SMART TRAFFIC MANAGEMENT: AN IMPORTANT STEP TOWARDS SMART CITY

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ABSTRACT

As for many developing nations, the twenty first century will be India's Urban, a period during which its population will become overwhelmingly urban in Cities are engines of growth for the economy of every nation, Including India. Nearly 31% of India's current population lives in urban areas and contributes 63% of India's GDP (Census 2011). As India's population is becoming more and more urban, the quality of life in its cities is receiving more attention from the popular media, business houses and corporations, as well as policymakers. Even politicians are incorporating aspects of it in their electoral strategies to gather urban votes. Last two decades or higher economic growth has improved the quality of life in Indian cities. But first we have to decide which components of quality of life to focus on, given that it is a very broad term covering a range of issues with little absolute agreement on what constitutes 'the good life'. Accordingly the purpose of the smart cities mission is to drive economic growth and improve the quality of life of people by enabling local area development and harnessing technology especially technology that leads to smart outcomes. Area-based development will transform existing areas (retrofit and redevelop), including slums, into better planned ones, thereby improving livability of the whole city. New areas (Greenfield) will be developed around cities in order to accommodate the expanding population in urban areas. Application of smart solutions will enable cites to use technology, information and data to improve infrastructure and services. Comprehensive development in this way will improve quality of life, create employment and enhance in income for all, especially the poor and the disadvantaged, leading to inclusive cities.

INTRODUCTION

In recent years popularity of private motor vehicles is getting urban traffic more and more crowded. As result traffic monitoring is becoming one of important problems in big smart city. Some of these concerns are traffic congestion and accidents that usually cause a significant waste of time. Property damage and environmental pollution. Any type of congestion on roads ultimately leads to financial losses. Therefore, there is an urgent need to improve traffic management.

Concept of Smart City in India

Smartness in city means different things to different people. It could be smart design, smart utilities, smart housing, smart mobility, (that is smart traffic management) smart technology etc.

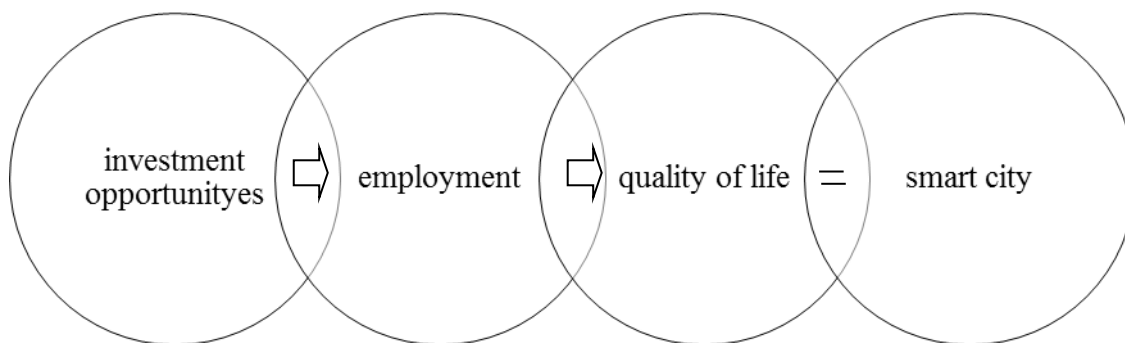**Environment & Social Sustainability**

Diagram No.1

Smart cities are those cities which have smart (intelligent) physical, social, institutional and economic infrastructure while ensuring centrality of citizens in a sustainable environment. It is expected that such a smart city will generate options for all residents to pursue their livelihoods and interests meaningfully and with joy.

Physical infrastructure refers to its stock of cost-efficient and intelligent physical infrastructure such as the urban mobility, the housing stock, the energy system, the water supply, sewerage system, sanitation facilities, solid waste management system, drainage system, etc. which all integrated through the use of technology.

