

EFFECTIVENESS OF E-GOVERNANCE THROUGH SMART CITY PROJECTS: A CASE STUDY OF PUNJAB SAFE CITY PROJECT

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ABSTRACT

This paper evaluates the effectiveness of the Punjab Safe City Project (PSCP), a flagship smart city initiative in Pakistan, in improving urban security, traffic management, and governance. A mixed-methods approach is adopted, combining quantitative data such as crime statistics and traffic violation records with qualitative insights from surveys, interviews, and a critical review of existing literature. The analysis focuses on the impact of PSCP on crime reduction, law enforcement efficiency, and public satisfaction. A comparative analysis with China's e-governance model is conducted to position Pakistan's experience in a global context, highlighting differences in ICT integration, institutional capacity and policy support, while identifying key lessons applicable to Pakistan. The findings indicate a significant reduction in reported crime and notable improvements in traffic monitoring and enforcement following the implementation of PSCP. Public perception data further supports these outcomes, with a majority of respondents reporting improved urban safety (85%) and traffic flow (91%) [5]. Despite these positive outcomes, several challenges remain, including concerns related to data privacy and security, system interoperability, and gaps in regulatory and policy frameworks. The study also presents a comparative review of smart city initiatives in Singapore, Dubai, India, Pakistan, Nepal, and Kenya's Konza Technopolis. Based on differences in technological adoption, governance models, implementation strategies, and overall performance, the paper provides policy-relevant insights for strengthening smart city-driven e-governance in developing countries.

Keywords: Smart City, E-Governance, IoT, Public Safety, Traffic Management, PSCP

Introduction

Rapid urban population growth across the world has increased the demand for more effective management of safety, infrastructure, and public services. As a result, modern smart city initiatives have emerged as a practical solution, utilizing advanced technologies such as Artificial Intelligence (AI), the Internet of Things (IoT), and big data analytics to enhance governance, policing, transportation, and emergency response systems.

Leading global cities such as New York, London, and Singapore have successfully implemented smart city concepts, demonstrating significant improvements in service delivery and urban safety. Through the use of networked sensors, real-time data analytics, and automated systems, these cities are better equipped to manage traffic congestion, reduce crime, and promote environmental sustainability [1].

In Pakistan, the Punjab Safe City Project (PSCP) represents a major step toward improving urban safety and traffic management through the

adoption of digital technologies. Launched in Lahore in 2016, the project has since expanded to other cities, contributing to a more secure and technologically advanced urban environment. PSCP incorporates AI-based video surveillance, facial recognition systems, and proactive policing tools to enhance law enforcement capabilities. Additionally, intelligent traffic management systems have been deployed to improve traffic flow, reduce congestion, and minimize road accidents.

Secure IoT architectures play a critical role in ensuring the reliability and safety of smart city systems, particularly in mitigating cyber threats. As Pakistan continues to expand its smart city initiatives, the development of robust cybersecurity policies and data privacy frameworks is essential to protect citizen information and maintain public trust in digital governance systems.

Problem Statement

Despite the widespread adoption of smart city technologies in urban areas around the world, there remains a lack of sufficient empirical evidence to evaluate their actual effectiveness in improving urban security and governance, particularly in developing countries. Although such initiatives are often promoted as transformative solutions for urban management, there is limited research examining whether these technologies produce measurable improvements in crime reduction, traffic management, institutional performance, and overall public safety.

In Pakistan, the Punjab Safe City Project (PSCP) represents one of the largest smart city initiatives aimed at modernizing law enforcement and urban management through digital surveillance systems, data analytics, and intelligent traffic control mechanisms. While the project has received considerable public attention and governmental support, comprehensive and independent evaluations of its effectiveness remain limited. Only a small number of academic studies have examined its impact on crime rates, traffic violations, emergency response efficiency, and broader law enforcement outcomes.

Furthermore, several critical issues including data reliability, privacy concerns, system sustainability, and inter-agency coordination have not been sufficiently explored in existing studies.

