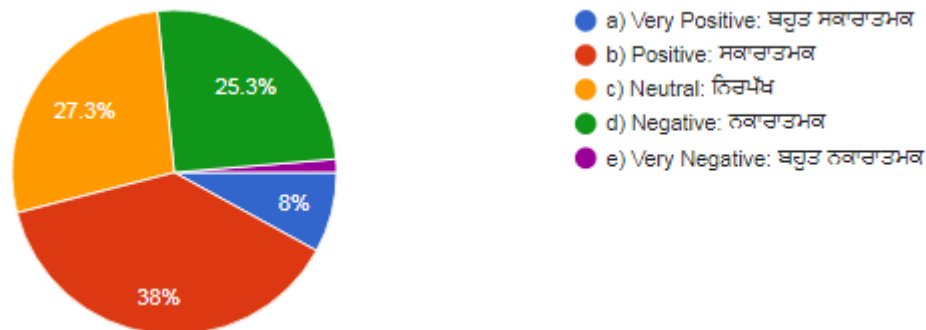
although the police have made several efforts to improve services through technology, certain shortcomings still remain.

Table No. 4.6: Experience with Police Personnel while using the New Technologies

Type of Response	Frequency	Percent (%)
Very Positive	12	08
Positive	57	38
Neutral	41	27.3
Negative	38	25.3
Very Negative	02	1.4
Total	150	100

Source: Based on Primary Data.

Figure No. 4.6: Experience with Police Personnel while using the New Technologies



Source: Based on Primary Data.

Senior officials mentioned that the Police Commissionerate Ludhiana is putting in consistent efforts to create a safer and more comfortable environment for the city's residents. They also said that, with the adoption of new technologies and the growing use of online platforms and social media, the Police Commissionerate Ludhiana is now engaging more actively with the public and regularly sharing important updates. As a result of this, Table No. 4.7 shows that 68% of respondents (60% agreed and 8% strongly agreed) believed that emerging technologies have improved the police-public interface. 18.7% of respondents were neutral, while 12% disagreed and 1.3% strongly

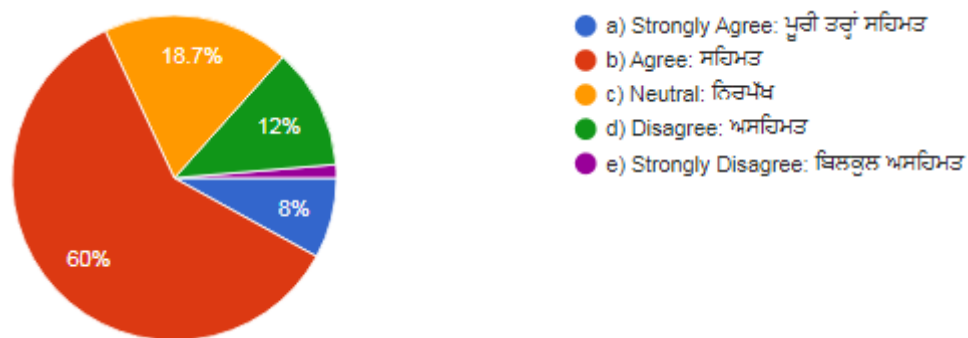
disagreed, indicating that they did not perceive an improvement in the interface due to emerging technologies. Figure No. 4.7 shows the frequency distribution of these responses.

Table No. 4.7: New Technologies and Police-Public Interface

Type of Response	Frequency	Percent (%)
Strongly Agree	12	08
Agree	90	60
Neutral	28	18.7
Disagree	18	12
Strongly Disagree	02	1.3
Total	150	100

Source: Based on Primary Data.

Figure No. 4.7: New Technologies and Police-Public Interface



Source: Based on Primary Data.

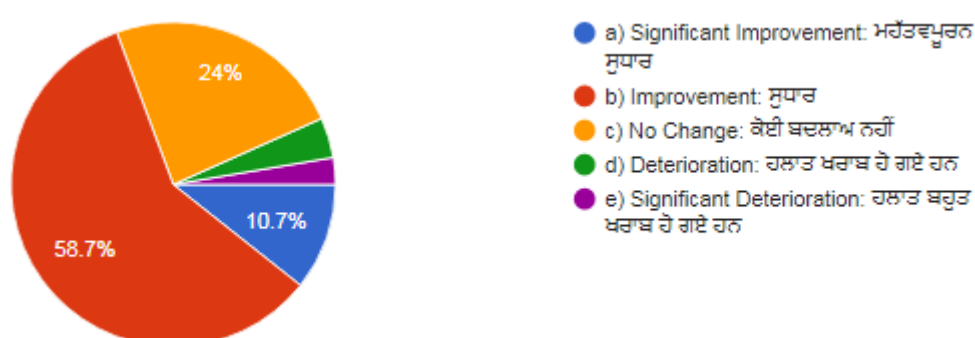
Beyond the police-public relationship, when the researcher asked respondents whether they noticed any improvement in the responsiveness of the police since the implementation of new technologies, 58.7% stated that they had noticed an improvement and 10.7% noticed a significant improvement, 24% of respondents observed no change, 4% reported a deterioration and 2.6% mentioned a significant deterioration (Table No. 4.8 & Figure No.4.8).

Table No. 4.8: Improvement in the Responsiveness of the Police since the Implementation of New Technologies

Type of Response	Frequency	Percent (%)
Significant Improvement	16	10.7
Improvement	88	58.7
No Change	36	24
Deterioration	06	04
Significant Deterioration	04	2.6
Total	150	100

Source: Based on Primary Data.

Figure No. 4.8: Improvement in the Responsiveness of the Police since the Implementation of New Technologies



Source: Based on Primary Data.

For the query regarding whether respondents had noticed an improvement in the efficiency of police services with the use of new technologies, 10% stated that they had observed a significant improvement, while 60.7% reported a general improvement (Table No. 4.9). Meanwhile, 5.3% perceived deterioration and 2% noted a significant deterioration. Additionally, 22% of respondents felt there was no noticeable change. Figure No. 4.9 shows its frequency distribution. Overall, the majority of respondents acknowledged a positive shift, especially in administrative services such as passport verification, application for Police Clearance Certificates (PCC) and tracking the status of

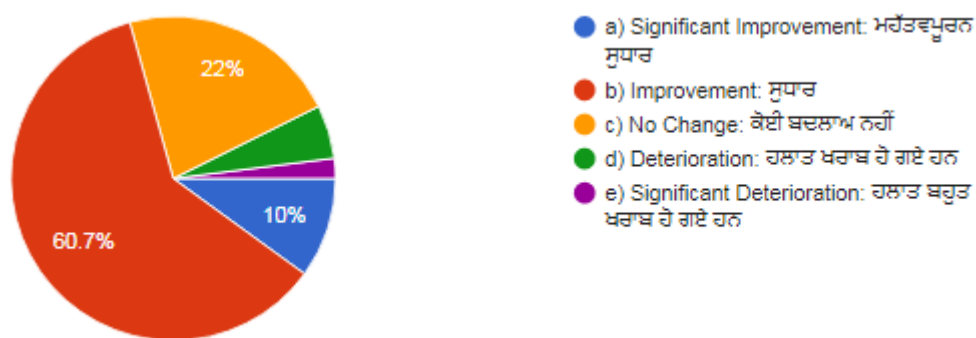
online complaints. According to respondents, technology has made processes smoother by reducing manual work, paperwork and time.

Table No. 4.9: Improvement in the Efficiency of Police Services with the use of New Technologies

Type of Response	Frequency	Percent (%)
Significant Improvement	15	10
Improvement	91	60.7
No Change	33	22
Deterioration	08	5.3
Significant Deterioration	03	02
Total	150	100

Source: Based on Primary Data.

Figure No. 4.9: Improvement in the Efficiency of Police Services with the use of New Technologies



Source: Based on Primary Data.

The integration of technology in policing has led to greater surveillance and visibility, which has made many citizens feel a lot safer, especially at night, in urban markets and in areas frequented by women. Compared to the older systems, the police today have introduced several changes in areas such as investigation, maintaining law and order and providing citizen services. CCTV cameras prompt responses by the police to mobile phone calls and services provided through the Police Control Room are often appreciated by the public. In response to the question of whether citizens of Ludhiana feel

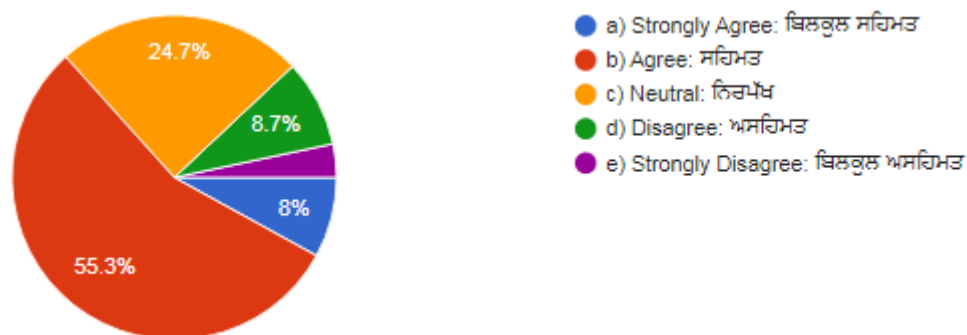
more secure due to the use of new technologies by the police, 55.3% of respondents agreed and 8% strongly agreed. Around 24.7% remained neutral, as they were not sure whether emerging technologies actually made them feel more secure. On the other hand, 8.7% disagreed and 3.3% strongly disagreed, stating that new technologies may enhance safety as well as bring new threats such as online fraud and banking fraud. (Table No. 4.10 & Figure No. 4.10).

Table No. 4.10: Do Citizens Feel More Secure with the Use of New Technologies by the Police

Type of Response	Frequency	Percent (%)
Strongly Agree	12	08
Agree	83	55.3
Neutral	37	24.7
Disagree	13	8.7
Strongly Disagree	05	3.3
Total	150	100

Source: Based on Primary Data.

Figure No. 4.10: Do Citizens Feel More Secure with the Use of New Technologies by the Police



Source: Based on Primary Data.

Ludhiana Police has made notable efforts to deliver quality policing services in a citizen-friendly and hassle-free manner. Most importantly, CCTV has played

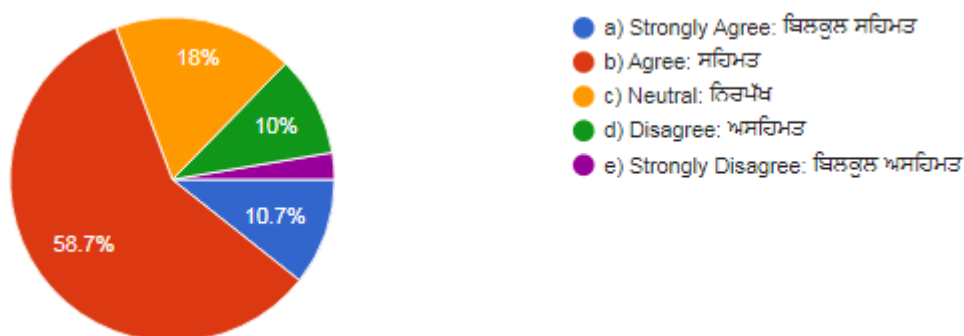
a crucial role in making police-public interaction more harmonious. To ensure that public organizations are accountable and transparent in their operations, CCTV should be installed across all departments and the police department is no exception. Knowing they're being watched on CCTV, both police and the public often think twice before doing something wrong. These days, the technology used in security systems is quite advanced, even regular televisions or computers can be used to watch the recorded footage. All police stations under Commissionerate Ludhiana have installed CCTV cameras. A visit to any police station confirms that several cameras are in place within the premises. These are usually installed at the main gate of the police station, reception area, SHO room and lock-up room. Police personnel said that having CCTV cameras in the police stations has made things more transparent and efficient. Table No. 4.11 and Figure No. 4.11 indicate that 58.7% of respondents agreed and 10.7% strongly agreed that new technologies have made police operations more transparent. At the same time, 18% were neutral, 10% disagreed and 2.6% strongly disagreed.

Table No. 4.11: New Technologies make Police Operations more Transparent

Type of Response	Frequency	Percent (%)
Strongly Agree	16	10.7
Agree	88	58.7
Neutral	27	18
Disagree	15	10
Strongly Disagree	04	2.6
Total	150	100

Source: Based on Primary Data.

Figure No. 4.11: New Technologies make Police Operations more Transparent



Source: Based on Primary Data.

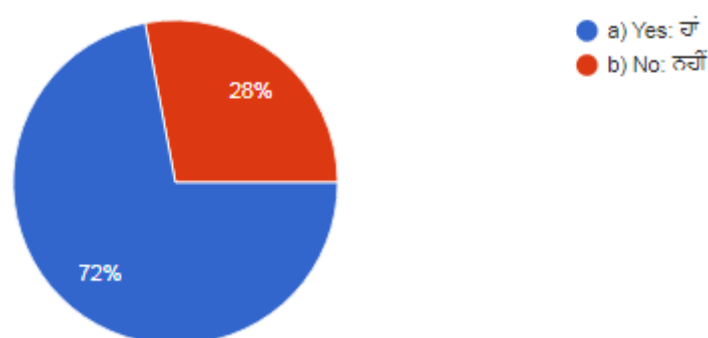
To control crime and maintain law and order, public participation always plays an important role. For meaningful participation, it is important that people remain connected with the police department. In this regard, the Ludhiana Police has taken several initiatives by introducing online platforms, digital services and facilities such as online reporting and access to the status of applications. Additionally, multiple helpline numbers, including a dedicated women's helpline, are active and operational. The department is also making efforts to connect with citizens through social media. As shown in Table No. 4.12, a significant majority of respondents (72%) said 'yes' and agreed that the use of new technologies has made it easier for the general public to connect with Ludhiana Police, while 28% said 'no' and disagreed (Figure No. 4.12).

Table No. 4.12: Use of New Technologies has made it easier for the General Public to Connect with the Ludhiana Police

Type of Response	Frequency	Percent (%)
Yes	108	72
No	42	28
Total	150	100

Source: Based on Primary Data.

Figure No. 4.12: Use of New Technologies has made it easier for the General Public to Connect with the Ludhiana Police



Source: Based on Primary Data.

4.3 CITIZEN ADOPTION, PREFERENCES AND SATISFACTION WITH TECHNOLOGY BASED POLICE SERVICES

Police, as a state subject, has a number of services. The services that policing offers to the community can be categorized into two groups: emergency and non-emergency services (Mazerolle et al., 2001). Emergency service is generally needed when crimes have occurred or when there is an immediate need for the police to act in order to prevent a breach of peace or social disorder. Mostly, phone calls are made to the police control room or directly to the concerned police station. The PCR system operator first sends out a wireless message whenever a call is received regarding a location and the nearest PCR vehicle is mobilized to reach the spot within the stipulated time. In some cases, multiple PCR vehicles are deployed depending on the ground situation. At the same time, the PCR also instructs the concerned police station to send the duty officer, who is usually an Assistant Sub-Inspector or Sub-Inspector posted at the station around the clock to respond to emergencies.

Non-emergency interactions between citizens and the police typically include services such as passport verification, grievance redressal, arms license verification, service and marriage verifications, license validation, permission to use loudspeakers, NOCs for obtaining cracker licenses and similar matters. This non-emergency service takes place in level two, in two levels namely Police Station Level and Police Headquarter Level. All such requests are received and processed at the Police Headquarters, with a report being sought from the respective police station in each case. Once the concerned police station submits its report, the requested service is provided to the citizen.

To facilitate access to these services, Ludhiana Police has adopted online platforms and portals. In addition, a dedicated building named ‘Single Window’ has been established at the office of the Commissioner of Police Ludhiana, where all online services under the Saanjh project, as well as other digital services, are made available to citizens. Within this Single Window system, there are separate counters for passport verification and enquiry, NCRB services, PCC, CVR & MVR verifications, Foreigner’s documentation, RTI applications and arms license processing. Each counter is equipped with modern technology such as computers, scanners, webcams, printers, etc., to ensure efficient service delivery.

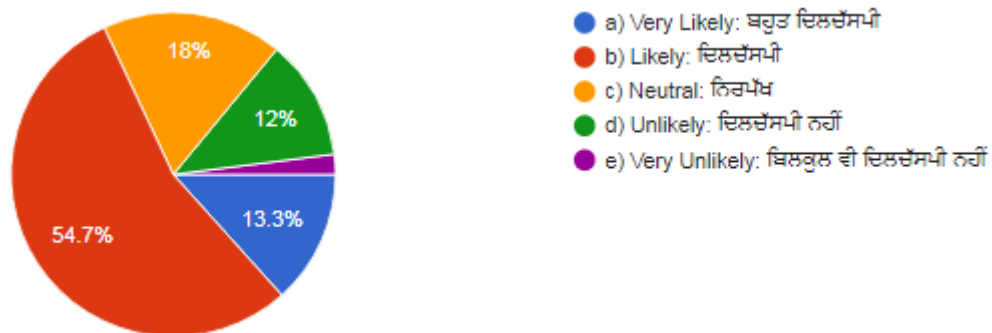
As shown in Table No. 4.13 & Figure No. 4.13, when respondents were asked how likely they are to use technology-based services provided by the police, 54.7% responded 'likely' and 13.3% responded 'very likely.' However, 18% remained neutral, 12% responded 'unlikely,' and 2% responded 'very unlikely,' indicating some hesitation, possibly due to lack of exposure or digital literacy.

Table No. 4.13: How Likely Citizens are to Use Technology-Based Services

Type of Response	Frequency	Percent (%)
Very Likely	20	13.3
Likely	82	54.7
Neutral	27	18
Unlikely	18	12
Very Unlikely	03	02
Total	150	100

Source: Based on Primary Data.

Figure No. 4.13: How Likely Citizens are to Use Technology-Based Services



Source: Based on Primary Data.

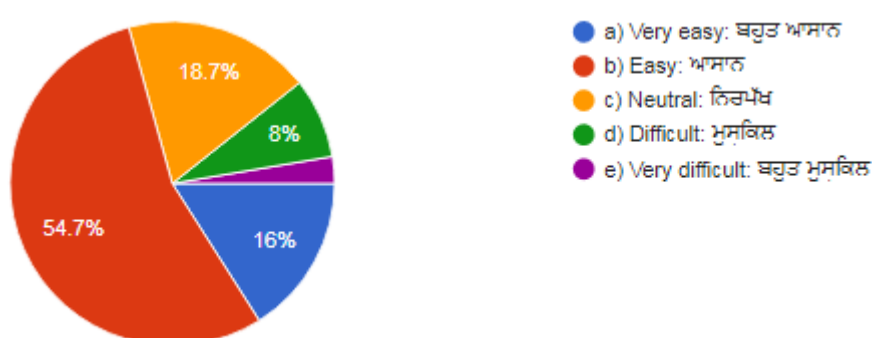
When asked how easy they perceive the process of reporting a crime using the available technology, Table No. 4.14 shows that 16% of respondents said it was 'very easy', while 54.7% found it 'easy'. About 18.7 percent stayed neutral, saying that sometimes the processing is easy and sometimes it is hard, especially in form filling and in the submission process. Meanwhile, 8% found it 'difficult' and 2.6% found it 'very difficult', mainly due to lack of clarity, poor user interface and most importantly, limited education and digital knowledge (Figure No.4.14).

Table No. 4.14: How Easy Citizens Find the Process of Reporting a Crime Using Available Technology

Type of Response	Frequency	Percent (%)
Very Easy	24	16
Easy	82	54.7
Neutral	28	18.7
Difficult	12	08
Very Difficult	04	2.6
Total	150	100

Source: Based on Primary Data.

Figure No. 4.14: How Easy Citizens Find the Process of Reporting a Crime Using Available Technology



Source: Based on Primary Data.

The citizen's survey reveals that 62% of respondents would prefer face-to-face interaction with police personnel rather than using technology for communication (Table No. 4.15 & Figure No. 4.15). This was surprising for the researcher, considering that Ludhiana City has a high literacy rate and most people here are educated. So, the question naturally came up, why is such a large proportion still not using online services?

One of the senior police officials helped explain this. He said that while Ludhiana does have a high literacy rate, the city also has a large number of migrants from nearby states and many of them are not well-educated. As a result, they tend to use services in more traditional ways. When the same question was asked to the public, one respondent shared his personal experience. He had applied for an RTI through post and

even online, but he only received a response after visiting the RTI counter in person multiple times. In such situations, he said, how can someone trust technology alone?

