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Transportation Management in Pune CIty

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ABSTRACT

In India Prime Minister Shri Narendra Modi decided to build 100 smart cities in India, and one of them is Pune, pune is the ninth-most populous city in India and second largest city of Maharashtra after the capital of Mumbai. Pune is also in the rank of world largest city in the world by 101st by the population and also considered in the cultural capital of Maharashtra. Pune is also one of the fastest growing cities in the Asia-Pacific region. The 'Mercer 2015 Quality of Living rankings' evaluated local living conditions in more than 440 cities around the world where Pune ranked at 145, second in India after Hyderabad (138). In Pune there are lots of problem are being happened like traffic jams, roads are not wider for more traffic, no smart transportation is there in city. In this paper we talk about the Smart Transportation Management. To control the traffic in Pune, PMC launched the rapid transit system (MRTS) with Intelligent Transit Management System (ITMS). The average number of buses per lakh population is only 37, compared to the benchmark of 55. In this city most of the areas are going on under construction of bridge, because of that heavy traffic may occurs on office timings. All this type of study, implementation and new things which are useful for this city are mentioned in short details in this paper.

Keywords: GPS, BRTS Network, CNG buses, MRTS, ITMS

I. INTRODUCTION

1.1. General Information

Efficient Parking, Traffic Management and Intelligent City Bus Service for Citizens.

A significant rise in the number of private vehicles and the lack of public transportation options have led to massive congestions across the city, with an average speed of 18 kmph, Pune is the only city among the top eight in the country without a mass rapid transit system (MRTS). The average number of buses per lakh population is only 37, compared to the benchmark of 55. This has resulted in 18% share of public transportation vs the 50% benchmark. The city has growing with most new job opportunities in IT and manufacturing being created on its outskirts. This has increased the averaged trip length to 10 km with 30% of bypass traffic going through the heart of the city. A lack of ring roads makes matters worse. While 50% of the commute is less than 5 km, limited non-motorised transport (NMT) options for pedestrians and cyclists has discouraged usage.

1.2. Transport and Mobility : Issues

- People have to visit 20 minutes before they get a bus.
- Only about a 5^{th} of all commuters use public transport leading to abig push on private vehicles.
- Pedestrian safety remains another major area of concern as $1/4^{th}$ of the city does not have footpaths and even where they exist, they are marred by significant obstructions.
- Average trip length is already at 10 kms today which will increase in future with the city expanding into the hinterlands.(8)

1.3. CNG Buses for Public Transport

- Total bus fleet – 1523
- Number of existing Buses running on CNG – 574
- Purchasing of additional CNG buses (in process) – 660
- Proposed new Buses under JNNURM – 400

Key Initiatives in Area-based development:

- BRT corridor of 8 km length that benefit the ABB area and other areas of Pune.

- Redesign 27 km streets, 60 km footpaths, 14 junctions
- Public bicycle sharing system with 1200 bicycles
- Smart Multi-level car park for 750 vehicles
- 100 electric buses, 100 e-rickshaws
- Development of 54 smart Bus Stop

Bus Depots equipped with CNG stations:

- Kothrud
- Na.Ta.Wadi
- Sant Tukaram Nagar
- Hadapsar
- Two more depot propose

1.4. Transportation conditions in the city

- Pune relies solely on buses for public transportation. Detailed roadmap created for 98 km of an integrated BRT system, of which 8 km is already functional, with good daily ridership of 30,000. Another 14 km will be functional by January 2016.
- PMPML (Pune Mahanagar Parivahan Mahamandal Ltd.) was hired 660 buses for the BRT corridors.(5)
- ITMS (Intelligent Traffic Management System) has been installed in 220 buses (PIS, two-way communication, control centre). Online ticketing rolled out based on Common Mobility Card Guidelines, 464 new bus shelters were installed and 2 new depots will be functional.
- 200 km of Footpaths and 100 km of Roads have been constructed.
- Government of India have been approved of two metro lines totalling 31 km.

1. Four corridors are identified as a Primary BRT Network to be implemented on a priority (Phase I) with a total length of 68.8km
2. Dedicated length - 58.3km (85%)
3. Mixed Corridor - 10.5km (15%)

Key issues facing Pune in Transportation Management

A significant rise in the number of private vehicles and the lack of public transportation options have led to massive congestions across the city, with an average speed of 18 kmph. Pune is the only city among the top eight in the country without a mass rapid transit system (MRTS). The average number of buses per lakh population is only 37, compared to the benchmark of 55.

- 8-km BRT linking Hinjewadi
- 54 regular bus stops with ICT solutions
- 100 e-buses for ABB–Hinjewadi connectivity.
- Non Motorized Transport focus through Public Bicycle Sharing with 40 stations, 42 km of cycle tracks, and redesign 60 km of footpath, 15 junctions and 27 km streets.

