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The Role of Crime Mapping and Predictive Policing in Modern Law Enforcement: Evidence From Sindh, Pakistan (2015–2025)

Samiullah Soomro [1*]

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ABSTRACT

Crime mapping and predictive policing represent two foundational pillars of data-driven public security delivery in the digital governance era. Crime mapping refers to the geographic identification and visualization of crime hotspots to enable place-based policing, while predictive policing employs data analytics and algorithms to forecast criminal activity and enable pre-emptive law enforcement intervention. This study examines whether policing in Sindh, Pakistan has meaningfully benefited from these modern law enforcement tools, and whether current capabilities are sufficient to meet future public safety demands. Employing a mixed-methods longitudinal design, integrating quantitative crime statistics, budget analysis, and qualitative Key Informant Interviews (KIIs), this research analyses eleven years of provincial crime data (2015–2025) alongside IT budget allocations across five financial years. The study reveals that despite incremental adoption of technology-based initiatives, Sindh Police's commitment to IT infrastructure remains critically underfunded, averaging merely 1.3% of total budget allocation, with procurement utilization falling well below sanctioned estimates in consecutive financial years. Findings confirm that systemic factors intrinsic to Sindh; including institutional inertia, elite capture, corruption, inadequate IT human resources, and poor data quality, have severely constrained the operational effectiveness of both crime mapping and predictive policing models. Eleven years of provincial crime data demonstrate no statistically significant reduction in any major crime category, indicating that existing tools have failed to produce the proactive, deterrence-oriented outcomes they are designed to deliver. Nevertheless, emerging platforms, notably the Karachi Safe City Project and the Sindh Smart Surveillance System (S4), present a credible foundation for AI-integrated, data-driven policing. This paper concludes with eighteen evidence-based policy recommendations, encompassing transparent IT recruitment, mandatory budget benchmarks, and phased smart surveillance expansion, aimed at bridging the gap between primitive reactive policing and modern predictive law enforcement.

Keywords:crime mapping, predictive policing, Sindh Police, digital governance, smart surveillance, law enforcement technology, Pakistan

[1] *National Institute of Public Administration (Nipa), Karachi*
e-mail: sami.soomro@hotmail.com

1. INTRODUCTION

Crime mapping and predictive policing have emerged as the two most consequential instruments of modern, technology-driven law enforcement. Crime mapping refers to the geographic identification and spatial visualizations of criminal activity, enabling agencies to pinpoint hotspots and deploy resources with precision. Predictive policing employs data analytics, machine learning algorithms, and historical crime patterns to forecast where, when, and by whom future offences are likely to be committed — shifting policing from a reactive to a proactive paradigm.

These tools are not merely technical innovations; they represent a fundamental reconceptualization of the police mandate — from responding to crime after the fact, to anticipating and preventing it in advance. It is within this conceptual framework that this study situates its examination of law enforcement in Sindh, Pakistan.

1.1 Context of Research

The first foundational concept of crime mapping was witnessed to be used in the 19th century, which proved a positive relation between two variables (areas with higher levels of education and a higher incidence of property crimes). This focused research has been designed to study the historical perspective of crime mapping and predictive policing, with their current utility and futuristic sustainability (integration of scrutiny and surveillance systems with Artificial Intelligence - AI) in the general context of Pakistan, deriving lessons from the Crime Analytics and Smart Policing in Pakistan Project (CASPP), with ***special focus on the province of Sindh***. During this research process, despite time limitations, various analytical tools (of different types and natures) used in modern law enforcement, primarily including crime mapping and crime prediction, have been assessed for devising strategies to provide actionable recommendations with policy implications, as compared to the documented outcomes of primitive and traditional policing.

Profound challenges, such as the typical police culture of Sindh, the lack of a skilled workforce, erosion of public trust, and de-internalization of modern technology, have been addressed with practical solutions to ensure that the benefits of crime mapping and predictive policing remain effective. A comprehensive analysis based on different modes of parameters has been made, keeping in consideration all the recruitments, Budget Estimates (BE) and percentage of IT staff appointment. Despite

the constraints of time, an effective strategy has been suggested inferring from all relevant critical analysis based on ratio of IT appointments versus total recruitments and budget allocations and expenditure in the last five financial years. The contribution of the Punjab Information Technology Board (PITB), in comprehensive coordination and effective working relationship with the Ministry of Information Technology and Telecommunication (MoITT), has also been compared with international best practices (case studies) for developing a detailed strategy. The devised strategy includes crime mapping and aims for data-driven policing to sort out crime patterns and trends, helping to deter future offenders in Sindh.

1.2 Statement of the Problem.

Despite a measurable rise in the adoption of modern law enforcement tools — including mobile applications, CCTV networks, and AI-driven platforms — their effective and sustained application remains critically deficient in Sindh. While crime mapping and predictive policing hold demonstrable potential to reduce crime rates, increase offender arrests, and restore public confidence in state security, these outcomes have not materialised at any meaningful scale.

Sindh presents a particularly acute case: a province already burdened by poor governance, elite capture, and institutional corruption, where the transition from reactive to proactive policing has been slow, underfunded, and inconsistently implemented. The required budgetary commitments have not been made, IT cadre recruitment has stagnated, and the strategic frameworks necessary to operationalise data-driven policing remain largely absent.

The core problem, therefore, is not a lack of available technology, but a failure of institutional will, resource prioritisation, and ethical governance to deploy it effectively. Without addressing these structural deficiencies, modern policing tools cannot deliver the safety and security that the people of Sindh are entitled to expect.

1.3 Formulation of Research Question

Drawing from the identified structural and institutional deficiencies in Sindh's law enforcement landscape, this study is anchored by the following central empirical question:

"Has policing in Sindh meaningfully benefited from crime mapping and predictive policing, and are the current modern law enforcement tools

sufficient to meet the public's need for a safe and secure society in the future?"

This question encompasses two interrelated dimensions: a retrospective assessment of existing IT-based policing initiatives and their measurable outcomes, and a prospective evaluation of whether the current trajectory is adequate to address Sindh's escalating public safety demands.

2. LITERATURE REVIEW

In conducting this research, a systematic and comprehensive review of available literature (qualitative literature review methodology) has been made:

Hunt (2019), in his article *From Crime Mapping to Crime Forecasting: The Evolution of Place-Based Policing*, published in the National Institute of Justice Journal, provides a foundational overview of the subject. He traces the brief but significant history of crime mapping before elaborating on the conceptual leap toward predictive policing and its realistic evaluation model. The article concludes by outlining future directions in the transition from static crime mapping to dynamic crime forecasting, offering a valuable trajectory for place-based policing research.

Ferguson (2019), in *Predictive Policing Theory*, published by the American University Washington College of Law, argues that law enforcement is being fundamentally transformed by predictive policing. Concrete operational decisions are increasingly made on the basis of data-driven insights rather than officer discretion alone. These techniques are documented to yield increased police efficiency and measurable reductions in crime within targeted areas. Critically, Ferguson grounds all predictive policing technologies within established policing theory and criminology, affirming their academic legitimacy. He further notes a marked upsurge in place-based predictive policing in recent decades, concluding that crime mapping and predictive policing together define the optimal role of police within the modern community.

