

# Accomplishing Smart Transportation System for Chennai: Problems and Issues

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## Abstract

Urbanization in India expands quickly and let to the advancement of shrewd urban communities. This paper proposes of perceiving the investigation issues and Challenges that ought to be directed to achieve keen Transportation framework for Chennai city. This can be proficient by understanding the present system and examples of urbanization, mechanization in Chennai; and their impact on flexibility and prosperity to Environment. The article closes by compressing the investigation issues regard to arranging of Non-mechanized transport, open transport and movement organization. It is typical that these examination issues will give potential heading for doing further research went for achieving shrewd transport framework for Chennai city.

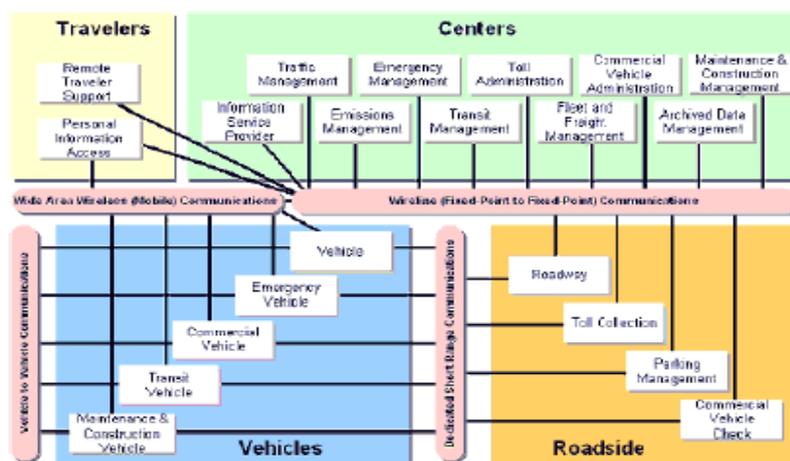
**Keywords:** Transportation, Traffic management, Road safety, intelligent transportation.

## INTRODUCTION

Road transport is the most important mode of transport in India which plays the major role in linking of people, goods, marketing, trading, etc. As per 2007-08 reports, the road network carry 56% of total freight traffic in the country. The sustainable money based growth has led to rise in the demand of the road transport. The total number of registered vehicle

increased from 55 million in 2001 to 298.7 million in 2016. On the other hand the country has developed at the rate of 5.2% in same period due to road network. The vehicle population has grown four times during the same period. Even though the road network density in India is 1.42km/square km, the road network growth cannot cope up with the growth of Vehicle population. The principal reason for traffic is the road space and the infrastructures have not improved with the traffic.

**Smart transportation system** is the one which manages the all traffic and transportation problems in a smart way with the help of smart applications. The aim of smart transportation is to provide an efficient, safe and sustainable way of moving people around the city and accomplishing benefits and meeting the goals of environmental integrity, social equity and economic efficiency. The objective of smart transportation is to evaluate, develop, analyze, integrate the new technologies and concepts to achieve the traffic efficiency, improve environment quality, save energy, conserve time, enhance safety and comfort for the drivers, pedestrians, traffic groups. Some of the applications of smart transportation system are intelligent transportation system (ITS), Advance Traffic Management system, Advance traveler information system, Advance public transportation system, commercial vehicle operations, etc.



(Source: CTTS)

Figure 1. Overview of smart transportation system

Some of the smart application is listed below;

- **Advance Traffic Management system:** it gets the real time traffic information to predict traffic congestion, incident detection on road network and also used to control the traffic lights suggests alternate routes.
- **Advance traveler information system:** provides the traffic information (location, route, road conditions, etc) to the travelers to select their travel mode and helpful in planning of the trip.
- **Advance public transportation system:** the urban and rural areas uses ITS to upgrade the availability of data to clients of open transportation and to enhance the booking and use of the general population transportation vehicles.
- **Commercial vehicle operation:** to improve the productivity of fleets, track of the operation of private trucks, taxis, etc.

The Figure-2 represents the components of the ITS. The ITS infrastructure consists of traffic sensors, infrastructure for processing.

Raw data and aggregated traffic information and computation infrastructure for processing raw data from individual traffic sensors for the traffic control.

### URBANIZATION

As per the 2001 statistics (Table 1), India has 393 towns with a populace of in excess of 0.1 million. Additionally, amid the second 50% of the most recent century, the quantity of urban communities in India with a populace of one million or more has relentlessly expanded from 5 million out of 1951 to 35 million out of 2001, which is required to additionally increment to 70 million by 2025. Watching the verifiable patterns of populace development in India (Table 2), it can be seen that the yearly normal development rate in consistently has been sure since 1931. A comparative positive pattern can be seen for the development in level of urban populace to the aggregate populace since 1921, which is relied upon to increment from 28% of every 2001 to 58% by 2025.