This research aims to address these gaps by conducting a systematic evaluation of the effectiveness of the Punjab Safe City Project using a data-driven approach. By analyzing crime statistics, traffic enforcement data, and related performance indicators, the study seeks to assess the extent to which PSCP has contributed to improvements in urban safety and governance. In addition, the research identifies key challenges and areas for improvement and provides policy recommendations to support the development of more effective smart city frameworks in Pakistan and other developing urban contexts.

Research Questions

This study is guided by the following research questions:

1. How has the Punjab Safe City Project (PSCP) impacted crime prevention and law enforcement efficiency?
2. What is the effect of smart city surveillance on traffic violations and accident rates?
3. What are the key technological and operational challenges faced by the PSCP?
4. How can the PSCP be improved to align with global smart city standards?

Literature Review

Smart cities have been extensively studied, with particular focus on urban security, traffic management, and data-driven governance. Existing research highlights the benefits of Artificial Intelligence (AI)-based surveillance, Internet of Things (IoT) adoption, and real-time data analytics in enhancing public safety and operational efficiency. However, the rapid evolution of smart city infrastructure has also introduced significant challenges, including data privacy concerns, cyber-attacks, and system vulnerabilities. Several studies emphasize the need for secure IoT architectures to ensure the reliability and resilience of smart city ecosystems.

AI-based surveillance systems enable law enforcement agencies to detect and respond to criminal activities more effectively, while IoT-based systems optimize transportation and traffic management. Despite these advantages, risks such as unauthorized access, data breaches, and integrity issues remain critical concerns. These challenges can be mitigated through robust encryption mechanisms, strong authentication protocols, and secure communication frameworks.

Smart Cities and Urban Safety

The existing body of literature demonstrates that smart city technologies significantly improve urban security and operational efficiency [1]. Core components include IoT-enabled surveillance systems, AI-driven analytics, and integrated command and control centers. For example, studies indicate that smart city initiatives in Punjab have contributed to reductions in street crime and improved police response times [1].

Globally, research shows that CCTV networks and predictive policing techniques enhance crime prevention and investigation efficiency [2]. Similarly, smart traffic management systems, utilizing sensors and automated ticketing mechanisms (e.g., e-challans), have been shown to reduce accidents and congestion [3]. However, the literature also highlights concerns regarding privacy and increased cybersecurity risks associated with large-scale surveillance systems [1]. These risks necessitate the implementation of strong data protection policies and security mechanisms [4].

Smart City Governance

Effective governance and supportive policy frameworks are essential for the successful integration of smart city technologies. Secure IoT architectures and cybersecurity-focused system designs are critical for building resilient smart city infrastructures. Studies emphasize the importance of multi-agency coordination, particularly among law enforcement, traffic management, and emergency services, as a key factor in successful smart city governance [1].

Transparency and accountability in surveillance practices are also crucial for maintaining public trust. Research suggests that when surveillance systems are implemented responsibly, community acceptance increases [2]. Furthermore, ethical considerations play an important role, especially in culturally sensitive contexts. It has been suggested that smart city surveillance initiatives in Pakistan should align with local ethical and societal norms to ensure broader public support [1].

E-Governance and ICT: Pakistan vs China

The Punjab Safe City Project operates within the broader context of e-governance development in Pakistan. Comparative studies reveal significant differences between Pakistan and China in terms of digital governance and ICT infrastructure. China has demonstrated substantial progress in e-governance, with its United Nations E-Government Development Index (EGDI) improving from 0.508 in 2005 to 0.812 in 2022 [5]. In contrast, Pakistan has shown relatively modest improvement, increasing from 0.284 to 0.424 over the same period.

These differences are largely attributed to disparities in infrastructure investment, institutional capacity, and access to advanced technologies. China's state-driven model has enabled rapid expansion in broadband access, digital services, and technological innovation. In comparison, Pakistan faces challenges such as limited financial resources and weaker institutional frameworks. Researchers suggest that strengthening national policies, such as the National Digital Pakistan Policy (NDPP), is essential for enhancing ICT capacity and accelerating digital transformation [5].

