ISSN (Online) 2394-2320

International Journal of Engineering Research in Computer Science and Engineering (IJERCSE)
Vol 4, Issue 3, March 2017

Redefining Smart Cities for a Sustainable Future

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Abstract - **Every city has its own history, culture and identity. There is no doubt that we need to nurture, preserve and renew the urban fabric with changing times. However, there is also a need to build new cities. A city is an economy of agglomeration; it provides various advantages and opportunities. India's economy is expanding rapidly. By 2030 it is expected to have grown by five times, During the same period, the country's labour force is expected to grow by 270 million workers, with urban jobs accounting for 70% of that growth.**

Today, India is less than 30 per cent urban and the quality of life in its cities is chronically low. However, with 2/3rds of GDP already generated in India's cities and rural to urban migration patterns accelerating, the country faces a critical challenge: managing this rapid urbanization in a way that enhances the livability of India's urban spaces. The wave of urbanization that is sweeping across India represents one of the country's greatest opportunities as well as one of its most serious challenges. India struggles with a number of significant barriers that continue to hamper the development of urban infrastructure: complex leadership structures, land valuation challenges, capability gaps, and funding shortfalls are all part of the urban challenge that is effectively holding India back from a new round of dramatic economic growth. India also needs to address the current problems of developing good infrastructure, solid waste disposal, flood management, storm water and sewerage system etc. resulting in urban decay, traffic gridlock and there by a deteriorating quality of life for many of its citizens.

With the mess that most Indian megacities are in, it is inevitable not only to drastically take steps to rehabilitate infrastructure in existing cities but build new cities to accommodate this burst in urban population. In many cases, if not all, retrofitting old cities with improved infrastructure and playing the 'catching-up' game is a more expensive and difficult-to-implement agenda. It is logical and quicker to build entire new smart cities from scratch instead.

But is India and its inhabitants ready to accept these smart cities, do we have that infrastructure and technology that will help to work for these smart cities. The answers to all these questions are unknown.

This research paper mainly focuses on these issues of smart cities and also raises a question whether India should opt for Smart cities or Sustainable cities.

Keywords:--- **urban fabric, Indian megacities, infrastructure in existing cities, Smart cities or Sustainable cities.**

I. INTRODUCTION

The wave of urbanization that is sweeping across India represents one of the country's greatest opportunities as well as one of its most serious challenges. India struggles with a number of significant barriers that continue to hamper the development of urban infrastructure, complex leadership structures, land valuation challenges, capability gaps, and funding shortfalls are all part of the urban challenge that is effectively holding India back from a new round of dramatic economic growth. India also needs to address the current problems of developing good infrastructure, solid waste disposal, flood management, storm water and sewerage system etc. resulting in urban decay, traffic gridlock and there by a deteriorating quality of life for many of its citizens.

The New Town Concept - The 'new town' concept, which came up a long time ago took cognizance of the inherent nature of things and tried to overcome urban decay by creating new planned settlements far away from the big metropolitan cities so that population aggregation at one place could be arrested and a more balanced distribution could be achieved. It was believed that this would over time help in building new communities and helps the parent metropolis to remain healthy and survive longer.

Regional development became a new area of interest and practice. At times, new towns have also come to be called 'satellite towns' as they are attached and function along with a parent metropolis. Existing cities have had huge extensions which are almost like new towns. Some examples are Rohini, Dwarka and Narela as extensions to Delhi, Navi Mumbai to Mumbai, Salt Lake City to Kolkata and Yelhanka and Kengeri to Bangalore. Noida,Greater Noida, Manesar, Pimpri-Chinchwad,

ISSN (Online) 2394-2320

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Rajarhat, Dankuni, etc are other examples of such new towns.

Many industrial townships as part of steel plants or large public sector undertakings have also been developed on modern lines from scratch. Bokaro, Bhilai, Rourkela and Vizag are such examples. In the private sector, Tata Steel'stown at Jamshedpur were the pioneers and other large business houses such as the Birlas, Modis, etc have also contributed to town building, basically to house their employees close to their factories. Where even new settlements have been developed, they have come up with a completely new infrastructure and are well planned. Over a period, they have been able to acquire their own identity and have successfully provided a reasonably good quality of life to the residents.