Bachner (2013), in *Predictive Policing: Preventing Crime with Data and Analytics*, published by the IBM Center for The Business of Government, elaborates the central role of crime analytics in modern crime prevention. He defines three foundational pillars underpinning effective crime prevention strategies: primary prevention, criminal justice, and law enforcement. Police departments are reported to employ

analytical techniques across three categories — space, time and space, and social networks. Drawing on a case study from Santa Cruz, California, Bachner illustrates how crime type and crime history can be spatially mapped at the locality level. He further notes that the visible presence of police at identified hotspot locations demonstrably reduces the inclination of potential offenders to commit crimes. Three pillars have been defined to lay the foundation of crime prevention: strategies encompassing primary prevention, criminal justice, and law enforcement. Police departments are reported to use analytical techniques that fall into three categories: spatial analysis, spatio-temporal analysis, and social network analysis. Bachner (2013) maps and analyses crime patterns, offence types, and criminal histories at the locality level, drawing on case evidence from Santa Cruz, California, United States of America (USA). He further suggests that potential offenders are demonstrably less likely to commit offences in areas where they observe a visible police presence or active police patrols.

Egbert (2019), in *Predictive Policing and the Platformization of Police Work*, published in Surveillance and Society, argues that this novel foresight watches and ward strategy rests fundamentally on crime data analysis. He contends that expansive surveillance is essentially grounded in locality-specific crime data, directly enhancing the effectiveness of the police watch and ward function. Egbert further asserts that crime data carries significant operational value, as its computational analysis facilitates the design and implementation of evidence-based anti-crime policies for public benefit. Critically, he notes that the utility of individual datasets is substantially amplified when integrated with complementary datasets, yielding a broader and more actionable picture of crime-infested areas.

Ektaabi (2020), in *Smart Policing Service Quality: Conceptualization, Development and Validation*, published in a peer-reviewed journal, presents a comprehensive evaluation of smart policing service quality. Employing a mixed-methods design combining both quantitative and qualitative methodologies, the study assesses the performance of smart policing services in the United Arab Emirates (UAE), with particular attention to the reliability and validity of the proposed construct. Findings reveal high levels of consumer satisfaction, with respondents demonstrating a strong propensity to continue engaging with the preferred smart policing methodology. The study further reports positive and significant service outcomes, translating into measurably improved

standards of living and quality of life for citizens. Ektaabi concludes that effective implementation of targeted security strategies is essential for comprehensively addressing prevailing security challenges.

3. RESEARCH METHODOLOGY

This study employs the historical method as its primary research methodology. Through systematic collection, critical evaluation, and analytical synthesis of documented evidence spanning eleven years (2015 to August 2025), this approach enables a rigorous longitudinal examination of crime trends, IT budget allocations, and the operational outcomes of crime mapping and predictive policing initiatives in Sindh. Historical method is particularly suited to this research as it allows for the identification of patterns, causative factors, and institutional trajectories that explain the current state of law enforcement in the province.

Primary data was gathered through structured and semi-structured Key Informant Interviews (KIIs) with senior Sindh Police and government officials, serving to corroborate and contextualise the findings derived from secondary sources. Research limitations include the restricted availability of disaggregated operational data and the time-bound scope of the study. The reference period spans from 2015 to August 2025, with futuristic projections drawn from emerging predictive policing and crime analytics models.

3.1 Scope/ Boundaries of Research

Since the topic assigned, "Crime Mapping and Predictive Policing: Tools for Modern Law Enforcement," is a very vast and all-inclusive research topic, the scope and boundaries of this research were set to research the matter in the context of Sindh province, focusing on its conceptual clarity. Time constraints put more reliance on secondary data rather than primary data. Some interviews (Key Informant Interviews: KIIs) in the methodological framework of primary data were conducted under the scope of this research, bordering on IT initiatives of the Sindh government (E-Governance) in general and the Sindh police in particular, with a 360-degree appraisal of the Karachi Safe City Project. In this longitudinal study, an analysis of both quantitative & qualitative methodologies was done to assess the performance of existing tools for modern law enforcement in Sindh. The comprehensive answers to the empirical question based on statistical data were drawn at the end of this research

within the defined scope and boundaries involving both the conceptual and synthesizing framework.

3.2 Sources of Data

For this research, data regarding crime mapping, predictive policing and tools for modern law enforcement has been mainly through secondary data sources. Whereas the factors of IT initiatives in Sindh police have been researched through thorough and comprehensive interviews (KII: Key Informant Interviews) of Secretary IT, DIGP IT, Project Director IT, Director General Safe City Project, DIGP Finance, DIGP Crimes and Investigation, DIG Special Branch, DIG CTD, AIGP Finance, AIGP Logistics, AIGP IT, SSP Madadgar 15. This being primary data source has been sought from the officers who have been directly dealing and who have the firsthand knowledge of all factors related to crime mapping, predictive policing and tools for modern law enforcement. Through questions raised in interviews an effort has been made to find the efficiency, effectiveness and future prospects of modern tools of law enforcement.

These interviews were conducted in this research for getting the data on the subject through structured and semi-structured way of asking the questions. Informal talks with key role players in crime patterned-identification and foresight policing have been made method to collect the qualitative information under the primary data.

4. CRIME MAPPING IN THE CONTEXT OF LAW ENFORCEMENT

Crime mapping is essentially for crime forecasting (crime prediction), thereby deterring potential offenders. Since the word mapping is itself explanatory of the concept of place. So crime mapping relates unequivocally to place-based policing. Data from various locations and neighborhoods, such as Karachi industrial areas, Sachal, Shahrae Faisal, Tipu Sultan, Surjani etc., have been an effective addition to a key theoretical framework for identifying crime hotspots. The most important theme and objective to be achieved is a decrease in crime numbers and an upsurge in the people's sense of security and safety.

4.1 Historical Background

The First example of crime mapping is attributed to the pioneering effort of Adriano Balbi and Andre Michel Guerry in the 19th century (1829)[2]. They displayed maps depicting the correlation between violent and property crimes and educational level in France. After around one decade, London Metropolitan Police's detective branch, established in 1842, started using pattern recognition to prevent crimes. After this, Joseph Fletcher showed maps depicting the rate of male imprisonment in 1849, and Henry Mayhew prepared a map of county crime in 1861[3]. After this, Clifford Shaw and Henry McKay (1942) plotted hundreds of juvenile delinquency incidents on a map in the early 20th century[4]. This mapping studied the correlation between juvenile delinquency and different societal standings. "Eyes on the Street" and "Social Capital" were two terms coined by Jane Jacobs (1950) about crime mapping. Criminologists have emphasized the importance of place since the 1970s. Here is the revised paragraph with full attribution for both theories: The Routine Activities Theory (RAT) was pioneered by Lawrence Cohen and Marcus Felson in their landmark 1979 publication, *Social Change and Crime Rate Trends: A Routine Activities Approach*, published in the American Sociological Review. The theory posits that the commission of an offence occurs whenever three factors converge simultaneously at the same time and place: a suitable target, the absence of capable guardianship, and a motivated offender. Cohen and Felson (1979) assert that "the spatial and temporal structure of routine legal activities should play an important role in determining the location, type, and quantity of illegal acts occurring in a given community or society." Building on this spatial foundation, Paul Brantingham and Patricia Brantingham, in their seminal 1981 work *Environmental Criminology*, published by Sage Publications, further identified place as an integral component of crime, proposing that criminal events occur at the intersection of four elements converging at one time: a law, an offender, a target, and a discrete location.

4.2 Definitions of Crime Mapping & Predictive Policing

Crime mapping and predictive policing have gained considerable currency in the policing approaches to crime. There is a tendency for crime to

[2] Evolution of place-based policing 2019

[3] Ibid

[4] Ibid

cluster in hot spots; there is one factor of their (hotspots) stability in longer periods of time (persistence of hotspots). Place, not people, has been defined as a key element in crime. This marked the start of hotspot policing.

