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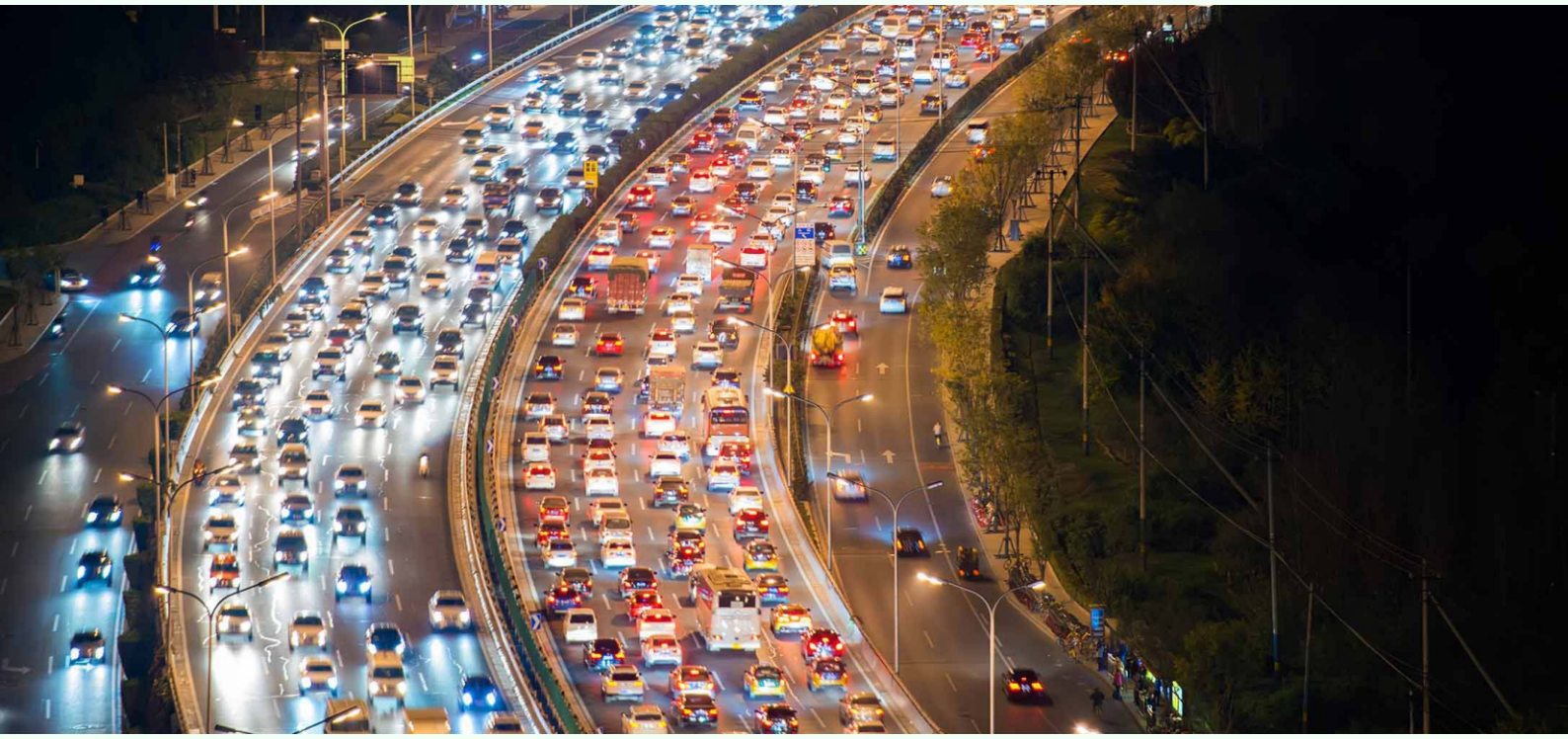
Group

ANALYSIS REPORT ON INDIA'S TRAFFIC MANAGEMENT



01 Introduction

India home to 2nd largest population in the world after China has witnessed the rising trend of using personal vehicles due to an increase in income levels. It is putting pressure on the underdeveloped road infrastructure of the country. The rising congestion in peak hours on the roads of metro cities of India like Delhi, Mumbai, and Bangalore is a sight for many who do not belong to the places locally.

