# Smart City Essentials: Gap Between Concept, Infrastructure and Approach

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# Abstract

Everyone dreams of a beautiful house, comfortable conveyance and a useful workspace. In between and around comes the remaining infrastructure. Though essential, it is still secondary on the minds of people. The primary concern of every working individual is to have these three essentials. While all these are to be fulfilled by him or his employer, it is the responsibility of government to provide, maintain and upgrade the required infrastructure with time. The government is also entrusted to educate and make people (users) aware of standard methods of using these utilities, to make them last longer and in aesthetically useful condition. The modern cities of India are reeling under multiple problems due to tremendous migration. A heterogeneous mix of urban population poses cultural and economic difference in life style and behavior. A serious concern among others is providing a safe, contemporary and cost effective solution to all road users, including pedestrians and cyclists, which are two significant mode of green travelling in urban places. Many countries greatly promote these modes of urban travel yet in India it is still perceived as financially deprived man's compulsion. It is important to make legal provisions and technical specifications to facilitate users to go for green and healthier transport which also needs paradigm shift of masses. With mass transport system being the order of day, feeder transport like cycles have potential to serve the purpose in perfectly effective manner. The aspects of urban green transport are discussed in present study in context of Rajkot city of Gujarat, India.

Keyword- Smart City, Urban Traffic Problems, Sustainability Of Urban Infrastructure, Stakeholder's Awareness, Rajkot City

# I. INTRODUCTION

Sustainability is the cornerstone of consistent growth in any field. An urban settlement is a conglomeration of differences. Different purposes, based on different work requirements and nature of economic activities, require travelling of short and long distances across the city. With major expansion of many cities due to industrialization and better infrastructural facilities, people are required to travel considerable distances to fulfill various needs. Mass rapid transport systems like BRTS, Metro, tram, sub-urban rail system, etc. are suitable and used in various cities of India at different success levels. The economic reforms have enabled average Indian's purchasing power. With facilitation by banks in form of easy loan, large numbers of two wheel and four wheel vehicles have filled the urban road. This burgeoning growth of vehicles has created a virtual chaos on the roads, having limited capacity. Due to little scope of widening of road in unsystematically expanded cities, the traffic movement has become snail paced, especially at peak hours. This is combined with the change in lifestyle of urban dwellers based more on comfort than fitness, as they prefer going by vehicle rather than walk small distances too. While mass transit system has greatly reduced burden on roads, the acceptability of these is still hesitant and partial. One great lacuna in complete acceptance of such rapid transit system is feeder service. Reaching to pick-up/ drop points is still a harrowing task for most commuters. With no organized feeder service, like dedicated city bus or small carts, people have to rely on auto-rickshaw or irregular local bus transport. This combined with parking woes scare the well-to-do potential (and targeted) commuter from using mass transit system, thereby making the whole effort redundant.

# II. CONCEPT OF SMART CITY

A smart city is conceived as an urban setting wherein the requirements of all class of people is fulfilled effectively with optimum utilization of resources and ensuring sustainability of natural environment including health.

In the urban planning field, the term "smart city" is often treated as an ideological dimension according to which being smarter entails strategic directions. Governments and public agencies at all levels are embracing the notion of smartness to distinguish their policies and programs for targeting sustainable development, economic growth, better quality of life for their citizens, and creating happiness.<sup>4</sup>

There are six most important components of any smart city and each component corresponds to the related aspects as mentioned in Table 1.

Components of a smart city	Related aspect of urban life
smart economy	Industry
smart people	Education
smart governance	e-democracy
smart mobility	logistics & infrastructures
smart environment	efficiency & sustainability
smart living	security & quality

Table 1: - Components of a smart city and related aspects

#### A. Smart economy:

Public expenditure on R&D, public expenditure on education, GDP per head of city population, unemployment rate.

#### B. Smart people:

Percentage of population with secondary-level education, foreign language skills, participation in life-long learning, Individual level of computer skills, patent applications per inhabitant.

## C. Smart governance:

Number of universities and research centers in the city, e-Government on-line availability and percentage of households with Internet access at home, e-Government use by individuals.

#### D. Smart environment:

ambitiousness of CO2 emission reduction strategy, efficient use of electricity, efficient use of water, area in green space, Greenhouse gas emission, intensity of energy consumption, policies to contain urban sprawl, proportion of recycled waste.

#### E. Smart living:

Proportion of the area for recreational sports and leisure use, number of public libraries, total book loans and other media, Museum visits, Theatre and cinema attendance.8

Creativity is recognized as a key driver of smart city, and thus education, learning, and knowledge have central role in smart city. Smart people generate and benefit from the social capital of a city, so the smart city concept acquires the meaning of a mix of education/training, culture/arts, and Business/commerce with hybrid social, cultural, and economic enterprises.7 The smart city does not mean just physical city but that of community. This perspective starts from the previous bottom-up knowledge scheme, and it aims at inspiring the sense of community among citizens.

Perhaps a reason that there is no general agreement about the term "smart cities" is that the term has been applied to two different kinds of "domains." It has, on the one hand, been applied to "hard" domains such as, buildings, energy grids, natural resources, water management, waste management, mobility, and logistics9, where ICT can play a decisive role in the functions of the systems. On the other hand, the term has also been applied to "soft domains" such as, education, culture, policy innovations, social inclusion, and government, where the application of ICT is not usually decisive.9

The standard definition of smart city may not be globally similar and the relevance of this term is largely contextual.

