The State of Art: Smart Cities in India: A Literature Review Report

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Abstract:
The Smart Cities can be abbreviated as Sustainable Management Action Resource Tools for Cities. Smart cities' is the latest concept when it comes to building the cities of the future. Smart cities are expected to be the key to combining sustainable future with continued economic growth and job creation. This paper emphasizing a review on "The State of Art – Smart Cities creation in India" based on some scholastically reviewed research articles and online databases. More over this paper discussing about smart cities - concepts, operational definitions, dimensions, technologies that are driving and finally four Indian smart cities.

Key words: smart city; smart environment; smart governance; smart people; smart mobility; smart economy; smart living

1. Introduction

Globalization, with trade liberalization measures and fast technological changes altering the relations of production, distribution and consumption, has very substantial effects on city development. As one important consequence (network-) economies evolved" […] with easier physical movement, globalized players making decisions with no regard to national boundaries" (Thornley, 2000). Cities around the world aspire to provide superior quality of life to their citizens. Furthermore, many are also seen as centers of unique opportunities, like business, fashion, entertainment and governance, for their citizens. Cities want to retain such preeminent positions or re-position themselves for newer opportunities. But, resources needed to reach and sustain such aspirations are decreasing while the expectations continue to rise from an increasing population-base. A positive trend of the internet age is that more data than even before is open and accessible, including from governments at all levels of jurisdiction, which enables rigorous analysis. Wellington E. Webb - Former Mayor of Denver, Colorado said that about cities

"The 19th century was a century of empires;

The 20th century was a century of nation states;

The 21st century will be a century of cities"

Cities play a decisive role, not only in Denver-Colorado but throughout the world. Cities are driving the economy. Cities are where people want to live, invest and work. That is why cities are focal points in the future sustainable economy (Claus Bjorn Billehoj, Sustainable City Development, Municipality of Copenhagen). There are numerous definitions of the term 'city' depending on countries, but the most common one defines 'city' as a relatively large and permanent settlement. Paul R Brown, AICP, CDM Smith Executive Vice President defined that "Cities are complex ecosystems that are dependent on natural systems, challenging out thinking about the development of both natural and urban environment".

2. Smart Cities

Mitchell's (1995) book on the City of Bits sets out a vision of urban life literally done to bits, left fragmented and in danger of coming unstuck. Mitchell's (1999) next book on e-topia provides the counter-point to this vision of urban life and scenario where the city is no longer left in bits and pieces, but a place where it all comes together. As Mitchell's (2004) states in his more recent book: ME++: the Cyborg-Self and the Networked City, all this coming together is possible because: 'the trail separation of bits and atoms is now over' and this post-AD 2000 dissolution of the boundaries between the virtual and physical is what makes everything worth playing for (p.3). The first concerns the proliferation of cities that adopt intelligent city strategies and define themselves as smart or intelligent cities. Since 2005, when Urenio Watch (www.urenio.org) began recording developments in the field of innovation ecosystems and intelligent cities, the increasing announcement and diversity of cities announcement and diversity of cities adopting intelligent city

strategies has been noted. This has often led to a simplistic use of the terms 'Smart' and 'Intelligent', which are easily assigned to any digital application associated with cities-often just for marketing purposes-without making clear what intelligence is being improved and how Holland's (2008) accurately pointed out that urban development in many countries has been increasing influenced by smart city concepts, but despite the wide use of this urban labeling phenomenon, we now little about so called smart cities.

The Cities that Think for you are also calling as Electronic Cities, I(Internet) Cities, Cyber Cities, Connected Cities, Wired Cities, Ubiquitous Cities, Intelligent Cities, Semantic cities, Transparent Societies and Digital Societies or Digital Cities. This is a new paradigm on how to build cities, which requires new strategies, technologies, models and urban processes in order to meet the current challenges related to quality of life, balance of the environment and efficiency of natural resources, to inequality and social exclusion. Smart cities, digital cities and intelligent cities are concepts that have characterized recent academic literature. Smart Cities have been gaining popularity among researchers and practitioners. Smart Cities constitute a major breakthrough in contemporary urban development and planning literature, which spans over a period of 20 years. The first academic paper on intelligent cities appeared in 1992 (Laterasse, 1992), while the first academic paper on smart cities was also published in the same year (Gibson et. al, 1992).