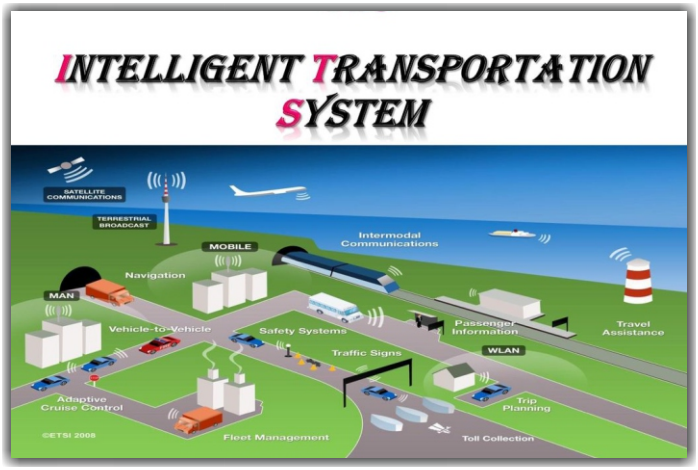
The scarcity of mass transit systems, unreliable last mile connectivity, time delays and road blockages lead to severe traffic situations on Indian roads. The rising number of personal vehicles is not only contributing to slow vehicle speed but also emitting a large amount of CO_2 and other Green House Gases (GHGs) that cause severe degradation of air quality where everyone breathes for life.

The implementation of effective management strategies to check the snailrail traffic and road fatalities due to the blockages and low maintenance is required on an urgent basis. Here the advanced technology, Intelligent Transportation Systems (ITS) can play a revolutionary role. The authorities should study the best practices followed across the world to address the rising problems of traffic and evolve a customized best-fit solution for Indian road infrastructure and daily commuters.

With a population of more than 1.3 billion within the geographical area of 3.1 million square kilo meters, it is a challenge to accommodate individual vehicles' traffic along with economic activities through the lifeline network of these densely congested roads. The accelerating growth and expanding social interaction across the country during the post covid scenario, add fuel to the rising traffic congestion and cause continuous health degradation in metro cities of India.

The manual controlling of such huge traffic is not adequate, thus an automated as well as adaptive traffic management system is the finest solution to bring out the multiple benefits for commuters and address the woes of traffic congestion and add quality time in their life for the physical and psychological well-being.

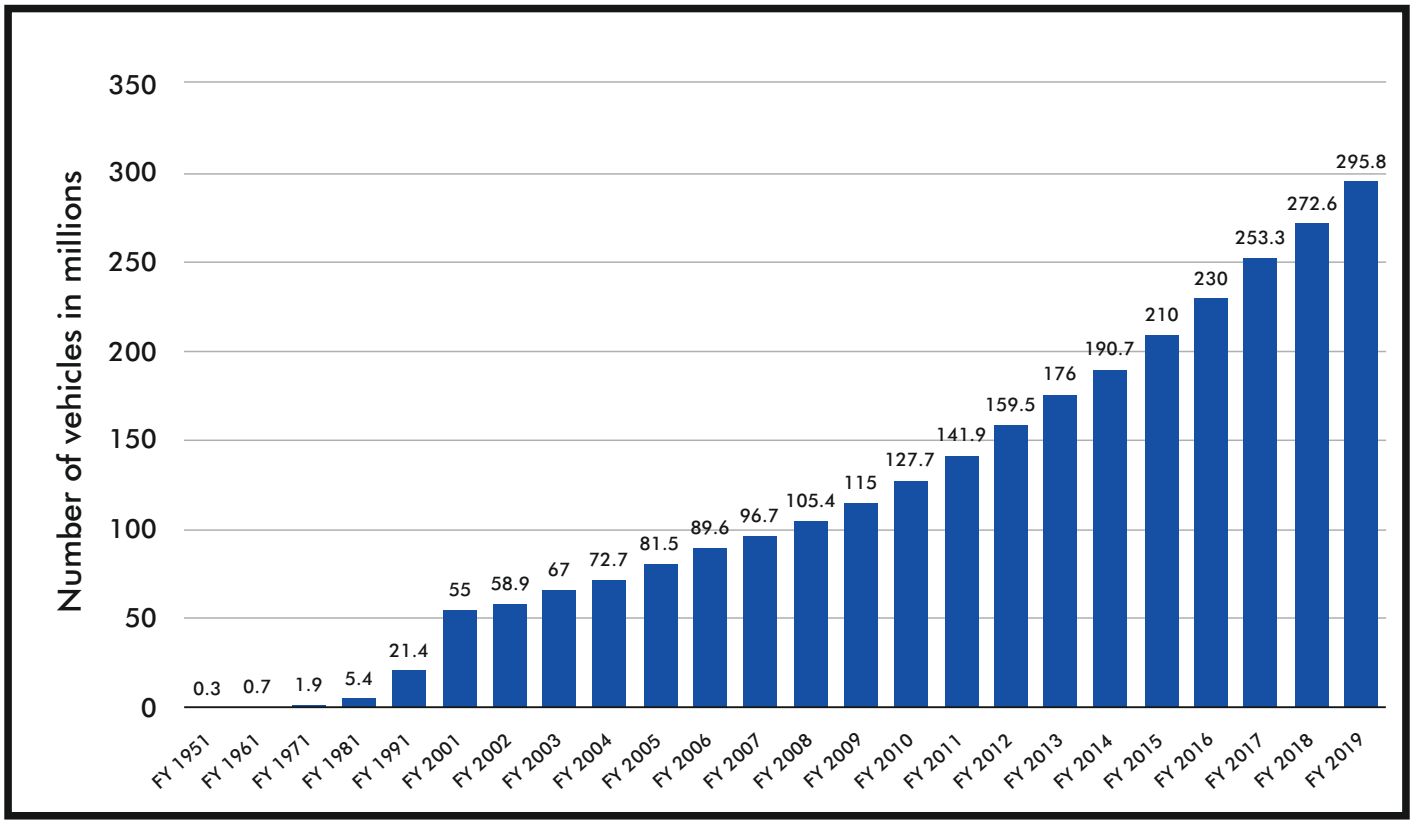
The Government's plan for India's infrastructural development under the PM Gati Shakti Master plan including the speedy construction of expressways, highways and roads is set to accommodate new vehicles on the Indian roads. But along with this, the government is also working to create sensitization towards car pooling, increasing the availability of mass transit systems and rising awareness for road safety, etc among the stakeholders. India's smart city project is also aiming for the better management of urban resources to provide a congestion-free quality city infrastructure to its citizens and segregate the traffic in terms of pedestrians, cyclists, two-wheelers, four-wheelers and commercial for better management. This is bringing a solution to present traffic obstacles and decreasing the incidence of road fatalities. It will also provide a balanced approach to safety on roads and better economic development simultaneously.



