

Smart Cities: A Giant Effort to Transform India

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Abstract: As the global population continues to grow at a steady pace, more and more people are moving to cities. Experts predict the world's urban population will double by 2050. Urban areas also contribute a higher share of GDP. In India, the urban population is currently 31% of the total population and it contributes over 60% of India's GDP. It is projected that urban India will contribute nearly 75% of the national GDP in the next 15 years. Cities are accordingly referred to as the engines of economic growth. There is accordingly a crying need for the cities to get smarter to handle this large-scale urbanization and finding new ways to manage complexity, increase efficiency, reduce expenses, and improve quality of life.

The smart cities will provide good infrastructure such as water, sanitation, reliable utility services, health care; attract investments; transparent processes that make it easy to run a commercial activities; to make citizens feel safe and happy. This paper deals with the key features of the smart city needed in the Indian context.

1. INTRODUCTION

Urbanization accompanies economic development. This is because urban areas provide the agglomerations that the industrial and service sectors need. This trend of urbanization continues to take place. 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.

Countries have taken different paths to development based on income vs energy consumption. While some, such as the oil rich countries, have adopted an energy intensive approach, others have adopted a more energy efficient growth path. In India, we should take the low energy path, especially in view of environmental sustainability as well as in view of the fact that we have to import a major part of our energy requirement, at prices that have been very vulnerable to the international political situation.

2. WHAT IS A SMART CITY?

The British Standards Institute defines it as "the effective integration of physical, digital and human systems in the built environment to deliver sustainable, prosperous and inclusive future of its citizens". Key 'smart' sectors of a city include transport, energy, health care, water and waste. A smart city should be able to respond faster to city and global challenges than one with a simple 'transactional' relationship with its citizens. Interest in smart cities is motivated by major challenges, including climate change, economic restructuring, the move to online retail and entertainment, ageing populations, and pressures on public finances.

Smartness in a city means different things to different people. It could be smart design, smart utilities, smart housing, smart mobility, smart technology etc. People migrate to cities primarily in search of employment and economic activities beside better quality of life. Therefore, a Smart City for its sustainability needs to offer economic activities and employment opportunities to a wide section of its residents, regardless of their level of education, skills or income levels.

It should provide a very high quality of life (comparable with any developed European City) i.e. good quality but affordable housing, cost efficient physical, social and institutional infrastructure such as adequate and quality water supply, sanitation, 24 x 7 electric supply, clean air, quality education, cost efficient health care, dependable security, entertainment, sports, robust and high speed interconnectivity, fast & efficient urban mobility etc. Safety and security of citizens is a basic need. A city that is considered unsafe is not attractive. Smart Cities are those cities which have smart (intelligent) physical, social, institutional and economic infrastructure. As such a Smart City will generate options for all residents to pursue their livelihoods and interests meaningfully with joy. As per Forbes rankings, top five smart cities in the world are Barcelona, New York, London, Nice and Singapore (Fig 1 to 5)



Fig. 1. Barcelona: Scored high on the Environment and Smart Parking.



Fig. 2. New York: Smart Street Lighting and Smart Traffic Management



Fig. 3. London: Technology and Open Data



Fig. 4. Nice, France: Environment and Agency Cohesion



Fig. 5. Singapore: Smart traffic Management and Creative use of Technology

3. WHY SMART CITIES FOR INDIA?

The concept of smart city is for the benefit of our country to endure a better lifestyle and get more job opportunities. When we Indians go abroad we see their development and then compare with our country. Luckily our government has taken up an initiative of making our cities better. Cities in India are not that good enough to live. Other nations have put up smart cities like Barcelona, Nice, Boston, Shanghai, Singapore etc. Our cities have more population than other nations like Singapore. The government has come with an investment of \$1.2 billion for 100 smart cities in the next 15 years. The project for 100 cities has already been approved by the Govt and thus project is ready to take off. If our cities do not develop in coming years, the living conditions will get worse due to rapid urbanization. Most of the cities in India face common problems such as traffic, average police activities, unemployment, parking problems at public place and the cities are not clean. With this project the government ensures the basic guidelines of smart city which reduces traffic as it promotes use of green vehicles or more public transport usage, better living conditions as the cities will be clean and it will increase employment. It brings up smart buildings which are "smart" in terms of saving our resources i.e. these buildings are named smart because they will save up to 30% of water usage, 40% of energy usage and the maintenance of these buildings will go down by 10-30 % (in cost). We all want our cities clean so that it can provide better lifestyle and attract business as well.

Challenges: The concept is not without challenges, especially in India. For instance, the success of such a city depends on residents, entrepreneurs and visitors becoming actively involved in energy saving and implementation of new technologies. India requires Singapore model for successful implementation.

