SMART CITY- SMART LIVES

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Abstract

The concept of smart city is a revolution in itself. Due to constraint in resources, there might be problem in providing services to the residents in future, so maintain a standard of living for growing population, necessity of smart city has aroused. This paper aims at describing the word smart along with its objectives. A Smart city mainly comprises of four pillars of infrastructure i.e. Institutional, Physical, Social and Economic Infrastructure, on which entire city is developed. In past few years, the different aspects of urban smartness is reviewed and compared with traditional cities to know how feasible it is in the respective cities. Smart City is defined on basis of Smart Transport, Smart Health, Smart Retail, Smart Factory, Smart Home and Smart Fitness which are known as the Elements of Smart City. A city to be known as smart city requires fulfilling certain criteria which has been discussed in detail in the paper.To support this information some images and few examples have been given.

Keywords: Pillars of Smart City, Elements of Smart City, Bench Mark of Smart City

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1. WHAT IS A SMART CITY?

A smart city is a developed urban area that enhances the quality of life and creates an economic development which is sustainable by improving in multiple key areas such as economic, people, living, mobility, environment and government and excelling in these key areas can be done through strong human capital, social capital and Information and Communication Technology infrastructure.

For a layman the picture of a smart city includes a list of infrastructure and services that describe his/her log of desires. With a motive for fulfilling the desires of the citizens, urban planners ideally focus on developing the entire urban eco-system. ICT i.e. Information and Communication technology forms the backbone of a smart city and is the main tool to address common problems like congestion and waste of energy. This can be a long term goal and urban planners can work for development of such infrastructure gradually, making the city smarter with time.

1.1 Objective of a Smart City

In initiation of the concept of smart cities, a set of objectives has been set to boost the cities that provides core infrastructure and give a suitable quality of life to its citizens, a clean and sustainable environment and application of 'Smart' Solutions. To improve efficiency of public utility in transportation, communication, water/gas/electricity supply and subsequently realize a modern lifestyle for the citizens. To improve safety and security in the living environment by utilizing technological innovations which subsequently adds to the inclusive growth prospects of these cities as well as smartness of the cities. Utilizing information technology to its best to habilitate the migrant population with e-management systems being the major backbone of infrastructure.

2. TRADITIONAL CITY V/S SMART CITY

Traditional city differs from smart city in different ways such as in traditional city there is High Power theft resulting in power shortages and intermittent blackouts while in smart city there is low theft, higher collections for the provider, adequate power supply, no blackouts and lower carbon emissions. In traditional city there are water shortages, timed water supply, and revenue losses for the provider while in smart city there is continuous and 24 hours water supply and higher collections for the provider. In traditional city there is high congestion, slow moving traffic, and high pollution while in smart city there is better traffic flow, low pollution. Traditional city need more apps or facilities to access citizen services while smart city will be well connected and will have smart portals to keep a track of utility services and other city level services.

Fig.1: A Smart City

3. PILLARS OF A SMART CITY

A smart city is represented by the four piers of comprehensive development — institutional, physical, social and economic infrastructure.
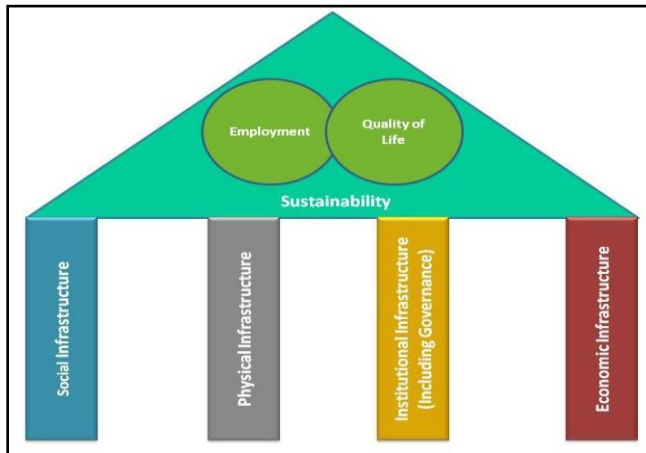

Fig.2: Four piers of a smart city

3.1 Institutional Infrastructure

Institutional Infrastructure refers to the activities that relate to governance, planning and management of a city. The new technology (ICT) provides a new ray to this system making its citizen more accountable, efficient and transparent. It works for the participatory systems of governance, e-governance, inclusive governance, the sense of safety and security and the opportunities for creativity.

3.2 Physical Infrastructure

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

3.3 Social Infrastructure

Social Infrastructure relate to those components that work towards developing the human and social capital, such as the education, healthcare, entertainment, etc. It also works on performance, sports and creative arts, 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 comprehensiveness.