Predictions are made regarding the time and locations of offenses which have chance to happen, as well as who is likely to be the culprit in previous crimes. Predictive policing is a paradigm metamorphosis in the field of policing, where analysis of data can forecast, and predictively hamper and obstruct the spree of crimes in advance of their taking in effect. Algorithms of foresight policing have an effective potential to allocate resources by patterning most vulnerable neighborhoods and stationing police aptly, enhancing the effectiveness of operational manifestations at the site and a general results-based approach.[5] Predictive policing aims to enhance the proactivity of the community to come in coordination of the police.

4.3 The Crime Analytics and Smart Policing in Pakistan (CASPP) Project

The Crime Analytics and Smart Policing in Pakistan (CASPP, 2022) project, a coordinated venture between the Punjab Information Technology Board (PITB) and the Ministry of Information Technology and Telecommunication (MoITT), proposes to elevate Pakistan's police force by priming Information and Communication Technology (ICT). This strategic framework relies on promoting and implementing different software applications and modern instruments to increase the capacity of different police organizations and embark upon policing functions based on the tools envisaging crime mapping and operationalizing predictive policing.

The key aspects of the project:

4.3.1 Technology Integration:

- ***Software Rollout:*** The project involves the nationwide rollout of various law and order software applications across police departments.

[5] (Berk, 2021)

- ***Main centric Hub*:** An important approach to derive all the policing functions based on Information Technology on the principle of oneness and similarity for ensuring the consistent projects and sharing of needed data among different police organizations
- ***Insight based on Data*:** The program primes analysis of data to infer conclusions for foresight policing, enabling policing services to perform efficiently when it comes to enforcing laws of the land and strict prevention of potential offences.
- ***Predictive Policing:*** The project utilizes predictive policing models to map likely crime places and deriving results for effective resource-allocation, potentially resulting in a reduction in crime rates.
- ***Real-time Crime Mapping*:** The Crime Mapping System, developed under CASPP, enables real-time tracking and analysis of figures of crimes, assisting policing services pin-point patterns and trends.

4.3.2 Impacts:

The impacts of the CASPP project are directly relevant to the core problem identified in this study — that Sindh, and Pakistan more broadly, has failed to transition from primitive reactive policing to a data-driven, proactive law enforcement model.

- **Improved Law and Order:** The CASPP project directly addresses the documented failure of traditional policing in Sindh by leveraging technology to enhance crime prevention, detection, and response. Given that eleven years of provincial crime data reveal no significant reduction in any major crime category, the project's technology-driven approach represents a necessary corrective to the institutional inertia that has long constrained policing effectiveness in the province.
- **Data-Driven Policing:** The project promotes a decisive shift towards data-driven policing, precisely the transition that Sindh Police has failed to achieve due to chronic underfunding of IT initiatives, averaging merely 1.3% of total budget allocation. By enabling police leadership to make more informed, evidence-based strategic decisions and resource distributions, CASPP offers a replicable model for addressing the resource misallocation that has undermined policing in Sindh.
- **Enhanced Effectiveness:** Through algorithm-based execution and spatiotemporal crime analysis, CASPP directly targets the operational

deficiencies at the heart of Sindh's policing problem — the absence of systematic crime patterning, hotspot identification, and predictive deployment of personnel. Its implementation framework offers a credible pathway toward the results-based policing that the people of Sindh are yet to experience.

4.3.3 Sindh Police- IT Initiatives for combating crimes

Sindh police is the oldest in sub-continent and the second largest police organization in Pakistan. Sindh police was established in 1843 by Sir Charles Napier on the pattern of Irish Constabulary. Initial strength was 4245.

Table 1

CPO Sindh

Major Crime –Sindh Province	
Heads	2025
Terrorism	25
Armed Robberies	3642
Murders	1330
Kidnapping For Ransom	122
Extortion	133

Figure 1

Map of Sindh; Courtesy: Central

The IT Directorate of Sindh Police came into existence as a nascent establishment in 2010, firstly under the departmental hierarchy of the Deputy Inspector General of Police (DIGP) Headquarters. In 2016, the Information Technology section was enhanced with 2656 job-related openings and the slot of DIGP IT Sindh police was sanctioned to effectively supervise IT directorate. Regarding the crime mapping models in Sindh IT wing started to function on technology innovations in the Sindh police with effective and efficient oversight and scrutiny of control centers (Data Hubs maintenance and their security). Crime mapping involves the identification of hotspots by area or regions (like K.Ind Area, Sh-e-Faisal, Zaman Town in Karachi).

4.3.4 Criminal Record Management System (CRMS) (Level of District):

The methodology is designed for managing the records of criminals & the reimaging and sorting out of criminals by utilizing prior criminal proclivities, anthropogenic parameters and apparent outlooks. The most important characteristics of this approach encompass the build-up of a database of fingerprints of offenders and the processing led results of their latent fingerprints through computer generated results. The main software hub of fingerprints is linked with all functional and geographic divisions and establishments of the Sindh police, allowing an offender from one geographic area to be swiftly traced in another. Furthermore, it is effectively linked with the CRMS of Punjab, the Tenant Registration System, and Hotel Eye, as an outcome of which hotel residents with deviant records can be traced throughout Sindh. Specific CRO rooms are functional in each administrative unit of the province, having facility of modern devices (fingerprints and palm) and fiber optic networking.

The geographic concentration of crime across Karachi's police station jurisdictions is most vividly illustrated through armed snatching data. To demonstrate the practical utility of crime mapping in identifying hotspots and informing targeted policing strategies, Table 2 presents a station-wise breakdown of armed snatching incidents — categorised by mobile phones, 4-wheelers, and 2-wheelers — recorded across the fifteen most affected police stations in Karachi from 1st January 2025 to 31st August 2025. This data was extracted from the Crime Mapping and Incident Reporting System maintained by the IT Directorate, Sindh Police, Karachi, and is accessible through the office of DIGP IT, Sindh Police Headquarters, Karachi.

Table 2
Mapping of crimes of armed snatching in Karachi (source: Karachi Police)

POLICE STATION	Armed Snatching			
	Mobile	**4 Wheelers**	**2 Wheelers**	**Total**
K.Ind Area	395	1	205	601
Sachal	314	42	240	596
Surjani Town	229	0	329	558
S.Ind. Area	203	7	283	493
Sh-e-Faisal	369	16	84	469
Zaman Town	354	0	97	451
Feroza bad	336	5	89	430
Awami Colony	252	3	128	383
Sohrab goth	276	2	98	376
Aziz Bhatti	271	7	73	351
Jamshed	234	0	114	348
Gulistan-e-Johar	241	7	94	342
Gulshan-e-Iqbal	193	7	88	288
Mobina Town	205	4	58	267
Tipu Sultan	203	1	61	265

In consolidation of the data Table 1 provides a concise overview of major crime heads in Sindh for 2025 (January to August), with clear figures highlighting the prevalence of Armed Robberies and Murders.

Karachi is far more advanced than other districts of Sindh in compilation of the data for crime mapping and predictive policing. Table 2 presents data on armed snatching incidents into mobile, 4-Wheelers, 2-Wheelers, and Total incidents in these categories of crimes. The place with the highest numbers for the defined types of crimes is K.Ind Area's total of 601 is the sum of 395 (Mobile) + 1 (4-Wheelers) + 205 (2-Wheelers). The data of first January 2025 up to 31st August reveals significant variation in incident counts across police stations. K.Ind Area reports the highest total incidents (601), while Tipu Sultan has the lowest (265). Mobile snatching dominates in most stations (e.g., 395 in K.Ind Area, 369 in Sh-e-Faisal), suggesting it is the most prevalent type of armed snatching. In contrast, 4-Wheeler incidents are notably low across all stations (e.g., 0 in Surjani Town, Zaman Town, Jamshed), indicating a potential focus area for law enforcement.