4. PILLARS OF A SMART CITY

Institutional Infrastructure, Physical Infrastructure, Social Infrastructure and Economic Infrastructure constitutes the four pillars on which a city rests. The centre of attention for each of these pillars is the citizen. In other words a Smart City works towards ensuring the best for its entire people, regardless of social status, age, income levels, gender, etc.

Institutional Infrastructure refers to the activities that relate to governance, planning and management of a city. The new technology (ICT) has provided a new dimension to this system making it citizen-centric, efficient, accountable and transparent. It includes the participatory systems of governance, e-governance, the sense of safety and security.

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

Social Infrastructure relate to those components that work towards developing the human and social capital, such as the education, healthcare, entertainment, etc. It also includes performance and creative arts, sports, the open spaces, children's parks and gardens. These together determine the quality of life of citizens in a city. It is also necessary that city promotes inclusiveness and bring disadvantageous sections i.e. SCs, STs, socially and financially backwards, minorities, disabled and women into the mainstream of development.

Economic Infrastructure This would generally comprise the following:-

- Incubation Centres.
- Skill Development Centres
- Industrial Parks and Export Processing Zones
- IT / BT Parks
- Trade Centers
- Service Centres
- Financial Centers and Services
- Logistic hubs, warehousing and freight terminals
- Mentoring and counseling services

Institutional Infrastructure (Including Governance): The current governance structures do not focus on citizen participation. People do not get the feel of ownership of city. Therefore, there is a need for involving citizens in decision-making processes. Procedures are cumbersome and citizens often find it difficult to secure public services they seek. Further, responsibilities for different services are fragmented across multiple institutions, making the situation even more complex for any citizen.

Typically, the principle to be followed is “**Governance by Incentives rather than Governance by Enforcement**”. This would imply that people do the right things because they are good for society or there are incentives to do so and not due to the fear of penal action. However, a greater sense of respect for civic discipline needs to be brought in through **deterrents to civic indiscipline**. More specifically, Smart Cities would have municipal offices fully automated through IT based facilities.

5. PHYSICAL INFRASTRUCTURE

Urban Mobility: Ease of being able to move from one place to another is at the core of a “Smart City”. 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. Walking and cycling have been rendered unsafe due to poor infrastructure and public transport has been inadequate. 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. The pedestrian is given a place of prominence.

Reliable Utility Services: Reliable, adequate and high quality Utility services are critical in a Smart City. 24x7 services are necessary. For example, a minimum of 100 Mbps of internet bandwidth and wide availability of Wi-Fi will be very important features. Similarly, municipal services such as electric, water supply, drainage, solid waste management need to be of very high quality. Telephone services based on Direct-to-Home Fibre should be available for every household. The general appearance of the city has to be pleasing and clean.

The main utilities that need to be ensured are the following:-

Water Supply: Smart cities should have adequate availability of piped water supply that also meets benchmarks of water quality, pressure, etc. across the city. Dual water supply systems that serve the needs of drinking water and other needs would help in recycling water and conserving it. Adoption of new methods especially smart metering for reducing loss and energy consumption in water networks needs to be ensured.

Sanitation: Smart cities should have a City Wide Sanitation Plan for all parts of the city. The Plan is expected to be based on the concept of Decentralized Sewerage and Solid Waste Management System. Also, each and every household should have a toilet so that no citizen needs to defecate in the open. There is a need for 100% recycling in the sanitation system.

Solid Waste Management: Waste management is the “generation, prevention, characterization, monitoring, treatment, handling, reuse and residual disposition of solid wastes”. Indian cities are facing many issues with regard to waste management

The following strategies therefore need to be adopted:

- Segregation of recyclable and non-recyclable waste as well as wet and dry waste at the source so that there can be 100% recycling of solid waste
- Appropriate technology should be adopted for treatment of waste
- Put in place an effective collection and disposal system
- Encourage use of products based on recycling of solid waste especially – power, compost, building material.

Storm Water Drainage: Lack of storm water drains lead to water logging, sanitation problem and outbreak of vector diseases such as malaria, dengue and so on during monsoons in our country. Cities, therefore, need to adopt a storm water management approach.

Electricity: Smart cities need to have universal access to electricity 24x7. The cities should shift towards smart metering at the household level and the establishment of a smart grid and its integration with the renewable sources such as solar and wind energy.

Internet and Telephone: A 100 Mbps internet backbone coupled with 100% coverage of the area by cell phone towers and a high level of telephone penetration will be essential in a Smart City as most services will have to be offered online. Fibre Optic connectivity to each home, Wi-Fi in all public places and educational institutions would be important feature of a Smart City.

Urban Development: The rapid urbanization of cities has resulted in unplanned development and urban sprawl. Most of the cities in our country are marred by congested CBDs and deteriorating city core. It is therefore essential that while planning for the smart cities, emphasis is given to planned development and decongestion of the CBDs.