02 Features of India's Traffic Operation and Management

The lack of mass transit systems and unreliable last mile connectivity promotes the use of personal vehicles and creates a severe situation for traffic operation and its smooth management. The rising income level and upgraded living standards in India's urban settings are complicating this situation for more with the desire to save little time and energy.

Registered Vehicles in India (Between 1951-2019)

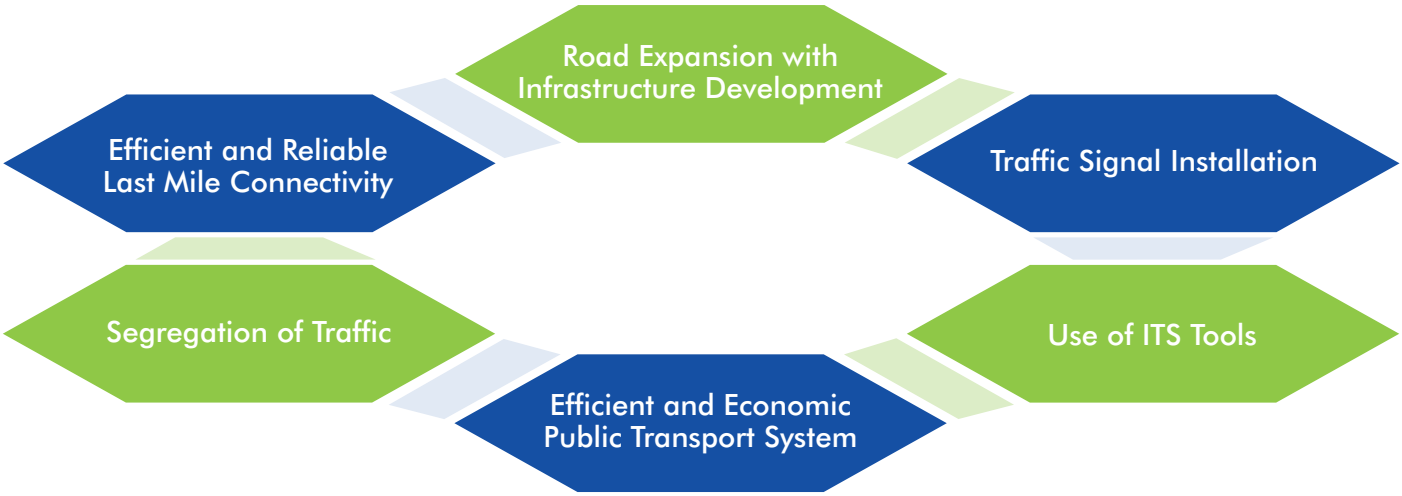


Source: https://www.statista.com/statistics/1023507/india-registered-vehicles-number/