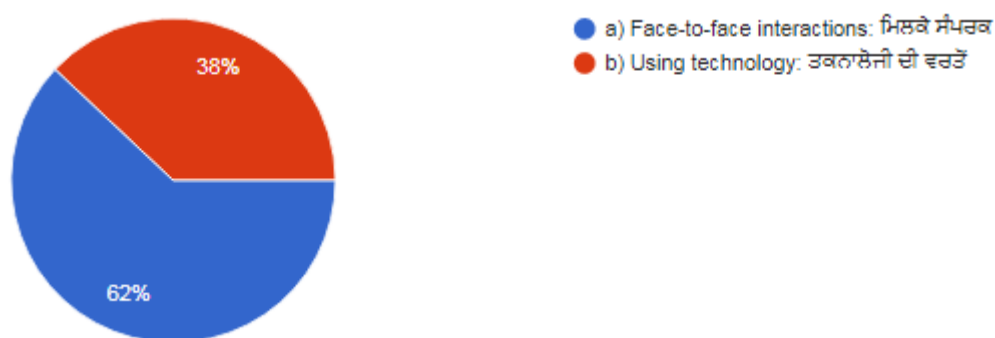
Some respondents mentioned that nothing ever gets done at a police station without a personal visit. The survey revealed that people generally don't feel satisfied after using online services alone, they feel more confident and reassured after meeting in person. Many said they prefer to explain their problems face-to-face because it gives them a sense of satisfaction. Senior citizens also preferred face-to-face meetings, mostly because they are not very familiar with technology or feel hesitant to use mobile phones and other digital devices. However, some younger respondents and those currently employed showed more interest in using online services, mobile apps and real-time updates offered by the police.

Table No. 4.15: Face-to-Face Interactions with Police Personnel or Using Technology for Communication

Type of Response	Frequency	Percent (%)
Face-to-face interactions	93	62
Using technology	57	38
Total	150	100

Source: Based on Primary Data.

Figure No. 4.15: Face-to-Face Interactions with Police Personnel or Using Technology for Communication



Source: Based on Primary Data.

The Ludhiana Police have introduced several mobile applications for the convenience of the general public, such as Know Your Police, PP Saanjh, Khoj Punjab Police, Public Grievance Division Punjab Police, etc.

a) Know Your Police Station

In certain situations, such as when an incident occurs while travelling or when an individual needs to lodge a police complaint, people are often unaware of which police station has jurisdiction over their current location. As a result, they may not know where to file their complaint. To deal with this problem, the Know Your Police Station mobile application was launched (Figure No. 4.16). Once downloaded onto a mobile device, the app can determine the user's location and instantly display which police station has jurisdiction over that area. Additionally, it provides navigational assistance via a map to help the user reach the relevant police station.

Figure No. 4.16: Know Your Police Station

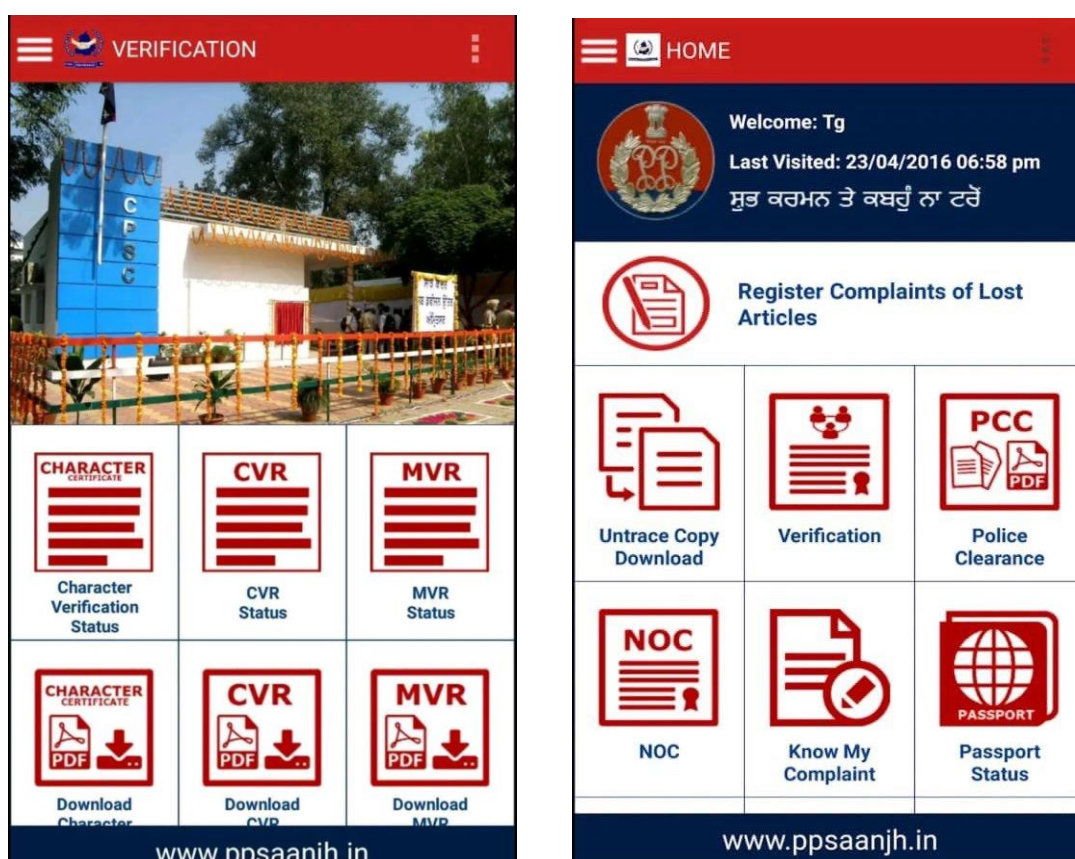


Source: <https://play.google.com/store/search?q=know%20your%20police%20station&c=apps>

b) PP Saanjh

The term “PP Saanjh” stands for Punjab Police Saanjh. Such an application enables citizens to obtain different services in the comfort of their homes, such as passport verification, obtaining a police clearance certificate and acquiring a No Objection Certificate (NOC). Through the app, users can also check the status of their applications (Figure No. 4.17).

Figure No. 4.17: PP Saanjh



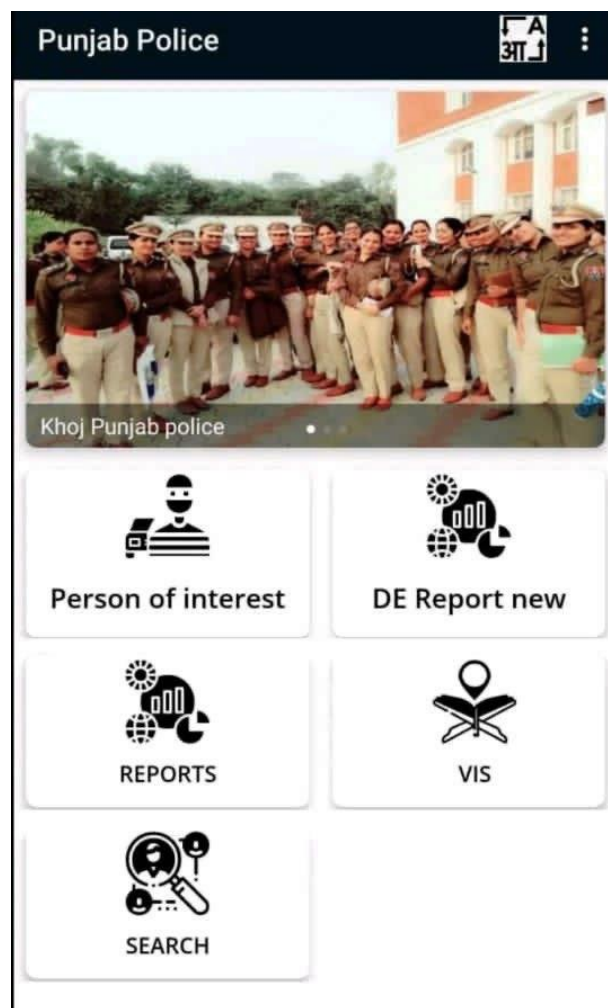
Source: <https://play.google.com/store/search?q=ppsaaanjh&c=apps>

c) Khoj Punjab Police

To facilitate the search for missing persons within the city and provide related details, the Ludhiana Police Commissionerate introduced the Khoj Punjab Police application (Figure No. 4.18). Whenever information about a missing person was received, their details were uploaded onto the app so that the public could be informed and assist in locating them. However, because of several factors, including a lack of

awareness of the app, not only among the population but also among police officers and the overall apathy, the application was not actively employed over the long term. Although the app is still available for download on the Google Play Store, no data is currently being uploaded or updated by the police.

Figure No. 4.18: Khoj Punjab Police



Source: <https://khoj-punjab-police.en.softonic.com/android>

d) Public Grievance Division Punjab Police

The *Public Grievance Division* portal of the Punjab Police was launched to ensure the timely resolution of public complaints. Through this online portal, any individual can submit an application to the police from the comfort of their home and can also check the status of their complaint online (Figure No. 4.19).

Figure No. 4.19: Public Grievance Division Punjab Police



Source: <https://pgd.punjabpolice.gov.in/>

For the query regarding citizen's satisfaction with the response time to requests or reports submitted via the mobile app provided by police, 8% of respondents reported being very satisfied & 27.3% satisfied. On the other hand, 20.7% remained neutral, 35.3% were dissatisfied and 8.7% were very dissatisfied (Table No. 4.16 & Figure No. 4.20). This indicates that more respondents were dissatisfied than satisfied.

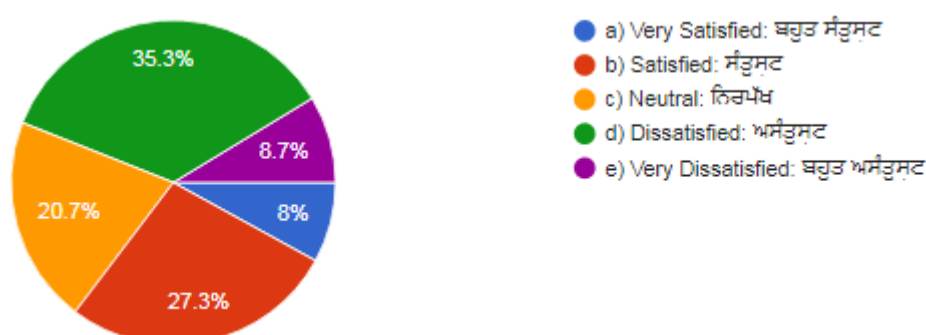
The survey showed that respondents who remained neutral were generally unaware of these apps. Among the 44% who were dissatisfied or very dissatisfied, many noted that the response time was average or below expectations and they often had to visit in person to obtain the actual status of their request. Respondents who expressed satisfaction said that using the app for online services was very easy and time-saving. However, they also noted that the app must be updated frequently.

Table No. 4.16: Citizen's Satisfaction with the Response time to Requests or Reports Submitted via the Mobile App Provided by Police

Type of Response	Frequency	Percent (%)
Very Satisfied	12	8
Satisfied	41	27.3
Neutral	31	20.7
Dissatisfied	53	35.3
Very Dissatisfied	13	8.7
Total	150	100

Source: Based on Primary Data.

Figure No. 4.20: Citizen's Satisfaction with the Response time to Requests or Reports Submitted via the Mobile App Provided by Police



Source: Based on Primary Data.

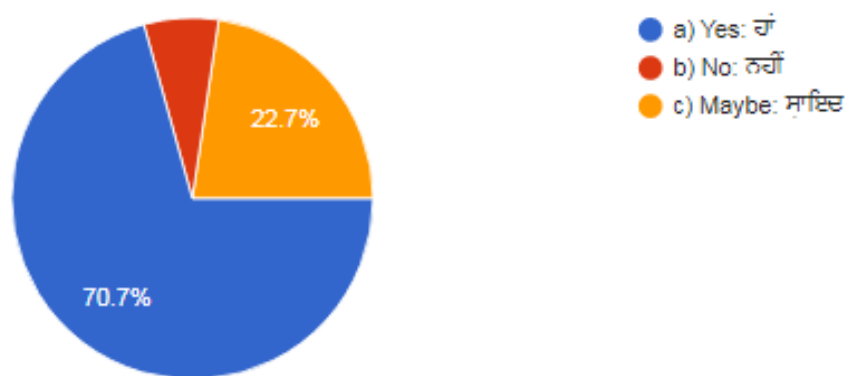
The results also highlight a gap on the part of the police. It is not only a matter of how many people are using the new technologies provided by the police, but also whether those who do use these apps are receiving accurate information and truly benefiting from them. Police personnel themselves require proper training in using and managing technological tools. Many officers are unfamiliar with how these apps function and some lack even basic computer-operating skills. According to the survey Table No. 4.17 & Figure No. 4.21 shows that 70.7% of respondents agreed that the police need more training on how to interact with the public through digital platforms, 22.7% said “maybe,” and only 6.6% responded “no.”

Table No. 4.17: Police Should Have More Training on How to Interact with the Public through Digital Platforms

Type of Response	Frequency	Percent (%)
Yes	106	70.7
No	10	6.6
Maybe	34	22.7
Total	150	100

Source: Based on Primary Data.

Figure No. 4.21: Police Should Have More Training on How to Interact with the Public through Digital Platforms



Source: Based on Primary Data.

4.4 EFFECTIVENESS OF SOCIAL MEDIA PLATFORM IN POLICE-PUBLIC COMMUNICATION

In October 2023, The Police Commissionerate Ludhiana took a further step towards enhancing the safety of the citizens with the help of the emerging technology, by introducing the CARE Station project (CARE stands for, Connect for Assistance and Relief in Emergency) (Figure No. 4.22). The initiative is designed to provide timely help in emergencies within the city with the help of a single-touch system. If a person encounters an emergency while travelling within the city but does not have access to a mobile phone, they can press the SOS button on a CARE station. By performing this action, police control room is connected to the person in question by a

one-way video call. This project is the first of its kind in Punjab and has been launched with an aim of providing safety and security to the citizens and more specifically to the women, children and other weaker sections of the population. Each CARE station is linked to the Integrated Command and Control Centre (ICCC), the city's CCTV surveillance network, the 112 helpline, the Police Emergency Response Support System (ERSS) and traffic management infrastructure. A public address system is present in these stations also in order to provide important information and control the traffic in case of an emergency. Initially, 10 CARE stations have been installed at main points across the city including marketplaces and sensitive locations. This communication provides direct contact with the police, which do not require a person to visit the police station physically to seek urgent relief. Based on demand and effectiveness, the network of CARE stations will be expanded in the future to further enhance the city's emergency response capabilities (The Times of India, 2023).

Figure No. 4.22: Launching CARE Station project in Ludhiana City



Source: <https://timesofindia.indiatimes.com/city/ludhiana/caught-in-a-crisis-just-press-sos-at-care-station/articleshow/104357578.cms>

While the Ludhiana Police is introducing a number of new devices and technological tools, a lack of awareness campaigns or information means that many

people are not utilizing these facilities. For example, when the researcher asked the respondents whether they have seen any public awareness campaigns or information from the police about the technologies used by them, more than half (56%) said ‘no’ (Table No. 4.18). This indicates that a lack of awareness remains a major issue.

Table No. 4.18: Public Awareness Campaigns by Police on Technologies they used

Type of Response	Frequency	Percent (%)
Yes	66	44%
No	84	56%
Total	150	100

Source: Based on Primary Data.

The growing popularity of WhatsApp has also reached policing. The Police Commissionerate has launched ‘RICN’ WhatsApp groups to share information, raise awareness and provide news related to the Commissionerate Police. These groups are created at the police station level with members including the general public of Ludhiana city, municipal councillors and village sarpanches. Even senior police officers join these WhatsApp groups so they can directly interact with residents and share important updates faster.

The Ludhiana Police also started their official Facebook (<https://www.facebook.com/LudhianaPolice/>), Instagram [https://www.instagram.com/cp_ludhiana_police/?hl=en] and X (Twitter) (https://x.com/Ludhiana_Police/) pages in order to engage with a wider audience.

The Police Commissionerate Ludhiana also operates a dedicated traffic Facebook page named Traffic Police Ludhiana. This page keeps the citizens informed on the daily traffic jams at different intersections within the city and directs them to use alternative roads that they could use in order to avoid traffic jams and minimize chances of accidents in the city. It also educates on road safety suggestions by placing advertisements, newspaper articles and carrying out preventive campaigns on avoiding traffic offenses and related crimes. Via traffic Facebook page (<https://www.facebook.com/TrafficPoliceLudhiana/>), Instagram page (<https://www.instagram.com/trafficpoliceludhiana/?hl=en>) and X (twitter) page

(<https://x.com/LudhianaTraffic>) the citizens can also interact with the Ludhiana Traffic Police directly and conveniently to raise traffic-related queries and complaints, give suggestions and seek help.

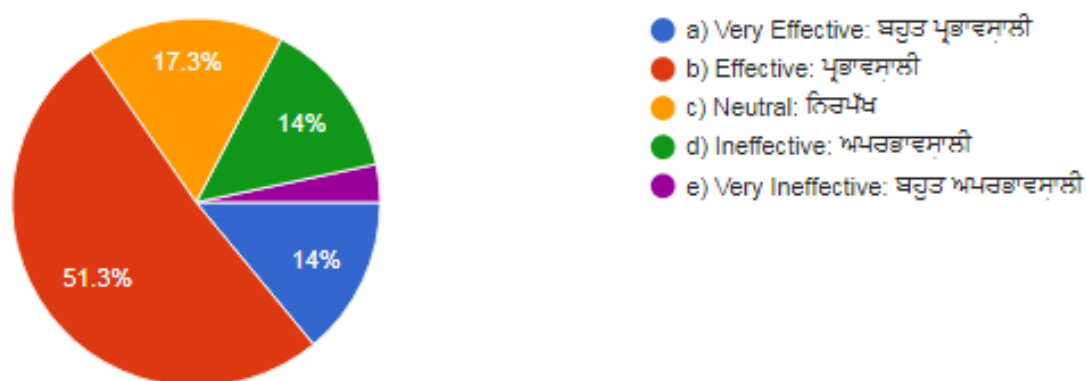
Table No. 4.19 and Figure No. 4.23 shows that 51.3% of respondents described the use of social media platforms by the Ludhiana Police as effective in communicating with the public and addressing concerns, whereas 14% rated it as very effective and 17.3% were neutral. Meanwhile, 14% considered it ineffective and 3.4% rated it as very ineffective. This reveals that a majority of respondents (65.3%) find it effective.

Table No. 4.19: Ludhiana Police’s use of Social Media Platform in Communicating with the public and addressing concerns

Type of Response	Frequency	Percent (%)
Very Effective	21	14
Effective	77	51.3
Neutral	26	17.3
Ineffective	21	14
Very Ineffective	05	3.4
Total	150	100

Source: Based on Primary Data.

Figure No. 4.23: Ludhiana Police’s use of Social Media Platform in Communicating with the public and addressing concerns



Source: Based on Primary Data.

In order to offer citizen friendly policing services, Police Commissionerate Ludhiana has launched website: <https://ludhianacity.punjabpolice.gov.in/>. This site was designed and created with the needs and requirements of citizens in mind. It provides various online services such as online FIR, details of stolen and recovered vehicles, reporting of lost mobile phones, complaint status tracking, information on arrested individuals and proclaimed offenders, RTI services, status of passport verification, press releases and more.

All citizens are legally entitled to file a factual and truthful complaint against any wrongdoing with the appropriate authority. The police can be contacted at any time in case of an issue or emergency through the available helpline numbers and technology has made this process even easier for the public. Contact details of all officers, police stations and police posts are available on Ludhiana police's official website. If the matter falls within the jurisdiction of the Police Commissionerate Ludhiana, a complaint can be submitted through the following modes. For the convenience of the public, the contact details of various police stations, posts and senior officers are readily accessible online.

a) Crime-Related Complaints:

In case of any complaint related to crime, one can contact the Control Room of the Police Commissionerate Ludhiana at 112 or calling 0161-2414936 / 0161-2414934. Complaints can also be made directly to the concerned area police post or police station. If the response from the Police Control Room, police station, or police post is unsatisfactory, then one may complain to the concerned Assistant Commissioner of Police (ACP), Additional Deputy Commissioner of Police (ADCP), Deputy Commissioner of Police (DCP), or Commissioner of Police (CP). For public convenience, the contact details of various police stations, police posts and senior officers are readily available online.

b) Traffic-Related Complaints:

For traffic related complaints, one can call the Traffic Control Room of Police Commissionerate Ludhiana at 1073 or may complain to the concerned traffic zone in-charge. If the response is not satisfactory then the complaint can be forwarded to the Assistant Commissioner of Police (ACP) Traffic, Additional Deputy

Commissioner of Police (ADCP) Traffic, Deputy Commissioner of Police (DCP) Traffic, or the Commissioner of Police (CP). Contact details of senior traffic officers and zone in-charges are available for public access.

c) Cyber Crime Complaints:

For cybercrime related complaints, citizens can call the national cyber helpline at 1930 or contact the Police Commissionerate Ludhiana Control Room at 112. They can also visit the Cyber Crime Help Desk, which has been set up in the building of Police Station Sarabha Nagar, Ludhiana. Additionally, complaints may be filed to the Inspector/SHO of the Cyber Crime Police Station. In case of an unsatisfactory response, it can be referred to ACP Cyber Crime or ADCP Cyber Crime, DCP or the Commissioner of Police (CP). Contact details of these officers and the Cyber Crime Police Station are publicly available.

d) Women-Related Crime Complaints:

In case of any crime against women, citizens can call 112 (Police Control Room) or the Women & Child Helpline numbers 1091 or 181. Complaints can also be made to the Inspector/SHO of the Women Police Station. If needed, complaints can be escalated to the ACP (Crime against Women & Children Cell), ADCP (Crime Against Women & Children Cell), DCP Headquarters, or CP. Contact details for these officers and the Women Police Station are available to the public.