6. SOCIAL INFRASTRUCTURE

Education: The city should have quality educational facilities, both for schools and higher education in every neighbourhood. This can be achieved with e-education and digital content.

Healthcare: High quality healthcare facilities are important factors in making a city liveable and attractive for people and businesses. This would necessitate creation of Electronic Health Record for every resident and adoption of telemedicine.

Entertainment: Good entertainment facilities make the people in a city happy. Theatres, concert halls, auditoriums, cultural centres, open spaces and plazas allow opportunities for recreation, important for healthy and happy living.

Good Sports Facilities: Children park, stadium, swimming pools, neighbourhood sports complex, golf courses.

Health Infrastructure: Making healthcare affordable and accessible for all its citizens is one of the key focus areas of the country today. In smart city approach in order to complement the skills, expertise and resources of each other as well as alleviate the financing burden for the growth and development of the healthcare sector, the private and public sectors are now working together at a varied pace. Some of the successful Public Private Partnerships (PPP) involves laboratory services (pathology, radiology, CT scan, MRI etc.), mobile medical units, PHC management, telemedicine services and hospital maintenance. Therefore, the need of the hour is to develop **Medi-city** in every Smart city with minimum land of 50-100 Acres.

7. ECONOMIC INFRASTRUCTURE

Financial Sustainability: The services need to be financially sustainable so that there are no financial constraints to delivering quality services. However, in doing so, tariff structures adopted should be such that they are affordable for the poor and yet recovers costs at higher levels as use. The revenue gaps can be bridged by innovative means to raise and allocate resources to the service. Use of the private sector would be a good way of tapping efficiencies in delivery to reduce costs.

Establishing Incubators and Creations of Jobs: Creation of a start-up eco-system requires an incubator being set up and spreading the culture of innovative thinking and finding solutions. Each city will house an incubator and 1000 start-ups per incubator shall create at least 1000 jobs per year. This will result in one million jobs created per year.

8. INSTRUMENTS THAT MAKE SMART CITY POSSIBLE

Energy Efficiency: Energy concerns are also a key feature of “Smart Cities”. Energy efficient practices are adopted in transportation systems, lighting and all other services that require energy.

Smart Grid: Smart grids include electricity networks (transmission and distribution systems) and interfaces with generation, storage and end-user.

Demand Management: Smart Cities would lay special emphasis on demand management, by creating incentives for savings and disincentives for excessive consumption. This could be by way of rate structures that are affordable and low levels of consumption, but increase steeply as more is consumed. For transport systems the demand management efforts will be such that they promote the use of non-motorized modes of travel or public transport and discourage personal motor vehicles.

Improved Access to Information: A very important feature of all smart cities is good citizen access to information. This could be through multiple channels – internet, mobile apps, radio, TV, print media, etc.

Environmental Sustainability: Pollution in our cities is growing at an unprecedented pace. This has resulted in a high rate of air borne diseases. It is therefore important that smart cities that are planned are environmentally sustainable.

Instruments Facilitating the Development of Smart City

Use of Clean Technologies: As per the WHO report, Indian cities are amongst the most polluted. *Use the* technologies that harness renewable materials and energy sources and have a lower smaller environmental footprint.

Use of ICT: The extensive use of ICT is must to ensure information exchange and quick communication. Most services will need to be ICT enabled. The ability to shop on-line or book tickets on-line or converse online is very powerful ways of reducing the need for travel, thereby reducing congestion, pollutants and energy use.

Participation of the Private Sector: PPP allows Government to tap on to the private sector’s capacity to innovate, invent and bring in efficiency. Greater involvement of the private sector enables higher levels of efficiency.

Citizen Participation: Citizen Consultation and a transparent system by which citizens can rate different services is yet another instrument for improving performance.

Smart Governance: For cities to become smart, it is essential that the governance structure is also smart. Therefore, Urban Local Bodies (ULBs)/ parastatal would need to make effective use of ICTs in public administration.

Internet of Things (IoT): The IoT will play a major role in developing smart cities that help planners truly understand our everyday tasks. By 2020, the IoT will connect more than 50 billion devices and almost anything your connected car, your pet’s collar and even your city – will communicate with other things. IoT technology can help cities streamline operations, reduce resource consumption and enable better services to citizens.

9. CONCLUSIONS

It is expected that smart cities will become a sizable market, with projections of nearly \$40 billion spent on smart-cities technologies by 2016 globally. Real estate experts predict that smart cities will be attractive to the educated work force in the future. If the India has to become a super power, it requires complete transformation of people like Singapore to transform the country. “Smart cities” for India is no longer a luxury but need to accommodate huge population in creative way by providing economical housing, intelligent transport systems, facilitate assisted or independent living through tele-health and tele-care products and systems, provide effective water management, smart energy networks, communications, business opportunities and waste management. It will bring operational efficiency, environmental advantages and service improvements for decent living of all the categories of the citizens.

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