The graph is representing the massive growth of vehicles in the country over time. Due to this, India's metro cities witness rising traffic congestion and degrading air quality around the year. The use of advanced digital technology, elimination of level crossings and smooth merger of traffic in case of diversions can resolve these obstacles significantly and help the environment positively by reducing emission levels.

Rapid industrialization and rising commercial vehicle load, create major maintenance issues for roads and become an important reason for slow traffic. Segregation of the variety of traffic with better load sharing in commercial vehicles in terms of magnitude and frequency through load shifting in other means of transportation for commercial purposes can help the road infrastructure breathe a little.

Thus, some of the important measures in the operation and management of India's traffic congestion are as under:



The IT-based traffic management with a coordinated centralized facility with the installation and use of various field devices such as traffic signals, cameras, and detectors, is the replacement of manual traffic management to enhance performance. In India, the Traffic Management and Information Control Centers (TMICC) can work as hub stations and perform the following operations concerning maintaining a smooth flow of traffic at the pan India level:

- Collection of Real Time Traffic Data such as Speed, Volume, etc.
- Analysis of Captured Data
- Central controlling of Traffic Management Systems such as Traffic Signal Systems, Detectors, etc
- Monitoring of Traffic Situation and Related Incidents
- Response Intervention in case of Traffic Incidents, Emergency Conditions, System Failures, etc
- Real Time circulation of Information to the stakeholders such as Commuters, Emergency Response Teams, Traffic Police, Media, etc

The installation of more traffic signals along with ITS tools, rising awareness of traffic rules, multilevel parking, a solution to the last-mile connectivity problem, etc can further simplify traffic management in India. But all these strategies need budgetary support and huge private investment. The long gestation period of infrastructural development projects and low return on investment discourage the interest of investors in this domain.

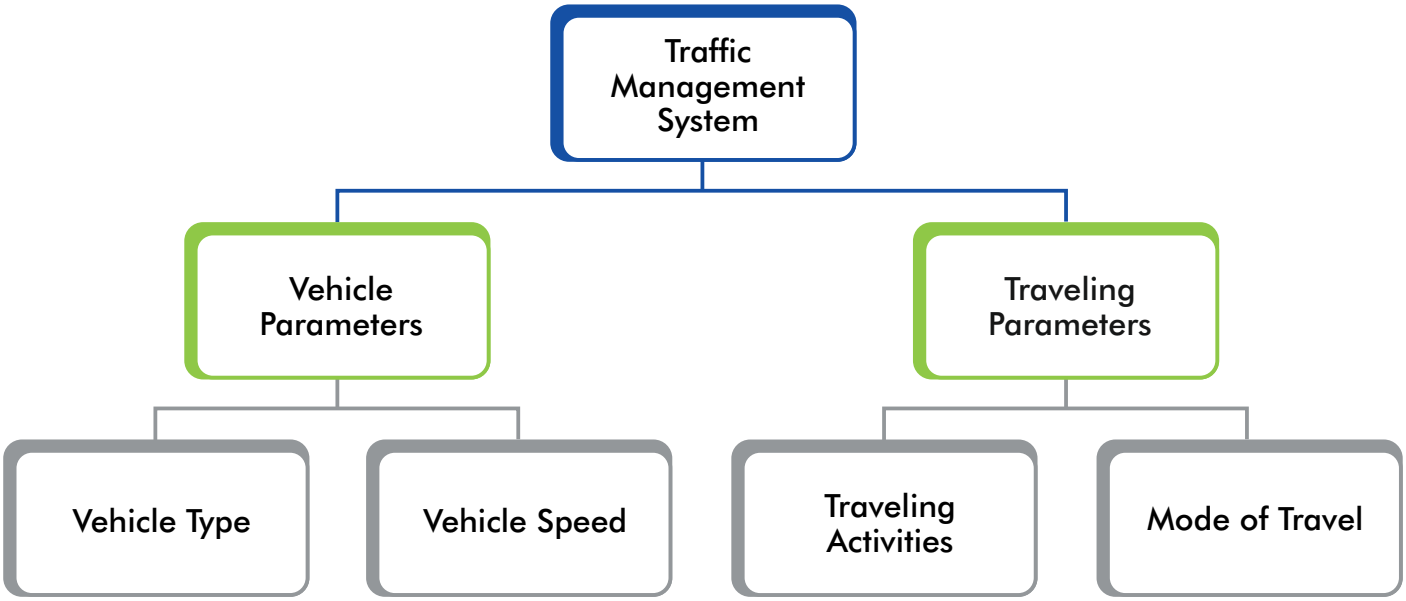
Traffic congestion, today is one of the crucial aspects of the smart city project of the Government of India where encroachments and poor urban planning in the past are playing a major hurdle in developing sustainable and environment-friendly solutions to reduce traffic congestion in the selected cities. The high use of ITS-based traffic signals and strict implementation of traffic rules are still not fully capable of reducing the woes of Indian urban commuters during peak hours. It thus presents a need to leap from conventional methods of traffic management to advanced technological solutions such as Artificial Intelligence, Drones, etc.

