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Modernizing Traffic Management in Telangana: Integrating Technology for Enhanced Road Safety and Efficiency

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Abstract:
This work therefore aims to explore the trends of traffic management efforts in operation since the formation of Telangana in year 2014. The traffic problems have emerged due to the fast-growing urbanisation, and with the road network of now 32,445 km, Telangana has adopted new measures into addressing the challenges. The paper also considers both conventional and recent trends in policing, including advanced technology like high-definition cameras, challan prepared by computers, and software programmes incorporating artificial intelligence. Secondly, the work shows that the indicators of road safety have improved substantiationly with 2016 as the starting year, and accidents, fatalities, and injuries decreased by 2020.. Such problems as increased working hours, ceaseless training in new technologies, and data protection issues are still there, however, the case of Telangana demonstrates that in a situation of the technological progress, it is still possible to create a coherent and effective system of security and public confidence for developing countries' regions. In this paper, it is agreed that multiplying of modern technologies with traditional police work has enhanced traffic management and road safety in the state.

Keywords: AI-based solutions, E-challan system, Road safety, Smart city, Technological integration, Telangana, Traffic management

Introduction

This young state of Telangana started only in 2014, but it has already made a remarkable place for itself in India's developmental paradigm. Being the 12th largest populated state and the ninth largest economy of India it has its own issues of growing road network and increased traffic. The state population was nearly 3.5 crore in 2014 and out of this, about 28% reside in Hyderabad and nearby places, the government has adopted many traffic management strategies to redress traffic congestion. The state with a functional road network of 32,445 kms under Roads and Buildings department comprises of 3,152kms of SH, 12,079kms of MDRs, 9,014 kms of ODRs and 4,983kms of NHs. The state has a total of 16 National Highways which is extending over 2552 KM. To administer this enormous network, Telangana has positioned its traffic system according to the commissioner rates and the district level. Each of the three commissioner rates in the Hyderabad Metropolitan Area specifically Cyberabad, Hyderabad, and Rachakonda have their traffic wings, zones, divisions, and police stations. The LMX is thus a long-term strategy designed to foster relatively fast-surfaced development in a traffic managed manner throughout the Telangana region, be it urban or rural.

Review of Literature:

Traffic law enforcement is a crucial tool used by governments worldwide to enhance road safety and modify driver behaviour. It operates through apprehension and deterrence, relying on three key processes: establishing traffic laws, policing these laws, and applying penalties to offenders. Enforcement strategies vary in visibility (overt or covert) and deployment methods (scheduled or non-scheduled). Sanctions aim to constrain, deter, or reform offending behaviour. These approaches target high-risk behaviours such as drunk driving, speeding, not wearing seat belts, and running red lights. Increasingly, law enforcement agencies are leverage technology to improve the effectiveness of traffic law enforcement, aiming to reduce crashes and enhance overall road safety. The efficacy of these strategies in improving road safety remains an active area of research and evaluation in traffic management.

Traffic enforcement balances automated systems and uniformed police presence. While automated methods are cost-effective for speed monitoring, human officers are crucial for issues like distracted driving and seatbelt use. Research suggests that combining both approaches enhances procedural justice perceptions and police legitimacy. Further studies are needed to determine optimal resource allocation between automated and traditional enforcement to maximize law compliance and reduce accidents.

India's road safety vision aims to reduce traffic fatalities significantly by 2015. Key strategies include establishing a National Road Safety Board, improving data collection, and implementing safety measures for vulnerable road users. Priorities encompass speed control, mandatory helmet and seatbelt laws, vehicle safety standards, and enhanced trauma care. Long-term goals focus on traffic calming, segregated lanes, safer highway design, and comprehensive strategies for drink-driving prevention and graduated licensing schemes.

Indian urban mobility relies on buses and non-motorized transport. Prioritizing these modes is crucial for reducing crashes and pollution. Key strategies include developing efficient bus systems, implementing pollution taxes on private vehicles to subsidize public transport, and creating safer infrastructure for pedestrians and cyclists. Urban design should focus on traffic calming and speed control. Policymakers must integrate safety and environmental goals in transport planning, considering broader health impacts.

Law enforcement believes traffic enforcement may reduce public order crimes. A correlational study in South Carolina found weak but statistically significant relationships between traffic enforcement rates and public order crimes in 4 of 5 counties. The findings suggest enhanced traffic enforcement could potentially help reduce certain crimes.

Numerous studies have explored intelligent traffic monitoring systems, but a secure and efficient solution prioritizing emergency vehicles is lacking. This study proposes an ITMS integrating VANET and IoT to facilitate ambulance flow in urban areas, addressing traffic signal hacking and prioritizing emergency messages. Results show improved emergency response times by minimizing delays, benefiting accident victims and critical patient transport.