Public Service Efficiency and Citizen Experience

Beyond technological infrastructure, successful e-governance depends on organizational and human factors. Studies indicate that while digital systems can improve efficiency and reduce operational costs, their impact varies across different contexts. In developing countries, challenges such as the digital divide often limit the effectiveness of e-governance initiatives.

Research highlights the importance of capacity building, including training for law enforcement personnel and public awareness programs for citizens. In the context of PSCP, this includes training police in data analytics and promoting the use of digital platforms such as emergency helplines and mobile applications.

International Best Practices

The literature identifies several global best practices for smart city implementation. These include the use of open data platforms to enhance transparency and encourage innovation, as seen in cities like New York and Chicago. Integration across agencies is another key factor, with leading smart cities such as Lisbon and Barcelona implementing unified command and control systems.

Public-Private Partnerships (PPP) are commonly used to support infrastructure development, particularly in countries like China. Additionally, citizen engagement through mobile applications and e-governance platforms has become a standard practice in cities such as Seoul and Singapore. Adopting these best practices can help align the Punjab Safe City Project with international smart city standards and improve its overall effectiveness.

RESEARCH METHODOLOGY

Introduction

This section describes the research methodology used to evaluate the effectiveness of the Punjab Safe City Project (PSCP) in Lahore and its potential expansion to other cities in Punjab. Given the complexity and multi-dimensional nature of smart city initiatives, this study adopts a mixed-methods research approach, combining both quantitative and qualitative techniques.

The mixed-methods design enables the study to measure objective outcomes such as changes in crime rates and traffic violations, while also capturing subjective perspectives related to public perception, institutional performance, and operational challenges. This triangulation enhances the validity of findings and provides deeper insights into real-world governance outcomes.

Data Collection

Secondary Quantitative Data

Secondary data were collected from official reports and publicly available sources, including:

- Crime statistics of Lahore and Punjab
- PSCA e-challan records
- National newspapers and policy reports

Key indicators analyzed include crime rates, traffic violations, and road accident statistics before and after PSCP implementation (2022–2024).

Public Perception Data

Survey data from approximately 2,100 respondents were used to evaluate public perceptions of safety, traffic conditions, and satisfaction with smart city services.

Primary Qualitative Data

Primary data were collected through semi-structured interviews and focus group discussions involving:

- Law enforcement officials
- PSCA administrators and technical staff
- Traffic police personnel
- Citizens and road users

These interviews explored operational efficiency, perceived benefits, and challenges such as system maintenance, inter-agency coordination, and data privacy.

Research Tools and Data Analysis

Quantitative analysis was conducted using descriptive statistics and comparative analysis of pre- and post-implementation data. Results are presented using tables and figures.

Qualitative data were analyzed using thematic coding to identify recurring themes such as:

- Operational efficiency
- Technological reliability
- Institutional capacity
- Public trust

Additionally, comparative policy analysis was conducted using international benchmarks such as the United Nations E-Government Development Index (EGDI).

Operational Context and Ethical Considerations

The Safe City Command and Control Center integrates multiple emergency services including Police, Traffic Police, Rescue 1122, and Fire Brigade.

All qualitative research followed ethical standards:

- Informed consent was obtained
- Data anonymity was ensured
- Sensitive information was protected

Proposed Research Methodology

Case Study Selection

Lahore was selected due to its large-scale PSCP implementation. Comparative references to other cities were included for scalability analysis.

Data Collection Phase

- Collection of quantitative data from PSCA and police records
- Review of policy documents and reports

- Interviews and focus groups

Data Analysis Phase

- Statistical trend analysis
- Thematic qualitative analysis
- Cross-national comparison

Triangulation and Validation

Findings from multiple sources were cross-validated to ensure reliability.

