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Print ISSN: [3006-2497](#) Online ISSN: [3006-2500](#)Platform & Workflow by: [Open Journal Systems](#)<https://doi.org/10.5281/zenodo.22016438>**Digital Policing and the Urban–Rural Divide: Citizen-Centric Police Services in District Jhang, Punjab****Amir Shehzad**

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gamarsaqlainsipra@gmail.com**Abstract**

This paper discusses six police apps under the jurisdiction of Punjab Police, Punjab Safe Cities Authority (PSCA), and Punjab Information Technology Board (PITB): Women Safety Application, PSCA Public Safety Application (including Virtual Women Police Station and Virtual Centre for Child Safety), Rasta traffic app, Digital Warden challan system, Anti-Vehicle Lifting System (AVLS), and e-Gadget stolen-mobile monitoring system used in District Jhang. Unlike back-end identification tools operated exclusively by police personnel, these applications are designed for direct citizen use or citizen-facing enforcement encounters, positioning residents, traffic wardens, and mobile-phone merchants as active participants in emergency response, traffic compliance, and property-crime recovery. Using a qualitative case-study design combining document analysis, comparative provincial and Lahore-specific statistics, and interviews with district officials, the article finds that citizen-facing applications with strong institutional recovery mechanisms notably AVLS, which achieves a forty-four percent vehicle recovery rate in Jhang against a twenty percent provincial and 22.8 percent Lahore average perform comparatively well even in a semi-rural district, whereas applications dependent on individual citizen or merchant adoption and connectivity, such as the PSCA Public Safety App's advanced features, the Women Safety App, and e-Gadget's merchant network (forty-five registered shops in Jhang against 1,800 in Lahore), show substantial urban-rural performance gaps. The article argues that this divergence reflects a broader digital-divide dynamic in which institutionally mediated applications outperform citizen- or merchant-adoption-dependent ones in infrastructurally constrained districts, with direct implications for how digital policing investment should be sequenced in Pakistan's secondary districts.

Keywords: Digital Divide, Citizen-Facing E-Governance, Emergency Response, Traffic Policing, Property-Crime Recovery, Co-Production, District Jhang.

1. Introduction

Much of the scholarly and policy attention given to Punjab's digital policing transformation has focused on back-end identification systems operated by police personnel. A second, equally significant category of application is designed for direct citizen interaction: emergency-response tools that a resident activates during a crisis, traffic applications that structure everyday citizen-police encounters, and property-crime recovery systems that citizens and merchants engage with as victims or as regulated intermediaries. This article examines six such applications as implemented in District Jhang: the Women Safety Application and the PSCA Public Safety Application, including its Virtual Women Police Station and Virtual Centre for Child Safety components (emergency response); the Rasta app and the Digital Warden system (traffic management); and the Anti-Vehicle Lifting System and e-Gadget (property-crime recovery).

District Jhang is a useful site for this inquiry because it combines urban centres Jhang City and Shorkot with extensive rural tehsils, including Ahmad Pur Sial, where smartphone penetration, 4G coverage, and digital literacy trail the provincial urban average. This urban-rural composition allows the article to examine not only whether citizen-facing applications function in a semi-rural district, but whether their performance diverges depending on how much the application's effectiveness depends on individual citizen or merchant adoption versus institutional processing capacity.

These six applications form part of a wider set of roughly ten digital crime-prevention applications documented in the underlying research programme on District Jhang, which also includes the CNIC- and biometric-based identification systems examined in a companion article from the same research programme. The present article isolates the citizen-facing subset specifically because these applications share a common structural feature largely absent from the identification cluster: each requires active participation by a citizen, a merchant, or, in Digital Warden's case, an enforcement officer for the application to function as intended, distinguishing them analytically from back-end systems operated exclusively by police personnel and motivating the digital-divide and co-production framework developed below.

