A Study on Finding the Most Significant Indicators for Smart City Planning of Vadodara, Gujarat

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Abstract

Infrastructure sector is the key driver for the Indian economy and contributes about 5% of its GDP. India's current population as per census 2011 is 121 crores out of which 31% of India's population lives in urban areas and contributes 63% of India's GDP. As population is growing more people are migrating to urban areas in search of better livelihood. To address the challenges of Urbanization and Urban Growth, Government of India has initiated many programs like AMRUT, HRIDAY, JNNURM, Housing for all, Smart City program etc. Smart city mission was initiated in 2015 and its mission is to empower the cities socially, economically and technologically. It mainly focuses on basic amenities, education, digitization, safety and security etc. This paper comprises of finding the smart city indicator which will have more impact on the development of city by the study of existing infrastructural facility of Vadodara city, Gujarat.

Keywords: Indicators, Infrastructure, Smart city, Urbanization, Vadodara

INTRODUCTION

Cities are flourishing due to growth in infrastructural facility. Infrastructure sector is highly responsible for driving India's overall development. According to planning commission, infrastructure investments are estimated to touch 8% GDP. Almost 37% of the investment in infrastructure comes from the private sector. India jumped 19 places to rank 35th among 160 countries in World Bank's Logistics Performance Index (LPI) 2016 (source: lpi.worldbank.org). India's current population as per census 2011 is 121 crores out of which 31% of India's population lives in urban areas and contributes 63% of India's GDP. Nearly 45.36 crore people are migrants in India, which is around 37.8% of total population. The main reason for migration is urbanization.

Urbanization rate is increasing every day in India. Starting from 1901, only 11.4% people were living in urban areas where as it has increased to 31.6% in 2011. It is expected that by 2030, 40.76% population will be residing in urban areas. Sustainable urbanisation can only be achieved by managing the migration of people. For solving these problems, government of India has initiated the smart city mission. In this research work we have studied the basic infrastructural facilities that are available in the Vadodara city and listed out the parameters which could be considered for designing and planning of it as a smart city.

OBJECTIVES OF STUDY
- To study existing infrastructure facility in context with smart city parameter for Vadodara city.
- To analyse smart city indicator which have more impact on development of smart city.

STUDY OF EXISTING INFRASTRUCTURAL FACILITY: VADODARA CITY

In terms of population as well as in area, Vadodara is considered as the third largest city of Gujarat. In 1981, 7.34 lakhs people were residing in Vadodara city whereas, the present population is 16.70 lakhs, as per census 2011. It is estimated that by 2041, it will be reaching around 37.12 lakhs. For accommodating this huge population, Government of India has initiated the smart city mission. From all over the country total 100 cities were selected and from Gujarat, 6 cities were selected, and they are Ahmedabad, Surat, Vadodara, Rajkot, Gandhinagar and Dahod.

Further study will be based on basic infrastructures like transportation, water availability, solid waste management, energy, safety etc.

Transportation condition

Vadodara city is very well connected by rail, road and air. It has the first green airport in Gujarat whereas stands second in India after Kochi. Vadodara Junction is one of the busiest junction of Gujarat and around 358 train passes from here each day. It has around 1,680 km of paved road and 400 km of unpaved road. Internal road connectivity is good in the city but there is a need for improvement in public transportation condition. Around 52 km of new road with width of 6-18 meter has been added to existing 900 km of road. 80 km of roads are made wall to wall, out of existing 425 km and 71 km of footpath have been added to these roads. 90% of the internal roads are converted to RCC roads. New flyovers have been constructed for the easy movement of traffic. Bus shelters have been increased from 110 to 300 number for the benefit of city bus passengers. City police is now using E-challan integrated with ANPR for good traffic management.

Availability of water

The water distributed in the city is around 380 MLD and 33% of it is supplied without pumping i.e. through gravity hence saving the power required for pumping. 90% of the household in Vadodara have water connections which are supplied through networks. VMC is ensuring quality monitoring in all the wards of the city. At present in most parts of the city, the water is supplied only for 1 hr or even less. To overcome this problem, they have introduced 24x7 water supply in 15% of the city households. They have also succeeded in reducing the water wastage by 33-40%.

Solid waste management

Vadodara has initiated Swachh Vadodara movement in 2014 and various stakeholders, NGO's and people of the city have taken part in it. It has been declared as the 10th cleanest city in the country. The waste produced in the city is almost 510 tons per day and the garbage collection is done door to door by GPS enabled monitoring system. The waste collected mostly comprises of organic matter, inert material and other waste. In 2012, 150 MT of solid waste is disposed by scientific disposal method which now has been increased to 350 MT. VMC has introduced energy generation from solid waste with 200 MT capacity. There is also an online grievance redressal system which works 24x7.