Interpretation and Reporting

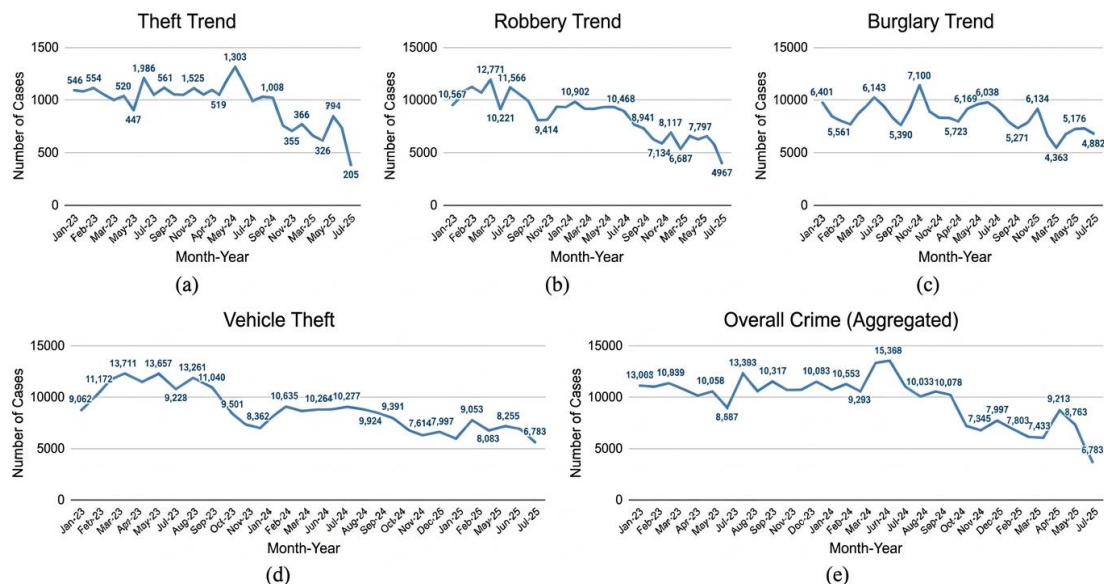
Results were interpreted in terms of:

- Technological effectiveness
- Governance outcomes
- Policy implications

Data Analysis and Findings

Crime Reduction

A significant reduction in crime was observed after PSCP implementation. The trend is illustrated in Figure 1.



Crime Trends Before and After Implementation of Punjab Safe City Project (PSCP)

Fig. 1. Crime Trends in Punjab based on PSCA Data

Table 1. Crime Statistics for Lahore (2022–2024)

Category	2023	2024	Change
Total Crimes	97,565	65,712	-39%
Robbery/Snatching	37,102	25,913	-36%
Vehicle Theft	45,571	28,862	-45%
Vehicle Snatching	1,670	1,298	-25%

Burglary	12,621	9,021	-33%
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Table 2 Crime Statistics for Punjab (2023–2025)

Category	2023-24	2024-25	Change
Total Crimes	341,806	273,026	-20.1%
Robbery/Snatching	126,773	91,894	-27.5%
Vehicle Theft	124,845	101,465	-18.7%
Vehicle Snatching	10,738	10,570	-1.6%
Burglary	72,780	64,425	-11.5%
Dacoity	6,670	4,672	-29.9%

Traffic Management and E-Challan Enforcement

PSCP introduced AI-based traffic monitoring and automated e-challan systems.

- 91% of drivers reported improved traffic conditions

- Traffic congestion reduced by approximately 40%
- Estimated savings of Rs 38 billion annually