4.3.5 Criminal Record Management System (CRMS) in Prisons.

- CRO units are functional at correctional facilities/prisons in Sindh.
- The Electronic CRO lab working under the operational and administrative supervision of Forensic Science Division (FSD) is fully functional in two timings to digitalize the all available man made records of fingerprints.
- There is a facility for real-time identification through the CRI interface with main Criminal Record Office digital hub.

4.3.6 Bio Verysis System One-to-N

The practice of using prints of the fingers as a method of tracing individuals has recently metamorphed as one of the trusted way of patterning so far, whether to trace missing corpse(s) or any person who is not willing to disclose his/her actual name or vice-versa. One-to-N is a service coming into being in coordination with NADRA (National Database and Registration Authority), with whose assistance an untraced person can easily be traced for identification putting their anthropogenic features and prints.

In addition to the above, the following technology-led policing initiatives of Sindh police are worth mentioning:

- **Police Station Record Management System (PSRMS)**
- **E-Tagging of 4,000 Repeat offenders**: The Govt. of Sindh has promulgated 'Habitual Offenders Monitoring Act-2022' to ensure

effective monitoring of habitual offenders by E-Tagging them using modern technology in order to check the menace of street crime and ensure safe cities and neighborhoods in the Province of Sindh especially Urban areas.

- **Hotel Eye Management System (HEMS)**
- **Employee Verification system (EVS)**
- **E-Driving License & Violation Management System (e-DL&VMS)**

Critique: *All these modernizations are limited to surface-level computerization, primarily restricted to record-keeping*.

4.3.7 Status of Crime Mapping & Predictive Policing in Sindh

The Sindh police has initiatives like the Karachi Safe City Project, which utilizes technology for the prevention and prediction of crimes, aiming to decrease crime by 90% in specific neighborhoods (Gulistan-e-Johar, Gulshan-e-Iqbal, Mobina Town, etc.). In addition to this Sindh Smart Surveillance System (S4) has been introduced since August 2023 to bring more efficiency in policing function of Sindh government.

Table 3
Directorate of IT Sindh Police

Karachi Safe City Project	Sindh Smart Surveillance System (S4)
Search by Picture	Installation of smart AI-powered CCTV
Search by Facial Features	Vehicle No: Reading & Facial Recognition
Search by Human Body Features	Integration with CRMS
Search by tracking individuals or vehicles	Integration with Excise Data
Real-time Alerts for Vehicles and Persons	Integration with Anti-Vehicle Lifting Cell

Both projects as elaborated in ***Table 3***, spearheaded by the National Radio Telecommunication Corporation (NRTC) with budgets of Rs. 40 billion (Safe City Phase I) and allocation of over one and half billion rupees exactly Rs. 1.567 billion for Sindh Smart Surveillance System for increasing the operational efficiency and investigative efficiency of Sindh police to keep pace with the developed nations employing all modern tools

and instruments for results-based policing. Sindh Smart Surveillance System relies on Automated Number Plate Readers (ANPRs), 12-Mega pixel cameras having functions of artificial intelligence and Facial Recognition (FR) features for being effectively utilized in high-risk areas like red zones and airports. The Capital City of Sindh; the mega city of Karachi, disturbed by frequent robberies like the robberies of 601 mobile sets only in industrial area like in Karachi Industrial Area as has been tabled at the top in ***Table 2***, these approaches are basically designed to decrease the frequency of these robberies and snatchings by a set target. The Key performance indicators of crime patterns, behavior and predictions of potential offenders could be digitally used for the benefit of public allowing them to live in harmony and peaceful environment.

Table 4

Mapping of crimes of deaths and injuries on robbery in Karachi (source: Karachi Police)

POLICE STATION	DURING ROBBERY		
	Deaths	**Injuries**	**Total**
Sachal	4	17	21
Zaman Town	4	6	10
K.Ind Area	1	8	9
Shah Latif Town	3	6	9
Gulistan-e-Johar	0	8	8
S.Ind. Area	0	8	8
Sohrab goth	2	6	8
Steel Town	2	6	8
Surjani Town	1	7	8
Docks	0	7	7
Gadap City	0	7	7
Ittehad Town	1	6	7
Sharafi goth	1	6	7
SITE-A	0	6	6
Korangi	4	1	5

Table 4 presents the crime mapping data for the period from 1st January 2025 to 31st August 2025. Only the area of Police station Sachal as shown at the top one ***Table 4*** indicates the severity of the issue of murders and injuries on the pre text of only robberies. Sachal tops the list with 17 injuries and four deaths occurred during the robberies placing it as the

most vulnerable hotspot for creating space for police to take strict action in accordance with the law. In exact contrast to this top-notch hotspot is the area of Korangi showing the exact same number of murders during robberies but only one injury during snatching showing place for an effective police strategy. Notably, deaths are relatively low across stations, with five stations (Gulistan-e-Johar, S.Ind. Area, Docks, Gadap City, SITE-A) reporting zero deaths, though injuries remain consistent (6–8 range). Zaman Town and Korangi stand out for high death-to-injury ratios, implying deadlier incidents, whereas Sachal's high injury count suggests frequent but less lethal encounters. All detailed data of most of the crime categories from year 2015 to the August of 2025 have been attached as ***Annexures A & B.***

5. THE PRIMITIVE MODE OF POLICING IN SINDH

The police have been mandated with the state duties for ensuring peaceful environment by adhering to the principles of law and justice. Ironically, Sindh police have faced criticism for a culture of corruption, an ineffective hierarchical and organizational discourse, and low efficiency in preserving the lives and properties of the public. Due to their maverick and inappropriate behavior, public avoid visiting the police formations and establishments. Police station, commonly known as 'Thana' in Sindh, is an emblem of mistreatment, cruelty, and exploitation.

Table 5

Finance Wing Sindh Police

SINDH POLICE COMPARATIVE ANALYSIS OF TOTAL BUDGET VERSUS IT BUDGET			
Financial Year	**Total Allocation of Budget to Sindh Police (PKR)**	**Total Allocation to IT Branch (PKR)**	**Total Budget for I.T Branch (%)**
2021-22	106,912,832,000	1,010,644,000	0.95
2022-23	109,962,666,000	2,963,162,885	2.69
2023-24	125,896,634,000	1,436,337,000	1.14
2024-25	163,893,086,000	1,505,983,000	0.92
2025-26	189,751,252,000	1,527,929,000	0.81

There are immense resource constraints on Sindh police when it comes to operational efficiency of policing. ***Table 5*** shows a critical approach

leading towards data-based analysis of Sindh Police's total budget appropriations in ratio of the allocated budget just for the IT initiatives. The time period of this comprehensive comparison is from the year 2021 to the current financial year 2025-26. Noticeably there has been a significant and steady increase in total provision of budgets. That is from Rs106.91 billion to Rs.189.75 billion denoting a 77% upsurge brought due to increased security needs originating from increased crimes. The increased crimes occur specifically under the types of robberies and vehicle theft. Despite this upsurge and increase in overall finances of Sindh police there has been fluctuation in the budget estimates allocated for IT initiatives. *Budget estimates vary from* Rs1.01 billion to Rs2.96 billion. The highest percentage of comparison of total Sindh police budget with IT allocations is with the percentage at 2.69% in 2022-23. This dived down to 0.81% in current financial 2025-26. If average is taken out from all these calculated years, it comes as *under 1.3%.* Such vacillating spectrum of IT budget speaks high of the low commitment, dedication and approach of Sindh government for changing from the primitive mode of policing to modern era of IT policing.