03 Current Scenario and Drivers of Rising Traffic Congestion

The traffic congestion in India is worsening with each passing day due to a lack of infrastructure upgrades, rising number of personal vehicles, diversions, poor maintenance of roads and traffic signals, lack of awareness among commuters, etc. This rising congestion results in the loss of financial, physical, mental and social well-being of the commuters. Many times in case of a medical emergency, people lose their lives in the ambulance in the absence of proper medical interventions due to heavy congestion.

The huge traffic congestion in India's national capital city Delhi is the talk of the town for everyone. The twerking traffic in India's Silicon Valley Bangalore is badging the city with one of the top polluted cities of the world because of the black poison emitting from the numerous vehicles participating in this devastating situation during the peak hours every day. The situation needs policy-level intervention and clear guiding regulations to ease the situation on the roads and decrease the fatalities.

Some of the basic parameters of traffic management are as under that ultimately put a severe negative impact on health and the environment.



All these elements, add to increasing traffic congestion as they affect the emission rate and frequency of vehicle travel significantly. The growing transportation network public, private, as well as commercial is increasing due to India's rapid economic growth and increasing opportunities for work. But the degrading air quality and exposure to rising noise pollution due to the increase in traffic is brought evil effects for society as well as individuals.

Even the GHG emission in these traffic congestion contribute to global climate change, managing which is a collective responsibility and must be addressed to curb at the source only. Due to long spending time on roads and traffic diversions emission level increases and increase the severity of the situation many fold.

But the behavioural issues in India are significantly contributing to rising traffic congestion on Indian roads. Some of which can be identified as:

1. High Use of Personal Vehicles
2. Private Encroachments
3. Non Cooperation
4. Lack of Protection among Drivers
5. Awareness towards Traffic Rules
6. Lack of Pedestrian Footpaths and Cycle Tracks
7. Lack of Parking Facilities for Vehicles at Personal Space
8. Lack of Green Corridors