Challan Trend

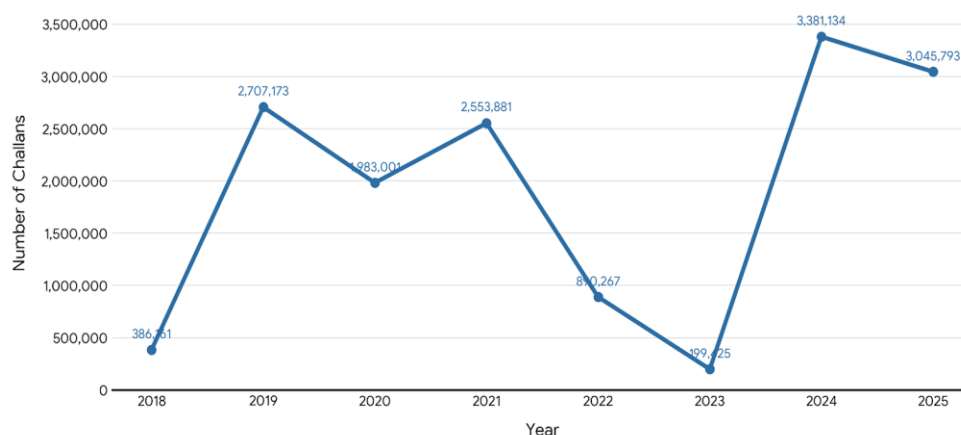


Fig. 2. Number of E-Challans Issued in Punjab (2018–2025)

Traffic Accidents Reduction

The implementation of intelligent traffic monitoring, automated enforcement, and improved traffic management under the Punjab

Safe City Project (PSCP) contributed to a significant reduction in both fatal and non-fatal road accidents in Lahore between 2023 and 2025.

Traffic Accidents Trend

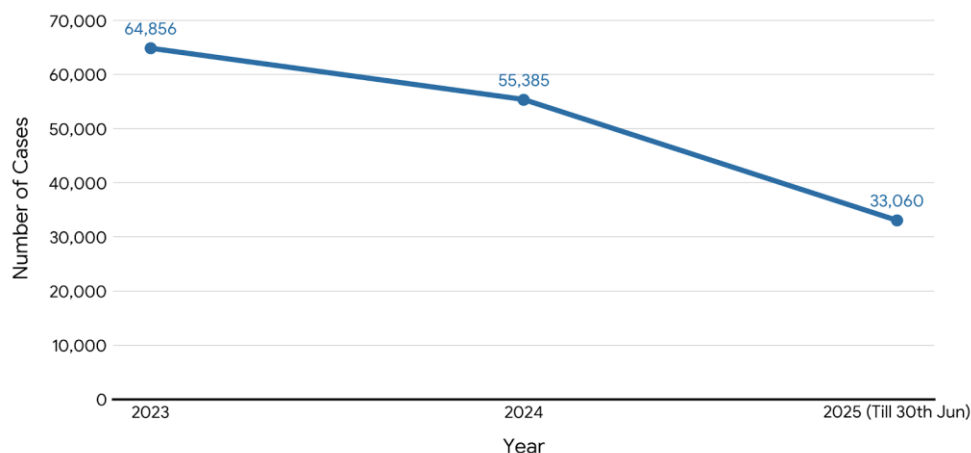


Fig 3. Traffic Accidents rate in lahore (2023–2025)

Table 3. Lahore Traffic Accidents (2023–2025)

Year	Fatal Accidents	Non-Fatal Accidents
2023	708	26,426
2024	496	18,460
2025*	252	12,501

Comparative Analysis of Smart Cities

Table 4. Comparison of Smart City Initiatives (2020–2025)

Country	Initiative	Impact	Challenges
Dubai	Smart Dubai [9]	High efficiency [10]	Privacy issues
Singapore	Smart Nation [6]	High global rank [11]	Digital divide [11]
India	Smart Cities Mission [12]	Infrastructure improved	Delays
Pakistan	PSCP	Crime reduction [7]	Weak ICT [13]
Nepal	Smart Cities Plan [14]	Limited progress	Funding issues
Kenya	Konza City [15]	Infrastructure built	Slow adoption

Outcomes of Smart City Projects

Table 5. Smart City Outcomes Comparison

Location	Crime Change	Traffic Fatality Change
Pakistan	-39%	-29.9% [8]
Dubai	-49.9% [16]	+9% [17]
Singapore	-2% [18]	+4.4%
India	+7.2% [19]	+2.3% [20]
Nepal	-1.23% [21]	+7.2% [22]
Kenya	Increase [23]	+11.8% [24]

Results and Discussion

Introduction

This chapter presents the empirical findings and their interpretation in relation to the research

questions: whether the Punjab Safe City Project (PSCP) significantly enhanced public safety, traffic control, and law enforcement in Punjab. The results are based on a mixed-methods dataset,

including crime and traffic statistics, enforcement indicators, e-challan records, a public perception survey of approximately 2,100 respondents, site observations, and interviews. Quantitative findings are presented first, followed by qualitative insights to explain how and why these outcomes were achieved.