- **Increase public transport usage through better** availability and reliability. Against 40% benchmark, Pune has public transportation usage of only 15%.
- **Reduce congestion through adaptive traffic control** and modal shift to NMT (besides public transport).
  Peak hour average speed is only 20 kmph

1.4.1. Pune has identified solutions along two theme:

A. "Smart Pune Public Transport System" to improve availability, reliability and passenger comfort:

1. Vehicle health monitoring system (VMS) across ~1080 buses with intelligent kits and back-end maintenance management system.
2. Real-time tracking of 100 percent buses (vehicle tracking system [VTS]) by installing GPS and setting up a central command control room to monitor driving quality and service levels.
3. CCTV surveillance and panic buttons on 510 buses to improve security.
4. Public information system (PIS) comprising bus guides and LED screens depicting expected time of arrival (ETA) and other critical information across all 190 bus stops and in around 510 buses, along with mobile apps and website providing real-time information.
5. In-bus entertainment through Wi-Fi in around 1080 buses.

B. "Smart Pune Traffic Management System" to reduce congestion:

1. Adaptive traffic signals across 319 signals, with a central command centre, and also equipped with "pedestrian buttons" and PIS

2. Smart parking across seven multi-level car parks, with PIS and real-time mobile apps
3. Private bus aggregators, to provide premium bus options
4. Intelligent road asset management system to improve road condition (using geographic information systems, or GIS)
5. Traffic mobile apps and online portal with live and future traffic
6. Traffic analysis using CCTV feed and mobile GPS (similar to City logic concept in UK).

II. METHODS AND MATERIAL

2. Literature Review

In this work, a Smart Transportation Management System (STMS) based on GSM, GPS and large array of smart sensors integration has been developed for enhancing public and private transportation services. The system is composed of an embedded microcontroller based smart board called Smart Board, a Cloud based web application and Google MAP Services(4)

Jose M. Gutierreza*, Michael Jensenb, Morten Heniusa and Tahir Riazc (6), states on paper that practically demonstrate Geological Information System (GIS), we present a waste collection solution based on providing intelligence to trashcans by using IoT prototype sensors. A realistic scenario is set up by using Open Data from the city of Copenhagen, highlighting the opportunities created by this type of initiatives for third parties to contribute and develop Smart city solutions.

3. Research Methodology

3.1. Transportation Management

1. BRTS Corridors-where there has been a 12% model shift to public transport-there is clear evidence that people will use more public transport if the quality, reliability and availability of buses are improved.
2. Adding to public woes
3. Widening the road
4. Synchronized the signal timings
5. On-street parking is high
6. Pedestrian walkaways
7. Traffic analysis and forecasting using CCTV footage and mobile GPS that improves decision making and reduces disruptions
8. Implementation of paid parking policies throughout the city

3.1.1. Benefits

1. Mobile app to track 100% buses, all buses that are coded and equipped with SMS-based ETA service
2. Smoother traffic flow as adaptive traffic control implemented.
3. Significant reduction in congestion, high usage of a high-quality, smart integrated multi-modal transport (Bus, BRT, MRTS) system.

4. Data Collection

This section deals with the methodology of the study.
The areas discuss includes:-

- Collection of data and information from different Municipal Corporation.
- Study of Research Papers and Journals.
- Analyze the situations by visiting sites.
- Through study of execution of smart city in other countries.
- Comparative study of Metro City Management against Smart City Management.

Aim & Objectives of Study

1. To make reduce traffic on roads and population.
2. To make good healthy environment.
3. Make planned to build new techniques for transportation.

Objectives of Study

1. To control different types of pollution, i.e air, water, soil pollution.
2. Public Transport, last mile connectivity.
3. Reduce the amount of time and energy required to provide transportation management services.

Pune Smart Public Transport System

- GPS and real-time monitoring of buses
- Smart bus stops with public information system
- Real-time tracking of buses through mobile apps
- Vehicle health monitoring

Smart Adaptive Traffic Management System

- 319 signals
- Pedestrian right of way buttons and emergency response system
- PA system, solar panels and UPS

Table 1: City initiatives will improve the key indicators of Transport and Mobility

Sector	Metric	From	To	Benchmark
Transport and Mobility	Public transport usage (% of trip share)	10%	30 %	60%
	Availability of buses (%)	30%	50 %	20%
	Non-motorized vehicles (NMT) usage (%)	50%	30 %	20%
	Average traffic speed (km/hr)	20%	40 %	40%

III. CONCLUSION & RESULTS

1. Smart Cities must have Public Transport facility available at short distances in the form of Buses and Metros or even rapid metros so that People avoid using their own vehicles to go for any domestic work and even office work as it reduces our dependence on personal vehicles which reduces our consumption and dependence on foreign country for Petrol and diesel and most importantly it protect our environment from destruction and does not lead to Deforestation.
2. Transport is the big uses are now in big communication cities, parking is also main issues of them, lots of traffic jams are there in office time, so the solution are smart parking, BRT system, IoT techniques are used, metro which is very useful for people and for traffic management, BRT system developed by PMC which is successful ongoing project on particular areas where BRT's are available.
3. SMART Cities must have Public Transport facility available at short distances in the form of Buses and Metros or even rapid metros so that People avoid using their own vehicles to go for any domestic work and even office work as it reduces our dependence on personal vehicles which reduces our consumption and dependence on foreign country for Petrol and diesel and most importantly it protect our environment from destruction and does not lead to Deforestation
4. Improving traffic speed usage.
5. Increasing average traffic speed usage.
6. Increase the availability of buses in time.

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