The existing system of police patrolling is also not based on any data-driven formulas. There has been a random deployment of police depending on the whim and wishes of the people who matter. The total crimes happening in entire provinces are shown in ***Annexures A & B*** informing conspicuously that there is no method of crime decrease in any type or category of crime.

5.1 The Trio of Crime Mapping, Predictive Policing, and Tools for Modern Law Enforcement from the Sindh perspective

The required interplay of modern tools for effective policing functions is the most important objective of digital policing. Crime patterns, category identifications, and assessment of crime hotspots are a major function of the model of crime mapping. When it comes to obstructing the criminals from commission of any crimes with the ultimate motive of saving the citizens from the onslaught of criminals the predictive policing has to play its part for being an important component in the trio of crime mapping, predictive policing, and modern tools for policing functions. The use of Information and Communication Technology ICT then becomes the norm when there is an effective interplay and coordination of all these systems for a holistic approach. Over reliance on the primitive mode of policing has not been able to give any formidable results, keeping in view the

security and safety of the people. The trio is new norm and must be adhered to and implemented with the setting of certain key performance indicators. The only infirmity in this approach can be human proclivities of bias and ethical considerations.

5.2 Digital Transformation Challenges

- **Inertia Towards Use of Technology:**

Digital policing has long been effectively practiced across all the developed countries through the course of history of modern policing. Since that start of 20th century there has been numerous innovations in what policing was doing earlier to control the streets and ensure policing function of watch and ward. Enhanced digital strengths of policing paved an effective way for 21st century to overrule all old and traditional modes and methods of ensuring peace and safety in the society.

The new dawn of the 21st century, witnessed altogether modern and rapidly evolving instruments like (CCTV) cameras, Number Recognition (ANPR) systems, Body-Worn Cameras (BWCs), in-car surveillance, foresight policing algorithms, and digital societal platforms for connections and supervising instruments. The exponential growth of technologies with the ultra-modern approaches and devices being developed in the last few years has made the indelible mark on the way policing has impacted the public with the people friendly fruits of watch and ward services of police. The concept, process and implementation of digital working with the continued developing of hardware and software has become the most important strategy adopted by all the institutions of public service delivery. Though there has been effective realization of their mandatory internalization in policing functions, digital policing services have not been able to gained much momentum in the Sindh police, as it is evident in ***Table 5*****,** showing the glaring difference in the total budget of Sindh police and its IT initiatives. The introduction of information technology in Sindh police is not quite a recent phenomenon, and at lower echelons, the existing staff is yet to give shape to their existing systems a well-deserved technological portfolio.

Table 6
Other Important Digital Transformation Challenges

Sr. No	Challenges
1	Shortage of skilled manpower
2	Requirements of Logistics
3	Establishment of IT units at Divisional and District Level
4	Concerns about the potential biases (the most common criticism), reliability, and equity[6]
5	Individual right to privacy
6	The accessibility inertia to technological advancements

5.3 Comparative Analysis of Tools for Modern Law Enforcement and Traditional Policing

- Digitalization of record of more than 400,000 offenders.
- Effective training of more than 200 Data Entry Staff in all districts and correctional facilities of Sindh
- Successful automation of around 390,000 all finger-print cards
- In a start of Bio Verysis System One-to-N, more than 30 unidentified corpses have been traced.
- 210 suspects who were not willing to show their identity were traced through Bio Verification System one-to-N, leading to the swift disposal of the pendency
- 178 identifying postings and tracings of Criminal record Office have been processed in HE Management Software
- 22 accused persons have been taken into custody through HE Management software.

[6] (Ferguson, 2017)

5.4 The Rewards versus Risks-Crime Mapping and Predictive Policing

A single example, as provided by the Project Director of the Directorate of Information Technology, Sindh Police, confirms the benefits of IT initiatives versus their risks.

***Key Informant Interview*:** The following account was provided by Ms. Tabasum Abid, Project Director, Information Technology Directorate, Sindh Police Headquarters, Karachi, during a structured Key Informant Interview (KII) conducted by the researcher in November 2018 at the IT Directorate, Sindh Police Headquarters, Karachi. The interview was conducted as part of the primary data collection process for this study and is documented in the researcher's KII records. Ms. Abid, in her official capacity as Project Director IT, provided the following operational account as a direct demonstration of the real-world benefits of the Bio Verysis One-to-N identification system.

In November 2018, three heavily armed separatist militants, equipped with modern gadgetry, attempted to breach sensitive installations housing Chinese residents and offices in Karachi. The militants were immediately neutralised in an exchange of fire with Sindh Police personnel. The unidentified bodies of the militants were subsequently transported to Jinnah Postgraduate Medical Centre (JPMC), Karachi, for post-mortem examination. Through the application of the Bio Verysis One-to-N fingerprint identification service, one of the deceased was successfully identified as Abdul Razaq, son of Deen Muhammad, a resident of Balochistan — an identification that would have been impossible through conventional manual record-checking alone.

This singular operational example powerfully illustrates the tangible dividends that IT-based policing tools can yield when adequately resourced and deployed. However, such successes remain isolated rather than systemic, largely because the procurement of IT infrastructure and technology across Sindh Police has been chronically underfunded and inconsistently prioritised. To contextualise the scale of this resource gap, **Table 7** presents a comparative analysis of Sindh Police's total procurement budget against the specific allocation made to IT initiatives across five consecutive financial years, from 2021-22 to 2025-26. This data was sourced from the Finance Wing, Sindh Police Headquarters, Karachi, and is accessible through the office of AIGP Finance, Sindh Police.

Table 7
Finance Wing Sindh Police

SINDH POLICE COMPARATIVE ANALYSIS OF TOTAL PROCUREMENT BUDGET VERSUS IT

Financial Year	Total Budget to Sindh Police for procurement (PKR)	Total Allocation to IT Branch for procurement (PKR)	% of Total Budget for I.T Branch
2021-22	3,695,425,000	190,000,000	5.14
2022-23	1,950,000,000	2,030,840,885	104.15
2023-24	7,675,631,000	486,845,000	6.34
2024-25	7,638,537,000	486,845,000	6.37
2025-26	6,196,677,000	465,000,000	7.50

Table 7 indicates the allocation of budget for procurement of whole Sindh police with the comparison of IT initiatives procurements. The time period of this comparative study is from year 2021-22 to the current financial year of 2025-26. There has been jolts in the allocation of budget for IT procurements in contrast to the total procurement budget. The last column on the percentage of total budget for IT branch procurement budget shows an invariable vacillation in these all five years under study. The IT share, averaging 5–7% except for 2022-23, suggests modest prioritization of tech upgrades despite the province's pressing need for AI-driven surveillance and data integration to combat high crime rates, such as 3,642 armed robberies in 2025 as depicted in ***Table 1.***

5.5 Karachi Safe City Project- Critical Appraisal

168 PTZ cameras were fixed at 66 various localities of Karachi-by-Karachi Metropolitan Corporation (KMC). The aim was *to supervise the properties of Karachi Municipal Corporation* covering important passage ways connecting different parts of the megapolis. 198 cameras at forty different locations in Karachi were fixed by the Information Technology department of Government of Sindh. The cameras were upgraded to 5-megapixel cameras. The aim was to monitor *traffic regulation* and monitoring. Capital City Traffic police of Karachi is effectively utilizing these surveillance systems for putting check on the traffic violation under

management system. 774 cameras on 164 various spots of Karachi city were fixed by Sindh Police. 2 megapixels was the capacity of these installed systems. The purpose was *to check the criminal activities*, and to monitor the significant events affecting the overall security environment of the capital city of Sindh: Karachi. Karachi Metropolitan Corporation (KMC) in 2014 re-enhanced the system of the data Centre with the developing of additional nine hundred ten cameras of three megapixels, on two hundred thirty-two hotspots of capital city, mainly monitoring the industrial areas like Korangi, New Karachi and SITE, etc. The aim was *to ensure surveillance of security situation and safety* of assets of KMC and upgrade the current strength of Data Hub of Karachi Municipal Corporation. There is no issue in the working efficiency of all these installed systems. Metropolitan Corporation re-enhanced the system of the current data hub by fixing additional two hundred twenty-five cameras in 2015. There cameras had the capacity of 5 megapixels These were installed at forty-five various hotspots of Karachi. The aim was *to ensure safety and security of the citizens* and properties of Karachi Municipal Corporation and upgrade the failing system of the installed data hub of Karachi Municipal Corporation.