Crime Trends and Interpretation

Findings: The deployment and expansion of PSCP correspond with substantial declines in reported crime in Lahore and across Punjab during the examined period. Official figures indicate a marked reduction in several major crime categories:

- **Total Heinous Crimes:** Reported decline of approximately 30–40% when comparing 2023 to 2024 annual aggregates (e.g., 97,565 → 65,712 in one city-level comparison).
- **Motor-Vehicle Theft (Calls):** Reductions reported in the range of 36–45%.
- **Robbery / Snatching:** Declines of approximately 30–36%.
- **Burglary:** Reductions of approximately 28–33%.

Interpretation: The temporal correlation between PSCP expansion and crime reduction suggests that PSCP likely contributed to deterrence and improved case detection. Several plausible mechanisms are supported by qualitative data and officer interviews:

1. **Increased Detection and Evidence:** Widespread CCTV coverage and recorded footage make investigations quicker and more effective, improving police detection rates.
2. **Deterrence:** Public awareness of cameras, visible enforcement, and rapid identification technologies (ANPR, facial analytics) increase both perceived and actual risk for offenders.
3. **Hotspot Policing:** Analytics and camera-based intelligence enable more targeted patrol deployment.

Caveats: While reductions are substantial, attributing the entire effect solely to PSCP would be overstated. Potential confounding factors include seasonal variations, concurrent non-PSCP policing initiatives, reporting changes, and broader socio-economic shifts. Additionally, reliance on police-reported crime data introduces possible reporting bias and variations in recording practices.

Traffic Management, E-Challan Outcomes and Road Safety



Fig 4. Traffic violation detection

Findings: PSCP traffic interventions, including the ANPR-enabled e-challan system, AI signal control, and automated violation detection, produced measurable gains in traffic discipline and commuter experience:

- **Public Perception:** Approximately 91% of surveyed drivers in Lahore reported smoother traffic following Safe City traffic enforcement implementation [4].

- **Travel Time and Economic Savings:** Localized studies estimate significant reductions in congestion and substantial aggregate savings in time and fuel costs.

- **Accident Statistics:** Police station-level data indicate decreases in both fatal and non-fatal accidents across many precincts following enhanced e-challan enforcement.

Interpretation: Compliance with lane discipline, red-light adherence, and speed limits appears to have improved through automated enforcement and signal optimization. These interventions reduce crash risks while improving traffic flow. The automated e-challan system minimizes discretionary enforcement, reduces corruption opportunities, and increases the perceived certainty of penalties.

Caveats: Some precincts demonstrated limited or no measurable improvement, indicating uneven geographic coverage and enforcement intensity. Furthermore, accident trends may lag behind enforcement interventions and are influenced by infrastructural factors such as road design and maintenance. Therefore, traffic safety outcomes should be interpreted alongside broader transportation infrastructure considerations.

Public Perception and Service Quality

Findings: PSCP has achieved high approval rates among the public across several service dimensions:

- **Crime Perception:** Approximately 85% of respondents in Lahore stated that they perceived crime had decreased since the implementation of the Safe City Project [4].
- **Satisfaction:** High satisfaction levels were reported regarding the e-challan system and emergency helpline services.

Interpretation: The high perceived improvements align with objective crime and traffic trends and are significant because citizen perception influences the legitimacy and acceptance of surveillance programs. Public approval appears to be driven by visible and tangible outcomes such as faster emergency responses, fewer visible offences, and transparent e-challan mechanisms.

Caveats: Perception surveys measure beliefs and experiences rather than objective outcomes. Positive responses may be affected by social desirability bias and sampling design limitations. However, the consistency between public perceptions and administrative data strengthens the argument that citizens experienced genuine service improvements.

Operational Efficiency and Response Times Findings:

- Reduced suspect identification time.
- Increased automated alerts.
- Improved inter-agency coordination.