In addition to the above, all other important contact numbers are also available online on the official site of the Ludhiana Police for the convenience of citizens.

CHAPTER - 5

FINDINGS AND CONCLUSION

The knowledge of the impacts of technological progression became pivotal to policing in the modern world. In the past two decades, there have been numerous significant changes and innovations as regards the technologies that are used by the police. Mobile phones, GPS, internet, CCTV cameras, Computers, Alco-sensors, ANPR, DNA and many others are some of the technologies that have far-reaching implications on policing. Review of literature revealed that technologies were complex and counterintuitive, improvements as a result of technological progress were not always direct. Results desired by technologies took a long time to be realised because agencies were adapting to new technologies and perfected their applications with time passing. Technologies can improve a lot of the aspects of the functioning of the police and performance and can decrease the response time. As an example, IT and mobile computing systems reporting requirements can decrease the time needed to communicate with the citizens or perform other proactive tasks.

Due to its professionalism, effort in combating terrorism, commitment or as a state police along the border, Punjab Police is always considered to be one of the best police forces in India. As an elite force, it had developed the reputation of integrity, dedication, courage, high standards and responsibility. Police Commissionerate Ludhiana has been continually modernizing itself to offer crime-free and peaceful environment to the citizens. Ludhiana Police had been working hard to deliver an effective, law abiding and responsive law enforcing machinery to the citizens of the so called ‘Manchester of India’ or the ‘Industrial Hub’. Police Commissionerate Ludhiana had modernized its combat gear including weaponry. The Police Commissionerate Ludhiana had incorporated additional of automatic and semiautomatic arms, Water Cannon and Anti-riot Vehicle, night vision devices, CCTV cameras, Safe City Project, technologically advanced control room, vehicles mounted cameras and AI based applications such as PAIS to overcome the demands of the maintaining of law and order. To improve road traffic management and enforces traffic rules, traffic police of Police Commissionerate Ludhiana has implemented digital challan machines, E-Challan system, Speed Radars and Towing System. Technical Support Unit, Finger Print Branch and Mobile Forensic Van

etc. are very important to collect and analyse evidence at crime scene. Ludhiana Police is also using some platforms like CCTNS, iHRMS and Saanjh duty software etc. To keep police personnel updated with the latest technologies, new laws and other developments a district-level advanced training school has been established at Police Lines, Ludhiana.

In order to engage with citizens and improve police-public relations Commissionerate Ludhiana Police also uses social media platforms. Official website to online platforms, e-mails to online help line numbers, Facebook account to WhatsApp service, X (Twitter) to Instagram, CCTV cameras to on-line traffic challan facilities, technology is being utilized to give the citizens free and fair policing services.

In the present times, Police Commissionerate Ludhiana had revamped and launched new technological advance services like SOS system, safe city project and online apps to provide more services to the public. Creation of cyber cell and cyber help desk 24X7 is another significant move at cracking down the increasing cyber-crimes and cyber-frauds in the city. Ludhiana Police had undertaken numerous citizen friendly initiatives like 'Know your police Station', 'PGD Portal', 'Khoj application' and Services under Saanjh project have set new standards in modern day policing. The transparency and accountability field is starting to transform with the help of online and mobile technology tools, although there is no specific source of technical or financial assistance.

Using a combination of primary and secondary data sources, a mixed-methods approach were used to guarantee a comprehensive and nuanced understanding of the topic. To collect primary data, the Police Commissionerate Ludhiana headquarters, specialized units, and all police stations were visited. Key informants for the study were interviewed, including Station House Officers (SHOs) from different police stations and other GOs (Gazetted Officers) posted in Police Commissionerate Ludhiana. The study involved a total of 500 respondents, of whom 150 were civilians and 350 were police personnel from the Ludhiana region. To ensure a varied viewpoint, the police officer sample included members from various ranks and units. People were chosen at random from different areas of the city. Both civilians and police officers were provided structured questionnaires to complete. Pilot research was carried out to pre-test the questionnaire before the main survey and the final survey tools were refined using input from the pilot study. The purpose of these questionnaires was to collect quantifiable data on attitudes, experiences and views about the Ludhiana Police Department's effectiveness,

its use of technology, and its level of satisfaction. To collect data from police personnel and officers, stratified random sampling technique were used. Qualitative insights were obtained through structured and semi-structured interviews with employees and senior officials, conducted both formally and informally. To collect data from civilians of Ludhiana city, purposive sampling was used. NCRB reports, academic journals, books, case studies, newspapers, police commission reports and official documents from the Indian government were some of the sources from which secondary data were gathered. Press releases and reliable websites on the internet also contributed to the secondary data. In order to provide context, historical perspective, and comparative views, secondary data were meticulously gathered, arranged, and examined. The data collected from secondary sources supplemented and enhanced the primary data, allowing a thorough comprehension of the development and effectiveness of the Ludhiana Police.

5.1 FINDINGS

The findings of the study have been presented below research objective and research questions wise.

5.1 (a) Objectives

Objective No. 1

To study the existing system of policing in Ludhiana city.

In accordance with a 2010 notification of the Punjab Government, “it has established for the municipal areas of Amritsar, Jalandhar and Ludhiana and their adjoining areas, comprising the Police Stations, a police system to be known as the City Police Commissionerate from the Superintendent of Police system”. After implementing the Police Commissionerate System in Ludhiana city in 2010, Sh. Swapan Sharma, IPS is the 24th Commissioner of Police Ludhiana posted on 30th March, 2025. A total of 4195 posted strength as of 4th February, 2025 excluding the Commissioner of Police, 02 Deputy Commissioner of Police, 07 Addl. Deputy Commissioner of Police, 19 Assistant Commissioner of Police, 61 Inspectors, 90 Sub-inspectors, 289 Assistant Sub-inspectors, 460 Head Constables, and 3266 Constables posted in Police Commissionerate Ludhiana. Other than these 275 Punjab Home Guards (PHGs), who are also affiliated with district

police. In the Police Commissionerate of Ludhiana, the total strength as per sanctioned is 5182, while the posted strength is 4195. But out of them, 37 vacancies for Sub-inspectors, 93 for Assistant Sub-inspectors, 623 for head constables and 243 for constables are available. For gazetted officers this strength and ratio are not based on the available posts, as there are many sanctioned or unsanctioned posts in the Police Commissionerate Ludhiana for gazetted officers. In the year 2010, when the Police Commissionerate System was implemented in Ludhiana city, only one officer of SSP rank was initially posted within the Commissionerate of Police Ludhiana, referred to as DCP. However, due to subsequent changes, today there are 6 officers of SSP rank in the city, known as JCP or DCP. The growing population and changing crime patterns have resulted in the creation of numerous new posts, leading to a consistent increase in the number of gazetted officers stationed in the city. Currently 6 posts for SSP/JCP/DCP Rank, 11 for ADCP/SP Rank, 25 for ACP/DSP Rank are available in the city.

The Ludhiana Police is presently headed by a Commissioner of Police holding the rank of Deputy Inspector General of Police (DIG) or Inspector General of Police (IG). The Deputy Commissioner of Police Investigation looks after crime and the Joint Commissioner of Police Law & Order looks after the law & order aspects. Traffic is looked after by the Deputy Commissioner of Police Traffic, whereas security arrangements, the crime against women cell, trainings, and other administrative work are looked after by the Joint Commissioner of Police Headquarters. The Joint Commissioner of Police City & Rural is the top supervisory office of police stations, sub-divisions and zones. If we talk about the hierarchical order of police administrative, a total number of zones in Police Commissionerate Ludhiana are 4 and 8 sub-divisions. There are 28 police stations, 1 women police station, 1 cyber police station and 35 police posts. In order to manage traffic in Police Commissionerate Ludhiana, a total of 157 police personnel work in city traffic police and Ludhiana city is bifurcated into six zones.

The Commissionerate can often be divided up into several units and branches, each in charge of particular policing responsibilities. While the Traffic Police are in charge of managing traffic and maintaining road safety, CIA unit is dedicated to criminal investigations. With the ever-increasing population and evolving crime patterns, the Ludhiana city Police Commissionerate undergoes continuous modifications. In addition, Ludhiana City has established a number of other units, including the EO Wing,

AHT Unit, CAW Cell, Women Police Station and the Cyber Crime Cell. Public relations and community trust-building are encouraged through Saanjh and Community Policing.

When the researcher asked the respondents about the effectiveness of the current policing system, 76.8% rated the existing system as effective and 17.1% found it very effective. More than 93% of police personnel are satisfied with how policing operations are being carried out, reflecting a generally positive outlook towards the present policing model. Police Commissionerate Ludhiana uses a number of new technologies and devices in police stations and investigative procedures. 91.8% of respondents confirmed that police personnel are aware of the technologies implemented in the Commissionerate, including the devices and systems in use. Additionally, 92.1% reported using new technologies in their daily operations or official duties, such as computers, mobile applications, emails and software.

Objective No. 2

To critically examine the conventional and new technologies used by Punjab Police in the Police Commissionerate Ludhiana.

To critically examine the transition from conventional methods to new technology-driven approaches, it is important to understand the level of awareness, frequency of usage and perceived effectiveness among police personnel. During interviews, senior officials stated that traditional practices such as the beat system, patrolling duties, handwritten reports and radio communication are still in use, but the integration of modern technologies such as CCTNS, CCTV cameras, computers and surveillance systems has added significant value to police operations.

The policing staffs demonstrate frequent use of modern technology, which indicates how deeply technology has woven itself into their professional routines. This also reflects a clear departure from conventional paperwork, handwritten reports and file-based record-keeping towards digitized operations. The elevated rate of technology usage indicates that police departments have transitioned from manual operations to digital methods of record-keeping, communication, reporting and field coordination. This signifies a substantial transformation in the operational mind-set, particularly within a force historically grounded in conventional systems. Police personnel expressed that tools

such as FIR registration via CCTNS, reports and information sending/receiving through e-mails and computerized systems have helped reduce paperwork and save time. Some officers, particularly those in older age brackets or with lower educational qualifications, reported difficulties in adapting to the newer system. During interviews with key officials, it was found that the traditional methods are still in use for attendance of police personnel at police stations. Specifically, the roll call attendance is recorded manually in the Rojnamcha register or in the Crime and Criminal Tracking Network & Systems (CCTNS), indicating the continued reliance on conventional processes.

During police personnel interviews, a fact that came to notice was that 71.2% of respondents acknowledged that new technological applications have made their tasks heavier instead of reducing their workload. The police personnel stated their workloads were already too high, but the introduction of new technology created a much heavier burden. A few police officers shared that the traditional method of submitting written leave forms has now been replaced by the iHRMS platform, which they find challenging to use. The police personnel explained that investigators formerly needed to create paperwork but recently must enter their work into CCTNS systems as well. The system caused police officers to perform their duties two times, which led to extra workloads. New technologies receive resistance from police officers when used in their workflows. The study showed that 12.1% of respondents strongly agree new technology usage is difficult, followed by 59.1% who somewhat agree to this. 9.4% of respondents were neutral on this query, whereas 12.9% and 6.5 % somewhat disagreed and strongly disagreed with this.

Graduate police personnel indicated that operating computers and entering data does not appear difficult to them. These employees find it interesting because the technology saves time while producing accurate results quickly. The young employees enjoy working with modern technology such as computers because they find new systems easy to command, but at the same time, they do feel that language remains the greatest challenge in effectively doing their work. Less-educated employees struggle to understand computers because the system functions in the English language and they also face major difficulties working on apps because all internet tools operate only through the English language. Several senior-age respondents said they avoid adopting present-day technologically advanced gadgets because of multiple factors. Education stands out as a key reason discouraging employees from developing an interest in learning new

technologies. Employees nearing retirement believe they lack the ability to adapt to computer-based systems and suggest that they be assigned responsibilities aligned with their current expertise and traditional methods of operation.

The citizen's survey reveals that 62% of respondents would prefer face-to-face interaction with police personnel rather than using technology for communication. This was surprising for the researcher, considering that Ludhiana City has a high literacy rate and most people here are educated. So, the question naturally came up, why is such a large proportion still not using online services? One of the senior police officials helped explain this. He said that while Ludhiana does have a high literacy rate, the city also has a large number of migrants from nearby states and many of them are not well-educated. As a result, they tend to use services in more traditional ways. When the same question was asked to the public, one respondent shared his personal experience. He had applied for an RTI through post and even online, but he only received a response after visiting the RTI counter in person multiple times. In such situations, he said, how can someone trust technology alone? Some respondents mentioned that nothing ever gets done at a police station without a personal visit. The survey revealed that people generally don't feel satisfied after using online services alone, they feel more confident and reassured after meeting in person. Many said they prefer to explain their problems face-to-face because it gives them a sense of satisfaction. Senior citizens also preferred face-to-face meetings, mostly because they are not very familiar with technology or feel hesitant to use mobile phones and other digital devices. However, some younger respondents and those currently employed showed more interest in using online services, mobile apps and real-time updates offered by the police.

It is quite surprising that when the researcher asked them about their experience with police while using these technologies, less than half of the respondents expressed satisfaction. During the interviews, one citizen mentioned that he had submitted a complaint online through the Public Grievance Division (PGD) Portal and then waited almost a month, when he did not receive any phone call or update regarding his complaint, he had to personally visit the office of the Commissioner of Police and hand over a hard copy of the complaint to ensure further action. A senior police officer acknowledged such delays, explaining that such delays sometimes occur due to online server problems or because the officials handling the portal are also engaged in essential

law and order duties. This reflects that although the police have made several efforts to improve services through technology, certain shortcomings still remain.

Police personnel themselves require proper training in using and managing technological tools. Many officers are unfamiliar with how these apps function and some lack even basic computer-operating skills. More than half of the respondents said they don't have seen any public awareness campaigns or information from the police about the technologies used by them. This indicates that a lack of awareness remains a major issue.

In comparing emerging technologies with conventional policing methods, respondents showed a strong preference for modern tools over traditional policing methods as emerging technologies proved more reliable according to 80% of respondents and much more reliable according to 17.1% of respondents. This indicates a rising trust in emerging technologies such as new methods of investigation, digital record-keeping, mobile phones, computers, AI-based software, CCTV cameras and forensic tools. Conventional methods of human intelligence, along with informant networks and community interaction, retain their essential role, especially for solving challenging, emotionally complex investigations. Therefore, to achieve comprehensive, effective policing, it is necessary to combine traditional police practices with emerging technologies in a well-balanced manner.

Objective No. 3

To analyze the capacity building and training of police personnel in the Police Commissionerate Ludhiana to use new technologies.

Training is one of the main characteristics, and an important element of human resource management. According to the Gore Committee Report on Police Training, if police are not properly trained in science and technology today, twenty years later, there will be many policemen who struggle to deal with the challenges of the future. Punjab Police provides world class training to its employees in different training centres. To train its personnel, Punjab Police has established several training centres across the state. The centres provide different kinds of training, such as basic recruiting, regular in-service courses, specialized units and commando operations. Punjab Police Academy (PPA), Phillaur; Police Recruits Training Centre (PRTC), Jahan Khelan, Hoshiarpur;

Recruit Training Centre, Punjab Armed Police (PAP), Jalandhar; Commando Training Centre (CTC), Bahadurgarh, Patiala; and In-Service Training Centre (ISTC), Kapurthala are the main training centers of Punjab Police.

In Police Commissionerate Ludhiana a training school located at Police Lines, Ludhiana, including a district training lab and a conference hall. The district training centre regularly organizes training sessions on various subjects such as CCTNS, iHRMS, the E-Sakshya app, new laws, emerging technologies in policing and other relevant areas as per the evolving needs of modern policing for the police personnel who are posted in Police Commissionerate Ludhiana. Additionally, professionals from the fields of forensics, senior police officers and doctors are asked to share their knowledge with police officers to help improve their professional skills and mental health. All ranks up to the level of inspector attend workshops or modules at the district training school on topics such as human rights, cybercrime, computer-related offenses, bank fraud and recent amendments in the law. Discussions revealed that while the Police Commissionerate Ludhiana started several trainings on new technologies, following up and providing in-depth training remains a challenge. The study found that 70.3% of respondents had received training on new technologies, such as CCTNS, mobile apps and computers, whereas 29.7% had not received any such training. This indicates that, despite training efforts, nearly one-third remain untouched by these initiatives. During survey 64.1% of respondents revealed that the training was average, while 7.6% found it excellent and another 7.6% said it was poor. Only 19.7% of respondents described the training as good. Virtual Reality based training is not currently in use, even senior-age group police personnel were not aware of virtual reality. Respondents indicated that the training provided was either limited in depth or too short in duration. Only 7.1% strongly agreed and 18.8% agreed that the training duration was adequate. However, a significant 33.2% remained neutral, while 37.1% disagreed and 3.8% strongly disagreed. Several respondents stated that they were unable to learn computer usage within the stipulated time and found it difficult to grasp the technical aspects of various technologies in such a short period. Police personnel aged above 46 years expressed that they now find it challenging to learn and adapt to new technologies. The majority of respondents (60%) reported feeling neutral about their confidence in using new technologies after undergoing training. These results reflect a direct correlation between insufficient training and the hesitancy or inability of personnel to effectively deploy digital tools in the field.

In spite of this 72.1% of the officers indicated that they occasionally require additional support or refresher training, while 19.7% stated that they need it frequently to keep up with new technologies. This suggests that although initial training may be adequate, continuous support and periodic refresher courses are important to ensure that personnel remain proficient and confident in using new technologies. This clearly indicates that, despite training efforts, the impact remains modest.

Objective No. 4

To assess the impact of new technologies on police-public relations within the Police Commissionerate Ludhiana.

With the introduction of emerging technologies, the police have adopted a more specialized and professional role in crime prevention and the maintenance of law and order. The use of modern technological tools such as CCTV, GPS systems, the internet (including social networking platforms like WhatsApp, Facebook, Twitter, Instagram, etc.) and other new devices has helped build public trust in police functioning. These emerging technologies have reshaped the patterns of interaction between the police and society and influenced the orientation, effectiveness and overall image of the police. 70% of the respondents had interacted with police personnel using new technologies such as online platforms, mobile phones and online reporting systems. Senior officials mentioned that the Police Commissionerate Ludhiana is putting in consistent efforts to create a safer and more comfortable environment for the city's residents. They also said that, with the adoption of new technologies and the growing use of online platforms and social media, the Police Commissionerate Ludhiana is now engaging more actively with the public and regularly sharing important updates. As a result of this 68% of respondents (60% agreed and 8% strongly agreed) believed that emerging technologies have improved the police-public interface.

All police stations under Commissionerate Ludhiana have installed CCTV cameras. A visit to police station confirms that several cameras are in place within the premises of police station. These are usually installed at the main gate of the police station, reception area, SHO room and lock-up room. Police personnel said that having CCTV cameras in the police stations has made things more transparent and efficient. 72%

of the respondents said the use of new technologies has made it easier for the general public to connect with Ludhiana Police.

The Ludhiana Police have introduced several mobile applications for the convenience of the general public, such as Know Your Police, PP Saanjh, Khoj Punjab Police, Public Grievance Division Punjab Police, etc. The *Public Grievance Division* portal of the Punjab Police was launched to ensure the timely resolution of public complaints. Through this online portal, any individual can submit an application to the police from the comfort of their home and can also check the status of their complaint online.

In October 2023, The Police Commissionerate Ludhiana took a further step towards enhancing the safety of the citizens with the help of the emerging technology, by introducing the CARE Station project. The initiative is designed to provide timely help in emergencies within the city with the help of a single-touch system.

The growing popularity of WhatsApp has also reached policing. The Police Commissionerate has launched ‘RICN’ WhatsApp groups to share information, raise awareness and provide news related to the Commissionerate Police. These groups are created at the police station level with members including the general public of Ludhiana city, municipal councillors and village sarpanches. Even senior police officers join these WhatsApp groups so they can directly interact with residents and share important updates faster.

The Ludhiana Police also started their official Facebook (<https://www.facebook.Com/LudhianaPolice/>), Instagram [https://www.instagram.com/cp_ludhiana_police/?hl=en] and X (Twitter) (https://x.com/Ludhiana_Police/) pages in order to engage with a wider audience.