Classical Techniques of Traffic Policing

Visible Police Presence: Visible police presence means that the police officers move around in their cars in a way that helps make traffic violations difficult or almost impossible. The theory used with this technique is the psychological aspect of noticing police cars to ensure that drivers stick to the right traffic laws. Officers can roam around areas with high traffic volume, high incidence of accidents or high traffic risk violations. Even the mere sight of a clearly marked police vehicle gets drivers to start

behaving better, such as driving slower, using seat belts and avoiding reckless turns. It also enables police officers to easily address cases of accidents or other related traffic nuisances. Police patrol in operating on the roads with the intention of minimizing on instances of accidents or any violations.

Sobriety Checkpoints Sobriety: checkpoints are temporary devises set on roads which Officers use to briefly stop vehicles using flashing lights to check the driver for alcohol or drug influence. These checkpoints are usually established during those periods of the time which the incidence of driving by intoxicated people are normally high as during the weekends or holidays. An officer might pull over every car, or might use a particular sequence to choose vehicles to check. At the checkpoint, officers take their suspect's breath test, and he or she is checked for signs of influence which includes, among others, difficulty in speaking, red/watery eyes and smell of alcohol. Drivers who are believed to be impaired are required to take a fitted breathalyzer as well as may be required to have a blood test which shows their BAC level. They startle drunk drivers and prevent them from causing harm and or death to themselves and their passengers and other people on the roads.Traffic Stops

Traffic stops: Are stop which officers carry out through observing and identifying violators on the road such as; running a red light, failing to yield, reckless driving and so on. When an officer sees the driver violating the traffic rules, the officer flags the driver dutifully through light and/Or sound. The officer approaches the vehicle, informs the driver why he has been pulled over, and asks him for the driver's license, car registration and proof of insurance. When stopped, the officer can either write ticket or simply warn the driver and the passengers, or arrest the driver on realization that he is facing … Traffic stops are a direct enforcement technique that required thedriver to be close and that ensure him that he will be compelled to answer for the alleged traffic violations. They also allow the officers to sometime share with the drivers good practices in driving or any issues with the Vehicle such as a spoiled rear lights or expired registration.

Accident Investigation: Traffic collision reporting consists of receiving calls on accidents, going to the scene, identifying the cause of the accident and enforcing the law. In the event of an accident, the officers are called to the scene to effect a blockade of the area, offer any required first aid assistance and lastly to conduct investigations. They determine the location of vehicles, talk to witnesses, and secure physical materials including a tire track or scratch or dent on a vehicle. Such information is used by officers to establish how the accident occurred and who was to be blamed. If the company was involved in wrong doing like speeding or reckless driving, then the officer will give tickets or even arrest people. Investigations assist in identifying individuals who bear the blame and serves the purpose of contributing data for enhancing safety on roads, insurance claims, and the law. Due to the analysis of accidents, police agencies try to avoid future traffic accidents and help to maintain road safety.

Modernised Techniques of Traffic Policing

High Resolution cameras :

To enhance traffic administration and curb of Traffic violations, the Telangana State Police has adopted an evidence based policing system. This initiative entails taking photos of traffic offences; vehicles/bikes speeding in the wrong lane, etc. The captured pictures act as proof being useful towards helping the police to overcome some factors such as biasness in their operations.

The number of cameras that has been installed is also differs from each other based on the area of traffic police station as well as the number of junctions in each area. This evidence based approach helps to desensitise citizens and make them fearful of getting apprehended whenever they are involved in the

commission of traffic offences hence improving on compliance with traffic laws in the Towns across the state.

Automated Traffic Challen System

The Telangana State Police has also adopted the Automatic Traffic Challan System (ATCS) in Hyderabad and other main cities of the state including; Warangal, Nizamabad, Khammam and Karimnagar. This advanced technology includes smart schemes and artificial intelligence to solve the problem by using fixed cameras at traffic signals. These cameras consist of sensors for an offences such as jumping a red light and exceeding the allowed speed limit.

The captured photos are onward transmitted back to the control room, whereby a processor system develops challans by following the vehicle number data from the server. Fines are then common to the offenders mobile phone and a letter to the address of the offender is also provided. In particular, the ATCS is to a certain extent encouraging compliance with discipline among people at junctions as well as the compliance with recommended speed and strict traffic laws in the busy towns.