2.1. Definitions

The term "smart cities" is a bit ambiguous. Some people choose a narrow definition - i.e. cities that use information and communication technologies to deliver services to their citizens. Some people prefer a broader definition: Smart cities use Information and Communication Technologies (ICT) to be more intelligent and efficient in the use of resources, resulting in cost and energy savings, improved service delivery and quality of life, and reduced environmental footprint - all supporting innovation and the low-carbon economy, accessed on 18/08/2013 (http://www.fastcoexist.com/1679127/the-top-10-smart-cities-on-the-planet). A city that monitors and integrates conditions of all of its critical infrastructures, including roads, bridges, tunnels, rails, subways, airports, seaports, communications, water, power, even major buildings, can better optimize its resources, plan its preventive maintenance activities, and monitor security aspects while maximizing services to its citizens (Hall, R. E, 2000).

2.2. Dimensions

Cities development presently depends not only on the city's endowment of hard infrastructure (Physical Capital) and social infrastructure (Intellectual and Social Capital) but also on the availability and quality of ICTs (Information and Communication Technologies). The ICT Form of capital is decisive for urban competitiveness. Based on this background the concept of the "smart city" has been introduced as a strategic device to encompass modern urban production factors in a common framework. Smart Cities outlines many of the opportunities for cities afforded by these contemporary technologies, indicating how the 'smart city' approach might fundamentally transform the way that cities are governed, operated, interacted with and experienced. Smart Cities can be identified along six main dimensions (IBM Smart Cities: www.ibm.com/uk/cities), (Giffinger, R et al, 2007). These axes are

- Smart Economy - Innovation and Competitiveness
- Smart Mobility- Transport and Infrastructure
- Smart Environment - Sustainability and Resources
- Smart People - Creativity and Social Capital
- Smart Living - Quality of Life and Culture
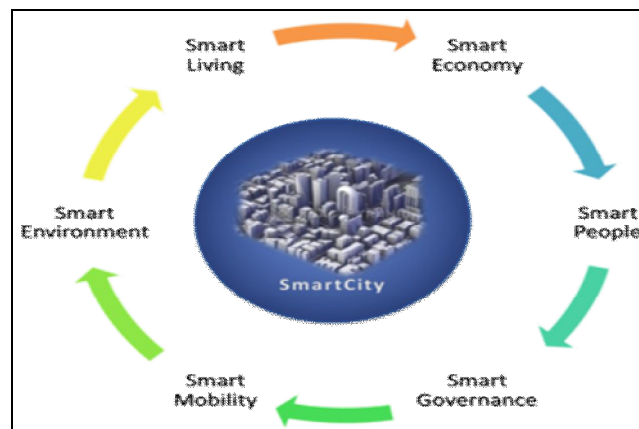- Smart Governance - Empowerment and Participation

Figure 1

2.3. Technological Agents

"The most profound technologies are those that disappear. They weave themselves into the fabric of everyday life until they are indistinguishable from it" - Mark Weiser.

Digital technologies captures, stores, analyses, manages, and presents data that is linked to a particular location and helps in resource management, asset management, archaeology, environmental impact assessment and urban planning. These digital technologies introduced in the very fabric of the city space is inflicting fundamental changes on the connection between the city and its inhabitants. At the same time it is making the hidden layers of social, economic, political processes and environmental, tensions, and flows transparent and visible in ways that were never possible before. Cities are made up of huge networks of people, organizations, businesses, infrastructure, consumption, energy, spaces and last but not least with technologies. In a Smart City, these networks are linked together, supporting and feeding off each other. The process of linking the many different networks of the city together in a system presents a number of technological as well as governance-related and social challenges. Starting with the technological challenges, most of the solutions which are needed in a Smart City have already been developed (Urban World: Mapping the Economic Power of Cities. McKinsey Global Institute 2011). Solar panels, smart home appliances, electric vehicles, wind turbines, smart grids, building management systems etc. all have the potential to become part of the Smart City. Being a smart technology, however, is not just about using less energy or being made of smart and reusable materials. It is about being able to function as an integral part of a larger system. The problem therefore lies not so much in the individual technology, but in fact that Smart Cities demand that this technology should be integrated into a system which knows as an IoT.