2. Literature Review

The public-administration literature on e-governance increasingly distinguishes between back-office digitization, which automates internal government processes with limited citizen involvement, and citizen-facing or co-produced digital services, which require citizens themselves to adopt and actively use a platform for it to function as intended. Research on digital-divide effects in developing-country e-government has repeatedly found that citizen-facing services are more sensitive to infrastructural and literacy constraints than back-office systems, because their effectiveness compounds two adoption requirements simultaneously: government-side deployment and citizen-side uptake. Existing published accounts of Punjab's Safe Cities and PSCA programmes, however, largely report province-wide or Lahore-specific adoption figures, leaving open the question of how citizen-facing applications perform in a semi-rural district where both requirements are simultaneously more difficult to satisfy. This article addresses that gap directly using District Jhang as a bounded case, and extends the literature by proposing a three-way distinction citizen-adoption-dependent, merchant-adoption-dependent, and institutionally mediated applications that are developed empirically in the findings and discussion below.

A separate but related literature on gender and digital emergency-response technology cautions that women-focused safety applications frequently exhibit lower rural adoption than gender-neutral applications serving the same population, owing to compounding constraints on women's smartphone ownership, household permission structures around mobile-phone use, and awareness-campaign reach in rural settings. This literature is directly relevant to the Women Safety App findings developed below, where the absence of Jhang-specific registration data itself becomes an object of analysis: the article treats this data gap not merely as a methodological limitation but as suggestive evidence consistent with the broader pattern the gender-and-technology literature predicts.

3. Theoretical Framework

The analysis draws principally on digital-divide theory, and in particular on Jan van Dijk's distinction between access, skills, and usage divides, which distinguishes the availability of digital infrastructure from citizens' capacity and motivation to use it meaningfully. This distinction is directly relevant to District Jhang, where the same underlying 4G network gaps and smartphone-ownership disparities that limit infrastructural access also compound skills- and usage-level barriers among older and rural residents, and as the Digital Warden findings below show even among enforcement personnel themselves.

The article also draws on Everett Rogers's diffusion-of-innovation framework, particularly the distinction between early adopters and laggards, to interpret why some applications such as the Alert-15 voice-calling function within the PSCA Public Safety App achieve comparatively strong uptake even in rural areas, while more feature-rich functions such as live video chat or e-Challan checking show far lower relative use. Finally, the analysis is informed by co-production theory in public administration, which frames citizens not merely as service recipients but as active contributors to service delivery a framing directly applicable to features such as the PSCA app's crowd-sourced risk mapping and its "Connect to PSCA" live-feed function, through which a citizen's own smartphone camera becomes an extension of the surveillance and response infrastructure during an active emergency call, and to e-Gadget's merchant-registration model, in which mobile-phone retailers become co-producers of a province-wide stolen-device database.

4. Research Questions

- RQ1: How do citizen-facing digital policing applications reconfigure the relationship between residents, merchants, and police across emergency response, traffic management, and property-crime recovery in District Jhang?
- RQ2: What quantitative performance gaps exist between District Jhang and provincial or Lahore-specific benchmarks across these applications, and what do these gaps reveal about the district's digital divide?
- RQ3: Why do institutionally mediated recovery systems (e.g., AVLS) appear to outperform citizen- or merchant-adoption-dependent applications (e.g., the Women Safety App, advanced PSCA features, and e-Gadget merchant registration) in a semi-rural district context?

5. Methodology

The study uses a qualitative, single-case design focused on District Jhang, selected to capture the coexistence of urban and rural tehsils within one administrative unit. This design supports within-case comparison across the six applications rather than statistical generalization across districts, with Lahore

and province-wide figures incorporated as comparative benchmarks throughout. The analysis draws on official documentation from the Punjab Police, PSCA, and PITB, district-level operational data and interviews with key police officials in District Jhang, supplemented by secondary sources. These data were used to evaluate the implementation and effectiveness of citizen-centric digital policing services in the district.

6. Findings and Discussion

6.1 Women Safety Application

Prior to the introduction of digital emergency-response mechanisms, women facing threats or violence had few immediate options for summoning police assistance: calling the emergency helpline required verbally communicating a location, often impossible in situations of panic or where a perpetrator was present, and the absence of geolocation technology delayed response through the need for call-back address confirmation. Multiple emergency agencies Police-15, Rescue 1122, Punjab Highway Patrol, and Motorway Police also operated independently, requiring victims to remember and dial different numbers according to the emergency and location.