ANPR:

Automatic Number Plate Recognition or simply known as ANPR Technology currently, new features such as Automatic Number Plate Recognition have been incorporated to the CP PLUS surveillance cameras. This integration helps the Hyderabad Traffic Police to manage and regulate the city and also to issue charges from their operation center. The use of the ANPR technology has led to the decrease of traffic offenses.

e-challen payment

The e-challan system introduced by the Telangana State Police Department is an electronic way of handling the traffic control issues of the urban area without much involvement of manpower. It has sections that use automatic number plate recognition and high-resolution cameras to obtain proof of the traffic offence. This system reduces the rate at which fines are levied, eliminates corruption since many human interferences are eliminated and increases the public's confidence in the police force.

Offenders get the fine notices through SMS or letter with the photograph of the violation, date and time and area infringed. The option for the payment of the e-challan is available with digital wallets, debit cards, credit card, net banking and e-seva centres among others. Besides making work easier for the traffic police, it also enhances responsible citizenship through compliance with the traffic laws as well as conveniently and efficiently making of fines.

Body Worn Cameras

The police force of Hyderabad has adopted the new technology of body worn cameras called CP PLUS in order to increase transparency, accountability and trust. These mobile recording gadgets capture both video and audio of police-public contacts, a crucial account of events. By obtaining new cameras, the cops have acted more professionally and the citizens are less aggressive.

From experience, the body-worn camera has helped minimize the cases of assault on police officers, since people avoid violent behavior when they know they are filming them. It also assists in acquiring evidence and address customer grievances against officers, hence making the public trust the department. This means that the success of the program is due to factors that include the high quality products of CP PLUS, and the quality trainings conducted for officers.

Regular DD's and Breath Analysers :

The police and the government of Telangana continue to target any vehicle with a driver under the influence of alcohol, and this is mostly at nights and over the weekend, and especially in urban cities.

With breath analyzers only, they target the Hyderabad region and the areas around it. For those who register over 35 points, ownership of a vehicle is taken away, a counselling session, and the person has to suffer through court sessions. It is important to note that this approach is forward looking, that is, it seeks to avoid the occurrence of accidents rather than attending to the consequences that they present.

As a result of maintaining clarity and controlling actions of representatives of both sides, policemen use body cameras during such interventions. This method not only helps to increase the responsibility of people but also acts positively on increasing the responsibility of the police. African countries mainly using strict enforcement alongside counselling and transparent process makes it easier in enhancing better compliance towards the traffic rules and hence checking cases of road accidents due to drink driving.

Social Policing Initiative

The police administration in the Telangana state began its social media use in 2014 with the Facebook and expanded to other platforms among them being twitter, You tube and Instagram. This programme targets all the chains of the police force right from the deputy inspector general of police to the police stations. These platforms help act as the interface between the citizens and the police, as well as increase accountability and transparency with regards to traffic control, and policing in general.

Using social networks traffic police disseminate important instructions and information, official notices, press releases. They also pass information to the public on the roles of police, road blocks and diversion, and traffic conditions on the roads at a particular time. This strategy fosters existing and efficient two-way communication between the police and the public, increase the dissemination of key pieces of information through mobile devices, and generally, a more transparent and easily accessed police force.

Real Time Traffic Monitoring

Police department of Telangana State specially in HYDERABAD has introduced ‘THIRD EYE Traffic Monitoring Drone’ for regulating dense traffic system of the urban city. This sophisticated system employs unmanned aerial vehicles with surveillance features to help to give real time information on traffic patterns. Different from basic online maps with dependency on cell phone traffic information, these copters afford accurate and timely information regarded traffic so that police can very efficiently resolve problems as well as guarantee better transport routes.

It uses IoT and artificial intelligence for effective examination of the roads thus enhancing the system. It turns out rather helpful during our rush hour and events with high turnout numbers like concerts, parades, and the like. It can greatly improve day-to-day traffic management over real-time complex traffic issues thereby offering more flexible solution to the constantly evolving urban traffic problems. This work also posits that since the drones provide views that are aerial in nature, they enhance the allocation of resources since better decisions are made.

AI based SMART city solutions

The Telangana Police has been efforts to include an AI based safe city solution in Hyderabad for better and more feasible monitoring. In this context, using the most modern AI technologies, the department plans to develop the security system of the city and increase the level of safety of inhabitants. The conceptual model of its application is the utilization of monitoring by AI and providing LEA with useful insights and intelligence.

Challenges of the AI-based solution where it can work as an identification of the images of enemies ranging from common criminals to known offenders. This is done through a master server that is based with state-of-art algorithms for facial recognition. Such comparisons happen in real time with the

database hence providing extraordinary monitoring success rates, which means that the suspects are so easily identified and tracked, enhancing eventual enhanced police force response and public safety in general.

ICCC: (Integrated Command Control Centre)

Hyderabad is putting up a new twin tower complex that will be a command and control center. The two towers taking seven acres of the city that cost ₹300 crores will be home to the sprawling network of CCTV cameras across the city. This centralized facility will therefore facilitate effective monitoring and management off the surveillance system to improve security of the public.