3.4 Economic Infrastructure

For a city to attract investments and to create the suitable economic infrastructure for employment opportunities, it has to first identify its core competence, strength and analyze its potential for generating economic activities. Once that is achieved, the lacuna in the required economic infrastructure can be determined. This would generally include Incubation centers, Skill Development Centers, Industrial Parks and Export Processing Zones, IT / BT Parks, Trade centers, Service Centers, Financial Centers and Services, Logistics hubs, warehousing and freight terminals, Mentoring and Counseling services.
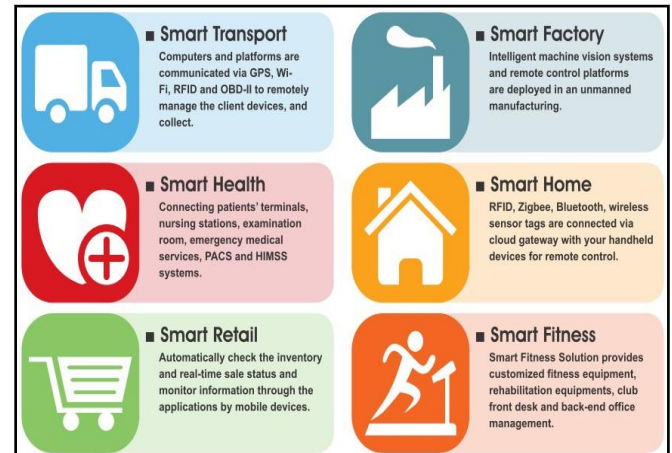
4. ELEMENTS OF A SMART CITY

Fig.3: Elements of a smart city

4.1. Smart Transport

Smart transport involves in creating walk able localities to reduce air pollution, congestion and less consumption of resources, enhances local economy, promote interactions and ensure security. The road network will not only concentrate on vehicles and public transport, but also on pedestrians and cyclists, and necessary administrative services are offered within walking or cycling distance.
-Geospatial-enabled services provides timely periodic traffic forecast, journey planning mobile applications based on real-time data, etc.
-Carpooling applications link drivers and passengers in real-time, thus enabling dynamic carpooling. Drivers wishing to profit from their journeys can find people situated on the same route via a smart phone app and vice versa.
-Integrated transport hubs seamlessly connect multiple modes of transportation like bus system, metro system, etc.
-A smart parking leverages parking sensors, cameras, smart parking solution, etc. to provide efficient management of on street and off street parking spaces

4.2. Smart Health

-IOE (Internet of Everything)can transform the healthcare sector, result in better health outcomes, increase productivity and provide an enhanced patient experience. Analyzing the data through internet in real time can positively impact patient outcomes and transform the way medical services are delivered.

4.3. Smart Retail

-With locational applications and websites now on consumers' smart devices, a more perceptive approach to customer profiling can be taken. When a customer activates one of these online resources, their locations and range of interests become readily available and curated content can be pitched in a bespoke way.

-Geospatial context will be analyzed when trying to assess a given branch's commercial success, such as the number of customers surrounding the building or branch, their detailed demographics, each customer's average length of shop over a series of visits and the regularity of returning shoppers. From these varied factors, a conversion rate can be calculated that involves a number of factors in order to more accurately reflect the appeal of a given branch and the performance of its staff.

4.4. Smart Factory

- A factory is only called a Smart Factory when its manufacturing is carried out in a smart way. Smart manufacturing is broadly categorized having a goal of optimizing concept generation, production, and product transaction.
- Smart manufacturing functions on basis of advanced information and manufacturing technologies which enables flexibility in physical processes in dynamic and global market.
- With the help of Smart manufacturing, traditional factories can be transformed from cost centers into profit centers so that progressive businesses will invest strategically for increasing sales.
- Traditional factories are cost centers which make more and more stuff while increasingly cuts cost which is beneficial for the consumers by buying all this affordable stuff.
- Hence such manufacturing intelligence **enables the factory floor to become a profitable innovation center.**

Fig.4: Smart Manufacturing

4.5. Smart Home

- A Home is a smart home when it is equipped with lighting, heating, and electronic devices that can be controlled remotely by smart phone or computer. Benefits of Smart Home are:
- **Convenience:** Convenience is one of the biggest reasons that attract people to build and buy smart homes. These homes give users remote access to systems such as heating and cooling systems, intercoms, music and multimedia devices throughout the home and etc.
- **Security:** Smart homes also provide an advanced security systems with cameras, motion sensors and a link to the local police station or a private security company. It may also use fingerprint identification or key cards in place of

conventional system of locks, making it difficult for someone to break in.
- **Accessibility:** Smart Accessibility is beneficial for elderly or disabled residents in ways like voice-command systems can do things like control lights, lock doors, operate a telephone or use a computer. Such home automation allows an individual to set a schedule for automatic tasks like watering the lawn, removing the need to perform these labor-intensive tasks on a regular basis.
- **Efficiency**: Smart homes offer enhanced energy-efficiency in ways like it can shut off Lights automatically when no one is in a room, and the thermostat can be set to let the indoor temperature drop during the day before returning it to a more comfortable level just before residents arrive in the evening. All of these automated tasks, along with modern, energy-efficient appliances, combine to save on electricity, water and natural gas, thereby reducing the strain on natural resources.