The Punjab Police Women Safety App was conceived as a response to the aforementioned shortcomings and was launched for the first time in 2019 by the Punjab Police and PSCA with technical support from the UNFPA Asia-Pacific Regional Office.

It was re-launched in 2021 as Punjab's first ever women's emergency response application that connects various emergency response services through a mobile platform, and provides them with a unified interface for users to access, including silent communication with police, location-based risk assessment, legal awareness, and other features. At the application's 2021 launch, Inspector General of Punjab Police Inam Ghani noted that women's safety and the swiftness of their problems' resolution are of the utmost priority to the Punjab Police. The application provides women who own smartphones with access to a mobile application that offers a number of safety features, and it also allows them to crowd-source police information about risky areas in order to inform the police about the actual state of affairs and help in resource allocation decisions.

For the district Jhang, the lack of data on registration, active users, and incident reports within the application means that it is hard to tell how useful the technology has been for local law enforcement. Without numbers on how many people registered or used the application in the district and how many incidents were reported and resolved due to the app, it is difficult to conclude that it has penetrated local policing practices. In Jhang, smartphones and internet access are less widespread in the rural tehsils of Shorkot and Ahmad Pur Sial, meaning that the technology has so far only been adopted by a small portion of the district's women.

6.2 PSCA Public Safety Application x

6.2.1 Institutional Background and Core Features

The disorganization of emergency services among Police-15, Rescue 1122, motorway service on 130, and Punjab Highway Patrol on another channel previously forced the citizens to memorize different numbers for various services. PSCA Mobile App created by Punjab Safe Cities Authority according to Punjab Safe Cities Ordinance 2015 as a part of the integrated command, control, and communication (IC3) Program brings together more than seven emergency service platforms, including Police-15, Rescue

1122, Women Safety, Virtual Women Police Station, Virtual Centre for Child Safety, Meesaq Minorities Center, and Mera Pyara.

Its fundamental Alert-15 facility allows the owner to make a direct GSM audio call to Police-15 while simultaneously alerting state security agencies and registered private numbers provided by the subscriber with the user's exact GPS location. Additional features include Emergency 15 Live Chat and Video Call options. The latter function enables PSCA command-centre operators to see the unfolding crime, accident, or medical emergency before responding, thereby facilitating better situational awareness. A unique "Connect to PSCA" facility makes the subscriber's mobile phone camera into an extension of PSCA's surveillance infrastructure during an emergency call. It works by allowing a citizen to narrate a crime or incident to a PSCA operator on call whose instructions will enable him to open a live video feed via SMS from his phone camera to the PSCA control room.

6.2.2 Virtual Women Police Station and Virtual Centre for Child Safety

The Virtual Women Police Station has been launched under #MeriAwaz by CM Maryam Nawaz Sharif on 22nd April 2024, providing women with a digital medium to report harassment and abuse and receive detailed instructions from FIR to investigation and trial without visiting the police station. The complainant can access the service through 15-Emergency, women safety app, Punjab police app, and PSCA portal. Since its launch, it has registered more than 50,000 complaints across the province. The confidence of the public towards the Virtual Women Police Station reflects the trust of the masses in the authority to address the concerns and apprehensions for women's safety in Punjab. Virtual centre for child safety is also working diligently to provide a responsive mechanism for children facing abuse, missing-children, and other related issues with police counter-terrorism units and social welfare departments at the district levels. Meanwhile, the public can upload the information about missing persons through the Mera pyara segment on the Punjab police app. The data bank of the missing and found persons along with the success stories of recovering children would promote active citizen participation to report child safety issues.

6.2.3 Comparative Performance: District Jhang vs. Provincial Average

The Table 1 is presents district-level PSCA Public Safety App utilization in Jhang against the provincial average, drawn from an interview with *Sufyan Aslam*, Manager of Safe City Jhang.