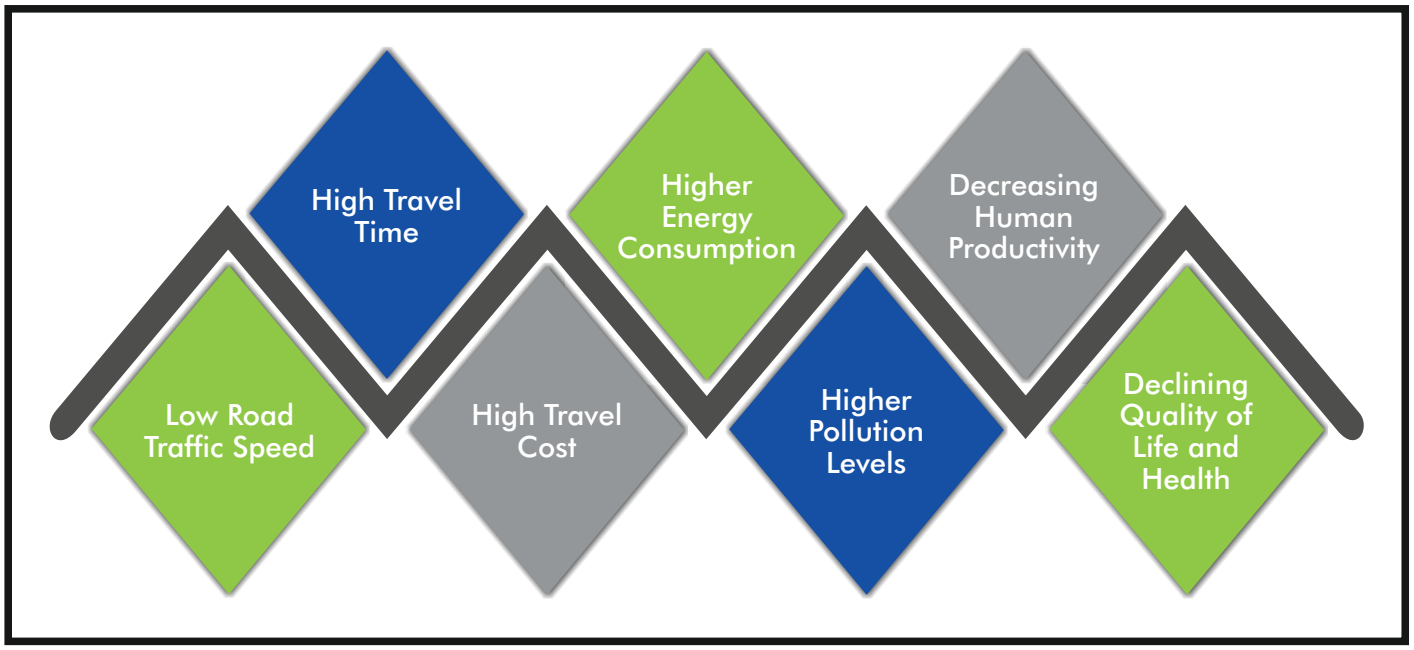
All these riders, make the traffic problem in India more severe. Due to the large population, the mass transit system management becomes more complex and thus needs a detailed analytical regulation with improved frequency and availability of last-mile connectivity options. The ongoing traffic situation in India is bringing challenges to the healthcare infrastructure also and ultimately taking a toll on human lives too. For this, the proactive response from traffic regulatory and management authorities is important and should be encouraged at the policy levels.

04 Issues and Challenges Related to India's Traffic and Safety Management

Urbanization and traffic miseries go hand in hand. Thus on the way to making India a developed nation, the increasing industrialization and economic activities have expanded the average geographical coverage of people including increased time on the congested roads. Here, a balanced policy approach to accommodate economic growth and smooth traffic management is required. As the traffic congestion in India is increasing ata higher rate, the approach of developing more roads, highways and expressways will not be adequate and serve the purpose anymore.

To handle the backdrop of this continuously growing issue, more sophisticated traffic control techniques and management systems are required. Along with this, their substantial availability is required to increase the traffic management capacity and improve the overall efficiency of traffic flow management in India. All these are the primary requirement to settle the traffic congestion and receive the physical, financial, environmental and political benefits.