**Figure 2.** Components of smart transportation system

**Table 1.** Democratic profile of Chennai city

Indicator	City (Municipal Corporation)	State (Urban)	India (urban)
Total population	4646732	34917440	377,106,125
Total population of UA if any	8653521		
Share of ULB population in district urban population (%)	100.00		
Population growth rate	0.67	2.39	2.76
Area (sq.km)	175		
Share of ULB area in district (%)	100.00		

Indicator	City (Municipal Corporation)	State (Urban)	India (urban)
Density of population(person per (sq.km)	26553		
Literacy rate (%)	90.18	87.04	84.11
Schedule caste (%)	16.78	14.21	12.60
Schedule tribe (%)	0.22	0.38	2.
Youth 15-24 years (%)	17.17	17.12	19.6
Slum population (%)	28.89	23.15	17.36
Working age group (%)	68.52	67.23	65.27

Source: Chennai Metropolitan cooperation

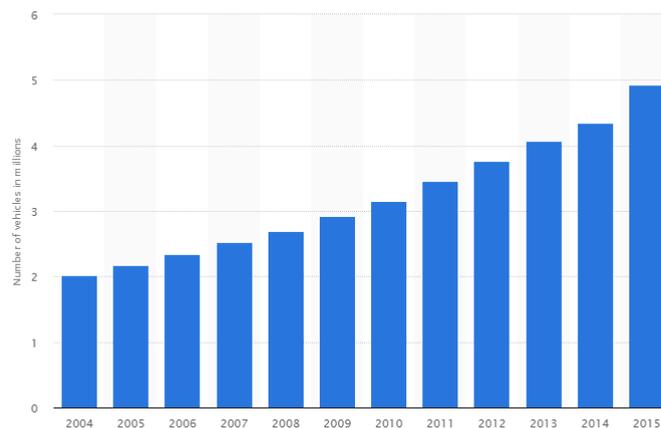
**Table 2.** History of growth of population in Chennai city

Growth of Population in Chennai City											
	1901	1911	1921	1931	1941	1951	1961	1971	1981	1991	2001
City population in lakhs	5.41	5.56	5.78	7.13	8.65	14.27	17.49	24.69	32.85	38.43	43.44
Area in sq.km.	68.17	68.17	68.17	68.17	77.21	128.83	128.83	128.83	176	176	176
Annual Rate of growth of population * (in percent)	--	0.27	0.39	2.12	0.69	-0.11	2.06	3.51	-0.27	1.58	1.23
Population density per Hectare	80	82	85	105	112	111	136	192	187	218	247

Source: Census of India

## MOTORIZATION

Indian urban communities have enormous growth in enrolling motor vehicles in past ten years. The way toward purchasing, offering things wishes the general population to possess an auto, the absolute best open transport concerning interest and solace, the legislature empowers the approaches in the market to get the simple advance in regards to the open auto advertise, and so on are the few purposes behind increment in the mechanization at a quick rate. From 1981 to 2001, populace expanded by 1.9 times in six noteworthy urban areas of India however the quantity of engine vehicles expanded by 7.75 times. Likewise, vitality request in transport zone is anticipated to develop at 5-8% every year. For instance, table 3 demonstrates the autos and SUVs will build 13 overlays in 2035 regarding 2012 measurements under the do nothing circumstance. Clearly, a nearly a similar development has not been taken after for transport armadas of real transport extends in India.



(Source: MOUD)