4.6. Smart Fitness

- Lack of activeness in a person's life can lead to a number of personal and health issues, which includes weight gain, onset of chronic and acute illness and also leading to low productivity in school, work and daily life. Similarly, constant activity can prevent and may even reverse many of these issues. A person's health can be boosted not only by moving around by walking, running but even by fidgeting in your seat.
- To boost people to stay fit, Smart Fitness has been implemented which provides custom-made fitness equipment, rehabilitation equipments, club front desk and back end office management.
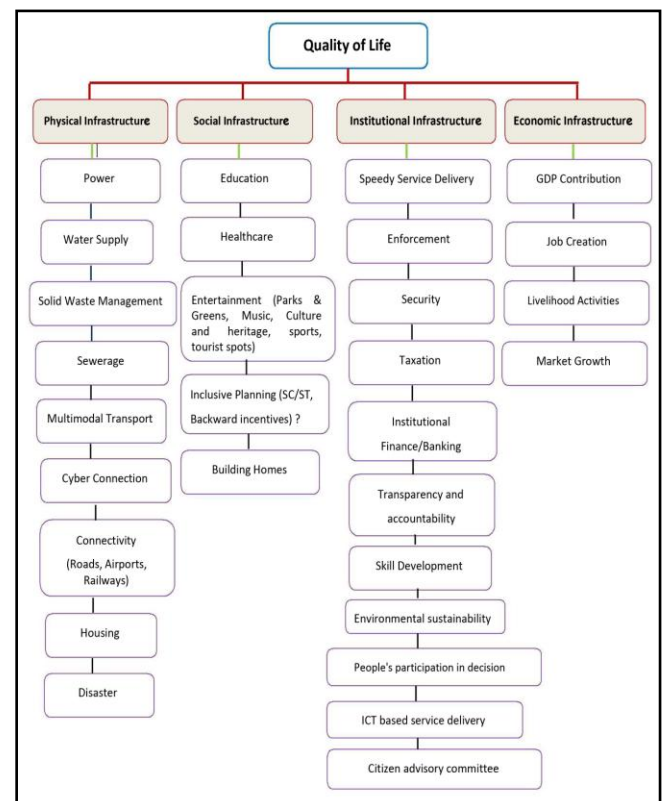

Fig.5: Quality of Life of a smart city

5. BENCHMARK FOR A SMART CITY

A city can be a smart city on followings basis:

- **Transport**: Travel time in small & medium cities should be 30 minutes & in metropolitan area in it should be 45 minutes maximum with heavy traffic. Minimum 2 m of continuous unobstructed footpath on either side of all streets with row 12m or more should be provided. Also a dedicated and physically segregated bicycle track with a width of 2 or more, one in each direction should be provided on all streets with carriageway larger than 10m (not Row).

-**Spatial Planning**: At least 95% of residence should have daily needs retail, parks, primary schools and recreational area accessible within 400 m walking distance. Also 95% residences should have way in to public, offices and institutional services by public transport or bicycle or walk. Economically weaker sections should occupy at least 20% of all residential units in each Transit Oriented Development Zone 800m from Transit Stations.

- **Water Supply**: There should be 24 x 7 supply of water. There should be provision of 135 liters of water supply per capita. There should be 100% metering of water connections. Smart cities should hence have adequate availability of piped water supply that also meets standard set for water quality, pressure, etc. across the city. The system of Dual water supply which serve the needs of drinking water and other needs would help in recycling water and conserving it.

- **Sewerage and sanitation**: Accessibility to toilets should be provided in each and every household. All schools i.e. 100% should have separate toilets for girls. 100% household should be connected to the waste water network also there should be 100% efficiency in the collection and treatment of waste water and sewerage.

- **Solid Waste Management**: There should be 100% of collection of municipal solid waste along with its separation at source where collected i.e. bio-degradable and non-degradable waste. 100% recycling of solid waste should be done.

- **Storm Water Drain**: There should be 100% coverage of road network with respect to storm water drainage network. Aggregate number of incidents of water logging reported in a year should be Zero and 100% rainwater harvesting shall be carried out.

- **Electricity**: There should be 24x7 supply of electricity. 100% households should have electricity connection and 100% metering of electricity supply should be done.