## **III.** SUSTAINABILITY OF EXISTING CITIES

Most cities in Europe and America were established in the 19th century when there was easy availability of land, gas and water. India is a late starter and is far more crowded and complex. Therefore India requires a much more efficient and sustainable solution for servicing urban areas and can reap the benefits by using technology to learn from practices from other parts of the world.Master plans are ready for seven brand new cities spanning 18 states in what will be the biggest urban development project. Their key features are: compact vertical developments, an efficient public transportation system, the use of digital technology to create smart grids for better management of civic infrastructure, recycling of sewage water for industrial use, green spaces, cycle tracks and easy accessibility to goods, services and activities designed to foster a sense of community.1

When traffic supply is inconsistent with the changed traffic demand, traffic problems will arise, such as traffic congestion. This is also of the primary reason for traffic congestion under the urban land re-development.13 Development of the city is expected to serve societal needs rather than just to produce GDP. The distribution of vehicles on the existing road network is seriously imbalanced, resulting in frequent bottlenecks on several main roads. Additionally, peak time is more chaotic as more people are burdened with work stress and are in haste. Secondly, other trip modes, specifically walking and bicycling, maintain significant positions because trip distance is relatively short in small and medium-sized cities.14

The third annual survey of Indian cities system (ASICS) was conducted recently in 21 cities across 18 states by Janaagraha Centre for Citizenship and Democracy. The evaluation of city performance on 83 parameters revealed following facts:

- 1) Despite being a planned city, Chandigarh ranked at last, which questions existing city planning and indicate more thinking on various related issues.
- 2) Most cities surveyed scored between 2 to 4.2 (on scale of 10) compared with global benchmarks (London-9.4, New York-9.7) which shows the vast gap between existing and ideal conditions.
- 3) The poor performance is largely the result of problem addressing approach by government rather than addressing flawed "legislation, policies, processes and practices underlying the various problems".
- 4) Improper management and staffing less power to administrators and under staffing has large demoralizing effect on caretakers of cities.

# IV. RAJKOT CITY

The city of Rajkot has recently been listed in top 10 cleanest cities in India. Though it is a matter of pride for the citizens and administrators of city, the ideals are a very far milestone. What the surveying agencies have revealed is a comparison of all the cities on various parameters. It does not indicate where these cities stand against the benchmark. While the task to reach ideal is very steep at this juncture, yet the positive approach and awareness about these through such evaluation and surveys will lead to change in general point of view.

The city is a major urban set up in large Kutch-Saurashtra region of western Gujarat, and thus experience a huge influx of semi-urban and rural adjacent places. The city is also local industry hub especially for machine parts, plastic and textile. This together has made the city multicultural and multi-activity centre spread in municipal area of 170 km<sup>2</sup>. With ever increasing expansion, largely unplanned, the city is expected to face more problems of water scarcity and drinking water distribution and sewage disposal is a big challenge for smart city planning.

## V. REQUIREMENTS FOR MAKING A SMART CITY

The standard definition for smart city indicates the ideals for various infrastructural facilities and services need to be made available under ambit of a clean environment with sustainability. Besides a lot of work to be done on waste disposal and clean air and water, a city needs traffic efficiency.

This study is aimed to bring two aspects of urban traffic practices to prominence, so that more focus can be given to them while planning for smart city: First, better pedestrian facilities and second, safe and connected cycle tracks. While the pavements on some roads provide path for walking, these are largely intermittent and often shared by cyclist or sometimes two wheelers also. The rule that the planners have tried to follow is that some form of public transport should be available within a 10-minute walk from home or office. Though many people would like to walk, but desist doing so due to absence of safe walk-ways and effective signals at road intersections and foot over/under bridge at busy intersections.





Fig. 1: Existing pedestrian way and usage in Rajkot

The minimum facilities provided for the people to walk are either misused by two wheelers or adjacent shops by extending their outlet. There are hardly any traffic signals for safe pedestrian crossings on busy road intersections. Also the mandatory zebra crossing is not marked on the roads. (Fig 1)

The gap in the existing facilities, behavior of user and policies of government can be visibly understood through Figure

2.



Fig. 2: Dedicated Pedestrian way across the Globe

To promote green transport, cycles are good and tested option of travel for both short and medium distances in many countries. The city presently lacks, both in terms of facilities like dedicated cycle tracks across the whole city as well as exclusively earmarked cycle parking. A little of those which exists are randomly encroached by auto rickshaws, cars, two-wheelers, etc. as seen in Figure 3.



Fig 3: Existing cycle way and usage in Rajkot



Fig. 4: Dedicated Cycle utilities across the Globe

In order to make these options truly viable a safe and dedicated route with proper sign and signals should be provide throughout the city. The developed countries have been laying a great emphasis on such mode of conveyance and provide all facilities in terms of policies, provisions, design, utilities and promotion (Figure 4). Some of the modern facilities to facilitate safe pedestrian and cycle movement can be seen in Figure 5.



Fig. 5: Dedicated Pedestrian and Cycle signal and actuator

# VI. CONCLUSION

Resorting to greener ways of transport is inevitable for a balanced and sustainable growth of a city. With limited road capacity and difficulty in road widening and creation of infrastructure to accommodate ever increasing population of vehicles, choosing the alternative mode of travels is a compulsion and the following need urgent attention:

While mass transit system has answered to long distance travelling, the feeder service still fights for sustainable environment friendly replacement.

Small distance travel on foot or cycle should be encouraged and supported through government policies and engineering initiatives.

- 1) While the scratches in this direction has been made in Rajkot city through cycle sharing and cycle borrowing schemes of RMC, especially for BRTS passengers, providing a safe environment through dedicated tracks and parking are must to achieve success in attaining green sustainable solution of a smart city.
- 2) Proper road markings, sign, signals and parking for cycle should be put in places.
- 3) Heavy fine must be imposed on violators.
- 4) Information of this intention must be disseminated to public through various media options like billboard, newspaper, etc.
- 5) Traffic enforcers should be trained to align their focus in this direction.

# APPENDIX

Parameters of ASICS

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