**Figure 4.** Vehicle growth in Chennai

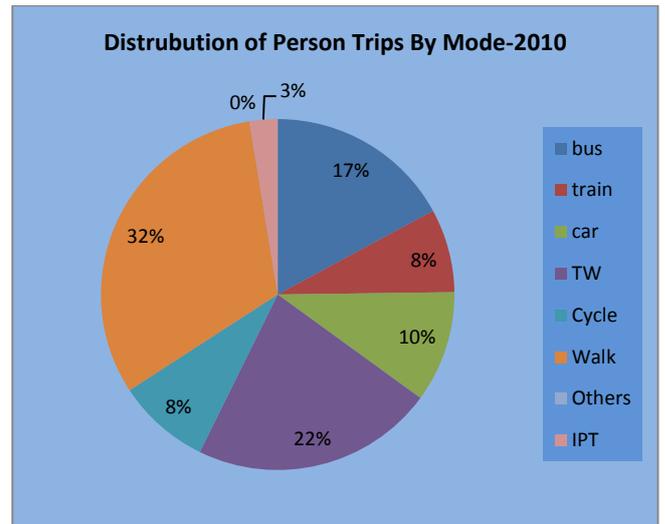
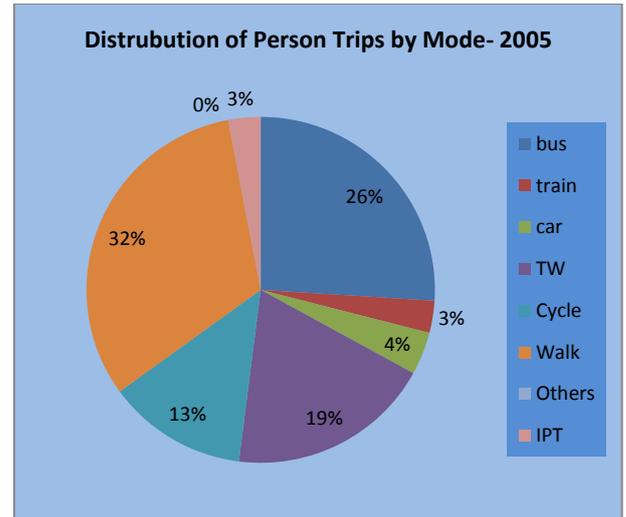
Per capita trip rate is 1.30 every day and excursion rate every hour is 5.88 every day, according to as CTTS(Comprehensive movement and transportation study,2010). Add up to individual excursions performed at Chennai is around 7.45m and 9.59m treks amid 2005 and 2010. Figure 8,9,10 present disseminations of individual outings by mode amid 1992, 2005, 2010. It could be watched that the offer of open transport, cycle and IPT have declined over years. This terrible pattern can be ascribed to the expanding vehicular

proprietorship, the stale development of transport armada and perilous privileges of-route for the cycles.



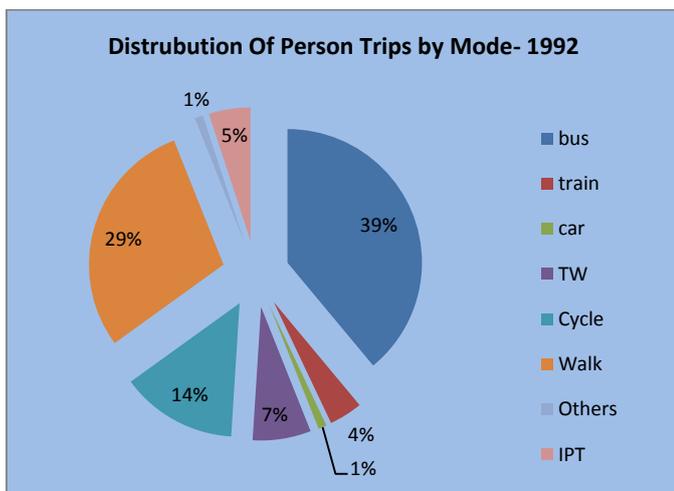
Source : CTTS

Figure 5. Road network of Chennai city



Source: CTTS

Figure 7&8 Distribution of person trips by modes- 2004&2010



Source: CTTS

Figure 6. Distribution of person trips by modes-1992

### EFFECTS OF MOBILITY

Capacity to move far and wide can be assessed regarding speed, travel times, delays, and so forth along the critical travel ways of the city. As per MOUD, the normal excursion speed in 2007 on critical city travel ways scope of 17-26 kmph, which is much parcel low when contrasted with the plan speed for similar streets. Likewise, as indicated by the MOUD give an account of ascertaining the group and blockage record on a scale 0-0.6, where '0' shows great and '0.6' demonstrates poor list esteem.

### Pollution due to Vehicular Emission

Pollution due to vehicular emission has done a lot of harm to the environment. Periodical monitoring conducted by the Tamil Nadu Pollution Control Board (TNPCB) revealed the following level of pollution:

<i>Pollutant</i>	<i>Load</i>	<i>Permissible level</i>
Carbon Monoxide (Co)	1908 to 4198 $\mu\text{g}/\text{m}^3$	0 $\mu\text{g}/\text{m}^3$
Suspend particulate Matter (SPM)	264 TO 451 $\mu\text{g}/\text{m}^3$	200 $\mu\text{g}/\text{m}^3$

**Table 4.** Future vehicle Population growth with respect to modal split in Chennai

		2004	2011	2016	2021	2026
Population in Lakhs		75.61	88.71	99.62	111.98	125.82
Daily per Capita Trips		1.32	1.50	1.60	1.60	1.65
Scenario 2 Modal Split %	Private	64.57	45	40	35	30
	Public	35.43	55	60	65	70
Total Daily Person Trips by Public Transport in Lakhs		35.36	73.19	95.64	116.46	145.32
	By Rail %	14.54	25	30	35	40
	By Road%	85.46	75	70	65	60
Daily Trips in Lakhs	By Rail	5.14	18.30	28.69	40.76	58.13
	By Road	30.22	54.89	68.95	75.70	87.19

Source: CTTS

#### IDENTIFICATION OF PROBLEMS AND ISSUES IN ACHIEVING SMART TRANSPORT

Despite these and numerous different activities by the focal and state governments, the upgrades are as yet not empowering, as obvious from the patterns exhibited in the before area. There are numerous issues and issues that should be tended to keeping in mind the end goal to attempt these endeavors effective in accomplishing maintainability in transportation for Indian urban communities. The same is talked about under different classifications in resulting sub-segments.