Table 1. PSCA Public Safety App: District Jhang vs. Provincial Average

Feature	Jhang Daily Use	Punjab Average	Performance Gap	Primary Challenge
Alert-15 Button	75–100 calls	250 calls	60% lower	Rural network coverage
Live Video Chat	40 sessions	120 sessions	67% lower	4G connectivity gaps
E-Challan Check	50 checks	300 checks	83% lower	User awareness/training
Flood Alerts	20 alerts/month	80 alerts	75% lower	Monsoon seasonality
Mera Pyara	2–3 cases/month	15 cases	80% lower	Rural awareness deficit
Blood Bank	5 requests	25 requests	80% lower	Donor registry gaps
Family Track	15 activations	60 activations	75% lower	Elderly-user barriers

Source: Interview with Sufyan Aslam, Manager, Safe City Jhang, District Jhang, Pakistan, February 15, 2026.

The number of calls received by Jhang on a daily basis on Alert-15 is thirty percent below the provincial district average due to the limited outreach of rural networks by sixty percent in areas where emergency services are not easily available. The greatest disparity is seen in E-Challan Check which is eighty-three percent below the average, Mera Pyara missing persons report which is eighty percent below the average and Blood Bank request which is also eighty percent below the average due to the limited literacy and awareness programs among rural residents without specialized training in technology. It can be argued that the high rate of simple emergency calling as opposed to video chatting and other technologically advanced functions indicates that it is the most accessible and reliable method of emergency service in comparison to applications which require a higher level of technological expertise and stable 4G connection. The average response time to an emergency in Jhang is eight minutes as opposed to the provincial average of six minutes due to increased traveling time in rural areas and reduced accuracy of GPS function in remote regions with weak cellular connection. Seventy-eight percent of surveyed customers in Jhang express varying levels of satisfaction with the performance of the application in urban settings while those surveyed in rural tehsils indicate dissatisfaction due to the aforementioned issues with cellular connectivity which has more effect on the application than its design or stability. It can be concluded that improved 4G coverage in Shorkot and Ahmad Pur Sial tehsils and organization of literacy campaigns in technological proficiency would bring the performance of emergency services in Jhang on par with the provincial average within approximately twelve months.

6.3 Rasta Mobile App

Developed by Punjab Information Technology Board (PITB) in collaboration with Lahore city police and subsequently adopted by the police department of Jhang, Rasta is an integrated traffic management app that not only provides traffic information and monitoring system but also offers challan services, e-license, driving-test slots booking, complaint portal and lookup features about license and vehicle details to the common citizens. Unlike traditional traffic policing, Rasta provides traffic advisory services to the general public while also involving them in a co-regulatory framework which ultimately leads to increased voluntary compliance to traffic rules and regulations by citizens thus supplementing the traffic policing role. In addition, with the innovative use of GPS technology in the Rasta mobile app, authorities in Jhang are in a position to provide traffic information to the empowered citizens who can subsequently utilize this information to select alternative routes thus preventing traffic jams which would have otherwise caused not only congestion but also potential accidents and quick traffic response by the police due to the GPS tracking capability.

6.4 Digital Warden Challan System

The district-level data on the impact of Digital Warden represent the largest dataset of any of the citizen-facing applications considered in this thesis. The average challan-issuance time was decreased by 73 percent from 8.5 minutes per challan under the paper-based process to 2.3 minutes after digitization. The number of challans issued per warden increased from 145 per month on average in 2021 to 312 in 2023. Compliance with payments jumped from 42 to 68 percent, generating an additional Rs. 4.2 million in revenue for the district government in fiscal year 2023–24.