It is in this context that the government has decided on developing l00 "Smart cities" in the country. Accordingly in his budget speech of July 2014, the finance Minister has stated as Follows:

> *"As the fruits of development reach an increasingly large number of people, the pace of migration from the rural areas to the cities is increasing. A neo middle class is emerging which has the aspiration of better living standards. Unless, new cities are developed to accommodate the burgeoning number of people, the existing cities would soon become unlivable. The prime Minister has a vision of developing 'one hundred smart cities', as satellite towns of larger cities and by modernizing the existing mid-sized cities'.*

BHAGWANSING M. BAINADE   2P a g e

Smart Traffic Management

Traffic congestion on road networks is nothing but slower speeds increased trip time and increased queuing of the vehicles. When the number of vehicles exceeds the capacity of the road . The number of vehicles using the limited road networks infrastructure has seen a tremendous growth recently. One major consequence of this increase is the orison management problems that range from traffic congestion control to driving safety and environmental impact over the last years. In the metropolitan cities of India traffic congestion is a major problem. Traffic congestion is caused when the demand exceeds the available road capacity. This is known as saturation Individual incidents such as accidents or sudden broking of a car in a smooth flow of heavy traffic have rippling effects and cause traffic jams. There are even severe security problems in traffic system due to anti social elements which also leads to stagnation of traffic at one place. In country like India there is an annual loss of Rs. 60,000 cores due to congestion (including fuel wastage). Congestion in India has also led to slow speeds of freight vehicles, and increased waiting time at city square. As result traffic is becoming one of important problem in big cities in all over the world. Traffic monitoring is becoming one of important problems in big cities infrastructure all over the world. Therefore, there is an urgent need to improve traffic management.

Traffic Management

"It is that aspect of management which deals with the planning, organizing, coordinating and regulating traffic operations, tools and methods so as to ensure safe, convenient and economic transportation of persons and goods".

In traffic management, four aspects are very important. They are known as 4 Es of traffic management they are

1. Enforcement
2. Education
3. Engineering
4. Environment

Our cities are faced with rapid motorization. This has led to severe congestion, deteriorating air quality, increasing incidence of road accidents and a rapidly increasing energy bill. Waking and cycling have been rendered unsafe due to poor infrastructure and public transport has been inadequate. So far, urban transport planning has emphasized providing for the personal motor vehicle. Public transport systems have been planned in isolation with the result that a well integrated multi-model system has not come up. This has resulted in high cost facilities not giving the outcomes that were sought.

BHAGWANSING M. BAINADE   3 P a g e

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(IMPACT FACTOR 2.07) INDEXED, PEER-REVIEWED / REFEREED INTERNATIONAL JOURNAL

Ease of being able to move from one place to another is at the core of a "Smart City" Seoul, Singapore Yokohama and Barcelona (all considered smart cities) have a sound transport system as the core of their "Smartness". The smart transport system emphasizes walking, cycling and public transport as the primary means for mobility with personal motor vehicles being actively discouraged. In fact, smart cities lay considerable emphasis on the walk ability and cycling in the city. The pedestrian in given a place of prominence as every trip has a leg that involves walking. However, smart city need to look into the bottlenecks of road/rail networks also and wherever required underpasses, elevated roads, additional rail networks need to be put in place urgently.

Cycling is one of the, most cost efficient and environmentally sustainable mode for commuting in cities. Many cities across the world have given emphasis to it and developed the required infrastructure for promoting cycling. Also programs like bicycle sharing such as Velib in Paris can be promoted to decongest the CBDS.

If cities are to be efficient engines growth, it is important that goods are able to move from production centers to consumption centers at low cost and high speed. Therefore, a good freight movement system acquires importance.

1. Improvements in public transport-Metro Rail, BRT, LRT, Monorail, Trams etc.
2. Improvements in infrastructure of other motor vehicles-ring roads, bypasses, underpasses, elevated roads, improvements in the existing road ways.
3. Improvements in infrastructure for walking, cycling waterways.

Major problem of traffic is citizens not using public transport and citizens not aware about bus timings and location. Second problem is traffic congestion on roads. A third problem is traffic signals not being managed properly, fourth problems are emergency vehicles like ambulance stuck in traffic jams and fifth problem is parking problem.