#### Traffic Characteristics

Arterial streets prompting the CBD convey overwhelming activity and are congested. Level of clog on arterials and other significant streets has expanded seven-overlay for the period 1984 to 2004. The normal volume conveyed by Anna Salai amid 2006 was around 1.58lakh PCU as against its ability of 60,000 PCU every day The volume limit (V/C) proportion on numerous connections amid top hours was more than one. In CBD, the V/C proportion was more than 1.5 for a large portion of the street joins. Remarkable development of vehicles combined with insignificant increment in street space, has prompted a low speed of 15 kmph in CBD and 20 kmph in other real streets. Arrangement of orbital streets, for example, IRR and Chennai By-pass (southern fragment) has by and large expanded the speed on the spiral streets. The City faces serious issue of blockage because of runaway development of personalized vehicles. The traffic management in the City is marked by introduction of a series of one-way traffic system.

Numerous Indian urban areas require stopping charges in CBDs and other occupied territories; notwithstanding, the vast majority of these plans are centered around income age as opposed to being utilized as an instrument to control the movement request. This is a direct result of absence of a reasonable stopping approach which would manage the obsession of levies and different limitations on vehicular stopping. The effect of stopping charges and other stopping strategy issues have not been examined logically to evaluate the effect and distinguish the potential measures and procedures to control the movement request. Blockage valuing is another great instrument to control travel request.

#### Parking

Interest for stopping in the CBD is 2 times the supply. Intense deficiency of stopping supply is seen in business territories of Anna Salai, T. Nagar, Purasawalkam and Mylapore. Unapproved and unpredictable stopping blocks free stream of activity and causes mischance's. Pinnacle stopping request, according to an investigation in 2003, was 13,000 PCE as against the supply of 5,100 PCE. For instance the supply in T. Nagar is 794 PCE against a request of 2151 PCE and the supply in Parrys is 704 PCE against a request of 4426 PCE. The aimless stopping has prompted misfortune in the street limit that reaches between 15% to 60%.

#### Non-Motorized Transport

One of the essential purposes behind the absence of appropriate fundamental gear required for a general public to work adversary strolling individuals and bi-cyclists in India is

the absence of comprehension of the capacity to move around the part that of every one of these modes. Likewise looking at the focal Business District(CBD) of European urban areas to Indian urban communities, it can be taken after that while in European urban communities, CBDs are generally identified with individuals on foot\bi-cyclists zones, however in Indian urban areas it is swarmed and blocked NMT not been utilized as a result of private vehicles are permitted to go into the CBD. One of the vital purposes behind this situation is that absence of sound ways to deal with examine about the NMT.

## RESEARCH ISSUES ADDRESS TO ACHIEVE THE SMART TRANSPORTATION SYSTEM

### Issues in traffic management

- Lack of developing the effective tools for handling the lane based traffic.
- Understanding the effect of traffic demand measures such as parking fees, toll fees, congestion charging, etc.
- Impact of share auto concepts and car pooling in traffic flow.
- Developing the strategies for traffic after the disaster scenario.
- Faulty intersections, narrow roads, sharp curves, poor upkeep of vehicles.
- Plying of vehicles in conflicting junctions.
- Increase of road accidents.
- The streets which are generally designed for slow and fast movement are interchangeably used.

### Issues in Non-Motorized Transport

- Need and role of NMT in the urban mobility.
- Improve the change in policy and planning guidelines for NMT.
- Development of access to the pedestrianization, pedestrian zones, etc.
- Provide standards for the development of pedestrian facilities for the same.
- Develop the geometric design for NMT to provide the connectivity and safe travel across the city.
- Identification of barriers that affects the NMT and remove it.
- Understanding the potential of traffic claiming in the pedestrian safety.

### Issues in Parking

- Inadequate data for drivers.
- Inefficient utilization of existing stopping limit.
- Excessive vehicle usage.
- Economic, environmental and aesthetic impacts of parking facilities.
- Parking spaces that are an inconvenience.
- Demand for debilitated parking spaces.
- Impact of extra parking spots.

- Existing, severe, overflow issues.
- Out-of-town parking.
- Inadequate pricing methods.
- Lack of sufficient parking at event site.

## CONCLUSIONS

This paper address that what are the challenges and the issue that acts as the barriers for achieve the smart transportation system for Chennai city. The issues that act as the barriers are traffic congestion, parking issues and pedestrian activities have been clearly explained in this paper, and the further research can be carried out in developing the city in the smarter way with these challenges.

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