2.3.1.Gather Data
First of all, being a type of Smart City technology means being able to constantly gather information about the city which can be used by the technology itself in order to adapt to the most sustainable and smart behavior. An Ex. of this is a Smart Building System, which constantly gathers data about performance of a building, which it then uses to optimize energy use.

2.3.2.Communicate Data
Secondly, It should also be able to share that data with people or things (Objects) or other technologies or borrow relevant data from elsewhere. In this sense, smart technology should be able to communicate with the rest of a Smart City system. For this to be the case, it needs to be able 'speak the same language' as the other devices in the Smart City system. Furthermore, it needs to be connected to a common communicative platform where information can be shared and interoperability can be promoted (e.g. a smart grid).

2.3.3.Multi-Functional
Thirdly, although technology which is able to gather data and communicate with other technologies is indeed smart, truly smart technologies are multi-functional. This means that they provide solutions to multiple problems. One Ex. could be the electric vehicle. This not only leads to less congestion; in connection with a smart grid it can also serve as an energy buffer, which would help level out the energy supply and demand curve.
Cities are adopting smart technologies for different reasons: Amsterdam to reduce its carbon emissions, Tokyo to become more competitive, and China to tackle its resource scarcity. Elsewhere, South Korea is using cities like living labs to help domestic companies drive growth in other markets, specifically in India and China. In every case, the smart city is the beginning of initiatives that will drive big changes on the earth over several decades. "The city is a relatively manageable entity when compared to the earth," says Ynse de Boer, who leads smart city projects for Accenture in Asia-Pacific. A smart city relies, among others, on a collection of smart computing technologies applied to critical infrastructure components and services (Hafedh Chourabi et al, 2012).
Smart cities use Internet of Things (IoT) technologies to be more intelligent and efficient in the use of resources, resulting in cost and energy savings, improved service delivery and quality of life, and reduced environmental footprint-all supporting innovation and the low-carbon economy. The main advantages of creation of smart cities are Smart Grid, Prevent Fires, Digital Governance, Waste Management, Water Management, Surveillance Security, Land – Use Planning Changes, Intelligence Transportation, Regional Green Cities, Quality of Urban Citizen Life Improvement, Smarter places to Visit, Live, Work and Play, Sustainable Development through Innovation Cities and finally which leads to for the nation's Economic Growth. The Internet of Things (IoT) enabled users to bring physical objects into the sphere of cyber world. This was made possible by different tagging technologies like NFC (Near Field Communication), RFID (Radio Frequency Identification) and 2D (2-Dimensional) barcode which allowed physical objects to be identified and referred over the internet (Faisal Razzak, 2012).

3. The State of Art
According to IBM's report from the IBM Institute for Business Value, "A Vision of Smarter Cities", in the next 20 years, for every minute, on an average 30 Indians will migrate from rural areas to smarter cities for their livelihood. So as per this prediction, India needs (http://www.ibm.com/smarterplanet/in/en/sustainable_cities/ideas/) to create 500 new cities in the forthcoming 20 years. In addition to this according to a study by consulting firm of Booz & Company also an average of 30 people will move from rural areas to the city for every minute in India, so the country is set to build 500 new cities over the next 20 years to house 700 million more city dwellers by 2050, (www.thecitiesoftomorrow.com/news/india-smart-cities).
Establishing two smart cities in each of India's 28 states in the country under phase II of the Jawaharlal Nehru National Urban Renewal Mission (JNNURM): that is the goal of the wide-range in project introduced by the Indian government to inject smart technology into cities home to between 500,000 and one million people an ambition that goes hand in hand with seven other smart-city projects already underway. The smart cities project is not meant for metropolitan cities. It is for smaller cities with half a million to one million population cities like Ujjain, and Jabalpur, as officially cited. Bigger cities are already covered under other schemes.