Public transport is often labeled as unreliable and erratic, people are unaware of the timing and frequency of busses due to unavailability of actual information and location of busses, people prefer buying own vehicles or using taxis leading to more congestion on roads, buses often run behind schedule and sometimes some bus stops are skipped leading to inconvenience.

Advantages of Public transport

Less pollution by using shared transport decongestion of roads as people stop using personal vehicles, parking issues addressed, organized and predictable movement of traffic, increased

revenue for Municipal Corporation and Government, shift of investment from creating more flyovers and roads to creation of more public transport assets.

To create smart transport system an application which will run on Android mobile, every bus conductor and radio cabs to have this application installed on a basic smart mobile to be provided along with preloaded application. The application will monitor real time movement of all the busses and cubs in the city through gPs on city map. Bus conductors to enter number of passengers present in the bus at every bus stop and also raise Panic Alarm in case of emergency low maintenance as no extra hardware to be fitted in bus.

The same application to be used by citizens to know about the exact location of public transport buses. Traffic situation in all parts of city will be monitored on real time basis. Citizens will start using public transport due to better reliability and service leading to decongestion of roads and decrease in pollution level.

Traffic signals are the most convenient method of controlling traffic in a dusky junction. But we can see that these signals fail to control the traffic effectively when a particular lane has got more traffic than the other lanes. Traffic signals are often too long or too short and do not reflect the need of the hour. Does not take into account major events, functions leading to occasional and heavy traffic on a particular road. The flow of vehicles changes dynamically and often can't be predicted; hence predesigned signals are highly ineffective.

SMART Signal Technologies

Based on GPS data of bus movement, the traffic movement and congestion can be automatically monitored on a real time basis on the CLOUD through application. The application server to manage traffic signals in the city, through the controllers on signals, which is very easy to retrofit in the existing signal controllers. If a stretch of road reports slow traffic movement thereby indicating traffic congestion, the traffic signals to automatically turn green for a longer period of time. All signals to the city to be turned SMART through a small hardware, thereby leading to better traffic management.

Video analysis consists of a smart camera placed which consists of sensors a processing unit and communication unit. The traffic is continuously monitored using a smart camera. The video captured is then compassed so as to reduce the transmission bandwidth. The video analysis abstracts scene description from the raw video data. This statistic includes frequency of the vehicles average speed of the vehicles as well as the lane occupancy. The problems associated with video analysis are (a) the overall cost of the system is quite high (b) the system gets affected in case of heavy fog or rain (c) night time surveillance requires proper street lighting.

Infrared sensor is used to detect energy emitted from vehicles, road surfaces and other objects. The energy captured by these infrared sensors in focused onto an infrared sensitive material using an optical system which then converts the energy into the electric signals. These signals are mounted overhead to view the traffic. Infrared sensors are used for signal control detection of pedestrian in crosswalks and transmission of traffic information. The basic disadvantages of infrared sensors are that the operation of the system may be affected due to fog also installation and maintenance of the system is tedious.

In addition to the earlier method of traffic congestion detection, one more method can be used. A server can be maintained which can receive certain crucial data calculated by the controller of the signals. The main aim is to implement a system that would trace the travel time of individual cars as they pass the roadside controllers and compute an average trip time using a rule-based system to decide whether the area is congested or uncongested. If congestion is sensed then system would control traffic signals/generate automatic re-routing massages to selected approaching vehicles.

We can use this technique to calculate the speed of a motorist and to detect if he violates the prescribed set speed limit. If the motorist violates the rule a warning massage will be sent to the motorist via audio and/or video interface and penalty will be calculated in the server and billed monthly to the vehicle owner.

This method will help reduce congestion on roads and would help in coping with accidents as the heavy vehicles and light vehicles will be in different lanes. Resultantly, a solution to much critical problem of traffic congestion and fatal accidents is possible using this system. The proposed system based on the information technology.

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BHAGWANSING M. BAINADE   6 P a g e

VOL 2, ISSUE 2   www.puneresearch.com/times   APR-JUNE 2017
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BHAGWANSING M. BAINADE   7 P a g e

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