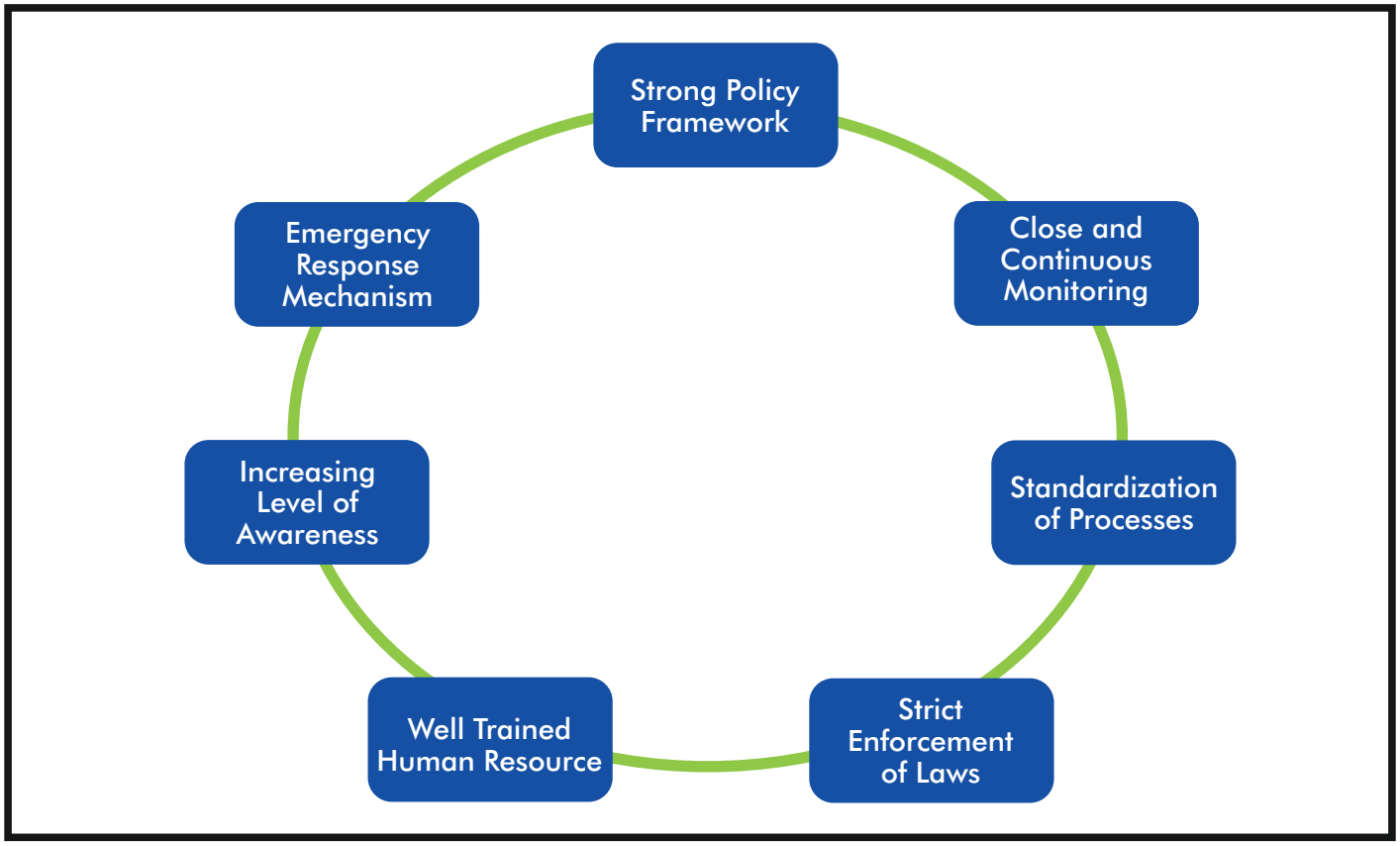
Due to the unavailability of adequate road and transport infrastructure and strict governance and administration, India's traffic congestion is putting a halt on mobility. It is hampering economic and industrial progress up to large extent and causing a major blow to the environment. Some of the major issues raised by increasing traffic congestion are as under:



These adverse impacts hamper the prosperity and economic development of the country in the long run. The rising rate of traffic congestion increase the possibility of road accidents and fatalities many fold. Because of this, India is bagged as one of the worst performing countries in terms of road safety with a high number of collisions per year in the past.

Here the challenges are dual, one related to road and traffic conditions, and the other is related to traffic and road safety management systems. To address the rising traffic collision, the problems need to address from engineering, governance and law enforcement perspective. Thus, the

following challenges need to be addressed within a time frame to reduce the congestion along with taking into account vehicle and traffic speed, infrastructure layout, driving behaviours and enhance the performance of the country in terms of road safety at the global level:



India is still using the traditional traffic monitoring systems for traffic management and road safety measures which include video cameras, ultrasonic sensors, radars, large cable installations, etc that need more energy and cost to connect through the central data processing units along with manual management of traffic flow in some part of the country.

But, when India is heading high on the global landscape in all other dimensions, it needs to adopt the best practices from the world in terms of traffic management and road safety too. The latest wireless sensor technology can bring a revolutionary change in the present traffic congestion scenario of India's metro cities including the benefits of low cost and energy consumption levels. It will help to ease the traffic situation and provide real-time assessment and evaluation including information communication to optimize the traffic flow efficiency and bring benefits for all the stakeholders.

05 Gap Analysis and Future Scpoe

India's rising traffic continuously results in the delay in commutation, reduction in work-life balance and quality health including rapid loss of environment and ecology. In developing countries like India where demand is huge in terms of infrastructure, the supply side constraint makes the situation worse. This gap should be addressed at all levels from the expansion of roads and highways including their regular maintenance, availability of mass transit systems at affordable prices, awareness of car-pooling, increased use of multilevel parking, etc. It can help in finding a way together for better traffic management on busy roads and draw a new picture of India's peak traffic flow.

The traffic situations the same across the globe, but India needs to handle it more seriously as it is a developing nation with an increasing rate of rising population. In this regard, advanced computational technologies can bring the best solution on the ground like in other parts of the globe such as the USA, UK, Japan, etc. The sensor-based reliable traffic management makes a way to handle problems related to delays due to congestion, minimized fuel consumption, quick response to emergency incidents, reduction in the number of fatalities and many more where automated smart traffic signalling plays a key role.