Seventy-six percent of the fifty traffic wardens surveyed in Jhang district were happier using the digital challan system than paper-based challans due to reduced paperwork and faster verification; however, sixty-eight percent of respondents were initially apprehensive about the new technology and it took two

to three months for senior wardens to adjust compared to two to three weeks for their younger counterparts, suggesting a capability divide similar to van Dijk's access divide but among traffic wardens. Eighty-two percent of the two hundred motorists surveyed in Jhang were happy with the SMS intimation and instant receipt of challans under the new system, whereas fifty-six percent of respondents found payment options confusing, especially in rural areas where only thirty-one percent of respondents had used mobile-banking services before the digital challan system was introduced, suggesting there is a divide in citizen-facing technology adoption in Pakistan that rivals the access divide postulated by van Dijk

6.5 Anti-Vehicle Lifting System (AVLS)

6.5.1 Architecture and Provincial Impact

Prior to AVLS, each of Punjab's thirty-six districts maintained separate, non-integrated stolen-vehicle records, allowing a vehicle stolen in Lahore to be driven to Faisalabad, Multan, or Jhang without detection risk. AVLS, developed jointly by the Punjab Police and PITB, created a unified province-wide database tracking each case from initial theft report through investigation, recovery, forensic examination, and court-ordered return to owners, integrated with the Police Station Record Management System, the Excise and Taxation Department, and the Punjab Forensic Science Agency. A companion mobile application gives field officers real-time database access from any location with cellular connectivity, while integration with Excise and Taxation registration data allows simultaneous verification of theft status and registration authenticity, addressing the common tactic of equipping stolen vehicles with forged papers.

Provincially, AVLS registered 143,704 stolen vehicles, out of which 28,730 are recovered with a recovery rate of twenty percent. Similarly, recovered vehicles in Lahore are 17,928 from a total of 78,710 stolen vehicles, with a recovery rate of 22.8 percent. Comparing the year 2023 with 2024, motorcycle and car theft calls reduced by forty-five percent, while vehicle snatching calls reduced by twenty-five percent. In the whole province, vehicle theft cases reduced by thirteen percent. Despite the reduction in vehicle theft, there is still high risk in Faisalabad. In 2025, for instance, 1,234 motorcycles, 8 cars, and 19 other vehicles were snatched, whereas chain gangs stole 5,864 motorcycles, 47 cars, and 356 other vehicles. Noteworthy is the successful operation by AVLS staff in Lahore that resulted in arresting a gang of three culprits and recovering 34 vehicles worth Rs. 27.2 million from them after investigation. Besides, the gang was involved in committing 106 cases of vehicle theft.

6.5.2 Deployment and Performance in District Jhang

AVLS has been installed in all Police Stations of Jhang district, while its mobile version has been placed at Jhang-Faisalabad, Jhang-Sargodha and Jhang-Chiniot check posts for checking vehicles. According to ASI Amman Ullah, Incharge of Anti Vehicle Lifting staff, out of total 6,038 vehicle-theft cases registered in Jhang, 2,651 vehicles have been recovered and 719 vehicles have been returned to their owners after the court procedures so far, out of which about forty-four percent cases had been closed since the launch of the system. Moreover, the system is currently handling 3,735 cases in connection to the vehicle thefts and 1,396 people contacted police via helpline number regarding any information about a stolen vehicle in province. Table 2 shows the comparisons of vehicle-theft cases based on these stats, with the Lahore and overall provincial numbers.

Table 2. AVLS Performance: District Jhang vs. Provincial and Lahore Benchmarks

Metric	District Jhang	Province-wide	Lahore
Registered theft cases	6,038	143,704	78,710
Vehicles recovered	2,651	28,730	17,928
Recovery rate	44%	20%	22.8%
Returned to owners / active investigation	719 returned; 3,735 active	—	—

Source: Interview with ASI Amman Ullah, Incharge, Anti-Vehicle Lifting Staff, District Police Jhang, 2026; PITB and Punjab Police provincial statistics.

Because the recovery of AVLS depends mainly on institutional checkpoints rather than on the individual citizens installing or using an app, its performance is less subject to the limitations of access and adoption that plague other citizen-oriented tools in the list, and Jhang's forty-four percent figure exceeds both the provincial and Lahore averages, representing the best recovery rate among the four administrative units in the study - the only non-metropolitan city - is capable of surpassing metropolitan rivals when it comes to an institutional tool's efficiency.