The Police Commissionerate Ludhiana also operates a dedicated traffic Facebook page named Traffic Police Ludhiana. This page keeps the citizens informed on the daily traffic jams at different intersections within the city and directs them to use alternative roads that they could use in order to avoid traffic jams and minimize chances of accidents in the city. It also educates on road safety suggestions by placing advertisements, newspaper articles and carrying out preventive campaigns on avoiding traffic offenses and related crimes. Via traffic Facebook page

(<https://www.facebook.com/TrafficPoliceLudhiana/>), Instagram page (<https://www.instagram.com/trafficpoliceludhiana/?hl=en>) and X (twitter) page (<https://x.com/LudhianaTraffic>) the citizens can also interact with the Ludhiana Traffic Police directly and conveniently to raise traffic-related queries and complaints, give suggestions and seek help. 51.3% of respondents described the use of social media platforms by the Ludhiana Police as effective in communicating with the public and addressing concerns, whereas 14% rated it as very effective.

In order to offer citizen friendly policing services, Police Commissionerate Ludhiana has launched website: <https://ludhianacity.punjabpolice.gov.in/>. This site was designed and created with the needs and requirements of citizens in mind. It provides various online services such as online FIR, details of stolen and recovered vehicles, reporting of lost mobile phones, complaint status tracking and information on arrested individuals and proclaimed offenders, RTI services, status of passport verification, press releases and more.

All citizens are legally entitled to file a factual and truthful complaint against any wrongdoing with the appropriate authority. The police can be contacted at any time in case of an issue or emergency through the available helpline numbers and technology has made this process even easier for the public. Contact details of all officers, police stations and police posts are available on Ludhiana police's official website.

Some of the respondents said, reporting a crime using the available technology is sometimes hard, especially in form filling and in the submission process, mainly due to lack of clarity, poor user interface and most importantly, limited education and digital knowledge. The results also highlight a gap on the part of the police. It is not only a matter of how many people are using the new technologies provided by the police, but also whether those who do use these apps are receiving accurate information and truly benefiting from them. Overall, the majority of respondents acknowledged a positive shift, especially in administrative services such as passport verification, application for Police Clearance Certificates (PCC) and tracking the status of online complaints. According to respondents, technology has made processes smoother by reducing manual work, paperwork and time.

Objective No. 5

To evaluate the transformative impact of emerging technologies on crime reduction in the region.

Ludhiana Police is trying its level best to ensure that the people of Ludhiana city are living in a secure environment. To meet this goal, vehicle mounted cameras and PCR vehicles have been deployed in the city 24X7. Additionally, there are 28 police stations, 35 police posts, one cyber police station and one women police station established to prevent and detect all forms of crime. Ludhiana Police has also been split in various special crime units in order to stop and address various type of crimes occurring in the city. In Ludhiana City, a dedicated Cyber Crime Police Station and a Cyber Forensic Lab have been established to tackle cyber-related offenses effectively. The Help Desk for Cyber Crime provides citizens with support to report cases involving digital crimes as well as cyber fraud, harassment and financial scams. The initiatives serve as vital mechanisms to build cybersecurity measures while enabling quick responses to cybercrimes in Ludhiana. Mobile forensic van is highly useful for collect and analyse evidence at crime scene. CCTNS operates in every police station throughout the Police Commissionerate Ludhiana. The registration processes of DDRs and FIRs now run exclusively through CCTNS because police staff operates the system 24 hours per day. Two important vehicles 'Varun' and 'Vajra' are used to maintain law and order and to control crowds during riots. The two vehicles feature advanced technology that enables them to efficiently handle law and order situations while maintaining effective crowd management. The water cannon vehicle 'Varun' operates by spraying high-pressure water to disperse crowds and the 'Vajra' possesses anti-riot gear for efficient mob management and control.

It was observed that police personnel in the Police Commissionerate Ludhiana are using many kinds of technologies, including CCTV, cyber cells and various kinds of software in their regular duties. The interview with the higher official suggests that crime prevention and faster detection are the reasons they rely on new technology. Its useful results have prompted officers to adopt new technologies. Police officials stated that technological tools are essential for addressing crimes such as murder, robbery and rape. By using this technology, police can now look into financial crimes, drug crimes, internet-related crimes and human trafficking crimes differently. Modern gadgets and

technology have changed the way crimes are viewed and addressed. Communication has become easier both within the organization and with agencies outside. 94% of the respondents found new technologies to be helpful. This widespread agreement indicates that emerging technologies are significantly enhancing both preventive and investigative capacities. 84.1% of the respondents reported using CCTV networks, indicating their dominant role in field investigation and crime pattern recognition. Senior officials revealed that the cameras installed in the city under the Safe City Project are very useful, often helping in the detection and tracing of criminal activities. Ludhiana Police are using several emerging technologies within the city to prevent crime and maintain law and order. Among these emerging technologies, Automatic License Plate Recognition (ALPR) plays an important role. ALPR is used to issue traffic challans to those who break traffic rules and also to trace vehicles involved in any criminal activities. In the Police Commissionerate Ludhiana, access to ALPR is available at the Traffic Online Challan Office and the Control Room under the Safe City Project.

Police Commissionerate Ludhiana utilizes AI-based software called Punjab Artificial Intelligence System (PAIS). This software helps to obtain complete details of suspects and criminals through facial recognition. It maintains a complete database of criminal records, including FIRs filed against individuals and the dates of their incarceration. This software proves to be highly useful in identifying accused individuals during routine checks and investigations. It was very surprising that 41.8% of respondents were not aware about this and they stated that artificial intelligence (AI) is not used in the Ludhiana Commissionerate. Apart from this Ludhiana Police uses crime analysis tools to examine criminal activities based on historical data. An Assistant Commissioner of Police (ACP) level police officer mentioned that analysis tools are used in the Police Commissionerate Ludhiana to analyze CDRs (Call Detail Records) and IPDRs (Internet Protocol Detail Records) in relation to crime investigation. These tools are primarily used by the Technical Support Unit, which processes the data and shares relevant information with the concerned police stations. According to 90.3% of the respondents, the adoption of emerging technologies has contributed to a reduction in the crime rate in Ludhiana. Among them, 74.4% agreed, while 15.9% strongly agreed with this view.

To examine year-wise crime trends within the Police Commissionerate of Ludhiana and to conduct an in-depth evaluation of the transformative impact of emerging

technologies on crime reduction in the region, the researcher collected ten years of crime data from Ludhiana city. Information pertaining to offenses registered under various sections of the Indian Penal Code (IPC), as well as under local and special laws, was obtained. The data from the past ten years shows a noticeable shift in crime trends, especially after the introduction of modern policing technologies. Between 2015 and 2024, total IPC and special law cases peaked in 2018 with 8,470 reported incidents, followed by a steady decline, reaching 5,216 cases in 2024. This aligns with the gradual introduction of digital tools such as mobile data analysis, CCTV cameras, the Safe City Project, CDR analysis, forensic laboratories and GPS-based location monitoring. Offences like robbery (395–399 IPC) decreased to only 19 in 2024 as compared to 32 in 2015. Housebreaking cases (454–460 IPC) dropped from 354 in 2018 to 153 in 2024. Similarly, technology played a vital role in solving serious crimes like kidnapping and dacoity. These decreases show that emerging technologies are not only contributing to quicker investigations but they are even serving as prevention. To elaborate on how emerging technologies can be used effectively in current policing, a few case studies were gathered through interviews with police officials and by conducting fieldwork at the Police Commissionerate in Ludhiana. These real case criminal investigations depict the ways police agencies are taking advantage of technologies such as call detail record (CDR) analysis, IMEI tracking, GPS locations, CCTV surveillance and digital transaction analysis to trace, investigate and resolve complex cases. All these case studies reveal how the adoption of the emerging technologies has increased the speed of police investigations in real-life conditions. The introduction of new technologies allowed law enforcement agencies to change their practices for preventing, detecting and investigating crimes. In general, the incorporation of technology has enhanced efficiency, outreach and accuracy of the policing within the city.

5.1 (b) Research Questions

Research Question No. 1

What were the traditional methods used by the Ludhiana Police for maintaining records and handling documentation?

Traditionally, the Ludhiana Police was overly dependent on manual, handwritten and paper-based systems to record and process documentation. The entries,

reports and FIRs were all done manually and stored in the physical registers making the process time consuming. The citizens had to visit police stations or its headquarters physically to complain or to make applications and request police services including police clearance certificates (PCC), passport verification, RTI requests and other official verification. The communication between the police stations and departments was mostly based on handwritten reports or being told something verbally or physically. The non-emergency services like verification of arms licenses, service and marriage verifications and applications for loudspeakers permissions were handled both at police station and headquarters levels by sequential manual reporting, which usually slowed service delivery. This system complicated the interactions with the public by making it more formal, slow and requiring personal visits.

Research Question No. 2

What new gadgets or tools have the Ludhiana Police started using recently?

The Ludhiana Police force has implemented a number of technological tools and gadgets that have been used to modernize the policing force and improve service delivery. These include mobile applications such as ‘Know Your Police Station’, which is used to identify the jurisdiction of a citizen as well as provide navigational assistance; the ‘PP Saanjh’, which allows online services like passport verification, police clearance certificates (PCC) and tracking of applications; ‘Khoj Punjab Police’, used to locate missing persons; and the Public Grievance Division (PGD) portal, which is used to file and follow up complaints online. Moreover, CCTV cameras have been placed in all police stations with some of the most critical places like main gates, reception areas, SHO room and lock-ups being equipped with the cameras to improve transparency and surveillance. The CARE Station is an emergency contacting system that will enable citizens to reach the police in case of an emergency by pressing a single button that is known as SOS system. Social media, such as Facebook, Instagram, X (Twitter) and WhatsApp RICN groups have been used to provide updates, create awareness and have a one-on-one interaction with the citizens. Furthermore, it has a specific web site that provides various online services, including FIR registration, vehicle tracking, complaint filing and RTI status monitoring. This research study outlines all key technologies employed by the Police Commissionerate Ludhiana such as CCTNS, iHRMS, Punjab Artificial Intelligence System (PAIS), projectors in district training lab, CCTV cameras,

GPS on PCR vehicles, Alco-sensor devices, Digital Challan Machines, Speed radars, E-Challan system, Flasher Lights, Light Batons, reflective jackets, Saanjh Duty Software, Water Cannon, Anti-riot Vehicle, Vehicle Mounted Cameras, Mobile Forensic van, Walkie-Talkie set, Meetings through Video Conference, computers, laptops and mobile phones etc.

Research Question No. 3

What positive changes have occurred since the Ludhiana Police began using new technology?

The administrative services like verification of passports, PCC applications and online complaint tracking are also made faster and efficient hence less paperwork and manual work. There has been an increased availability of information and police services to the public and many of the citizens have identified that they are finding it easy to connect with the police employees. CCTV cameras have also increased the level of transparency and accountability, thus increasing the level of trust among the people and the police. CARE Stations, mobile apps and PCR systems have made emergency response faster, which has led to an increase in citizen satisfaction and security. The social media platforms have facilitated the timely information sharing, increased participation of the citizens and interactive communication in reporting the concerns or getting updated.

Technological tools are essential for addressing crimes such as murder, robbery and rape. By using this technology, police can now look into financial crimes, drug crimes, internet-related crimes and human trafficking crimes differently. Respondents noted that processes have become smoother, paperwork has reduced and public safety has improved, especially at night. Modern gadgets and technology have changed the way crimes are viewed and addressed. Communication has become easier both within the organization and with agencies outside. Overall, the technology has enhanced transparency, surveillance and responsiveness, which has positively impacted law and order, citizen satisfaction and safety.

Research Question No. 4

What challenges have the Ludhiana Police faced when implementing new technology?

Despite technological advancements, Police Commissionerate Ludhiana faces multiple challenges in implementation. The lack of the adequate training of the officers is also a major problem since some of them cannot use computers or applications effectively. Online complaint resolution is sometimes hampered by server chores or authorities responsibility in law and order. Technological adoption among the population is also low because of the lack of awareness of technology usage, with more than 56 percent of respondents stating that they had never witnessed any public campaigns about police technology. Some of the mobile applications such as Khoj Punjab Police are poorly used because they are not updated frequently and officers are not motivated to use the applications. Additionally, a significant percentage of citizens continue to choose face-to-face communication, especially older citizens or less educated migrants, which is a cultural and educational barrier to the use of the digital. 63.2% of police personnel are 10th or 12th pass, which results in communication difficulties when using the on-line platforms, because they mostly are in English language. Several senior-age respondents said they avoid adopting present-day technologically advanced gadgets because of multiple factors. Education stands out as a key reason discouraging employees from developing an interest in learning new technologies. These challenges highlight gaps in both police capacity and public outreach.

Research Question No. 5

Do police officers find it easier to perform their duties with the help of technology?

Technology has partially relieved the police work by simplifying the administrative tasks, and facilitating quick contact as well as better surveillance. Nevertheless, this advantage is not much because not all officers have enough training and are digitally literate. Graduate police personnel operating computers and entering data does not appear difficult to them, these employees find it interesting as compare to traditional methods, because the technology saves time while producing accurate results quickly. Officers who do not know how to use apps or even how computers work find it difficult to exploit such tools, which make the whole process of technological interventions less efficient. According to the survey, 70.7% of the participants felt that the police have to be better trained to communicate effectively with the people via digital platforms. Although such tools as mobile applications, SOS CARE Stations and online portals theoretically support duties, the actual efficiency of such tools heavily relies on

the adequacy of training and awareness, which is one of the main gaps that was recognized during the research. Due to lack of knowledge 71.2% of respondents acknowledged that new technological applications have made their tasks heavier instead of reducing their workload. The police personnel stated their workloads were already too high, but the introduction of new technology created a much heavier burden. Employees nearing retirement believe they lack the ability to adapt to computer-based systems and suggest that they be assigned responsibilities aligned with their current expertise and traditional methods of operation.

Research Question No. 6

Do the residents of Ludhiana feel more connected to the police now that they are using technology?

Technology has made most residents feel connected to the police. The survey findings show that 72% of the respondents had to agree that digital platforms and online services help to find the police personnel easier, whereas social media platforms, mobile applications, and online portals allow getting access to information and interacting. Online complaint tracking and SOS CARE Stations have also facilitated direct and timely contact with no in-person visits required. But 28 percent of the respondents did not feel increasingly connected, citing other reasons such as not being aware, not being exposed to it, or just preferring a more traditional, face-to-face communication. These results indicate that technology has enhanced a feeling of connectivity, but the effect is not evenly distributed to all demographics.

Research Question No. 7

How do the new gadgets help the Ludhiana Police prevent crimes and apprehend criminals?

There are new technological tools that help in crime prevention and apprehension of criminals, as they help in increasing surveillance, monitoring and quick response. Ludhiana Police are using several emerging technologies within the city to prevent crime and maintain law and order. Among these emerging technologies, Automatic License Plate Recognition (ALPR), Punjab Artificial Intelligence System (PAIS), Crime Analysis Tools, Cameras under Safe City Project, Forensic Mobile Van, Cyber Police Stations and Technical Support Unit plays an important role. CCTV networks have around-the-clock monitoring of police offices, market places and other

sensitive places, which scares off would-be criminals. The complaints, missing persons, and suspicious actions are monitored through mobile applications and online portals, whereas social media and WhatsApp groups allow keeping the people informed and coordinate the actions. All these tools enhance situational awareness, gathering of evidence and collaboration with citizens to facilitate crime prevention in a more active and effective way.

Research Question No. 8

In what ways has the use of new technology improved policing in Ludhiana?

Police has been enhanced in several aspects by technology. There has been faster administration services and transparency which has saved paper work and delays. Modernized Police Control Room and PCR mobilization have been used to improve the response times of the emergency. CCTV, Safe City Project and integrated command centres has increased the safety of the population and police accountability. It is now easy to communicate with the police through E-mails, mobile phones, mobile applications, portals, and social media by the citizens. Investigation is modernized with the help of new devices and analysis tools. New apps and technical methods are very useful during investigation. Information sharing is now faster and more extensive and assists in traffic management, crime warnings and awareness. Overall, technology has strengthened efficiency, transparency, responsiveness and citizen engagement which has made policing more efficient and more modern.

Research Question No. 9

How do Ludhiana police officials receive training to use new technology in their work?

There is a training school located at Police Lines, Ludhiana, including a district training lab and a conference hall. If we specifically talk about the training of police personnel focused only on new technologies, the district training centre regularly organizes training sessions on various subjects such as CCTNS, iHRMS, the E-Sakshya app, new laws, emerging technologies in policing and other relevant areas as per the evolving needs of modern policing for the police personnel who are posted in Police Commissionerate Ludhiana. At present, the Ludhiana Police experience the gap in training because many officers do not know enough about the technological tools. The

survey shows that 72.1% of respondents said that, they occasionally require additional support or refresher training, while 19.7% stated that they need it frequently to keep up with new technologies, respondents also indicated that the training provided was either limited in depth or too short in duration. This means that although there might be a number of initiatives, there is a need to have formal and regular digital literacy programs that would make sure that officers can effectively use new technologies such as mobile applications, portals and social media platforms to work with effectively.

Research Question No. 10

What strategies can be implemented to enhance the effectiveness of technology in maximizing safety, security and police-public relations?

To increase the effectiveness of technologies, such a two-pronged approach is necessary. First, law enforcement officers need to undergo an all-encompassing digital training in order to enhance their abilities in the usage of apps, portals, social media and surveillance systems. Second, the awareness campaigns should be conducted widely and publicly to inform the citizens on tools available, online reporting systems and mobile applications. Frequent updates of applications, maintenance of platforms offered and online services along with real-time tracking would increase efficiency further. Trust, responsiveness and safety can also be reinforced by encouraging feedback on digital services and the expansion of the community networks as well as direct communication through social media. The integration of citizen engagement and officer training will maximize the effect of the technology on the policing, safety of people and police-public relations.

5.2 CONCLUSION

The research shows that technology has emerged as the foundation of modern law enforcement, transforming the operational, administrative and relational aspects of policing in important aspects. The findings confirm that while traditional policing strategies are still the main pillars, but the introduction of the latest technologies, including the CCTNS, Safe City Project, PAIS, ALPR systems, digital traffic challan machines and the social media platforms has transformed the Police Commissionerate Ludhiana into a more responsive, transparent and people-oriented organization.

The replacement of manual and paper-based systems with digital platforms has enhanced administrative activities and helped in enhancing communication in the organization as well as increased the rate at which citizen services are rendered through passport verifications, PCCs and through online complaints tracking. Such developments have not only minimized paper work and time of response but also boosted the confidence of the people towards the police due to increased transparency and accountability. The use of surveillance equipment like the CCTV cameras, GPS-equipped PCR vehicles and forensics has greatly enhanced situational awareness, crime detection and prevention.

However, the research also discloses the multidimensional issues that should come with the factor of technological modernization. Most officers, particularly the ones who are less digitally literate or those with lower levels of education, still have a problem with effective use of technological applications. This has been seen as one of the biggest barriers to maximizing the benefits of technological adoption through the absence of regular, thorough and sustained training. As much as there are training facilities and programs in the Commissionerate, they need to be significantly enhanced in terms of duration, frequency and depth in order to close the gap between the possible technological potential and its actual application. The paper also indicates a generation gap in flexibility and younger officers have expressed higher interest and comfort with digital applications than their older colleagues.

The effects of new technologies have been mostly positive to the citizens. Most of the respondents admitted having better access to the police services, quicker redress of grievances, as well as having more access to direct communication via online portals and social media. Initiatives like CARE Stations, Know Your Police Station app and Public Grievance Division (PGD) portal have allowed citizens to have better access to the police particularly in cases of emergency. However, there remains a significant portion of the population who value traditional and face-to-face interaction, especially older people and the less-educated migrants and this is where broader awareness and more approachable online interfaces are necessary.

With the implementation of AI-driven applications such as the Punjab Artificial Intelligence System (PAIS) and CDR/IPDR data analytics, the investigative practices have been transformed. Data analysis of crime rates between 2015-2024 shows

that there is a significant decrease in serious crimes and this is associated with the implementation of these new technologies. This confirms the fact that technology is not only efficient in investigations but also a deterrent and enhances surveillance, which has prevented crime.

Capacity building still plays one of the major roles in determining the success of technology-led policing. The research lays emphasis on the need of continuous professional growth and refresher courses and digital literacy programs across the ranks. In addition, awareness among the citizens should be carried out to ensure the use of digital platforms to facilitate inclusiveness and equal access to modern policing tools. The successful introduction of the system demands not only the technical facilities but also the humanistic approach with the focus on flexibility, enthusiasm and cooperation between the police officers and civilians.

In conclusion, the example of the Ludhiana Police Commissionerate can be viewed as a dynamic example of change in the sphere of Indian urban policing. It shows that operational efficiency, accountability, crime prevention and police-public relations can be significantly enhanced by the implementation of technology. However, to maintain these benefits, the focus should not be on the acquisition of technology but on strategic use of the technology, which would have to be facilitated by systematic training, infrastructural consistency and citizen involvement. The research supports the fact that technology, with properly trained officers and educated/informed citizens, can help to make the policing more transparent, efficient and community-focused, the one that does not only react to crime but also predicts and prevents it, making the cities safer and closer relations between the police and the citizens.