The ITS-based traffic management model based on global best practices followed can provide a solution to India's real-time traffic problems and improve the efficiency of urban public transport systems through dynamic flow and signal controlling methods. The fast response based on ITS tools will make the traffic management system in India capable of providing time-bound emergency responses and green corridors for medical emergencies to keep a check on secondary fatalities on Indian roads. The optimization of signal timing through advanced digital tools will increase the average speed and result in reduced energy consumption, carbon emissions and delay on roads to upgrade overall well-being.

The future course and better management of India's traffic are based on the increased use of ICT tools along with a major behavioural change in citizens towards the traffic system and its management. Some of the important steps to make a level playing field for all the stakeholders affected by India's burgeoning traffic are as under:

1. Increased Awareness & Behavioral Change
2. Safe Road Infrastructure
3. Vehicular Safety Standards
4. Training and Capacity Building
5. Emergency Response and Post Trauma Care

Thus, automated data collection through the latest sensors using 5G technology will bring multiple benefits to India's traffic management. The use of wireless sensor networks will be capable of revolutionizing congestion and incident supervision on Indian roads. It will also enhance the effectiveness of its traffic operation with optimized installation and maintenance costs. This will ease the traffic management and surveillance of India's dense road network through better collection and transmission of congestion-related information for smooth governance. It will further pave the way for an increasing rate of road safety across the length and breadth of the country in the years to come.

06 Government's Policy Support to Facilitate Traffic Management in India

Over time, the Government of India has realized the fact that the increasing number of vehicles on road for personal as well as commercial purposes has been compounded with the use of fixed time signalling or manual controlling of traffic. The situation now needs a dynamic ICT-based solution to centrally manage and control the huge traffic congestion on India's busy artery routes. For this purpose, the Ministry of Urban and Housing Affairs along with the Ministry of Road Transport & Highways has started working to identify the gap in the demand and supply of India's traffic control and management.

It has been accepted that developed nations across the globe have drawn the major benefits of digital solutions such as Traffic Management and Information Control Centres (TMICC) to effectively manage their increasing demand for mobility and commutation. It is capable of limiting carbon emissions and reducing the time spent on densely congested roads by increasing the average speeds on roads. It will also help in real-time traffic enforcement, close monitoring and management including the dissemination of information to the public based on the central data repository.

Along with this, the government is also highlighting the following strategy to ensure the safety of commuters on these congested roads:

- Establishment of Road Safety Information Database
- Ensure Safe Road Network
- Ensure Safety of Vulnerable Road Users
- Road Traffic Safety Awareness and Training
- Strict Enforcement of Traffic and Safety Laws
- Human Resource Development Regarding Traffic Management and Road Safety
- Mechanism to strengthen Legal, Institutional, and Financial Framework for Road Safety

Through the adaption of the Motor Vehicles (Amendment) Act, 2019 and related provisions, the government of India has ensured better compliance with traffic rules to ensure road safety. Under this, National Road Safety Board has also been constitutionalized for smooth regulation of traffic and on-road vehicles along with the promotion of measures related to road safety, innovation and adoption of new technologies in the area. Besides this, the National Road Safety Policy has also played a major role in achieving significant improvement to raise awareness among the masses and curbfatalities, which play a major role to increase traffic congestion and diversions.

At the global forum, the Government of India has also signed Brasilia Declaration to envisage the guiding policy framework related to the development of sustainable modes of transportation in the country such as walking, cycling, mass transit systems, etc. It will also help in minimizing the load of highly congested roads. It sets the accountability of each stakeholder at the source and significantly reduces the traffic and its aftermath effects through the government's interventions in letter and spirit.

07 Way Forward

Sustainability, Innovation and Resilience is the primary need of India's traffic management and here technology plays an important role to drive future development in addressing the traffic congestion issues. It will make India's traffic management more efficient, effective as well as robust to handle future traffic advancements. The Intelligent Transport System is the future of India's traffic control and management. Thus, the related research and development of trained human resources will be the key requirement for its effective implementation on the ground.

The traffic conditions are expected to be worsened over time, but centralized control management based on intelligent technology will make the way for brighter economic, social and environmental well-being. On the global canvas, India is all set to play a key role in the Global geopolitics of the 21st century while sensibly responding to its global shared responsibilities. With this, India will work on a sustainable policy formulation, that can better address India's traffic controlling and management concerns in the future ahead.

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