Interpretation: Integration of analytics and human decision-making improved operational efficiency and response speed.

Caveats: Performance depends on trained personnel and system uptime, with occasional maintenance issues affecting efficiency.

ICT Integration, Interoperability, and Comparative Insights

Findings: PSCP has developed advanced surveillance and analytics systems; however, integration with broader provincial and national systems remains incomplete.

Interpretation: While effective in policing and traffic management, limited interoperability restricts broader smart city benefits.

Implementation Challenges

Key challenges identified include:

1. **Data privacy and legal framework:** Lack of comprehensive data protection laws raises trust concerns.
2. **Cybersecurity:** Large datasets require strong protection mechanisms.
3. **Human capacity:** Continuous training is required for effective operation.
4. **Maintenance and financing:** Sustained funding is needed for long-term operation.
5. **Interoperability:** Limited cross-agency data sharing reduces system effectiveness.

Discussion of Implications: Addressing these challenges is critical for sustaining and scaling the benefits of PSCP.

Limitations of the Analysis

1. Attribution vs. correlation limitations.
2. Data quality and transparency issues.
3. Limited temporal scope.
4. Survey-related biases.

Summary Interpretation and Policy-Oriented Takeaways

The findings indicate that PSCP has delivered measurable improvements in crime reduction, traffic management, and public satisfaction. However, long-term success depends on addressing legal, technical, and institutional challenges.

Recommendations

- Establish strong data protection laws.
- Conduct regular system audits.
- Develop sustainable maintenance funding models.
- Enhance training for law enforcement personnel.
- Implement improved evaluation methodologies.

Conclusion and Future Work

Conclusion

In summary, the evaluation of the Lahore Punjab Safe City Project (PSCP) indicates that it has significantly contributed to public safety and urban well-being. Statistical findings demonstrate substantial reductions in crime and improvements in traffic management following PSCP implementation. For example, Bhatti (2025) reported that crime-related emergency calls decreased by approximately 13% annually, while robbery and criminal activity declined by 14% year-over-year after the Safe City system was deployed. Similarly, another study reported a 39% reduction in violent heinous crimes within one year in Lahore.

Public perception data further supports these findings. A city-wide survey of approximately 2,100 respondents revealed that 85% believed

crime had reduced due to PSCP efforts, while 91% reported improved traffic management resulting from e-challan enforcement and monitoring strategies. These quantitative findings are reinforced by stakeholder interviews. For instance, Akbar Nasir Khan (2018), CEO of PSCP, stated that Lahore's crime rate declined significantly following project implementation. Combined statistical indicators and stakeholder feedback strongly suggest that PSCP has played a major role in crime prevention and road safety enhancement in Lahore.

The success of the project is largely attributed to its integration of advanced technologies. The centralized command center, Punjab Police Integrated Command, Control and Communication Center (PPIC3), consolidates live feeds from approximately 8,000+ high-definition CCTV cameras deployed across Lahore. These cameras are strategically installed at major intersections, public spaces, and sensitive locations, supported by AI-driven analytics such as facial recognition, Automatic Number Plate Recognition (ANPR), and real-time behavioral analysis.

In addition, the Safe City infrastructure incorporates IoT-based traffic management systems, including networked traffic lights and automated e-challan mechanisms capable of detecting red-light violations and speeding offences without officer intervention. As a result, Lahore's policing and traffic management model has shifted from reactive to proactive operations, enabling faster responses and more efficient resource deployment.

According to Ahsan Younas (2025), CEO of PSCP, the Safe City initiative represents a transformative approach to urban governance, leveraging modern surveillance technologies to enhance public safety, improve law enforcement responsiveness, and strengthen overall security infrastructure in Punjab [25].

The project was also designed and validated in collaboration with international partners, including engineering consultants such as Arup, and benchmarked against global best practices. This alignment with international standards

enhances the technical credibility of the system and supports its operational effectiveness.