5.3 SUGGESTIONS

Study reveal that technological innovation has transformed every organization and police department is not an exception to this. Some suggestions have been presented for better usage of technology in Police Commissionerate Ludhiana, keeping in mind the efficiency and effectiveness of the functioning of the police.

(i) Technological Infrastructure and Modernization

The Police Commissionerate, Ludhiana, has witnessed several advances in emerging technologies, which have improved the efficiency and effectiveness of policing. But to meet the changing patterns of crime and public expectations, continuous technological modernization is required.

Expansion of Safe City Infrastructure: Coverage of CCTV cameras in the Safe City project is to be expanded to cover crime-prone areas, markets, industrial areas, educational institutions, transport areas and other vulnerable places. High-resolution cameras equipped with night vision and facial-recognition capabilities should be installed to improve surveillance and crime detection.

Enhancement of Cybercrime Infrastructure: Cybercrime police stations, cyber forensic laboratories, and technical support units should be enhanced with modern equipment, software and trained manpower. But with the rising rate of cyber fraud, financial scams and online harassment, more resources should be provided for cybercrime investigation and digital evidence analysis.

More Adoption of Artificial Intelligence and Data Analytics: The use of AI-based tools like Punjab Artificial Intelligence System (PAIS) should be further enhanced for police operations. Police may be using predictive policing, crime mapping, facial recognition and data analytics to help address crime proactively and to efficiently allocate resources.

Technological Resources: Upgrade police stations with computer systems, digital investigation equipment, mobile forensic equipment and secure communication systems. Technological infrastructure should be reconnoitered from time to time to keep it compatible with the evolving policing needs.

(ii) Capacity Building and Human Resource Development

Technology can only be used to achieve desired results by police personnel if they have the knowledge and skills to do so.

Comprehensive Technology Training: Training programmes should be conducted on Artificial Intelligence, Digital Forensics, Cybercrime

Investigation, CCTNS, Data Analytics, GPS Tracking, CDR/IPDR Analysis and other new technologies on regular basis. The training must be application oriented and practical.

Refresher Courses and Continuous Learning: Police personnel should attend periodic refresher courses to ensure that they are kept updated on the latest advancements in technology. Continuous learning mechanisms should be institutionalized for the long-term competency.

Special Training for Senior Personnel: Senior police officers have problems adapting to technological changes. Officers nearing retirement should be provided with special training modules to help them adjust to the use of digital devices and technology in policing.

Compulsory Technology Training for all Ranks: Technology based training should be made compulsory for all ranks.

(iii) Reduction of Workload and Administrative Reforms

The study identified that many police officers feel that the technological applications create additional work for them, due to the fact that data has to be entered into multiple systems.

Elimination of Duplicate Work: Digital systems should be used to avoid repeated data entry and duplication of paperwork. All the information added to one platform should automatically synchronize in other authorized platforms.

Increased Technical Support Staff: Appoint dedicated technical support staff to help police stations maintain software systems and resolve technical problems. This will help investigating officers concentrate on core policing activities.

Adequate Manpower and Resource Allocation: Ensure that vacant posts are filled at the earliest. Man power is a key to the successful implementation of technology-based policing initiatives and will help to alleviate workload for existing staff.

(iv) Police–Public Relations and Citizen Participation

Public trust, awareness and participation are important factors to the success of technology-driven policing.

Public Awareness Campaigns: Digital police awareness campaigns should be run on social media, in educational institutions, resident welfare associations and local community meetings to inform the public about the digital police services and mobile apps/ grievance portals etc.

User-Friendly Online Services: Simplify Police websites, mobile apps and grievance portals so they are easily used by people and are available in languages that can be understood by local residents, including Punjabi and Hindi. User interfaces should be made to be user friendly for users with low digital literacy.

Timely Disposal of Online Complaints: The timely response to online complaints should be facilitated by the mechanisms that are developed to this end. There should be enhanced automatic status update and complaint tracking tools to boost public confidence.

Strengthening Community Policing: Digital platforms should be used in addition to, not in place of, community policing. The engagement of citizens and police officers should go on via public meetings, community outreach programmes and local engagement initiatives.

(v) Crime Prevention and Investigation

The study shows how emerging technologies are a key asset to the prevention and investigation of crime.

Integration of Technology with Conventional Policing: The integration of technology with conventional policing should be carried out, meaning that traditional policing methods like community policing, human intelligence, informant networks and field investigation should be also coupled with technology. A balanced approach is likely to be more effective in policing outcomes.

Enhancing the Forensic and Analytical Skills: Forensic science, digital evidence collection, crime analytics and intelligence policing should be emphasized. Expanded mobile forensic units and analytical tools for faster investigation and prosecution.

Data Driven Policing: Crime data should be analyzed systematically and regularly to find emerging threats, recurring patterns and crime hotspots. This evidence-based policing can help to inform strategic decision making and more efficient use of police resources.

(vi) Policy & Future Preparedness

Adapting policies and setting up institutional readiness are a continuous process due to the fast-changing nature of technology.

Technological Modernization Budget: A special budgetary provision must be set aside for the technological modernization, maintenance of equipment, software modernizations and specialized training programmes.

Collaboration with Academic and Research Institutions: Police organizations should work with universities, research institutions and technology specialists to analyze new technologies and come up with innovative policing solutions.

Preparation for Emerging Technological Challenges: Future policing strategies need to be planned for challenges arising out of AI, Deepfakes, Cryptocurrency-related crimes, Cyber terrorism and other technology-enabled offences.

The use of emerging technologies along with proper training, institutional changes, public participation and ongoing modernization can significantly improve the efficiency, transparency, accountability and citizen-centric approach of policing in Police Commissionerate Ludhiana.

5.4 SCOPE FOR FUTURE RESEARCH

The current research has given an excellent overview of how the emerging technologies have revolutionized the policing activities in the Police Commissionerate

Ludhiana, but there are many aspects that can be ventured into in the future. Comparative studies across various Police Commissionerates in Punjab (and other states) can be conducted in future researches to determine changes in technologies, training sufficiency and citizen interactions in the regions. The longitudinal studies can also be done to investigate how the technological interventions can have a lasting effect on reducing crime, administrative efficiency and improving the satisfaction of the citizens in the long run. The other field of possible investigation is evaluating how citizens experience policing through technology, in particular between various demographic and socio-economic categories, to make digital services more inclusive and accessible. Lastly, it is possible that future researchers investigate how next-generation technologies like drones, body-worn cameras, blockchain and Internet of Things (IoT)-enabled systems can be applied to policing in India to determine their potential and the effect it will have on policing in this country. All these future perspectives will help advance knowledge of technology-led policing and would lead to the development of a clear, effective and citizen-oriented model of law enforcement that will be relevant in the digital world.

BIBLIOGRAPHY

- Agarwal, S. (2023). Use of artificial intelligence in criminal cases. *International Review of Law and Technology*, 2(2), Forthcoming.
- Agrawal, R. B., Singh, N. U., Upadhyay, S. A., Awari, S. P., & Thanaker, S. A. (2016). Enhancement in existing CCTNS system. *International Journal of Advance Research and Innovative Ideas in Education*, 2(1), 562–573.
- Alemika, E., & Chukwuma, I. C. (2005). Criminal victimization and fear of crime in Lagos metropolis, Nigeria. *Cleen Foundation Monograph Series*, 1.
- Arnold, D. (2000). *Science, technology, and medicine in colonial India*. Cambridge University Press.
- Arthur, W. B. (2009). *The nature of technology: What it is and how it evolves*. Free Press.
- Assam Police. (n.d.). Home page. Government of Assam. Retrieved November 17, 2024, from <https://police.assam.gov.in/>
- Australian Federal Police. (2017). *Policing for a safer Australia: Strategy for future capability*. <https://www.afp.gov.au/sites/default/files/PDF/strategy-for-future-capability.pdf>
- Banerjee, A., Roy, K. A., & Dawn, D. S. (2020). Crime dynamics and distribution of Asansol Durgapur Police Commissionerate, Paschim Bardhaman District. *IOSR Journal of Humanities and Social Science (IOSR-JHSS)*, 25(2), 8–16.
- Bayley, D. H. (1983). *The Indian police*. Princeton University Press.
- Bayley, D. H., & Shearing, C. D. (1996). The future of policing. *Law & Society Review*, 30(3), 585–606.
- Bindu, R., & Singh, G. (2021). Cyber sexual assault against women – vulnerability and remedies. *The Indian Police Journal*, 90–97.
- Bittner, E. (1970). *The functions of the police in modern society*. National Institute of Mental Health Center for Studies of Crime and Delinquency.
- Boateng, D. F., & Wu, G. (2018). Effect of organizational support on police effectiveness and behavior: A cross-cultural comparison. *Asian Journal of Criminology*, 13, 311–328.
- Bowling, B., Phillips, C., Campbell, A., & Docking, M. (2004). Policing and human rights: Eliminating discrimination, xenophobia, intolerance and the abuse of power from police work (UNRISD Programme Paper No. 4). United Nations Research Institute for Social Development. https://www.researchgate.net/publication/44285936_Policing_and_human_rights

[Eliminating discrimination xenophobia intolerance and the abuse of power from police work](#)

- Brynjolfsson, E., & McAfee, A. (2014). *The second machine age: Work, progress, and prosperity in a time of brilliant technologies*. W. W. Norton & Company.
- Bureau of Police Research and Development. (2022). *Impact of Police Commissionerates on Police Effectiveness and Policing Outcomes*. Ministry of Home Affairs, Government of India. <https://bprd.nic.in/uploads/pdf/Impact%20of%20Police%20Commissionerate%20on%20Police%20Effectiveness%20and%20Policing%20Outcomes.pdf>
- Byrne, J., & Hummer, D. (2017). Technology, innovation and twenty-first-century policing. *Cahiers Politie Studies*, 3(20), 375–389.
- Chakraborty, T. (2003). Prospect of community policing: An Indian approach. *The Indian Journal of Political Science*, 64(3-4), 251–262.
- Chan, J. (2001). The technological game: How information technology is transforming police practice. *The British Journal of Criminology*, 41(4), 613–634. <https://doi.org/> [add if available]
- Chan, J. B. L. (2001). The technological game: How information technology is transforming police practice. *Criminal Justice*, 1(2), 139–159. <https://doi.org/10.1177/1466802501001002001>
- Chan, J., Brereton, D., Legosz, M., & Doran, S. (2001). *E-policing: The impact of information technology on police practices*. Criminal Justice Commission, Queensland, Australia.
- Chaturvedi, T. N. (1982). *Police administration*. Indian Institute of Public Administration.
- Choudhury, J. N. (2003). Policing India in 2025 – challenges and issues ahead. *The Indian Police Journal*, 50(1), January–March.
- Chouhan, K. S. (2018). Police reforms against custodial violence in India: Past and present. *International Journal of Law Management & Humanities*, 1(5). <https://ijlmh.com/police-reforms-against-custodial-violence-in-india-past-and-present>
- Colton, K. W. (1979). The impact and use of computer technology by the police. *Communications of the ACM*, 22(1), 10–20. <https://doi.org/10.1145/359046.359049>
- Commonwealth Human Rights Initiative. (2010, September). *Seven steps to police reform*. https://www.humanrightsinitiative.org/programs/aj/police/india/initiatives/seven_steps_to_police_reform.pdf

- Commonwealth Human Rights Initiative. (n.d.-a). *Summary of Ribeiro Committee's recommendations*.
https://humanrightsinitiative.org/publications/police/recommendations_ribeiro.pdf
- Commonwealth Human Rights Initiative. (n.d.-b). *The Padmanabhaiah Committee on Police Reforms: An analysis*.
https://humanrightsinitiative.org/programs/aj/police/india/initiatives/analysis_padmanabhaiah.pdf
- Cordner, G., & Perkins, E. B. (2013). Problem-oriented policing in practice. *Criminology & Public Policy*, 12(2), 199–205.
- Custers, B. H. M. (2012). Technology in policing: Experiences, obstacles, and police needs. *Computer Law & Security Report*, 1, 62–68.
<https://ssrn.com/abstract=3047124>
- Dakolias, M., & Thachuk, K. (2000). Attacking corruption in the judiciary: A critical process in judicial reform. *Wisconsin International Law Journal*, 18, 353.
- Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319–340.
<https://doi.org/10.2307/249008>
- Deflem, M. (2002). Technology and the internationalization of policing: A comparative-historical perspective. *Justice Quarterly*, 19(3), 453–475.
- Deflem, M. (2017). *Policing world society: Historical foundations of international police cooperation*. Oxford University Press.
- Deflem, M., & Chicoine, S. (2014). History of technology in policing. In G. Bruinsma & D. Weisburd (Eds.), *Encyclopedia of criminology and criminal justice* (pp. 2269–2277). Springer.
- Delhi Police. (n.d.). Home page. Government of Delhi. Retrieved November 17, 2024, from <https://delhipolice.gov.in/>
- Demir, S. (2009). Diffusion of police technology across time and space and the impact of technology use on police effectiveness and its contribution to decision-making (Doctoral dissertation, Kent State University).
- Facebook. (n.d.). Commissioner of Police, Ludhiana [Facebook page]. Facebook. Retrieved February 2, 2025, from <https://www.facebook.com/photo.php?fbid=897525642399062&set=a.362972085854423&type=3&mibextid=wwXlfr>
- Fitzgerold, M. J. (1980). *Criminal investigation* (pp. 1–7). ARCO Publishing Company.
- Fox, S. J. (2018). Policing - the technological revolution: Opportunities & challenges! *Technology in Society*.

- Galton, F. (1892). *Fingerprints*. Macmillan and Co. <https://galton.org/books/fingerprints/galton-1892-fingerprints-1up.pdf>
- Geller, W. A. (1992). *Police videotaping of suspect interrogations and confessions: A preliminary examination of issues and practices*. National Institute of Justice. <https://www.ojp.gov/pdffiles1/Digitization/139584NCJRS.pdf>
- Gill, K. P. S. (1999). Technology, terror & a thoughtless state. *Faultlines*, 3, 1–20. South Asia Terrorism Portal. https://www.satp.org/Docs/Faultline/3_Technology--Terror---a-Thoughtless-State.pdf
- Goldstein, H. (1990). *Problem-oriented policing*. McGraw-Hill.
- Gore Committee. (1973). *The Gore Committee report on police training*. Ministry of Home Affairs, Government of India. Retrieved February 2, 2025, from <https://www.scribd.com/document/189823584/The-Gore-Committee-Report-on-Police-Training>
- Government of India. (1950). *The Constitution of India* (Art. 355). Ministry of Law & Justice. <https://cdnbbsr.s3waas.gov.in/s380537a945c7aaa788ccfcd1b99b5d8f/uploads/2024/07/20240716890312078.pdf>
- Government of India. (2000). *The Information Technology Act, 2000*. https://www.indiacode.nic.in/bitstream/123456789/13116/1/it_act_2000_updated.pdf
- Government of Punjab. (n.d.). About district. *District Ludhiana, Government of Punjab*. <https://ludhiana.nic.in/about-district/>
- Gujarat Police. (n.d.). DGP office. Government of Gujarat. Retrieved November 17, 2024, from https://police.gujarat.gov.in/dgp/CMS.aspx?content_id=47
- Gupta, K. (2016). Police professionalism: Emerging new challenges in changing scenario. *The Indian Police Journal*, 63(2–3), 66–82.
- Haryana Police. (n.d.). Citizen login. Government of Haryana. Retrieved November 17, 2024, from <https://haryanapolice.gov.in/login>
- Hekim, H., Gul, S. K., & Akcam, B. K. (2013). Police use of information technologies in criminal investigations. *European Scientific Journal*, 9(4), 1857–7881 (Print), 1857–7431 (e).
- Hindustan Times. (2017, May 12). Cases of misbehaviour with cops down by 90% in Ludhiana, say traffic police. *Hindustan Times*. Retrieved February 2, 2025, from <https://www.hindustantimes.com/punjab/cases-of-misbehaviour-with-cops-down-by-90-in-ludhiana-say-traffic-police/story-L0D7G4XeaVhfAz2m0I6yHL.html>
- Hindustan Times. (2025, January 13). Commissionerate system has improved police functioning: Ex-UP DGP. <https://www.hindustantimes.com/cities/lucknow->

[news/commissionerate-system-has-improved-police-functioning-ex-up-dgp-101736707393652.html](https://www.indianpolicejournal.com/news/commissionerate-system-has-improved-police-functioning-ex-up-dgp-101736707393652.html)

- Iyer, T. G. L. (2003). Improving the police image. *The Indian Police Journal*, 50(1), January–March.
- Jafa, Y. S. (2001). Challenges for police in the 21st century. *The Indian Journal of Public Administration*, 47(1), 96–105.
- Janet Chan, David Brereton, Margot Legosz & Sally Doran. (2001). *E-policing: The Impact of Information Technology on Police Practices*. Criminal Justice Commission, Queensland, Australia.
- Jayanto N. Choudhury. (2003). Policing India in 2025 – challenges and issues ahead. *The Indian Police Journal*, 50(1), January–March.
- Kaplan, R. (2015). Artificial intelligence and predictive policing: Examining the future of law enforcement. *Criminology & Public Policy*, 14(3), 421–439. <https://doi.org/> [add if available]
- Kapoor, V. (2016). The study of mobile & WhatsApp usage and trends. *The Indian Police Journal*, 63(2–3), 106–121.
- Karnataka Police. (n.d.). Home page. Government of Karnataka. Retrieved November 17, 2024, from <https://ksp.karnataka.gov.in/english>
- Kaur, S. (2017). How far public trust the police? A micro level study. *Asian Journal of Multidimensional Research*, 6(8), 117.
- Kerala Police. (n.d.). Home page. Government of Kerala. Retrieved November 17, 2024, from <https://keralapolice.gov.in/>
- Kumar, P. (n.d.). Forensic fingerprinting: A fascinating historical journey from Bengal. In *Bharatiya jurisprudence and Indian knowledge system: Vedas to verdict* (Chap. 5, pp. 48–58). IIP Series. <https://iipseries.org/assets/docupload/rs1202569C54F1CEC1DE5F.pdf>
- La Vigne, N. G., Lowry, S. S., Dwyer, A. M., & Markman, J. A. (2011). *Using public surveillance systems for crime control and prevention: A practical guide for law enforcement and their municipal partners*. Urban Institute. <https://www.urban.org/sites/default/files/publication/27551/412402-Using-Public-Surveillance-Systems-for-Crime-Control-and-Prevention-A-Practical-Guide-for-Law-Enforcement-and-Their-Municipal-Partners.PDF>
- Ludhianvi, M. U. (2021). Establishment of Ludhiana Police. In *Dastaan-E-Ludhiana* (pp. 36–38). Chetna Parkashan.
- Lum, C., Kennedy, L. W., & Sherley, A. J. (2016). The effectiveness of CCTV in crime prevention: Meta-analysis of research findings. *Journal of Experimental Criminology*, 12(3), 375–398. <https://doi.org/> [add if available]

- Madhya Pradesh Police. (n.d.). Home page. Government of Madhya Pradesh. Retrieved November 17, 2024, from <https://www.mppolice.gov.in/en>
- Maharashtra Police. (n.d.). Posting details. Government of Maharashtra. Retrieved November 17, 2024, from https://www.mahapolice.gov.in/uploads/posting_details/d34fec4a3d29831de08ce65a271a40a.pdf
- Majumder, D., & Mitra, A. (2019, September). Technology and policing: An assessment of police commissionerate of two cities of Eastern India. *International Journal of Innovative Technology and Exploring Engineering*, 8(11). ISSN 2278-3075.
- Manes, J. (2020). Secrecy & evasion in police surveillance technology. *Berkeley Technology Law Journal*, 34, 503–566.
- Marks, M., & Fleming, J. (2006). The right to unionize, the right to bargain and the right to democratic policing. *Annals of the American Academy of Political and Social Science*, 605(1), 178–199.
- Maurice J. Fitzgerald. (1980). *Criminal investigation*. ARCO Publishing Company, New York.
- Mazerolle, L., Rogan, D., Frank, J., Famega, C., & Eck, J. E. (2001). Managing citizen calls to the police: An assessment of non-emergency call systems [Final report to the National Institute of Justice].
- Ministry of Home Affairs, Government of India. (2006). *A brief note on the Bill proposed for the Model Police Act, 2006*. https://www.mha.gov.in/sites/default/files/2022-09/Press_Brief_Oct_30%5B1%5D.pdf
- Ministry of Home Affairs, Government of India. (2013). *Police reforms*. [https://www.mha.gov.in/sites/default/files/PoliceReforms\(E\)181013.pdf](https://www.mha.gov.in/sites/default/files/PoliceReforms(E)181013.pdf)
- Ministry of Home Affairs. (2005). *Report of the Review Committee on the Recommendations of the National Police Commission and Other Commissions/Committees on Police Reforms (Mooshahary Committee)*. Government of India. https://www.mha.gov.in/sites/default/files/2022-12/ReportMooshaharyCommittee_16122022%5B1%5D.pdf
- Mitropolitski, S. (2011, April). Weber's definition of the state as an ethnographic tool for understanding the contemporary political science state of the discipline [Conference paper]. Canadian Political Science Association. https://www.researchgate.net/publication/228262719_Weber%27s_Definition_of_the_State_as_an_Ethnographic_Tool_for_Understanding_the_Contemporary_Political_Science_State_of_the_Discipline
- Mohan Mathor, K. (1998). Fifty years of Indian police - a reappraisal. *The Indian Journal of Public Administration*, 44(1).