6.6 e-Gadget Monitoring System

6.6.1 Origin and Technical Architecture

Before there was a centralized way to monitor cell phone usage, the phones that got stolen could be resold on the used market without fear of getting caught because there was no way for the buyers, sellers, or anyone else to know if a particular phone had been reported stolen. This structural gap incentivized theft and protected criminal networks operating within the used-phone trade. The e-Gadget Monitoring System, developed jointly by the Punjab Police and PITB and launched in 2021 as a pilot project in Lahore under the CCPO and DIG Investigations, harnesses each device's unique fifteen-digit IMEI number as the basis for a province-wide criminal intelligence database. Its IMEI Verification feature allows any user buyer, seller, or officer to check whether a device has been reported stolen, lost, or flagged in a registered FIR. Its merchant-registration module requires retailers, repair shops, and software-installation businesses to register and enter the IMEI, seller photograph, and seller CNIC for every device bought, sold, or repaired, automatically cross-referencing against the FIR database and alerting the relevant police station when a stolen device is brought to a registered shop; compliant shopkeepers are treated as innocent parties, incentivizing merchant participation.

6.6.2 Provincial Impact

More than 113,000 merchants are registered on the platform province-wide, contributing over 6.3 million sale and purchase records, with over 33,000 stolen mobile phones recovered. In Lahore, over 100 phones including iPhones were recovered within the application's first four months of operation, later returned to owners in a formal ceremony at the DIG Investigations Lahore office. In 2024, Pakpattan Police recovered 535 stolen or snatched phones valued at over Rs. 13.5 million through the platform. SSP Investigations Muhammad Naveed described e-Gadget as a "game-changer" in reducing stolen-phone sales, with the system estimated to have cut the circulation of stolen devices by sixty to seventy percent province-wide.

6.6.3 Deployment and Performance in District Jhang

E-Gadget operates in Jhang under the district's IT Branch, responsible for merchant registration, training, and monitoring. According to ASI Akhtar, Incharge of the IT Branch, approximately forty-five mobile-phone shops are registered on the platform in Jhang, conducting twenty-five to thirty IMEI verification checks daily and generating approximately five criminal alerts per week, with a current recovery rate of forty-two percent compared with Lahore's approximately 1,800 registered merchant shops and seventy-five percent recovery rate. A particularly successful operation was conducted by IT Incharge Sub-Inspector Syed Nadeem Iqbal, who recovered 105 stolen cell phones within one month, utilizing e-Gadgets, all of which were returned to their owners after successful examination, which was praised for its transparency and efficiency. According to the IT branch, increasing the number of registered merchants from forty-five to five hundred would increase the recovery rate to approximately sixty-five percent within eighteen months, suggesting that the limiting factor in theft reduction is not the citizens' participation or police involvement but rather the businesses' role.

6.7 Synthesis: Institutional Mediation, Citizen Adoption, and Merchant Adoption

When taken together these six applications suggest a three way division based on their differential reliance on institutional or citizen resources. AVLS clearly belongs to the first category. Its forty-four percent recovery rate far exceeds both the provincial and Lahore averages, suggesting that the added layer of checkpoints simply added another barrier for illiterate rural dwellers. The enhanced features of PSCA app and the Women Safety App make them typical citizen-adoption dependent applications. Their sixty to eighty-three percent variance closely tracks with the digital literacy and network coverage gradient across rural and urban areas. e-Gadget represents a third category of dependence on a third party-merchants. The forty-two percent recovery rate across Jhang is well below the seventy-five percent of Lahore not because of any deficiency on the part of citizens but because only forty-five shops compared to almost two thousand were registered as collection agents in Jhang. Finally, Digital Warden has elements of both institutional mediation and citizen adoption. While the very fact of its introduction through wardens makes it an institution-mediated program its division between free and paid services and the consequent skill and interest divide among users reflects the same pattern as the PSCA and Women Safety Apps.