Public perception and stakeholder feedback further highlight the project's positive societal impact. Most surveyed citizens expressed satisfaction with PSCP services and reported improvements in law and order. Police leadership similarly noted operational gains, including reductions in average emergency response times to under 15 minutes after PSCP became fully operational. Real-time coordination through PPIC3 has improved emergency responsiveness and strengthened public confidence in law enforcement services.

In addition, PSCP has introduced direct citizen-facing interfaces, including mobile safety applications and 24/7 emergency helplines, enabling residents to report incidents and access support more efficiently. Overall, the combined evidence from crime statistics, traffic data, public surveys, and stakeholder feedback indicates that the Lahore Safe City Project has significantly enhanced urban security, traffic management, and citizen trust in policing institutions.

Limitations and Strengths of the Study

Although the findings of this study are promising, several limitations must be acknowledged.

Limited Data Access: While aggregate crime statistics and e-challan records were accessible, detailed internal datasets such as full accident reports and confidential investigation records were not available for analysis. This limited the granularity of certain conclusions, particularly regarding minor traffic collision trends and internal case clearance rates.

Survey Response Bias: Public perception surveys are inherently subject to response bias. Individuals with stronger opinions may have been more likely to participate, potentially skewing the findings. For instance, the high satisfaction rates reported (85–91%) may partially reflect self-selection bias among more engaged or optimistic respondents.

Limited Generalizability: The study is context-specific to Lahore, and institutional,

infrastructural, and socio-economic differences across other cities may limit the transferability of findings. Variations in police capacity, urban infrastructure, and governance structures may produce different outcomes if the PSCP model is replicated elsewhere.

Despite these limitations, the study also possesses several important strengths that enhance confidence in its findings:

- **Mixed-Method Design:** The study employed both quantitative and qualitative methodologies, enabling triangulation across independent data sources. Crime and traffic statistics were compared with public surveys and stakeholder interviews, improving internal validity through methodological complementarity.

- **Data Triangulation:** Multiple data streams were integrated, including police records, PSCA operational logs, victimization surveys, and stakeholder interviews. This reduced reliance on any single source of evidence and strengthened the robustness of findings.

- **International Benchmarking:** The PSCP was designed with input from international technology experts and benchmarked against global smart city standards. Comparative analysis with international smart city initiatives, such as those in Dubai and Singapore, provided broader context and enhanced the external relevance of the study.

Collectively, the mixed-method approach, multi-source evidence base, and international comparative framework provide substantial methodological strength and help compensate for the study's limitations.

Future Work

Future research should expand upon this study in several important directions:

- **Comparative Analysis Across Cities:** Future studies should assess Safe City implementations in other cities of Punjab, such as Rawalpindi, Multan, and Faisalabad, as well as in other regions of Pakistan. Since the Punjab Safe City Project (PSCP) is expected to expand to additional cities, comparative research would provide insight into how outcomes vary according to local socio-economic, institutional,

and infrastructural conditions. Multi-city analysis would help determine whether Lahore's findings are transferable and identify location-specific implementation challenges and best practices.

- **Longitudinal Analysis:** A longer-term evaluation is necessary to determine whether the positive effects of PSCP are sustainable over time. While the present study provides a snapshot of immediate post-implementation outcomes, follow-up studies over multiple years would reveal whether improvements in crime reduction and traffic management persist or diminish. Periodic reassessment of crime statistics, traffic trends, and citizen perceptions would distinguish short-term gains from long-term systemic impact. Such analysis would also enable evaluation of infrastructure upgrades, such as camera expansion and software modernization.

- **Cybersecurity, Privacy, and Inclusion:** Future research should investigate the technological security and social inclusiveness of PSCP. In particular, systematic audits of the Safe City network should assess cybersecurity resilience, encryption mechanisms, access controls, and compliance with privacy standards. Digital Rights Foundation (2018) has noted the absence of dedicated legal protections governing PSCA data practices, highlighting the need for regulatory evaluation. Additionally, future studies should examine digital literacy and accessibility among different demographic groups, including elderly and low-income populations, to determine how effectively all citizens can utilize PSCP services such as mobile safety applications and e-challan systems. Ensuring equitable access and trust across all segments of society is essential for inclusive smart city governance.

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