- Mukherjee, R. K. (1988). Indian police and emerging challenges. In S. K. Chaturvedi (Ed.), *Police and emerging challenges* (pp. 51–64). B.R. Publishing Corporation.
- Nagaland Police. (n.d.). Home page. Government of Nagaland. Retrieved November 17, 2024, from <https://police.nagaland.gov.in/>
- National Crime Records Bureau. (2023). *Crime in India – Additional Tables: 2023*. Government of India. Retrieved December 27, 2025, from <https://www.ncrb.gov.in/crime-in-india-additional-table.html?year=2023&category=>
- National Police Chiefs’ Council, & Association of Police and Crime Commissioners. (2025). *National policing digital strategy 2025–2030*. Police Digital Service. https://pds.police.uk/wp-content/uploads/2025/05/250519-NPCC-Digital-Strategy_FINAL.pdf
- National Police Commission. (1981). *Sixth report of the National Police Commission*. Government of India. <https://www.thehinducentre.com/resources/67792421-Sixth-Report.pdf>
- Nunn, S. (2001). Police technology in cities: Changes and challenges. *Technology in Society*, 23(1), 11–27. [https://doi.org/10.1016/S0160-791X\(00\)00033-6](https://doi.org/10.1016/S0160-791X(00)00033-6)
- Odisha Police. (n.d.). Home page. Government of Odisha. Retrieved November 17, 2024, from <https://odishapolice.gov.in/>
- OW Wilson & McLaren, R. C. (1977). *Police administration*. McGraw Hill Book Company.
- Pareek, D., & Shah, M. (2019). ePolice station – towards effective management of police station. *International Research Journal on Police Science*, 32–35.
- Pattavina, A. (2005). Information technology and the criminal justice system. <https://doi.org/10.4135/9781452225708>
- Police Executive Research Forum. (2012). *How are innovations in technology transforming policing?* Washington, D.C., U.S.A.
- Pradeep, N. C. (2013). Innovations in police organisation in India: A study of two police commissionerates. In *Proceedings of the 9th International Conference on Public Administration* (pp. 628–639).
- Public Grievances Division, Punjab Police. (n.d.). Public grievance Punjab Police. <https://pgd.punjabpolice.gov.in/>
- Punjab Police. (n.d.). Home page. Government of Punjab. Retrieved November 17, 2024, from <https://punjabpolice.gov.in/>
- Raghavan, R. K. (2003). The Indian police: Problems and prospects. *The Journal of Federalism*, 33(4). <http://publius.oxfordjournals.org>

- Rai, M. K., & Sharma, P. (2019). Cyber security and challenges in SCADA. *International Research Journal on Police Science*, 45–56.
- Rajasthan Police. (n.d.). Home page. Government of Rajasthan. Retrieved November 17, 2024, from <https://police.rajasthan.gov.in/>
- Rogers, E. M. (2003). *Diffusion of innovations* (5th ed.). Free Press.
- Sawant, P., Sundaram, V., & Rajput, S. (1993). *Work culture in public service institutions*. Himalaya Publishing House.
- Shahid, M., Abbas, T., Khan, T., Saleem, M., & Parveen, S. (2021). Technological dramas and the Punjab police: The downfall of front desk. *PPAR*, 11(1). <https://doi.org/10.7176/PPAR/11-1-07>
- Sharma, D., & Marwah, J. (2013). An appraisal of community policing practices: A case study of Chandigarh, India. *JOAAG*, 8(1).
- Shaun Whitehead & Graham Farrell. (n.d.). Anticipating mobile phone ‘smart wallet’ crime: Policing and corporate social responsibility. Retrieved from <http://www.policing.oxfordjournals.org>
- Singh, J. (2020). Structure and functions of government in ancient India. *Editorial Board*, 9(8), 245.
- Singh, M., & Gulzar, D. (2019). Role of Crime and Criminal Tracking Network System (CCTNS) in crime control: A study of Haryana State. *History Research Journal*, 5(6), 982–991.
- Singh, U. K. (2002). Amnesty for police officers: Politics of truth and reconciliation. *Economic and Political Weekly*, 37(32), 3326–3328.
- Singhvi, G. C. (1982). Citizens grievances against police: Dimensions and strategies. In T. N. Chaturvedi & S. V. Rao (Eds.), *Police administration* (pp. 63–80). Indian Institute of Public Administration.
- Srivastava, G. K., & Kumar, P. (2024). Empowering policing for a safer tomorrow: The Police Commissionerate System in Uttar Pradesh. *International Journal of Sociology and Political Science*, 6(2), 65–67. <https://sociologyjournal.in/assets/archives/2024/vol6issue2/6029.pdf>
- State Police Manual (n.d.). Manual on forensic science laboratory (FSL) procedures. Punjab Police. https://www.punjabpolice.gov.in/media/documents/Manual_FSL.pdf
- Steve Wright. (1978). New police technologies: An exploration of the social implications and unforeseen impacts of some recent developments. *Journal of Peace Research*, 15(4), 197.

- T.G.L. Iyer. (2003). Improving the police image. *The Indian Police Journal*, 50(1), January–March.
- Tamil Nadu Police. (n.d.). e-Services. Government of Tamil Nadu. Retrieved November 17, 2024, from <https://eservices.tnpolice.gov.in/CCTNSNICSDC/Index?15>
- Tankebe, J. (2008). Police effectiveness and police trustworthiness in Ghana: An empirical appraisal. *Criminology & Criminal Justice*, 8(2), 185–202.
- Tapan Chakraborty. (2003). Prospect of community policing: An Indian approach. *The Indian Journal of Political Science*, 64(3-4), 251–262.
- Telangana Police. (n.d.). Home department. Government of Telangana. Retrieved November 17, 2024, from <https://www.telangana.gov.in/departments/home-department/>
- The Times of India. (2023, October 12). Caught in a crisis? Just press ‘SOS’ at CARE station. <https://timesofindia.indiatimes.com/city/ludhiana/caught-in-a-crisis-just-press-sos-at-care-station/articleshow/104357578.cms>
- The Tribune. (2025, January 20). Comprehensive protective measures need of hour. *The Tribune*. Retrieved February 2, 2025, from <https://www.tribuneindia.com/news/ludhiana/comprehensive-protective-measures-need-of-hour/>
- Times of India. (2025, January 25). E-challans begin today, locations kept under wraps. *Times of India*. <https://timesofindia.indiatimes.com/city/ludhiana/e-challans-begin-today-locations-kept-under-wraps/articleshow/117556835.cms>
- Tiwari, A. N. (2004). Transparency and accountability in administration. *Orissa Review*, 27–31. <https://magazines.odisha.gov.in/orissareview/aug2004/englishPdf/Pages27-31.pdf>
- Tombul, F., & Çakar, B. (2015). Police use of technology to fight against crime. *European Scientific Journal*, 11(10), 286–296.
- Tyler, T. R., & Fagan, J. (2008). Legitimacy and cooperation: Why do people help the police fight crime in their communities? *Ohio State Journal of Criminal Law*, 6, 231.
- Umranikar, J. Y. (2009). *Police reforms in India, a Sisyphean saga*. Ameya Prakashan.
- Usman, D. J. (2019). Public perceptions of trust in the police in Abuja, Nigeria (Doctoral dissertation, University of Glasgow).
- Uttar Pradesh Police. (n.d.). Police units. Government of Uttar Pradesh. Retrieved November 17, 2024, from <https://uppolice.gov.in/article/en/police-units>
- Van Dijck, J. (2013). *The culture of connectivity: A critical history of social media*. Oxford University Press.

- Weber, M. (1947). *The theory of social and economic organization* (T. Parsons, Trans.). Oxford University Press.
- West Bengal Police. (n.d.). Home page. Government of West Bengal. Retrieved November 17, 2024, from <https://wbpolice.gov.in/>
- White, M. D. (2014). *Police officer body-worn cameras: Assessing the evidence*. Office of Justice Programs, National Institute of Justice, U.S. Department of Justice.
- Whitehead, S., & Farrell, G. (n.d.). Anticipating mobile phone ‘smart wallet’ crime: Policing and corporate social responsibility. *Policing*. Retrieved from <http://www.policing.oxfordjournals.org>
- Wienroth, M. (2023). Technology in policing, policing in a technological society. *International Journal of Police Science & Management*, 25(3), 223–225. <https://doi.org/10.1177/14613557231200984>
- Wilson, O. W., & McLaren, R. C. (1977). *Police administration*. McGraw Hill Book Company.
- Y.S. Jafa. (2001). Challenges for police in the 21st century. *The Indian Journal of Public Administration*, 47(1), 96–105.

Annexure-I

QUESTIONNAIRE FOR KEY OFFICIALS

- Name:
- Current Rank/Post:
 - Commissioner of Police
 - Senior Superintendent of Police
 - Joint Commissioner of Police
 - Deputy Commissioner of Police
 - Addl. Deputy Commissioner of Police
 - Asst. Commissioner of Police
 - SHO
- District:
- Age:
 - 18-25 Years
 - 26-35 Years
 - 36-45 Years
 - above 46 Years
- Overall Years of Service in Policing:
 - Less than 5 Years
 - 5-10 Years
 - 10-15 Years
 - 15-20 Years
 - More than 20 years
- 1. What system does the Punjab Police Commissionerate mostly employ to map and analyse crime scenes in real-time?
- 2. How would you describe the current state of policing in Ludhiana?
- 3. What are the primary strengths of the current policing system?
- 4. What are the main challenges or weaknesses you face with the current policing system?
- 5. What methods were used by the Ludhiana Police for maintaining records before the introduction of new technologies?

6. How does the Punjab Police Commissionerate use Automated License Plate Recognition (ALPR) and In what way does they utilize body-worn cameras technology?
7. What new technologies have been recently implemented in the Ludhiana Police Commissionerate?
8. How effective are these new technologies compared to conventional methods?
 - a) Much More Effective
 - b) More Effective
 - c) As Effective
 - d) Less Effective
 - e) Much Less Effective
9. What training programs are in place for police personnel to learn about new technologies?
10. How does the Punjab Police Commissionerate leverage social media analytics?
11. Do you believe the training provided is sufficient for effective use of new technologies?
 - a) Strongly Agree
 - b) Agree
 - c) Neutral
 - d) Disagree
 - e) Strongly Disagree
12. Are there any gaps in the training that need to be addressed?
13. How have new technologies impacted the relationship between the police and the public?
14. Have you received any feedback from the public regarding these technologies, if yes what has the feedback been ?
15. What challenge does the Punjab Police Commissionerate face when implementing emerging technologies?
16. What impact have new technologies had on crime rates in Ludhiana?
 - a) Significant Decrease
 - b) Decrease
 - c) No Change
 - d) Increase
 - e) Significant Increase

17. Can you provide any specific examples where technology has directly contributed to solving a crime?
18. What future technological advancements do you foresee being beneficial for crime reduction?
19. How does the Punjab Police Commissionerate use mobile applications to interact with the public?
20. Which of the following strategies do you think would enhance the effectiveness of technology in police work?
 - a) Regular training and refresher courses
 - b) Community awareness programs
 - c) Upgrading existing technologies
 - d) Increasing the budget for technology
 - e) All of Above

Annexure-II

QUESTIONNAIRE FOR POLICE PERSONNEL

- Name: ਨਾਮ (optional):
- Qualification: ਵਿਦਿਅਕ ਯੋਗਤਾ:
 - 10th or Below 10th
 - 12th
 - Graduation
 - Post-Graduation
- Age: ਉਮਰ
 - 18-25 Years
 - 26-35 Years
 - 36-45 Years
 - above 46 Years
- Rank: ਅਹੁਦਾ
 - Constable
 - Head Constable
 - Asst. Sub Inspector
 - Sub Inspector
 - Inspector
- Gender: ਲਿੰਗ
 - Male: ਮਰਦ
 - Female: ਔਰਤ
- Years of Service: ਸੇਵਾ ਦੇ ਸਾਲ
 - Less than 5 Years
 - 5-10 Years
 - 10-15 Years
 - 15-20 Years
 - More than 20 years

1. Do you have Computer knowledge?
ਕੀ ਤੁਹਾਨੂੰ ਕੰਪਿਊਟਰ ਦੀ ਜਾਣਕਾਰੀ ਹੈ ?
 - a) Yes: ਹਾਂ
 - b) No: ਨਹੀਂ

2. Do you face difficulties in using new technologies such as computers, mobile apps, software's, iHRMS, CCTNS etc. ?
ਕੀ ਤੁਹਾਨੂੰ ਨਵੀਆਂ ਤਕਨਾਲੋਜੀਆਂ ਜਿਵੇਂ ਕਿ ਕੰਪਿਊਟਰ, ਮੋਬਾਈਲ ਐਪਸ, ਸਾਫਟਵੇਅਰ, iHRMS, CCTNS ਆਦਿ ਵਰਤਣ ਵਿੱਚ ਮੁਸ਼ਕਿਲਾਂ ਆਉਂਦੀਆਂ ਹਨ?
 - a) Strongly Agree: ਬਿਲਕੁਲ ਸਹਿਮਤ
 - b) Agree: ਸਹਿਮਤ
 - c) Neutral: ਨਿਰਪੱਖ
 - d) Disagree: ਅਸਹਿਮਤ
 - e) Strongly Disagree: ਬਿਲਕੁਲ ਅਸਹਿਮਤ

3. Do you think the English language is a barrier to using new technology?
ਕੀ ਤੁਸੀਂ ਸੋਚਦੇ ਹੋ ਕਿ ਨਵੀਂ ਤਕਨਾਲੋਜੀ ਦੀ ਵਰਤੋਂ ਕਰਨ ਵਿੱਚ ਅੰਗ੍ਰੇਜ਼ੀ ਭਾਸ਼ਾ ਰੁਕਾਵਟ ਹੈ?
 - a) Strongly Agree: ਬਿਲਕੁਲ ਸਹਿਮਤ
 - b) Agree: ਸਹਿਮਤ
 - c) Neutral: ਨਿਰਪੱਖ
 - d) Disagree: ਅਸਹਿਮਤ
 - e) Strongly Disagree: ਬਿਲਕੁਲ ਅਸਹਿਮਤ

4. Do you think educational qualifications are a barrier to using new technology?
ਕੀ ਤੁਸੀਂ ਸੋਚਦੇ ਹੋ ਕਿ ਨਵੀਂ ਤਕਨਾਲੋਜੀ ਦੀ ਵਰਤੋਂ ਕਰਨ ਵਿੱਚ ਵਿਦਿਆਰਥਿਕ ਯੋਗਤਾਵਾਂ ਰੁਕਾਵਟ ਹਨ?
 - a) Strongly Agree: ਬਿਲਕੁਲ ਸਹਿਮਤ
 - b) Agree: ਸਹਿਮਤ
 - c) Neutral: ਨਿਰਪੱਖ
 - d) Disagree: ਅਸਹਿਮਤ
 - e) Strongly Disagree: ਬਿਲਕੁਲ ਅਸਹਿਮਤ

5. How effective do you find the current policing system in Ludhiana?
ਤੁਸੀਂ ਲੁਧਿਆਣਾ ਵਿੱਚ ਮੌਜੂਦਾ ਪੁਲਿਸਿੰਗ ਸਿਸਟਮ ਨੂੰ ਕਿੰਨਾ ਪ੍ਰਭਾਵਸ਼ਾਲੀ ਮੰਨਦੇ ਹੋ?
- a) Very Effective: ਬਹੁਤ ਪ੍ਰਭਾਵਸ਼ਾਲੀ
 - b) Effective: ਪ੍ਰਭਾਵਸ਼ਾਲੀ
 - c) Neutral: ਨਿਰਪੱਖ
 - d) Ineffective: ਅਪਰਭਾਵਸ਼ਾਲੀ
 - e) Very Ineffective: ਬਹੁਤ ਅਪਰਭਾਵਸ਼ਾਲੀ
6. Are you aware of the new technologies being implemented in the Ludhiana Police Commissionerate?
ਕੀ ਤੁਸੀਂ ਲੁਧਿਆਣਾ ਪੁਲਿਸ ਕਮਿਸ਼ਨਰੇਟ ਵਿੱਚ ਲਾਗੂ ਕੀਤੀਆਂ ਨਵੀਂ ਟੈਕਨੋਲੋਜੀਆਂ ਬਾਰੇ ਜਾਣਕਾਰੀ ਰੱਖਦੇ ਹੋ?
- a) Yes: ਹਾਂ
 - b) No: ਨਹੀਂ
7. How often do you use new technologies (e.g., computers, mobile apps, Emails, Fax, software's) in your daily operations?
ਤੁਸੀਂ ਆਪਣੀ ਰੋਜ਼ਾਨਾ ਕਾਰਜਾਂ ਵਿੱਚ ਨਵੀਂ ਟੈਕਨੋਲੋਜੀਆਂ (ਜਿਵੇਂ ਕਿ ਕੰਪਿਊਟਰ, ਮੋਬਾਈਲ ਐਪਸ, ਈ-ਮੇਲ, ਫੈਕਸ, ਸੌਫਟਵੇਅਰਸ) ਕਿੰਨੀ ਵਾਰ ਵਰਤਦੇ ਹੋ?
- a) Daily: ਰੋਜ਼ਾਨਾ
 - b) Weekly: ਹਫ਼ਤਾਵਾਰੀ
 - c) Monthly: ਮਹੀਨਾਵਾਰੀ
 - d) Rarely: ਘੱਟ ਹੀ
 - e) Never: ਕਦੇ ਨਹੀਂ
8. How effective are these new technologies in improving your efficiency?
ਇਹ ਨਵੀਂ ਟੈਕਨੋਲੋਜੀਆਂ ਤੁਹਾਡੇ ਕੰਮ ਕਰਨ ਦੀ ਸਮਰੱਥਾ ਨੂੰ ਸੁਧਾਰਣ ਵਿੱਚ ਕਿੰਨੀਆਂ ਪ੍ਰਭਾਵਸ਼ਾਲੀ ਹਨ?
- a) Very Effective: ਬਹੁਤ ਪ੍ਰਭਾਵਸ਼ਾਲੀ
 - b) Effective: ਪ੍ਰਭਾਵਸ਼ਾਲੀ
 - c) Neutral: ਨਿਰਪੱਖ
 - d) Ineffective: ਅਪਰਭਾਵਸ਼ਾਲੀ

e) Very Ineffective: ਬਹੁਤ ਅਪ੍ਰਭਾਵਸ਼ਾਲੀ

9. What system does the Police Commissionerate Ludhiana mostly employ to map and analyze crime scenes in real-time?

ਲੁਧਿਆਣਾ ਪੁਲਿਸ ਕਮਿਸ਼ਨਰੇਟ ਵਾਸਤੇ ਅਸਲ-ਸਮੇਂ ਵਿੱਚ ਅਪਰਾਧ ਦੇ ਦ੍ਰਿਸ਼ਾਂ ਦਾ ਨਕਸ਼ਾ ਅਤੇ ਵਿਸ਼ਲੇਸ਼ਣ ਕਰਨ ਲਈ ਕਿਹੜਾ ਸਿਸਟਮ ਵਧੇਰੇ ਤੌਰ ਵਰਤਿਆ ਜਾਂਦਾ ਹੈ?

a) Geographic Information Systems (GIS): ਜੀਓਗ੍ਰਾਫਿਕ ਇੰਫੋਰਮੇਸ਼ਨ ਸਿਸਟਮ

b) Crime Mapping Software: ਕ੍ਰਾਈਮ ਮੈਪਿੰਗ ਸਾਫਟਵੇਅਰ

c) CCTV Networks: ਸੀ ਸੀ ਟੀ ਵੀ ਨੈੱਟਵਰਕ

d) None of the above: ਉਪਰੋਕਤ ਵਿੱਚੋਂ ਕੋਈ ਨਹੀਂ

10. How does the Police Commissionerate Ludhiana use Automated License Plate Recognition (ALPR) technology?

ਲੁਧਿਆਣਾ ਪੁਲਿਸ ਕਮਿਸ਼ਨਰੇਟ ਵੱਲੋਂ ਆਟੋਮੈਟਿਕ ਲਾਇਸੈਂਸ ਪਲੇਟ ਰਿਕਗਨੀਸ਼ਨ (ALPR) ਟੈਕਨੋਲੋਜੀ ਦੀ ਵਰਤੋਂ ਕਿਵੇਂ ਕੀਤੀ ਜਾਂਦੀ ਹੈ?

a) Traffic Monitoring: ਟਰੈਫਿਕ ਦੀ ਨਿਗਰਾਨੀ

b) Vehicle Theft Detection: ਵਾਹਨ ਚੋਰੀ ਦੀ ਪਛਾਣ

c) Toll Collection: ਟੋਲ ਕਲੈਕਸ਼ਨ

d) Not used: ਵਰਤੋਂ ਨਹੀਂ ਕੀਤੀ ਜਾਂਦੀ

11. What is the role of Artificial Intelligence (AI) in the Police Commissionerate Ludhiana crime analysis efforts?

ਲੁਧਿਆਣਾ ਪੁਲਿਸ ਕਮਿਸ਼ਨਰੇਟ ਵੱਲੋਂ ਜੁਰਮ ਦੀ ਵਿਸ਼ਲੇਸ਼ਣ ਦੀਆਂ ਕੋਸ਼ਿਸ਼ਾਂ ਵਿੱਚ ਆਰਟੀਫੀਸ਼ੀਅਲ ਇੰਟੈਲੀਜੈਂਸ (AI) ਦੀ ਕੀ ਭੂਮਿਕਾ ਹੈ?

a) Predictive Policing: ਭਵਿੱਖਬਾਣੀ ਕਰਨ ਵਾਲੀ ਪੁਲਿਸਿੰਗ

b) Identifying Crime Patterns: ਜੁਰਮ ਦੇ ਰੁਝਾਨ ਦੀ ਪਹਿਚਾਣ ਕਰਨਾ

c) Fraud Detection: ਧੋਖਾ ਧੜੀ ਦਾ ਪਤਾ ਲਗਾਉਣਾ

d) Not used: ਵਰਤੋਂ ਨਹੀਂ ਕੀਤੀ ਜਾਂਦੀ

12. Does the Police Commissionerate Ludhiana utilize body-worn cameras?

ਕੀ ਲੁਧਿਆਣਾ ਪੁਲਿਸ ਕਮਿਸ਼ਨਰੇਟ ਵੱਲੋਂ ਬਾਡੀ ਕੈਮਰਿਆਂ ਦੀ ਵਰਤੋਂ ਕੀਤੀ ਜਾਂਦੀ ਹੈ?

a) Yes: ਹਾਂ

b) No: ਨਹੀਂ

13. What advantage does the use of biometric systems offer the Police Commissionerate Ludhiana?

ਬਾਇਓਮੈਟ੍ਰਿਕਸ ਸਿਸਟਮ ਦੀ ਵਰਤੋਂ ਨਾਲ ਲੁਧਿਆਣਾ ਪੁਲਿਸ ਕਮਿਸ਼ਨਰੇਟ ਨੂੰ ਕਿਹੜਾ ਫਾਇਦਾ ਹੁੰਦਾ ਹੈ?

a) Faster Identification: ਜਲਦੀ ਪਹਿਚਾਣ ਕਰਨਾ

b) Enhanced Security: ਵਧੀਆ ਸੁਰੱਖਿਆ

c) Both a and b: a ਅਤੇ b ਦੋਵੇਂ

d) Not used: ਵਰਤੋਂ ਨਹੀਂ ਕੀਤੀ ਜਾਂਦੀ

14. Which technology is employed by the Police Commissionerate Ludhiana to analyze and forecast criminal activities based on historical data?