The operation center will have a 'large screen across the size of a wall' that shows real time feed from cameras installed in the city. This real-time monitoring capability will enable police and other rescue forces to get acquainted with incidents on happening. This will be achieved by creating a centralized integrated command and control center for the surveillance activities, and since all the agencies shall be coordinated from one point, resource shall be well arranged, thus leading to a safer city for the people of Hyderabad and visitors alike.

Out Comes

Enhanced transparency and accountability: This paper will argue that the use of high-resolution cameras as well as body worn cameras enhances evidence based policing thereby minimising bias and enhancing public confidence on police force.

Improved traffic management: ATCS and ANPR technologies have enabled effective administration of traffic flow, reduction of infringement of traffic laws in major cities.

Increased public safety: Bi-annual drunk driving cheque with the help of breath analyzers with counselings and enforcement measures have reduced chances of any accidental occurrence and has had positive influence on the driving behaviour.

Better communication with citizens: By the use of forums we have ensured that their is update on the conditions of the traffic within the country, arrangement on roads and functions of the police services.

Advanced monitoring capabilities: Traffic monitor equipped drones and smart city technologies built on artificial intelligence have helped for real time traffic analysis and quick reaction to enhance the mobility in the congested cities.

Telangana with their road safety measures have met with considerable success, especially from 2016 onwards. Despite the increase in the initial three components, which showed that the state had a problem in terms of road safety, it was possible to offset the tendency by the efficient implementation of the above-mentioned measures.

The most significant enhancement was realised in 2020 where all the four categories recorded significant drops in their rates: accidents, fatality rates, and injuries. Achieving these results is not a simple task when the countries rate increase their rate of development rapidly and besides it the good results of Telangana's Police and Road Transport department proves ability in adoption of effective road safety measures.

Challenges

Extended working hours: The proposed techniques such as the twenty-four-hour real-time monitoring and two-to-three time repeated drunk driving cheques, on nights and weekends would quite undeniably ensure longer and irregular working hours for the police personnel that intervene in the operations.

Continuous technological education: Given the escalating integration of new technologies such as artificial intelligence systems, ANPR and drones for monitoring activities, police personnel always require continuing and professional development education.

Data protection and privacy concerns: Opposition to surveillance cameras, body cameras, and principally AI-supported facial recognition systems is fueled by the fundamental question of data privacy and protection. Credibility of collected information and preservation of security of collected data could be problematic.

Technology dependence and maintenance: A major weakness of the organisation could be realised from the fact that traffic is highly automated, which means that if systems fail, or need to be serviced, operation could be significantly affected. Maintaining the level of performance and having contingency measures might be challenging.

Balancing human judgement with AI-driven decisions: While inflating the increase of AI solutions to be utilised more and more in the near future, some concerns may arise towards the capacity to maintain an appropriate utilisation of artificial intelligence with set human decisions in various traffic laws and decision-making processes.

Conclusion:

Telangana State Police has come a long way in improvement of traffic laws and authority through the application and adoption of various technologies. Starting from the use of high efficient cameras as well as automated challan systems, through using application of real traffic monitoring drones, up to application of artificial intelligence technology to improve with smart city solutions, these have enhanced traffic control, public safety and police efficiency and accountability. Despite obstacles that include increased working hours, ceaseless technology training, and issues regarding data protection, the end results are nascent. The measures taken since 2016 and most notably in 2020 have yielded the promise results in terms of road accidents, fatalities, and injuries. Thus, Transforming telangana is a clear example of other fast developing regions applying emergent technology systems not only meeting the goal of efficient and secure traffic policing but also maintaining public trust.

References

1. Bates, L., Soole, D., & Watson, B. (2012). The effectiveness of traffic policing in reducing traffic crashes. *Policing and security in practice: Challenges and achievements*, 90-109.
2. Tudor-Owen, J. (2021). The importance of ‘Blue Shirts’ in traffic policing. Policing: A Journal of Policy and Practice, 15(1), 480-491.
3. Roy, P. (2023). Indian traffic: identities in question in colonial and postcolonial India. Univ of California Press.
4. Mohan, D. (2002). Traffic safety and health in Indian cities. Journal of Transport and Infrastructure, 9(1), 79-94.
5. Weiss, M. W. (2016). Traffic enforcement, policing, and crime rates.
6. SURENDER, A. (2009). Traffic Administration in Hyderabad, India. In Urbanization, Policing, and Security (pp. 185-208). Routledge.
7. *https://www.transport.telangana.gov.in/html/statistics_accident.html*