Private Cities **-** The concept of private cities is gradually gaining acceptance in India. If all goes well, India should have at least 30 private cities across the country by the end of this decade. The number could be even greater, depending on the manner in which India's policy makers allow this concept to germinate. India is now home to various types of private cities. There are private housing and commercial enclaves like those of DLF in Delhi and Hiranandani in Mumbai where the entire security, street maintenance and administration of the estate is managed by the developers. Then there are the larger industrial townships like Jamshedpur, Mithapur and Modinagar, where the entire town's administration is managed by the industry promoter (often uneasily) with the consent of the state government.

Lavasa, India's first fully planned hill city is developed primarily by Hindustan Construction Company (HCC) India and is set amidst 7 hills and 60 km of lakefront and spread over 25,000 acres. It is a convenient 3 hours drive from Mumbai, an hour's drive from Pune and is a whopping quarter size of Mumbai Lavasa is planned across four town centers. Designed for a population of 0.2 millions, Lavasa city will have a wide range of residences, from sprawling hillside villas, to up to 3 BHK homes and will offer homes which fit budgets across socio-economic classes.

New Cities **-** With the mess that most Indian megacities are in, it is inevitable not only to drastically take steps to rehabilitate infrastructure in existing cities but build new cities to accommodate this burst in urban population. In many cases, if not all, retrofitting old cities with improved infrastructure and playing the 'catching-up' game is a more expensive and difficult-to-implement agenda. It is logical and quicker to build entire new smart cities from scratch instead.

What is a Smart City? *A* ***smart city*** uses information and communication technologies (ICT) to enhance quality, performance and interactivity of urban services, to reduce costs and resource consumption and to improve contact between citizens and government. Sectors that have been developing smart city technology include government services, transport and traffic management, energy, health care, water, innovative urban agriculture and waste management. Smart city applications are developed with the goal of improving the management of urban flows and allowing for real time responses to challenges.
India is finally set to give shape to its futuristic smart cities - world-class, self sustainable habitats with minimal pollution levels, maximum recycling, optimized energy supplies and efficient public transportation.The Government of India under the Hon'ble Prime Minister Shri Narendra Modi has a vision of developing 100 smart cities as satellite towns of larger cities by modernizing the existing mid-sized cities.

The Smart Cities Mission is an urban renewal and retrofitting program by the Government of India with a mission to develop 100 cities (the target has been revised to 109 cities) all over the country making them citizen friendly and sustainable. The Union Ministry of Urban Development is responsible for implementing the mission in collaboration with the state governments for its the respective cities. Smart Cities Awas Yojna Mission was launched by Prime Minister Narendra Modi in June 2015. A total of Rs 980 billion (US$15 billion) has been approved by the Indian Cabinet for development of 100 smart cities and rejuvenation of 500 others. Rs48,000 crore (US$7.1 billion) for the Smart Cities mission and a total funding of RS. 50,000 crore (US$7.4 billion) for the Atal Mission for Rejuvenation and Urban Transformation (AMRUT) has been approved by the Cabinet. In the 2014 Union budget of India, Finance Minister Arun Jaitley allocated Rs7, 016 crore (US$1.0 billion) for the 150 smart cities. However, only Rs 9.24 billion (US$140 million) could be spent out of the allocated amount till February 2015. Hence, the 2015 Union budget of India allocated only Rs. 1.43 billion (US$21 million) for the project.

First batch of 20 selected cities are in the second stage of completion and they will be provided with central assistance of Rs. 2 billion (US$30 million) each, during this financial year followed by Rs. 1 billion (US$15 million) per year during the next three years. The remaining money has to come from the states, urban bodies

ISSN (Online) 2394-2320

International Journal of Engineering Research in Computer Science and Engineering (IJERCSE)
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and the consortium that they form with corporate entities. Also, 10 per cent of budget allocation will be given to states / union territories as incentive based on achievement of reforms during the previous year. Urban Development Ministry had earlier released Rs. 2 crore (US$300,000) each to mission cities for preparation of Smart City Plans. The cities selected have started project preparations and implementation.