ਕਿਹੜੀ ਟੈਕਨੋਲੋਜੀ ਨੂੰ ਲੁਧਿਆਣਾ ਪੁਲਿਸ ਕਮਿਸ਼ਨਰੇਟ ਵੱਲੋਂ ਪੁਰਾਣੇ ਡੇਟਾ ਦੇ ਆਧਾਰ 'ਤੇ ਅਪਰਾਧਕ ਗਤੀਵਿਧੀਆਂ ਦਾ ਵਿਸ਼ਲੇਸ਼ਣ ਕਰਨ ਅਤੇ ਅਨੁਮਾਨ ਲਗਾਉਣ ਲਈ ਵਰਤਿਆ ਜਾਂਦਾ ਹੈ?

a) Predictive Policing Software: ਪ੍ਰੇਡਿਕਟਿਵ ਪੋਲਿਸਿੰਗ ਸਾਫਟਵੇਅਰ

b) Crime Analysis Tools: ਕ੍ਰਾਈਮ ਵਿਸ਼ਲੇਸ਼ਣ ਟੂਲਜ਼

c) Geographic Profiling: ਜ਼ਮੀਨੀ ਨਕਸ਼ਾ ਤਿਆਰ ਕਰਨ ਲਈ

d) None of the above: ਉਪਰੋਕਤ ਵਿੱਚੋਂ ਕੋਈ ਨਹੀਂ

15. How does the Police Commissionerate Ludhiana leverage social media analytics?

ਲੁਧਿਆਣਾ ਪੁਲਿਸ ਕਮਿਸ਼ਨਰੇਟ ਸੋਸ਼ਲ ਮੀਡੀਆ ਦੀ ਵਰਤੋਂ ਕਿਵੇਂ ਕਰਦਾ ਹੈ?

a) Monitor Public Sentiment: ਜਨਤਕ ਭਾਵਨਾਵਾਂ ਦੀ ਨਿਗਰਾਨੀ ਕਰਨਾ

b) Identify Criminal Activity: ਅਪਰਾਧਕ ਗਤੀਵਿਧੀ ਦੀ ਪਛਾਣ

c) Both a and b: a ਅਤੇ b ਦੋਵੇਂ

d) Not used: ਵਰਤੋਂ ਨਹੀਂ ਕੀਤੀ ਜਾਂਦੀ

16. Which of the following technologies is used for improving emergency response efficiency in the Police Commissionerate Ludhiana?

ਕਿਹੜੀ ਟੈਕਨੋਲੋਜੀ ਨੂੰ ਲੁਧਿਆਣਾ ਪੁਲਿਸ ਕਮਿਸ਼ਨਰੇਟ ਵੱਲੋਂ ਐਮਰਜੈਂਸੀ ਜਵਾਬ ਦੇਣ ਵਿੱਚ ਸੁਧਾਰ ਕਰਨ ਲਈ ਵਰਤਿਆ ਜਾਂਦਾ ਹੈ?

a) GPS Tracking: GPS ਟ੍ਰੈਕਿੰਗ

b) Mobile Communication Systems: ਮੋਬਾਇਲ ਕਮਿਊਨਿਕੇਸ਼ਨ ਸਿਸਟਮ

c) Emergency Dispatch Software: ਐਮਰਜੈਂਸੀ ਡਿਸਪੈਚ ਸਾਫਟਵੇਅਰ

d) None of the above: ਉਪਰੋਕਤ ਵਿੱਚੋਂ ਕੋਈ ਨਹੀਂ

17. Compared to conventional methods, how reliable do you think emerging technologies are in solving crimes more efficiently?

ਰਵਾਇਤੀ ਤਰੀਕਿਆਂ ਦੇ ਮੁਕਾਬਲੇ, ਤੁਹਾਡੇ ਅਨੁਸਾਰ ਉਭਰਦੀਆਂ ਤਕਨੀਕਾਂ ਅਪਰਾਧਾਂ ਨੂੰ ਵਧੇਰੇ ਕੁਸ਼ਲਤਾ ਨਾਲ ਹੱਲ ਕਰਨ ਵਿੱਚ ਕਿੰਨੀਆਂ ਭਰੋਸੇਯੋਗ ਹਨ?

a) Much More Reliable: ਬਹੁਤ ਵੱਧ ਭਰੋਸੇਯੋਗ

b) More Reliable: ਭਰੋਸੇਯੋਗ

c) Less Reliable: ਘੱਟ ਭਰੋਸੇਯੋਗ

d) Much Less Reliable: ਬਹੁਤ ਘੱਟ ਭਰੋਸੇਯੋਗ

18. How well do you think new technologies help in crime prevention and investigation?

ਤੁਸੀਂ ਕਿਵੇਂ ਮੰਨਦੇ ਹੋ ਕਿ ਨਵੀਂ ਟੈਕਨੋਲੋਜੀਆਂ ਜੁਰਮ ਰੋਕਣ ਅਤੇ ਜਾਂਚ ਵਿੱਚ ਕਿਵੇਂ ਮਦਦਗਾਰ ਹੁੰਦੀ ਹਨ?

a) Very Well: ਬਹੁਤ ਵਧੀਆ

b) Well: ਵਧੀਆ

c) Neutral: ਨਿਰਪੱਖ

d) Poorly: ਮਾੜਾ

e) Very Poorly: ਬਹੁਤ ਮਾੜਾ

19. Have you received training on the new technologies implemented in the Ludhiana Police Commissionerate?

ਕੀ ਤੁਸੀਂ ਲੁਧਿਆਣਾ ਪੁਲਿਸ ਕਮਿਸ਼ਨਰੇਟ ਵਿੱਚ ਲਾਗੂ ਕੀਤੀਆਂ ਨਵੀਂ ਟੈਕਨੋਲੋਜੀਆਂ ਬਾਰੇ ਟ੍ਰੇਨਿੰਗ ਪ੍ਰਾਪਤ ਕੀਤੀ ਹੈ?

a) Yes: ਹਾਂ

b) No: ਨਹੀਂ

20. How would you rate the quality of the training provided?

ਤੁਹਾਡੇ ਮੁਤਾਬਿਕ ਪ੍ਰਦਾਨ ਕੀਤੀ ਗਈ ਟ੍ਰੇਨਿੰਗ ਕਿਸ ਦਰਜੇ ਦੀ ਹੈ?

a) Excellent: ਸ਼ਾਨਦਾਰ

- b) Good: ਵਧੀਆਂ
- c) Average: ਦਰਮਿਆਨੀ
- d) Poor: ਮਾੜਾ
- e) Very Poor: ਬਹੁਤ ਮਾੜਾ

21. How does the Police Commissionerate Ludhiana use virtual reality (VR) in their training programs?

ਲੁਧਿਆਣਾ ਪੁਲਿਸ ਕਮਿਸ਼ਨਰੇਟ ਆਪਣੇ ਸਿਖਲਾਈ ਪ੍ਰੋਗਰਾਮਾਂ ਵਿੱਚ ਵਰਚੁਅਲ ਰੀਅਲਟੀ (VR) ਨੂੰ ਕਿਵੇਂ ਵਰਤਦੀ ਹੈ?

- a) Crime Scene Simulation: ਕਰਾਈਮ ਸੀਨ ਤਿਆਰ ਕਰਕੇ
- b) Officer Training in Crisis Situations: ਸੰਕਟ ਦੀਆਂ ਸਥਿਤੀਆਂ ਵਿੱਚ ਅਫਸਰ ਸਿਖਲਾਈ
- c) Driving Simulations: ਡ੍ਰਾਈਵਿੰਗ ਸੀਨ ਤਿਆਰ ਕਰਕੇ
- d) Not used: ਵਰਤੋਂ ਨਹੀਂ ਕੀਤੀ ਜਾਂਦੀ

22. Was the duration of the training sufficient for you to understand and use the new technologies (apps, software's etc.) effectively?

ਕੀ ਤੁਹਾਡੇ ਲਈ ਨਵੀਂ ਟੈਕਨੋਲੋਜੀਆਂ (ਐਪਸ, ਸੌਫਟਵੇਅਰਸ ਆਦਿ) ਨੂੰ ਸਮਝਣ ਅਤੇ ਵਰਤਣ ਲਈ ਟ੍ਰੇਨਿੰਗ ਦੀ ਮਿਆਦ ਕਾਫ਼ੀ ਸੀ?

- a) Strongly Agree: ਪੂਰੀ ਤਰ੍ਹਾਂ ਸਹਿਮਤ
- b) Agree: ਸਹਿਮਤ
- c) Neutral: ਨਿਰਪੱਖ
- d) Disagree: ਅਸਹਿਮਤ
- e) Strongly Disagree: ਬਿਲਕੁਲ ਅਸਹਿਮਤ

23. Do you feel confident in using the new technologies after the training?

ਟ੍ਰੇਨਿੰਗ ਦੇ ਬਾਅਦ ਤੁਹਾਨੂੰ ਨਵੀਂ ਟੈਕਨੋਲੋਜੀਆਂ ਵਰਤਣ ਵਿੱਚ ਕਿੰਨਾ ਵਿਸ਼ਵਾਸ ਹੈ?

- a) Very Confident: ਬਹੁਤ ਵਿਸ਼ਵਾਸ
- b) Confident: ਵਿਸ਼ਵਾਸ
- c) Neutral: ਨਿਰਪੱਖ
- d) Not Confident: ਘੱਟ ਵਿਸ਼ਵਾਸ

e) Not Confident at All: ਬਿਲਕੁਲ ਘੱਟ ਵਿਸ਼ਵਾਸ

24. How often do you need additional support or refresher training for these new technologies?

ਤੁਸੀਂ ਕਿੰਨੀ ਵਾਰ ਨਵੀਂ ਟੈਕਨੋਲੋਜੀਆਂ ਲਈ ਵਾਧੂ ਸਹਾਇਤਾ ਜਾਂ ਤਾਜ਼ਾ ਟ੍ਰੇਨਿੰਗ ਦੀ ਲੋੜ ਮਹਿਸੂਸ ਕਰਦੇ ਹੋ?

a) Frequently: ਬਹੁਤ ਜ਼ਿਆਦਾ

b) Occasionally: ਕਦੇ-ਕਦਾਈਂ

c) Rarely: ਘੱਟ ਹੀ

d) Never: ਕਦੇ ਨਹੀਂ

25. Which technology is utilized to enhance the Police Commissionerate Ludhiana's ability to manage large public events?

ਲੁਧਿਆਣਾ ਪੁਲਿਸ ਕਮਿਸ਼ਨਰੇਟ ਵੱਲੋਂ ਵੱਡੇ ਜਨਤਕ ਸਮਾਗਮਾਂ ਦਾ ਪ੍ਰਬੰਧਨ ਕਰਨ ਦੀ ਸਮਰੱਥਾ ਨੂੰ ਸੁਧਾਰਣ ਲਈ ਕਿਹੜੀ ਤਕਨਾਲੋਜੀ ਵਰਤੀ ਜਾਂਦੀ ਹੈ?

a) Drones: ਡ੍ਰੋਨ

b) CCTV Networks: ਸੀ ਸੀ ਟੀ ਵੀ ਨੈੱਟਵਰਕਸ

c) Crowd Control Software: ਭੀੜ ਨਿਯੰਤਰਣ ਸਾਫਟਵੇਅਰ

d) None of the above: ਉਪਰੋਕਤ ਵਿੱਚੋਂ ਕੋਈ ਨਹੀਂ

26. Do you think the new technologies have improved police-public interactions?

ਕੀ ਤੁਹਾਨੂੰ ਲੱਗਦਾ ਹੈ ਕਿ ਨਵੀਂ ਟੈਕਨੋਲੋਜੀਆਂ ਨੇ ਪੁਲਿਸ-ਪਬਲਿਕ ਸੰਬੰਧਾਂ ਵਿੱਚ ਸੁਧਾਰ ਕੀਤਾ ਹੈ?

a) Strongly Agree: ਪੂਰੀ ਤਰ੍ਹਾਂ ਸਹਿਮਤ

b) Agree: ਸਹਿਮਤ

c) Neutral: ਨਿਰਪੱਖ

d) Disagree: ਅਸਹਿਮਤ

e) Strongly Disagree: ਬਿਲਕੁਲ ਅਸਹਿਮਤ

27. Which emerging technology assists the Police Commissionerate Ludhiana in maintaining real-time communication during operations?

ਲੁਧਿਆਣਾ ਪੁਲਿਸ ਕਮਿਸ਼ਨਰੇਟ ਨੂੰ ਕਾਰਵਾਈਆਂ ਦੌਰਾਨ ਰੀਅਲ-ਟਾਈਮ ਕਮਿਊਨਿਕੇਸ਼ਨ ਜਾਰੀ ਰੱਖਣ ਲਈ ਕਿਹੜੀ ਟੈਕਨੋਲੋਜੀ ਸਹਾਇਤਾ ਕਰਦੀ ਹੈ?

a) 5G Networks: 5G ਨੈੱਟਵਰਕਸ

b) Encrypted Mobile Communication: ਇੰਕ੍ਰਿਪਟਡ ਮੋਬਾਇਲ ਕਮਿਊਨਿਕੇਸ਼ਨ

c) Radio Systems: ਰੇਡੀਓ ਸਿਸਟਮ

d) None of the above: ਉਪਰੋਕਤ ਵਿੱਚੋਂ ਕੋਈ ਨਹੀਂ

28. In your opinion, have the use of emerging technologies in policing contributed to a reduction in crime rates in Ludhiana?

ਤੁਹਾਡੇ ਮੁਤਾਬਿਕ ਕੀ ਪੁਲਿਸਿੰਗ ਵਿੱਚ ਉੱਭਰਦੀਆਂ ਤਕਨੀਕਾਂ ਦੀ ਵਰਤੋਂ ਨੇ ਲੁਧਿਆਣਾ ਵਿੱਚ ਅਪਰਾਧ ਦਰਾਂ ਨੂੰ ਘਟਾਉਣ ਵਿੱਚ ਯੋਗਦਾਨ ਪਾਇਆ ਹੈ?

a) Strongly Agree: ਬਿਲਕੁਲ ਸਹਿਮਤ

b) Agree: ਸਹਿਮਤ

c) Neutral: ਨਿਰਪੱਖ

d) Disagree: ਅਸਹਿਮਤ

e) Strongly Disagree: ਬਿਲਕੁਲ ਅਸਹਿਮਤ

29. What challenge does the Police Commissionerate Ludhiana face when implementing emerging technologies?

ਲੁਧਿਆਣਾ ਪੁਲਿਸ ਕਮਿਸ਼ਨਰੇਟ ਨੂੰ ਨਵੀਨਤਮ ਤਕਨੀਕਾਂ ਨੂੰ ਲਾਗੂ ਕਰਨ ਸਮੇਂ ਕਿਹੜੀਆਂ ਚੁਣੌਤੀਆਂ ਦਾ ਸਾਹਮਣਾ ਕਰਨਾ ਪੈਂਦਾ ਹੈ?

a) High Cost: ਵੱਧ ਲਾਗਤ

b) Lack of Expertise: ਨਿਪੁੰਨਤਾ ਦੀ ਘਾਟ

c) Resistance to Change: ਤਬਦੀਲੀ ਦਾ ਵਿਰੋਧ

d) All of the above: ਉਪਰੋਕਤ ਸਾਰੇ

30. Which of the following strategies do you think would enhance the effectiveness of technology in police work?

ਕਿਹੜੀਆਂ ਤਕਨੀਕੀ ਰਣਨੀਤੀਆਂ ਤੁਹਾਨੂੰ ਲਗਦਾ ਹੈ ਕਿ ਪੁਲਿਸ ਦੇ ਕੰਮ ਵਿੱਚ ਟੈਕਨਾਲੋਜੀ ਦੀ ਪ੍ਰਭਾਵਸ਼ੀਲਤਾ ਨੂੰ ਵਧਾ ਸਕਦੀਆਂ ਹਨ?

a) Regular training and refresher courses: ਰੈਗੂਲਰ ਸਿਖਲਾਈ ਅਤੇ ਰਿਫਰੈਸ਼ਰ ਕੋਰਸ

b) Community awareness programs: ਕਮਿਊਨਿਟੀ ਜਾਗਰੂਕਤਾ ਪ੍ਰੋਗਰਾਮ

c) Upgrading existing technologies: ਮੌਜੂਦਾ ਟੈਕਨਾਲੋਜੀ ਨੂੰ ਅੱਪਗ੍ਰੇਡ ਕਰਨਾ

d) Increasing the budget for technology: ਟੈਕਨਾਲੋਜੀ ਲਈ ਬਜਟ ਵਧਾਉਣਾ

e) All of Above: ਉਪਰੋਕਤ ਸਾਰੇ

Annexure-III

QUESTIONNAIRE FOR CITIZENS OF LUDHIANA CITY

- Name: ਨਾਮ

- Age: ਉਮਰ

18-25 Years

26-35 Years

36-45 Years

above 46 Years

- Gender: ਲਿੰਗ

Male: ਮਰਦ

Female: ਔਰਤ

Other: ਹੋਰ

- Residence District: ਰਿਹਾਇਸ਼ੀ ਜ਼ਿਲ੍ਹਾ

1. Does the police help citizens when required?

ਕੀ ਪੁਲਿਸ ਲੋੜ ਪੈਣ 'ਤੇ ਨਾਗਰਿਕਾਂ ਦੀ ਮਦਦ ਕਰਦੀ ਹੈ?

c) Yes: ਹਾਂ

d) No: ਨਹੀਂ

e) Can't Say: ਕਹਿ ਨਹੀਂ ਸਕਦੇ

2. In your opinion, is the police corrupt or honest?

ਤੁਹਾਡੇ ਵਿਚਾਰ ਵਿੱਚ, ਕੀ ਪੁਲਿਸ ਭ੍ਰਿਸ਼ਟ ਹੈ ਜਾਂ ਇਮਾਨਦਾਰ?

a) Honest: ਇਮਾਨਦਾਰ

b) Corrupt: ਭ੍ਰਿਸ਼ਟ

c) Neutral: ਨਿਰਪੱਖ

d) Can't Say: ਕਹਿ ਨਹੀਂ ਸਕਦੇ

3. In your opinion, do the police violate the law more than the average citizen?

ਤੁਹਾਡੇ ਵਿਚਾਰ ਵਿੱਚ, ਕੀ ਪੁਲਿਸ ਆਮ ਨਾਗਰਿਕਾਂ ਦੇ ਮੁਕਾਬਲੇ ਕਾਨੂੰਨ ਦੀ ਵਧੇਰੇ ਉਲੰਘਣਾ ਕਰਦੀ ਹੈ?