On the directions of the Supreme Court, ten thousand new high-resolution cameras at two thousand nascent hotspots have been ordered by the Government of Sindh to fix all cameras in three Ys through an enhancement program. The Karachi Safe City project (Rs36 billion, 5 phases) integrates predictive tools, AI, and CCTV for crime forecasting and real-time monitoring. General predictive policing can raise bias concerns if projects like the Karachi Safe City are not properly managed.

As many as 891 surveillance cameras out of 1,300 have been installed under the 1st stage of the Safe City Project, marking nearly 70 percent progress in the current phase. First stage of the Safe City Project is nearing completion and second phase of the project is scheduled to commence this year. Pursuing the model of crime mapping the Safe City Project will facilitate the optimal deployment of Police Madadgar-15, Shaheen Force, Sindh Police Highway Patrol, AVLC, Emergency Response Vehicles (ERVs), and other police units at various strategic locations. Field formations will benefit from these systems under Karachi safe city projects when these will receive messages generated from the systems in addition to the Emergency Response vehicles (ERV).

Right from the start of year 2008 there has been gradual enhancement in the surveillance infrastructure of Karachi Safe City Project. There have

been improvements in the quality of cameras especially their pixel and the capacity of coverage. This has been providing dividends to Karachi City Traffic police for effective traffic management function of Police. In addition to this step for traffic police the core policing function and security of assets of Karachi Municipal corporation have befitted immensely from the gradual increase in infrastructure.

Karachi needs the Safe City Project to be completed in the fastest possible time owing to the monster of street crimes affecting the people residing in the heart of Sindh. Bearing testimony to that concern of crime is the data manifesting a single category of crime i.e., vehicle theft.

Table 8
Mapping of crimes of 4 & 2 wheelers vehicle theft in Karachi (source: Karachi Police)

POLICE STATION	**Vehicles Theft**		
	4 Wheelers	**2 Wheelers**	**Total**
K.Ind Area	18	1056	1074
Awami Colony	6	943	949
Surjani Town	10	858	868
Sachal	37	813	850
Sh-e-Faisal	50	647	697
Landhi	5	647	652
Gulistan-e-Johar	56	578	634
Gulshan-e-Iqbal	58	556	614
Zaman Town	13	568	581

POLICE STATION	Vehicles Theft		
	4 Wheelers	**2 Wheelers**	**Total**
Taimoria	73	476	549
Azizabad	28	477	505
Al Falah	20	466	486
Feroza bad	27	445	472
Baloch Colony	15	452	467
Darakhshan	36	430	466

Table 8 lists vehicle thefts (4-wheelers and 2-wheelers) across Karachi's fifteen most affected police stations for the period from 1st January 2025 to 31st August 2025. A critical analysis of this data reveals several significant patterns with direct implications for the Karachi Safe City Project's deployment strategy. The overwhelming dominance of 2-wheeler theft across all fifteen stations, accounting for an average of 97% of total vehicle thefts, indicates a structurally embedded crime pattern that has persisted despite existing surveillance infrastructure. K.Ind Area alone recorded 1,056 motorcycle thefts in just eight months, equivalent to approximately four motorcycles stolen every single day within a single police station's jurisdiction. This concentration of theft in industrial and high-density residential zones — K.Ind Area, Awami Colony, Surjani Town, and Sachal collectively accounting for 3,741 out of 8,085 total vehicle thefts across the fifteen stations — strongly validates the crime mapping principle that criminal activity clusters persistently in identifiable hotspots over time.

The comparatively low incidence of 4-wheeler theft, peaking at only 73 in Taimoria, suggests that existing security measures, including vehicle tracking systems and immobilisers, have been relatively more effective for this category, whereas 2-wheeler theft has remained largely unchecked.

This disparity points to a critical gap in surveillance coverage in areas dominated by motorcycle commuters, precisely the demographic most vulnerable to street crime in Karachi.

From a predictive policing standpoint, these patterns are not random they are spatially predictable and therefore actionable. The Safe City Project's AI-powered CCTV network, Automated Number Plate Recognition (ANPR) systems, and real-time crime mapping capability are ideally positioned to address this specific and persistent crime pattern, provided the project is completed within its mandated timeline and integrated fully with ground-level police response units including Police Madadgar-15 and the Anti-Vehicle Lifting Cell (AVLC). The data makes an unambiguous case: accelerated completion of the Karachi Safe City Project is not merely a governance priority — it is a public safety imperative. All detailed crime data across categories from 2015 to August 2025 are provided in ***Annexures A and B.***

6. THE SPECTRUM OF KPIS IN TOOLS FOR MODERN LAW ENFORCEMENT

Crime mapping is expected to serve as a means of improving efficiency in resource allocation. The IT Directorate of Sindh police has received the following budget in three heads of salary component, operational, and procurement expenditure in the last four financial years and the current financial year (BE) Budget Estimates.

Table 9
Finance Wing Sindh Police

SINDH POLICE UTILIZATION OF IT BUDGET

Financial Year	Head	Allocation (PKR)	Expenditure (PKR)
2021-22	Salary Component	717,338,000	220,004,009
	Operational Budget	103,306,000	103,258,650
	Procurement Budget	190,000,000	189,999,810
2022-23	Salary Component	694,201,000	228,337,182
	Operational Budget	238,121,000	238,520,263

SINDH POLICE UTILIZATION OF IT BUDGET

Financial Year	Head	Allocation (PKR)	Expenditure (PKR)
	Procurement Budget	2,030,840,885	1,627,154,275
2023-24	Salary Component	687,816,000	245,704,237
	Operational Budget	261,676,000	255,494,231
	Procurement Budget	486,845,000	236,416,044
2024-25	Salary Component	732,298,000	333,899,283
	Operational Budget	286,840,000	285,802,394
	Procurement Budget	486,845,000	249,973,518
2025-26	Salary Component	776,084,000	58,923,617
	Operational Budget	286,845,000	1,257,426
	Procurement Budget	465,000,000	
Sanctioned Strength as per Budget Book			2,656
No IT recruitment has been made in the last three years			

Full utilization of all allocated budget is the first and foremost key performance indicator of Sindh police's commitment in implementing IT initiatives. By looking at the ***Table 9*** of budget allocations inference of inefficiency can be made easily since all the allocated budget under the head of procurement was not optimally utilized especially in financial years 2023-24 and 2024-25 where almost half of the budget especially that of procurement head got surrendered despite the meagre allocation of budget to IT as compared to the total budget of Sindh police as specified in ***Table 5***.