- The projects launched by Ahmedabad are "sewage treatment plant, housing project and smart learning in municipal schools".
- Bhubaneswar launched "railway multi-modal hub, traffic signalization project and urban knowledge centre".
- New Delhi Municipal Council launched "mini-sewerage treatment plants, 444 smart class rooms, WiFi, smart LED streetlights, city surveillance, command and control centre".
- Launch of Smart city projects in Pune.

How smart these cities would be - A smart city is one that completely runs on technology—be it for electricity, water, sanitation and recycling, ensuring 24/7 water supply, traffic and transport systems that use data analytics to provide efficient solutions to ease commuting, automated building security and surveillance systems, requiring minimal human intervention, and Wi-Fi-powered open spaces and houses that ensure always-on, high-speed connectivity. And with the diminishing energy reserves the smart city project should not remain a dream unfulfilled. An alternative energy resource should be found and utilized for the functioning of smart cities. Energy that is renewable and sustainable. The city should be designed in a holistic pattern with multiple themes or components to ensure easy service delivery and quality life for citizens. With recent announcement of 98 smart city aspirants by the government, India has taken concrete steps towards the smart city transformation. As per the mission guidelines for smart cities released by Ministry of Urban Development, a clean and sustainable environment will be a significant feature for upcoming smart cities. The sustainability aspect is not just in terms of environment but also economic, social and governance. The three pillars of sustainable economic advancement, political participation and social emancipation are the core foundations of a smart sustainable city. Hence the objective should be designing smart cities by converging the aspects of sustainability

What is a sustainable city?

A **sustainable city** or eco-city (also ecocity") is a city designed with consideration of environmental impact, inhabited by people dedicated to minimization of required inputs of energy, water and food, and waste output of heat, air pollution - CO_2, methane, and water pollution. Ideally, a sustainable city creates an enduring way of life across the four domains of ecology, economics, politics and culture. However, minimally a sustainable city should firstly be able to feed itself with a sustainable reliance on the surrounding countryside. Secondly, it should be able to power itself with renewable sources of energy. The crux of this is to create the smallest possible ecological footprint, and to produce the lowest quantity of pollution possible, to efficiently use land; compost used materials, recycle it or convert waste-to-energy, and thus the city's overall contribution to climate change will be minimal, if such practices are adhered to.

It is estimated that over 50% of the world's population now lives in cities and urban areas. These large communities provide both challenges and opportunities for environmentally-conscious developers, and there are distinct advantages to further defining and working towards the goals of sustainable cities. Humans are social creatures and thrive in urban spaces that foster social connections. Because of this, a shift to denser, urban living would provide an outlet for social interaction and conditions under which humans can prosper.

Contrary to common belief, urban systems can be more environmentally sustainable than rural or suburban living. With people and resource located so close to one another it is possible to save energy for transportation and mass transit systems, and resources such as food. Finally, cities benefit the economy by locating human capital in one relatively small geographic area where ideas can be generated.

Sustainable cities can be achieved through various means, such as:

- Different agricultural systems such as agricultural plots within the city (suburbs or centre). This reduces the distance for food travels from field to fork. Practical work out of this may be done by either small scale/private farming plots or through larger scale agriculture (e.g. farm scrapers).
- Renewable energy sources, such as wind turbines, solar panels, or bio-gas created from sewage. Cities provide economies of scale that make such energy sources viable.
- Various methods to reduce the need for air conditioning (a massive energy demand), such as

ISSN (Online) 2394-2320

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planting trees and lightening surface colors, natural ventilation systems, an increase in water features, and green spaces equaling at least 20% of the city's surface. These measures counter the "heat island effect" caused by an abundance of tarmac and asphalt, which can make urban areas several degrees warmer than surrounding rural areas—as much as six degrees Celsius during the evening.