Safety and security

In 2011, Vadodara was ranked as one of the safest city in the country. Public participation in maintaining, prompt crime reporting, empowering women for self-defense, disseminating traffic awareness through various initiatives like Suraksha SETU program, Vadodara Traffic & Community Policing program. Introduced ABHYAM which is a helpline and response system for women working 24x7. Cognizable cases have been reduced from 27801 to 19317. 220 CCTV's cameras have been installed in the city till now for ensuring safety and security.

Availability of energy

The city of Vadodara is having surplus power supply. 100% houses in the city have been electrified and efficient metering and user-friendly billing system is adopted. VMC have reduced the transmission and distribution losses from 10.44% to 6.41%. Unscheduled outages have also been reduced through efficient distribution system. Almost 70% of the street lights have been converted to LED's for power saving. There has been an increase in the usage of renewable energy for ex. canal-top solar panel and roof top solar panel. This will reduce pressure on the demand for non-renewable energy sources.

FINDINGS

In the last 3 years, much efforts have been made by the city to improve livability, sustainability and economic development. From the service level benchmarking of Vadodara city, it is found out that there is a considerable service level gap in urban mobility, including public transport, pedestrian facilities, parking etc. Significant improvement is also required for water supply, sewerage, solid waste and storm water drainage management.

ANALYSING SMART CITY PARAMETERS IN CONTEXT TO VADODARA CITY

Many definitions of smart city exist today and hence there is no universally accepted definition for it. The concept of smart city, varies all over the world considering the level of development, keenness to adopt changes and reforms, resources and aspirations of the residents of city. For the designing of smart city, planners have decided 4 major factors for the comprehensive development and they are- economic, institutional, physical and social infrastructures.

A smart city should fulfil certain objectives for the urban development like promoting cities which have core infrastructure, provides a decent quality of life to its residents and have sustainable environment. The city should be promoting mixed land use and have housing opportunities for every section of the society. It should have open spaces and walkable localities. Various transportation options should be available making it cost effective and citizen friendly. Overall the city should have an identity of its own.

Albino et al. (2015) stated that initially in 1999 the first definition for smart city was based on three parameters- technology, people and community but with time these parameters are changing, and new dimensions are being formed. [1]

Aditya et al. (2015) analyzed that IOT (internet of things) is a way for building smart cities. They believed that by interconnecting everything the information can be shared easily, and decisions can be made in a faster way. [4]

Anthopoulos et al. (2015) identified six common dimensions, namely people, government, economy, mobility, environment and living which could be used for building smart city. [2]

Chourabi et al. (2012) acknowledged eight critical factors of smart city initiatives: management and organization, technology, governance, policy context, people and communities, economy, built infrastructure, and natural environment. Technology can be considered as a meta-factor in smart city development, since it could heavily influence each of the other seven factors. [6]

Nam et al. (2011) highlighted three main dimensions for building smart city- technology, people, and institutions. They highlighted the fact that social factors other than smart technologies are central to smart cities. There lies a connection between social and technical factors of services and physical environments in a city. [8]

MAJOR FINDINGS

A smart city has various dimensions and its performance can be evaluated based on these dimensions. Cities differ because of infrastructural, cultural and governmental terms, so there is no one, universal evaluation model for smart cities. By the through study and from the smart city guidelines provided we have identified 9 indicators which could be used for the development of smart city.

Economic factors- It is mostly related to different costs and investments made for the development of an area or city.

Environmental Factors- The use of technology to increase sustainability, livability of a city and to better manage natural resources.

Innovation and learning factor- A new or creative learning which helps in generation or development of technologies or applications.

Information Communication & Technological Factors- Networks play a crucial role in making smart cities a reality. It includes wireless infrastructure (fiber optic channels, Wi-Fi networks, wireless hotspots, kiosks) service-oriented information systems.

Mobility Factors- Helpful for reducing congestion and fostering faster, greener, and cheaper transportation options

Operational & Managerial Factors- It is concerned with converting materials and labor into goods and services as efficiently as possible to maximize the profit.

Physical Factors- It refers to the basic physical structures required for an economy to function and survive, such as transportation networks, a power grid and sewerage and waste disposal systems.

Political Factors- These are those factors which are confined to government's norm. They have the power to change results. It can also affect government policies at local to federal level.

Social factors- These are related to human development and growth. It includes factors like education, recreational facilities, safety etc. Focuses mainly on upliftment of people.

CONCLUSION

This paper explored that how the urbanization is increasing every day and people are transferring to urban areas in search of better livelihood. Vadodara is also facing the same scenario, and hence it is selected for the smart city mission. For finalizing the smart city parameters, we have studied the existing facilities available in the city. This paper provides the existing infrastructural facility available in the city and from the study, nine parameters have been selected which could be helpful for designing Vadodara as a smart city. Further study will include evaluation of priority index for the infrastructural planning of smart city.

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