- a) Strongly Agree: ਪੂਰੀ ਤਰ੍ਹਾਂ ਸਹਿਮਤ
- b) Agree: ਸਹਿਮਤ
- c) Neutral: ਨਿਰਪੱਖ
- d) Disagree: ਅਸਹਿਮਤ
- e) Strongly Disagree: ਬਿਲਕੁਲ ਅਸਹਿਮਤ

4. Are you aware of any new technologies being used by the Ludhiana Police?

ਕੀ ਤੁਸੀਂ ਜਾਣਦੇ ਹੋ ਕਿ ਲੁਧਿਆਣਾ ਪੁਲਿਸ ਦੁਆਰਾ ਕਿਸੇ ਨਵੀਂ ਟੈਕਨੋਲੋਜੀ ਦੀ ਵਰਤੋਂ ਕੀਤੀ ਜਾ ਰਹੀ ਹੈ?

- a) Yes: ਹਾਂ
- b) No: ਨਹੀਂ
- c) Can't Say: ਕਹਿ ਨਹੀਂ ਸਕਦੇ

5. Have you interacted with police personnel using new technologies (e.g., mobile apps, online reporting, prompt action by police) provided by the police?

ਕੀ ਤੁਸੀਂ ਪੁਲਿਸ ਦੁਆਰਾ ਪ੍ਰਦਾਨ ਕੀਤੀਆਂ ਨਵੀਆਂ ਤਕਨਾਲੋਜੀਆਂ (ਜਿਵੇਂਕਿ ਮੋਬਾਇਲ ਐਪਸ, ਆਨਲਾਈਨ ਰਿਪੋਰਟਿੰਗ, ਪੁਲਿਸ ਵੱਲੋਂ ਤੁਰੰਤ ਕਾਰਵਾਈ) ਰਾਹੀਂ ਪੁਲਿਸ ਕਰਮਚਾਰੀਆਂ ਨਾਲ ਸੰਪਰਕ ਕੀਤਾ ਹੈ?

- a) Yes: ਹਾਂ
- b) No: ਨਹੀਂ

6. How would you rate your experience with police personnel while using the new technologies provided by them?

ਪੁਲਿਸ ਦੁਆਰਾ ਪ੍ਰਦਾਨ ਕੀਤੀਆਂ ਨਵੀਂ ਤਕਨਾਲੋਜੀਆਂ ਦੀ ਵਰਤੋਂ ਕਰਨ ਦੌਰਾਨ ਤੁਹਾਡਾ ਪੁਲਿਸ ਕਰਮਚਾਰੀਆਂ ਨਾਲ ਤੁਹਾਡਾ ਤਜਰਬਾ ਕਿਵੇਂ ਰਿਹਾ?

- a) Very Positive: ਬਹੁਤ ਸਕਾਰਾਤਮਕ
- b) Positive: ਸਕਾਰਾਤਮਕ
- c) Neutral: ਨਿਰਪੱਖ
- d) Negative: ਨਕਾਰਾਤਮਕ
- e) Very Negative: ਬਹੁਤ ਨਕਾਰਾਤਮਕ

7. Do you think the use of new technologies has improved police-public interactions?

ਕੀ ਤੁਸੀਂ ਸੋਚਦੇ ਹੋ ਕਿ ਨਵੀਂ ਟੈਕਨੋਲੋਜੀਆਂ ਦੀ ਵਰਤੋਂ ਨਾਲ ਪੁਲਿਸ-ਜਨਤਾ ਦੇ ਆਪਸੀ ਤਾਲਮੇਲ ਵਿੱਚ ਸੁਧਾਰ ਆਇਆ ਹੈ?

- a) Strongly Agree: ਪੂਰੀ ਤਰ੍ਹਾਂ ਸਹਿਮਤ
- b) Agree: ਸਹਿਮਤ
- c) Neutral: ਨਿਰਪੱਖ
- d) Disagree: ਅਸਹਿਮਤ
- e) Strongly Disagree: ਬਿਲਕੁਲ ਅਸਹਿਮਤ

8. Have you noticed an improvement in the responsiveness of the police since the implementation of new technologies?

ਕੀ ਤੁਸੀਂ ਨਵੀਂ ਟੈਕਨੋਲੋਜੀਆਂ ਦੇ ਲਾਗੂ ਹੋਣ ਤੋਂ ਬਾਅਦ ਪੁਲਿਸ ਦੀ ਪ੍ਰਤੀਕਿਰਿਆ ਵਿੱਚ ਸੁਧਾਰ ਮਹਿਸੂਸ ਕੀਤਾ ਹੈ?

- a) Significant Improvement: ਮਹੱਤਵਪੂਰਨ ਸੁਧਾਰ
- b) Improvement: ਸੁਧਾਰ
- c) No Change: ਕੋਈ ਬਦਲਾਅ ਨਹੀਂ
- d) Deterioration: ਹਲਾਤ ਖਰਾਬ ਹੋ ਗਏ ਹਨ
- e) Significant Deterioration: ਹਲਾਤ ਬਹੁਤ ਖਰਾਬ ਹੋ ਗਏ ਹਨ

9. Do you feel more secure with the use of new technologies by the police?

ਕੀ ਤੁਸੀਂ ਨਵੀਂ ਟੈਕਨੋਲੋਜੀਆਂ ਦੀ ਵਰਤੋਂ ਨਾਲ ਆਪਣੇ ਆਪ ਨੂੰ ਹੋਰ ਸੁਰੱਖਿਅਤ ਮਹਿਸੂਸ ਕਰਦੇ ਹੋ?

- a) Strongly Agree: ਬਿਲਕੁਲ ਸਹਿਮਤ
- b) Agree: ਸਹਿਮਤ
- c) Neutral: ਨਿਰਪੱਖ
- d) Disagree: ਅਸਹਿਮਤ
- e) Strongly Disagree: ਬਿਲਕੁਲ ਅਸਹਿਮਤ

10. Do you believe that new technologies make police operations more transparent?

ਕੀ ਤੁਸੀਂ ਮੰਨਦੇ ਹੋ ਕਿ ਨਵੀਆਂ ਟੈਕਨੋਲੋਜੀਆਂ ਪੁਲਿਸ ਦੀਆਂ ਕਾਰਵਾਈਆਂ ਨੂੰ ਹੋਰ ਪਾਰਦਰਸ਼ੀ ਬਣਾਉਂਦੀਆਂ ਹਨ?

- a) Strongly Agree: ਬਿਲਕੁਲ ਸਹਿਮਤ
- b) Agree: ਸਹਿਮਤ

- c) Neutral: ਨਿਰਪੱਖ
- d) Disagree: ਅਸਹਿਮਤ
- e) Strongly Disagree: ਬਿਲਕੁਲ ਅਸਹਿਮਤ

11. Have you noticed an improvement in the efficiency of police services with the use of new technologies?

ਕੀ ਤੁਸੀਂ ਨਵੀਆਂ ਟੈਕਨੋਲੋਜੀਆਂ ਦੀ ਵਰਤੋਂ ਨਾਲ ਪੁਲਿਸ ਸੇਵਾਵਾਂ ਦੀ ਕੁਸ਼ਲਤਾ ਵਿੱਚ ਸੁਧਾਰ ਮਹਿਸੂਸ ਕੀਤਾ ਹੈ?

- a) Significant Improvement: ਮਹੱਤਵਪੂਰਨ ਸੁਧਾਰ
- b) Improvement: ਸੁਧਾਰ
- c) No Change: ਕੋਈ ਬਦਲਾਅ ਨਹੀਂ
- d) Deterioration: ਹਲਾਤ ਖਰਾਬ ਹੋ ਗਏ ਹਨ
- e) Significant Deterioration: ਹਲਾਤ ਬਹੁਤ ਖਰਾਬ ਹੋ ਗਏ ਹਨ

12. Are you using the mobile apps and other online platforms (Online PCC, online complaint system, online RTI system etc.) provided by the police?

ਕੀ ਤੁਸੀਂ ਪੁਲਿਸ ਵੱਲੋਂ ਪ੍ਰਦਾਨ ਕੀਤੇ ਮੋਬਾਇਲ ਐਪਸ ਅਤੇ ਹੋਰ ਆਨਲਾਈਨ ਪਲੇਟਫਾਰਮਾਂ (ਜਿਵੇਂਕਿ ਆਨਲਾਈਨ PCC, ਆਨਲਾਈਨ ਸ਼ਿਕਾਇਤ ਪ੍ਰਣਾਲੀ, ਆਨਲਾਈਨ RTI ਪ੍ਰਣਾਲੀ ਆਦਿ) ਦੀ ਵਰਤੋਂ ਕਰ ਰਹੇ ਹੋ?

- a) Yes: ਹਾਂ
- b) No: ਨਹੀਂ

13. How likely are you to use technology-based services (e.g., online reporting, mobile apps) provided by the police?

ਤੁਸੀਂ ਪੁਲਿਸ ਦੁਆਰਾ ਪ੍ਰਦਾਨ ਕੀਤੀਆਂ ਤਕਨਾਲੋਜੀ ਆਧਾਰਿਤ ਸੇਵਾਵਾਂ (ਜਿਵੇਂਕਿ ਆਨਲਾਈਨ ਰਿਪੋਰਟਿੰਗ, ਮੋਬਾਇਲ ਐਪਸ) ਵਰਤਣ ਵਿੱਚ ਕਿੰਨੀ ਦਿਲਚਸਪੀ ਰੱਖਦੇ ਹੋ?

- a) Very Likely: ਬਹੁਤ ਦਿਲਚਸਪੀ
- b) Likely: ਦਿਲਚਸਪੀ
- c) Neutral: ਨਿਰਪੱਖ
- d) Unlikely: ਦਿਲਚਸਪੀ ਨਹੀਂ
- e) Very Unlikely: ਬਿਲਕੁਲ ਵੀ ਦਿਲਚਸਪੀ ਨਹੀਂ

14. How easy do you find the process of reporting a crime using the available technologies (e.g., online reporting, mobile apps) ?

ਤੁਸੀਂ ਪ੍ਰਾਪਤ ਉਪਲਬਧ ਟੈਕਨੋਲੋਜੀ (ਜਿਵੇਂਕਿ ਆਨਲਾਈਨ ਰਿਪੋਰਟਿੰਗ, ਮੋਬਾਈਲ ਐਪਸ) ਦੀ ਵਰਤੋਂ ਕਰਕੇ ਜੁਰਮ ਦੀ ਰਿਪੋਰਟ ਕਰਨ ਦੀ ਪ੍ਰਕਿਰਿਆ ਕਿੰਨੀ ਆਸਾਨ ਮੰਨਦੇ ਹੋ?

- a) Very easy: ਬਹੁਤ ਆਸਾਨ
- b) Easy: ਆਸਾਨ
- c) Neutral: ਨਿਰਪੱਖ
- d) Difficult: ਮੁਸ਼ਕਿਲ
- e) Very difficult: ਬਹੁਤ ਮੁਸ਼ਕਿਲ

15. Have you seen any public awareness campaigns or information from the police about the technologies they use ?

ਕੀ ਤੁਸੀਂ ਪੁਲਿਸ ਵਲੋਂ ਵਰਤੀ ਜਾ ਰਹੀ ਟੈਕਨੋਲੋਜੀ ਬਾਰੇਕੋਈ ਜਨ ਜਾਗਰੂਕਤਾ ਮੁਹਿੰਮ ਜਾਂ ਜਾਣਕਾਰੀ ਦੇਖੀ ਹੈ?

- a) Yes: ਹਾਂ
- b) No: ਨਹੀਂ

16. Do you agree that the use of new technologies has made it easier for the general public to connect with the Ludhiana Police?

ਕੀ ਤੁਸੀਂ ਸਹਮਿਤ ਹੋ ਕਿ ਨਵੀਆਂ ਟੈਕਨੋਲੋਜੀਆਂ ਦੇ ਇਸਤੇਮਾਲ ਨਾਲ ਲੁਧਿਆਣਾ ਪੁਲਿਸ ਤੱਕ ਆਮ ਜਨਤਾ ਦੀ ਪਹੁੰਚ ਵਧੇਰੇ ਸੌਖੀ ਹੋ ਗਈ ਹੈ?

- a) Yes: ਹਾਂ
- b) No: ਨਹੀਂ

17. How effective do you find the Ludhiana Police's use of social media platforms (e.g., Facebook, Twitter, Instagram) in communicating with the public and addressing concerns?

ਤੁਹਾਨੂੰ ਲੁਧਿਆਣਾ ਪੁਲਿਸ ਵੱਲੋਂ ਲੋਕਾਂ ਨਾਲ ਤਾਲਮੇਲ ਅਤੇ ਗੱਲਬਾਤ ਕਰਨ ਲਈ ਸੋਸ਼ਲ ਮੀਡੀਆ ਪਲੇਟਫਾਰਮਾਂ (ਜਿਵੇਂ ਕਿ ਫੇਸਬੁੱਕ, ਟਵਿੱਟਰ, ਇੰਸਟਾਗ੍ਰਾਮ) ਦੀ ਵਰਤੋਂ ਕਰਨਾ ਕਿੰਨਾ ਪ੍ਰਭਾਵਸ਼ਾਲੀ ਲੱਗਦਾ ਹੈ?

- a) Very Effective: ਬਹੁਤ ਪ੍ਰਭਾਵਸ਼ਾਲੀ
- b) Effective: ਪ੍ਰਭਾਵਸ਼ਾਲੀ
- c) Neutral: ਨਿਰਪੱਖ
- d) Ineffective: ਅਪ੍ਰਭਾਵਸ਼ਾਲੀ
- e) Very Ineffective: ਬਹੁਤ ਅਪ੍ਰਭਾਵਸ਼ਾਲੀ

18. Would you prefer face-to-face interactions with police personnel or using technology for communication?

ਕੀ ਤੁਸੀਂ ਪੁਲਿਸ ਕਰਮਚਾਰੀਆਂ ਨਾਲ ਮਿਲਕੇ ਸੰਪਰਕ ਕਰਨ ਨੂੰ ਤਰਜੀਹ ਦੇਵੋਗੇ ਜਾਂ ਤਕਨਾਲੋਜੀ ਰਾਹੀਂ ਸੰਚਾਰ ਕਰਨ ਨੂੰ?

a) Face-to-face interactions: ਮਿਲਕੇ ਸੰਪਰਕ

b) Using technology: ਤਕਨਾਲੋਜੀ ਦੀ ਵਰਤੋਂ

19. How satisfied are you with the responses time to your requests or reports submitted via the police mobile app?

ਤੁਸੀਂ ਪੁਲਿਸ ਮੋਬਾਇਲ ਐਪ ਰਾਹੀਂ ਦਿੱਤੀਆਂ ਗਈਆਂ ਬੇਨਤੀਆਂ ਜਾਂ ਰਿਪੋਰਟਾਂ ਲਈ ਕਾਰਵਾਈ ਦੇ ਜਵਾਬੀ ਸਮੇਂ ਨਾਲ ਕਿੰਨਾ ਸੰਤੁਸ਼ਟ ਹੋ?

a) Very Satisfied: ਬਹੁਤ ਸੰਤੁਸ਼ਟ

b) Satisfied: ਸੰਤੁਸ਼ਟ

c) Neutral: ਨਿਰਪੱਖ

d) Dissatisfied: ਅਸੰਤੁਸ਼ਟ

e) Very Dissatisfied: ਬਹੁਤ ਅਸੰਤੁਸ਼ਟ

20. Do you think that the police should have more training on how to interact with the public through digital platforms?

ਕੀ ਤੁਸੀਂ ਸੋਚਦੇ ਹੋ ਕਿ ਪੁਲਿਸ ਨੂੰ ਡਿਜੀਟਲ ਪਲੇਟਫਾਰਮਾਂ ਰਾਹੀਂ ਜਨਤਾ ਨਾਲ ਤਾਲਮੇਲ ਕਰਨ ਦੇ ਲਈ ਹੋਰ ਟ੍ਰੇਨਿੰਗ ਦੀ ਲੋੜ ਹੈ?

a) Yes: ਹਾਂ

b) No: ਨਹੀਂ

c) Maybe: ਸ਼ਾਇਦ

Annexure-IV

LIST OF PUBLICATION

Journal Paper/ Conference proceeding/ Book Chapter	Web link of Published research work	Journal Name	Journal Indexing	Title of Paper	Type of Paper (Research /review)
Conference Proceeding	DOI:10.4324/9781003725084-29 <i>(Paper indexed in Scopus)</i>	Taylor & Francis	Scopus	The Introduction to the Changing Dynamics of Police Commissionerate System in India with Reference to Police Commissionerate Ludhiana, Punjab	Research
Research Article	https://ijikm.us/index.php/journals/article/view/167	Interdisciplinary Journal of Information, Knowledge, and Management (IJKM)	Scopus	The Future of Policing: Harnessing New Technologies with Special Reference to Police Commissionerate, Ludhiana, Punjab	Research
Book Chapter	N/A	LPU Publication House	Level of Publication: National/State/Central & Local with ISSN 978-81-19929-10-8	Emerging Trends of Police Commissionerate System in India: A Study of Ludhiana City Punjab	Research

Annexure-V

CONFERENCE CERTIFICATES

**PPGAPPE**
Public Policy, Governance & Administration in Post Pandemic Era

**SCHOOL OF
LIBERAL AND CREATIVE ARTS
(SOCIAL SCIENCES & LANGUAGES)**

ThinkBIG

**NAAC A++**

Certificate No 355012

Certificate of Presentation

This is to certify that Mr./Ms./Dr. Ramandeep Singh of Lovely Professional University has gave Presentation on **The Future of Policing: Harnessing New Technologies with Special Reference to Police Commissionerate, Ludhiana, Punjab** in the International Conference on “Public Policy, Governance and Administration in Post Pandemic Era” (PPGAPPE-2024) held on 13th November 2024, organized by the Department of Government and Public Administration, School of Liberal and Creative Arts (Social Sciences and Languages), at Lovely Professional University, Punjab.

Date of Issue: 13-11-2024
Place : Phagwara (Punjab), India

Prepared by
(Administrative Officer-Records)

Dr. Manvendra Singh
Organizing Secretary
[PPGAPPE-2024]

Prof. (Dr.) Pavitar Parkash Singh
Program Chair/HOS
[PPGAPPE-2024]

Prof. (Dr.) Sanjay Modi
Head of Faculty
Lovely Professional University

**MANAV RACHNA**
International Institute of Research and Studies

**SLM**
School of Leadership and Management

**NAAC A++**
ACCREDITED

**DR. PRITAM SINGH FOUNDATION**

School of Leadership and Management

Manav Rachna International Institute of Research and Studies

4th PRITAM SINGH MEMORIAL (PRISM) CONFERENCE ON

WORKPLACE DISRUPTION: LEADERSHIP CHALLENGES & ORGANIZATIONAL SUSTAINABILITY

in association with

**International Academic Partners**

**INTI**
International University

**NKU**
NORTHERN KENTUCKY UNIVERSITY

**SYNERGY UNIVERSITY**

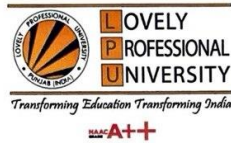
**ANGLO AMERICAN**
UNIVERSITY

Certificate of Participation

This is to certify that Ramandeep Singh of Lovely Professional University, Phagwara, Punjab has presented a research paper titled The Introduction to the Changing Dynamics of Police Commissionerate System in India with Reference to Police Commissionerate Ludhiana, Punjab during the 4th PRITAM SINGH MEMORIAL (PRISM) Conference held on 19th – 21st November 2024 at the School of Leadership and Management, Manav Rachna International Institute of Research and Studies, Faridabad.


Dr. Arnab Chakraborty
Organising Co-Chair


Dr. Deepti Dabas Hazarika
Organising Chair



Certificate No. 454292

Certificate of Presentation

This is to certify that Prof./Dr./Mr./Ms. **Ramandeep Singh** of **Lovely Professional University, Phagwara** has presented a paper on **“Substance Abuse in Urban India: Insights from Police Commissionerate Ludhiana, Punjab”** through Online mode in the **“International Conference on Social Sciences: Past, Present and Future”** held from 24th to 25th April 2026 organized by Lovely Faculty of Business and Arts, at Lovely Professional University, Punjab.

Date of Issue: 24-04-2026
Place: Phagwara, Punjab, India


Prepared by
(Administrative Officer-Records)


Organizing Secretary


COF
Lovely Faculty of Business and Arts