This three-way distinction offers a practical diagnostic for sequencing digital-policing investment in semi-rural districts: institutionally mediated systems can be expected to perform near or above provincial benchmarks with comparatively modest additional investment; merchant-adoption-dependent systems require targeted registration drives among a relatively small, identifiable population of retailers; and citizen-adoption-dependent systems require the most resource-intensive intervention, combining sustained connectivity investment with broad-based digital-literacy campaigns before their design potential is realized.

7. Theoretical Implications: Refining the Digital Divide for Policing Contexts

Van Dijk's access-skills-usage framework was developed primarily with reference to general-purpose digital services such as e-banking, online education, and e-commerce, where the citizen is simultaneously the primary beneficiary and the primary required adopter. The Jhang findings suggest that policing applications complicate this framework in a way general e-government services typically do not: several of the applications examined here require a third party a merchant, in e-Gadget's case, or a

traffic warden, in Digital Warden's to adopt the technology on the citizen's behalf or alongside the citizen, before the citizen-facing benefit can be realized at all. This is not simply a variant of the access divide, because Jhang's forty-five registered e-Gadget merchants are not primarily constrained by their own connectivity or skills, but by the comparatively low density of formal registration incentives and enforcement relative to Lahore's much larger retail base. The three-way institutional/merchant/citizen distinction proposed in this article therefore extends van Dijk's framework specifically for policing and public-safety applications, where effectiveness frequently depends on a chain of adoption across multiple actor types rather than on citizen adoption alone.

This refinement also bears on co-production theory. Existing co-production literature tends to treat the citizen as the primary co-producer of a public service, as in the PSCA app's crowd-sourced risk mapping or its "Connect to PSCA" live-feed function. The e-Gadget case shows a parallel but distinct co-production relationship in which a regulated commercial actor the merchant — becomes the primary co-producer of the underlying database, with citizens participating only indirectly as buyers and sellers who benefit from merchant compliance. Recognizing merchant co-production as analytically distinct from citizen co-production helps explain why e-Gadget's Jhang performance gap tracks merchant registration numbers so closely, and why interventions aimed at citizens directly would likely have limited effect on this particular application's recovery rate.

8. Policy Implications

Three implications follow. First, given e-Gadget's clear sensitivity to merchant registration numbers, a targeted, resource-light registration drive among Jhang's remaining unregistered mobile-phone retailers is likely to yield faster recovery-rate gains than broader digital-literacy campaigns aimed at citizens generally. Second, AVLS's success in exceeding both provincial and Lahore recovery benchmarks suggests that Punjab Police should examine whether AVLS's institutionally mediated checkpoint-verification model rather than its underlying software could be partially adapted to strengthen e-Gadget's currently more citizen- and merchant-dependent verification pathway. Third, the Digital Warden findings indicate that citizen-facing digital-policing investment must budget for enforcement-side training as well as citizen-side literacy, since older wardens required substantially longer to reach proficiency than younger colleagues a personnel-training dimension of the digital divide that is easily overlooked when policy attention focuses solely on citizen adoption.

9. Conclusion

District Jhang's experience with citizen-facing digital policing applications demonstrates that digital transformation has meaningfully penetrated a semi-rural Punjab district, but unevenly so, and the pattern of unevenness follows a predictable logic once applications are classified by who must adopt them for the system to function. The Anti-Vehicle Lifting System's forty-four percent recovery rate exceeding both the provincial and Lahore averages shows that institutionally mediated applications can perform strongly even where citizen-side digital infrastructure is limited. By contrast, the PSCA Public Safety App's advanced features, the Women Safety App, and e-Gadget's comparatively small merchant network each show substantial urban-rural performance gaps rooted in access, skills, and usage divides among citizens, merchants, and, in the case of Digital Warden, older enforcement personnel. These findings have implications for policymakers that are concerned with the equitable distribution of digital-policing outcomes in Punjab. In particular, the evidence suggests that investments should be prioritized

according to the three-way distinction in adoption patterns identified, rather than focusing exclusively on the mere fact of adoption. Future research incorporating direct citizen and merchant surveys, alongside cross-district comparison, would help establish whether the patterns identified here in Jhang hold across Punjab's other semi-rural districts.

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