Table 10
KPIs (Key Performance Indicators) for the crime mapping and predictive policing in Sindh

Sr. No	Indicators
1	*100* Percentage of utilization of the allocated budget for IT initiatives
2	*5%* of the total budget allocation to the IT Directorate of Sindh Police
3	*2.5%* increase in Year-on-Year allocation of budget to the IT Directorate of Sindh Police
4	*25%* of the total procurement budget to the IT Directorate procurement
5	*5% reduction in crime numbers for the first two Ys*
6	*10% decrease in crime numbers for the next five years*
7	*25% reduction in crime numbers for the next seven Ys*
8	*50% decrease in crime numbers for the next ten years*
9	*10% of total recruitments for IT recruitment for the next five years*
10	*100% completion of all phases of Karachi Safe City Project in 2 years*
11	*100* Percentage of utilization of the allocated budget for IT initiatives

6.1 Crime Mapping and Predictive Policing - Panacea Against the Crime Infestation

Crime Mapping and Predictive Policing underline the priority areas of reforms for more effective results. The outdated policing system in Sindh underscores the urgent need for holistic implementation of crime patterning and foresight policing. Predictions have to be actionable. There must be an improvement in actionable intelligence. Identification of areas at an increased vulnerability of spectrum of potential offences provides opportunities for police to devise crime-curbing strategies. Patterns of crimes are identified through predictive methods, leading to the generation of recommendations. These tools provide actionable recommendations to the field officers. A Geographic Information System (GIS) analyzes the collected crime data to improve resource allocation and accountability. A single but significant key academic study on predictive policing in Karachi

(capital city of Sindh) used Machine Learning (ML) for an analysis of cumulative and conventional figures and predict crimes, achieving around 83% accuracy in predictions[7].

6.2 Challenges and Concerns

Sindh's model of policing is primarily based on primitive methods due to deeply rooted tribalism, customs, departmental norms, and inertia, which are the main obstacles to change. The literacy levels of people in Sindh are inadequate in IT skills and digital knowledge. Even the existing capacity of the Sindh police struggles to adopt basic information technology parameters. Software like Point Me and E-sheet, although simple to operate, remain largely unused due to a lack of IT skills, inertia, and the difficulty some older constables face in switching from a basic mobile phone to a smartphone. As a result, crime mapping and predictive policing models are not well-received by the lower ranks of the Sindh police. Analyzing crime data over the last 11 years (From 2015 to August 2025) (details provided in ***Annexures A & B***) shows no significant reduction in crime. Deployments based on crime mapping patterns have not produced the desired level of safety. Overall, the safety and security standards of the province have not improved, despite IT initiatives having been introduced by the Sindh police since 2010. Consequently, both crime mapping and predictive policing have not achieved the expected outcomes. Some IT initiatives, such as Point Me and E-Sheet, have helped improve police discipline and attendance. The Hotel Eye software has assisted in the arrest of several absconders and proclaimed offenders.

The allocated budget of Sindh police is mainly directed towards the release of salary and related expenses for around one hundred twenty-seven thousand employees of Sindh Police. There has been no systematic allocation of budget for IT initiatives including procurements specifically aimed at crime pattern identification and foresight policing. Though the budget was allocated for Sindh Smart Surveillance System at forty-two various toll plazas of Sindh but there have been technical issues emanating from low service and poor-quality alert messages provided by National Radio Telecommunication Company (NRTC). Ironically, despite being IT-based, the S4 system relies heavily on manpower, which diverts resources from traditional policing. Although IT schemes generally

[7] Predictive Policing, 2019

depend on computational power and algorithms, in this case, considerable resources and personnel are allocated to S4, adversely impacting conventional policing. In addition, the quality of the data in the Sindh police as compared to the Punjab police is extremely low. The citizens of Sindh are deeply concerned about their safety, properties, movements, and liberties. The modernity of Sindh's police force is still in its early stages, as many people notice little difference in their quality of life or safety. It is mainly the responsibility of the Government of Sindh to invest in modern law enforcement tools to fully realize the benefits of IT-based policing through crime mapping and predictive policing. Without AI integration, the Sindh police will remain several steps behind the criminals.

7. CONCLUSION

In the era of digital governance, a functionally specific department of Sindh with the assigned purpose of policing has to tread the path of increasing digitalization for combating the menace of crimes and proposing a futuristic strategy for crime reduction. While Sindh Police has made strides in IT adoption, current tools fall short of fully benefiting policing or ensuring future societal safety. Full integration of AI and predictive models is essential to combat crime infestation, but requires overcoming inertia, enhancing skills, and prioritizing ethics.

Using IT initiatives like crime mapping and predictive policing would decrease demand for increased manpower, decrease chances of malpractices, atrocities, and enhance the effectiveness of the Sindh police. Additionally, the road map to inclusivity and acceptability is imbued with a sense of ownership towards the committed goals and responsibilities of any bias or secrecy of the citizens, keeping in consideration all ethics and human proclivities of corruption and stigmatization.

While conducting the research, the research question was successfully answered with the empirical evidence and the reliable data which established that there are certain factors intrinsic to Sindh which have been the causative factors of poor policing and sub-optimal results given by the police's primitive model, and from existing crime mapping and predictive policing models. The current modern law enforcement tools are NOT enough to meet the public's needs for a safe society in the future.

8. RECOMMENDATIONS WITH POLICY IMPLICATIONS

The findings of this study make it unequivocally clear that Sindh Police's transition from primitive reactive policing to a modern, data-driven law enforcement model demands not incremental adjustments but structural transformation. The following eighteen policy recommendations, derived from primary Key Informant Interviews and validated against international best practices, are presented with defined responsibilities, timeframes, and expected impacts. All recommendations must align with ethical frameworks, ensure protection of citizen data privacy, and be subject to continuous monitoring and transparent evaluation.

8.1 Immediate Priority Reforms

8.1.1 Complete Digital Enrollment of Criminals in Correctional Facilities

The foundation of effective crime mapping and predictive policing is a comprehensive, accurate criminal database. All criminals currently held in Sindh's jails and correctional facilities must be digitally enrolled without delay.

Responsibility: Home Department, Prisons Department, Sindh Police, IT Department *Timeframe:* Immediate *Expected Impact:* Enhanced predictability of criminal behaviour; more effective and evidence-based action against repeat offenders; strengthened foundation for hotspot identification and predictive deployment.

8.1.2 Continuous Training and Capacity Building

The most sophisticated technology is rendered ineffective without a skilled workforce capable of operating it. A structured, mandatory, and continuously updated training programme must be instituted across all ranks of Sindh Police, with special emphasis on IT literacy, crime mapping tools, and data analytics.

Responsibility: Home Department, IT Directorate, Finance Wing *Timeframe:* Immediate and continuous *Expected Impact:* Effective and sustained utilisation of modern law enforcement technology; measurable improvement in operational outcomes; reduction in institutional resistance to digital policing.

8.1.3 Improved Investigation Through Big Data Analytics

The Crime and Investigation Department must be equipped with big data analytics capability to enhance the quality, speed, and accuracy of criminal

investigations. Integration of analytics with existing crime records will enable pattern identification and stronger evidence compilation.

Responsibility: Crime and Investigation Department, IT Directorate, Additional IG Investigation *Timeframe:* Immediate and continuous *Expected Impact:* Improved conviction rates; more efficient crime mapping; enhanced surveillance-led investigation.