- **Health care facilities**: There should be 24*7 availability of telemedicine facilities to 100% residents. For every 15,000 residence there should be 30 minutes emergency response time and 1 dispensary. Nursing home, child, welfare and maternity center should have 20-30 beds per lakh population. Multi-Specialty Hospital should have 200 beds per lakh population, while General Hospital should have 500 beds per lakh population. Also there should be 1 Diagnostic center for every 50,000 residents, 1 Veterinary Hospital for every 5lakh residents and 1 Dispensary for pet or every 1 Lakh residents.

- **Education**: There should be 1 Pre-primary/Nursery School for every 2500 residents, 1 Primary School (class I to V) for every 5000 residents and 1 Senior Secondary School (Class VI to XII) for every 7500 residents. There should be 1 school for physically challenged for every 45000 residents and 1 school for mentally challenged for 10 lakh population.

There should be 1 college per 1.25 Lakh population For Higher educations, there should be 1 technical education center per 10 Lakh populations, 1 engineering college per 10 lakh population, 1 medical college per 10 Lakh populations, 1 other professional college per 10 Lakh population, 1 veterinary institute and 1 paramedical institute per 10Lakh population.

- **Fire Fighting**: There should be one fire station per 2 lakh population/ 5-7 km radium and one sub-fire station with 3-4 km radius.

- 100% of the city must have Wi-Fi connectivity, having an internet speed of 100Mbps.

- Rooftop Solar panels shall be used on all public, institutional and commercial buildings as well as multi-storied residential housings.
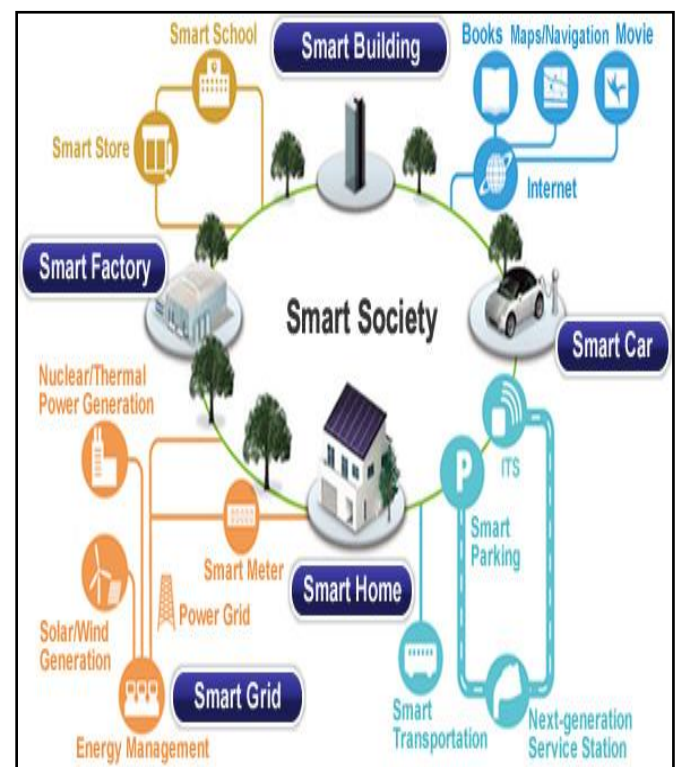

Fig.6: Benchmark of Smart Society

6. FINANCE

The project cost of each Smart City proposal will vary depending upon the requirements and capacity to execute and repay. To make a dream come true of smart city, the Central Government proposes to give financial support to the Smart city Mission to the extent of Rs. 48,000 Crores over five years i.e. on an average Rs. 100 crore per city per year. Here are few examples of State Government cities that have successfully set up financial intermediaries such as Tamil Nadu, Gujarat, Orissa, Punjab, Maharashtra, Karnataka, Madhya Pradesh and Bihar.

7. CONCLUSION

This paper attempts to clarify the meaning of the concept "Smart City" which is getting increasingly popular. Many elements and angles describing a smart city emerged from the analysis of the literature. This study showed how cities can be considered "SMART" by reviewing definitions, components and measures of performance of cities. Also with the help of the above information and supporting examples it has been concluded that smart city will purely bring great advantages in the future. A smart city would not only ease out the lives of people but also play a major role in protecting our environment. We would be glad if this paper will be useful to people in learning how to identify smart cities, to spur for their development and to monitor the smart progress of their cities.

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BIOGRAPHIES

B.E (Civil) from Bangalore University in 1995. L.L.B from Utkal University in 2010. Chartered Engineer from The Institute Of Engineers (India) (2014). Registered Structural Engineer for approved panel of BMC. (1998) (Regd. No. STR/S/217). Registered Quantity Surveyor from Local Authority (B.M.C).