- Improved public transport and an increase in pedestrianization to reduce car emissions. This requires a radically different approach to city planning, with integrated business, industrial, and residential zones. Roads may be designed to make driving difficult.
- Optimal building density to make public transport viable but avoid the creation of urban heat islands.
- Solutions to decrease urban sprawl, by seeking new ways of allowing people to live closer to the workspace. Since the workplace tends to be in the city, downtown, or urban center, they are seeking a way to increase density by changing the antiquated attitudes many suburbanites have towards inner-city areas.

One of the new ways to achieve this is by solutions worked out by the Smart Growth Movement

- Green roofs
- Sustainable transport
- Zero-energy building
- Sustainable urban drainage systems or SUDS
- energy conservation systems/devices
- Xeriscaping - garden and landscape design for water conservation
- Key Performance Indicators - development and operational management tool providing guidance and M&V for city administrators.

Smart cities can be horizontal or vertical, depending on the available space. Singapore is an example of a vertical smart city, while Masdar in Abu Dhabi is a horizontal smart city. The first-of-its own kind, partially completed smart city project in Mumbai, which is expected to be completed in 2025, is Palava city by the Lodha Group. It will span 4,000 acres, and cost Rs.14,000 crore. For Palava, the Lodha Group has a franchisee agreement with Maharashtra State Electricity Distribution Co. Ltd for 24-hour electricity supply; solar panels will power street lights. It has a tie-up with General Electric Co. (GE) for 100% water recycling, and automated water metering and billing to ensure transparency and zero water loss. It will run a fleet of CNG buses within Palava city and connect people to nearby Dombivali station and Navi Mumbai. The Lodha World School will offer all established Indian and international syllabi. It has the potential to create 350,000 jobs by 2025.The second example for a smart and a sustainable city is the Masdar City - a planned city project in Abu Dhabi, in the United Arab Emirates. Its core is being built by Masdar, a subsidiary of Mubadala Development Company, with the majority of capital provided by the Government of Abu Dhabi. Designed by the British architectural firm Foster and Partners, the city relies on solar energy and other renewable energy sources. Masdar is a sustainable mixed-use development designed to be very friendly to pedestrians and cyclists. Masdar City has terracotta walls decorated with arabesque patterns. From a distance, the city looks like a cube. The temperature in the streets is generally 15 to 20 °C (27 to 36 °F) cooler than the surrounding desert. The temperature difference is due to Masdar's unique construction of a 45-meter-high (148 ft) wind tower modeled on traditional Arab designs, sucks air from above and pushes a cooling breeze through Masdar's streets. The site is raised above the surrounding land to create a slight cooling effect. Buildings are clustered close together to create streets and walkways shielded from the sun.

Integrated approach in both planning and execution - The path towards becoming smart and sustainable invariably requires coordinated action by the multiple city stakeholders. The complex city management structure needs to work in harmony in order to deliver the city's vision. This will require steering away from the traditional system of different city departments and agencies working in isolation towards a more integrated approach, both during planning as well as the execution of smart and sustainable strategies. A governance model with clearly defined leadership roles should be established to work around the complex city administrative structure. Cities to establish a nodal agency that will work together with city officials and policy-makers, in order to ensure that municipal strategies and urban planning targets are completely aligned with the city's overall smart and sustainable vision. These agency will be able to drive active collaboration and can serve as the single window for all stakeholders.

Governance for a sustainable future - Responsibility and accountability are integral towards making our community more sustainable. People, communal groups, organizations and businesses groups must recognize that the decisions made affect the sustainability of our community. Administrators needs to be accountable and responsive to their citizens, transparent in their reporting on the use of

public resources and in decision-making, and create opportunities for participation in policy as well as service delivery. Good governance serves as a powerful inspiration for promoting reforms in policies and programmes for sustainable development. These include open and transparent opportunities for the poor and underprivileged to access information and secure their rights over land, forest and energy resources. And we must hold each other responsible for the community's sustainability and for providing future generations with environmental, economic and social resources that meet their needs.

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