8.1.4 Upgradation of Data Centres

Sindh Police's data infrastructure requires immediate and sustained upgradation to support the volume, velocity, and variety of data generated by modern surveillance and crime mapping systems. Robust cybersecurity protocols, backup systems, and disaster recovery mechanisms must be embedded within the upgraded infrastructure.

Responsibility: KMC, IT Directorate, S4 Project Hierarchy *Timeframe:* Immediate and continuous *Expected Impact:* Resilient and secure data infrastructure; effective cybersecurity with reliable backup and disaster recovery capability.

8.1.5 Transparent IT Recruitment Process

The sanctioned IT cadre strength of 2,656 posts has remained largely unfilled for three consecutive years. A transparent, merit-based recruitment process must be initiated immediately through the Sindh Public Service Commission to fill all vacant IT positions.

Responsibility: Sindh Public Service Commission (SPSC), Establishment Wing *Timeframe:* Immediate and continuous *Expected Impact:* Availability of IT-literate operators and specialists; elimination of the human resource deficit that has been the single most consistent constraint on Sindh Police's digital policing capacity.

8.1.6 Optimum Utilization of Existing IT Software

Several IT tools already procured and deployed by Sindh Police — including Point Me, E-Sheet, and Hotel Eye — remain significantly underutilized due to inertia and inadequate training. Immediate steps must be taken to ensure full operational utilization of all existing software assets.

Responsibility: Training Branch, IT Directorate, DIG IT *Timeframe:* Immediate and continuous *Expected Impact:* Maximum value for money from existing IT investments; measurable improvement in police discipline, attendance monitoring, and absconder tracking.

8.2 Short-Term Reforms (Three to Twelve Months)

8.2.1 Development of Advanced Automation Tools

In coordination with the Punjab Information Technology Board (PITB), advanced automation tools must be developed and deployed to support predictive policing functions, including automated hotspot detection, patrol optimisation algorithms, and real-time crime alert systems.

Responsibility: IT Directorate, IT Department, PITB *Timeframe:* Three months *Expected Impact:* Effective operationalisation of predictive policing; measurable reduction in crime rates through proactive algorithmic deployment of police resources.

8.2.2 Establishment of District-Level IT Units

IT infrastructure and supervision currently concentrated at headquarters level must be decentralised through the establishment of dedicated IT units at divisional and district levels across Sindh. This will ensure sustainability of IT projects and localised technical oversight.

Responsibility: IT Department, District Administration, District Police, IT Directorate *Timeframe:* Three months *Expected Impact:* Sustained operability of IT projects at the grassroots level; availability of district-level IT supervisors capable of providing immediate technical support.

8.2.3 Enhanced Facial Recognition and ANPR Systems

The deployment of facial recognition technology and Automated Number Plate Recognition (ANPR) systems must be expanded and upgraded across Karachi and other major urban centres of Sindh, with full integration into the Safe City Project and S4 surveillance network.

Responsibility: Home Department, IT Directorate, Finance Wing *Timeframe:* Three months to one year *Expected Impact:* Significantly improved real-time surveillance capability; faster identification and apprehension of offenders; enhanced deterrence in designated high-risk zones.

8.2.4 E-Tagging of Repeat Offenders

Building on the Habitual Offenders Monitoring Act 2022, the electronic tagging of all identified repeat offenders must be fully implemented and operationalised, providing real-time monitoring of individuals most likely to commit future offences.

Responsibility: Home Department, Sindh Police *Timeframe:* One year *Expected Impact:* Effective continuous surveillance of habitual offenders; measurable reduction in repeat offending and street crime.

8.3 Medium-Term Reforms (One to Two Years)

8.3.1 Automation of Manual Processes

All remaining manual record-keeping and administrative processes within Sindh Police must be systematically automated to eliminate opportunities for record falsification, forgery, and data manipulation.

Responsibility: IT Department, Sindh Police *Timeframe:* Six months *Expected Impact:* Significant reduction in forgery and fraudulent manipulation of official records; improved data integrity as the foundation for reliable crime mapping.

8.3.2 Development of Public Facilitation Mobile Applications

Citizen-facing mobile applications must be developed to enhance public access to police services, improve digital literacy, and facilitate real-time reporting of crimes — creating a two-way data flow that enriches the crime mapping database.

Responsibility: IT Department, Information Department *Timeframe:* Six months *Expected Impact:* Improved digital literacy among citizens; increased accessibility of police services; faster information flow between the public and law enforcement.

8.3.3 Constitution of Digital CRO Labs in All Districts

Digital Criminal Record Office (CRO) laboratories under the Forensic Science Division must be established in every district of Sindh, replicating the model currently functional in select urban centres and extending its benefits province-wide.

Responsibility: IT Department, Home Department, Sindh Police *Timeframe:* Two years *Expected Impact:* Comprehensive and standardised criminal records across all districts; more efficient identification and tracking of offenders; stronger evidentiary foundation for prosecution.

8.3.4 Revamping of Urban Police Stations

Urban police stations, particularly in Karachi, must be restructured as self-sufficient operational units equipped with their own IT infrastructure,

logistics, and financial autonomy — transforming them from administrative outposts into proactive crime-response hubs.

Responsibility: Additional IG Karachi, District Police, IT Directorate *Timeframe:* One year *Expected Impact:* Operationally independent urban police stations capable of executing data-driven crime mapping and predictive policing strategies without dependence on centralised command.

8.3.5 Establishment of Urban Centre Policing Units

Dedicated urban centre policing units must be established across Sindh's major cities, specifically designed to integrate safe city systems, predictive policing tools, and community engagement strategies into a unified operational model.

Responsibility: Home Department, Sindh Police, KMC, Mayors *Timeframe:* Two years *Expected Impact:* Sustained safe city systems; improved predictive policing outcomes; stronger police-community relations in high-density urban areas.

8.4 Long-Term Reforms (Two to Three Years and Beyond)

8.4.1 Establishment of Safe City Projects in All Urban Centres

The Karachi Safe City Project model must be replicated across all major urban centres of Sindh, with phased implementation plans, dedicated budgets, and clear accountability frameworks established for each city.

Responsibility: KMC, Mayors, IT Department and Directorate *Timeframe:* Three years *Expected Impact:* Province-wide smart and inclusive policing infrastructure; significant reduction in urban crime rates; measurable improvement in public safety and citizen confidence in law enforcement.

8.4.2 Establishment of a Crime Mapping Research Centre

A dedicated Crime Mapping Research Centre must be established within Sindh Police to provide the analytical backbone for data-driven policing — conducting spatial analysis, generating actionable intelligence, and developing province-specific predictive policing models.

Responsibility: Home Department, Sindh Police, IT Department *Timeframe:* Six months to two years *Expected Impact:* Enhanced institutional capability in spatial analysis and dataset integration; a

sustained research foundation for continuously improving crime mapping and predictive policing models in Sindh.

8.4.3 Completion of the Forensic Science Laboratory Project

The long-delayed Forensic Science Laboratory project must be completed within a defined and strictly monitored timeline. A fully functional forensic laboratory is indispensable for evidence-based prosecution and the credibility of the criminal justice system in Sindh.

Responsibility: Home Department, Finance Department, Project Director *Timeframe:* Three years *Expected Impact:* Reliable, scientifically validated evidence processing; significantly improved conviction rates; strengthened deterrence through credible forensic accountability.

8.4.4 Overarching Principle

All eighteen recommendations must be implemented within a framework of transparency, public accountability, and ethical governance. Data privacy and citizen rights must be protected through clear legislative safeguards. Regular independent evaluations must be conducted against the defined timeframes and expected outcomes to ensure that these recommendations translate into the measurable public safety improvements that the people of Sindh are entitled to demand from their government.

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