According to 2011 census, about 32% of India's population lives in urban areas. It is projected to grow and reach 40% in a decade and 50% in about 30 years. The JNNURM was launched in 2005 by the Government of India to last for a period of seven years.

Upgrading social and economic infrastructure in cities, provision of basic services to urban poor, introducing reforms to strengthen municipal governance are the principal strategies adopted in this JNNURM mission. The aim of the Mission is to encourage reforms and fast-track planned development of identified cities. The Mission also focuses on inclusive growth of cities with safe drinking water, improved public transport, sustainable environment, and standardized service level. Community participation in urban local bodies is also part of the mission. One of the basic reasons for investments flocking in to the smaller cities is available properties and affordable prices. Moreover, the special initiatives taken by the respective governments in providing the smaller cities with infrastructural facilities and creation of SEZs, has played a vital role in promoting these small towns into cities of the future. Keeping in view all the congenial factors necessary for setting up corporate infrastructure, the investing companies ranging from pharmaceuticals to financial institutions, automobiles to the IT & ITES (IT-Enabled Services) sectors; to the retail and real estate sector are opting for the smaller cities transforming them into India's fastest growing cities in a matter of few years.

3.1. Lavasa

The dream of India's first smart city is now inching closer to reality in Lavasa. It is a private, planned city being built near Pune. Touted as India's first smart city, My City Technology– a joint venture set-up by Lavasa Corporation and Wipro – signed a definitive agreement for Cisco who is the giant of networking technology to participate in its development. According to The Wall Street Journal, among the digital experiences, Lavasa homes will offer are touch panel automation, occupancy-based lighting, door sensors, motion sensors, beam detectors and on-call transport services. The city is boasting of City by assets tracking automatically through RFID tags, all residential & buildings are connecting by secure IP, networking technologies to help centralize management operations, logistic supply centers boasting of roads, airport, rail, dry dock and operation centre and smart transportation and JIT delivery.

3.2. GIFT (Gujarat International Finance Tec-City)

Designed as modern recreation of India's architectural past, mirrored twins of the Gateway. It will house over a million people with millions more commuting there daily. Well placed between the political and commercial capitals of Gujarat. GIFT is a public-private partnership, it will India's first major super tall Central Business District project that is designed to be the focal point of both the world's and India's booming financial services market by providing companies with all those things Mumbai is still developing: comprehensive infrastructure, power, virtualized office space, a well designed, planned & expandable urban form.

Figure 2

3.3. Kochi

Smart City Kochi is an IT Special Economic Zone under construction in Kochi, Kerala (Framework Agreement. kerala.gov.in, 2007), (Agreement reached on Smart City project. Thehindu.com (2011-02-02)). Smart City (Kochi) Infrastructure Pvt. Ltd. is a joint venture company formed to develop the Kochi Smart City project. Government of Kerala (16% share), TECOM Investments (84% share), a subsidiary of Dubai Holding are the main investors of the company. "The four-storeyed building project of 22 lakh sq. ft. spread over 50 acres will be located on the banks of Kadambraya at Edachira near Kakkanad. The project will be ready in two years timeframe". From this the NASSCOM forecast that the Indian Information Technology (IT) industry will exceed $300 billion by 2020.

3.4. Bangalore

Prof. em. Dr. techn. Jörg Schönharting said that Bangalore is going to be a Smarter City through an Indo-German-Research Project mainly via Smart Mobility including (Noise, Pollutants); (E-Mobility, Car Sharing); (Information, Traffic Management); (Walkability, Distances, Modal Split); (High Occupation Rate); (Smart PT, Linkage with Private); (Safety, Accessibility, Costs); (Energy Efficiency). The Government of Karnataka has inked an agreement with networking solution provider Cisco for a pilot programme to develop the roadmap for an intelligent, smart and sustainable Bangalore city. The pilot programme would aim at developing replicable ICT solutions to help promote sustainable, intelligent urban development practices in the city. The company also unveiled its blueprint for "Intelligent Urbanization," a global initiative to help cities around the world use the network as the next utility for integrated city

management, better quality of life for citizens and economic development. Bangalore's traffic police departments that are beginning to employ smart technologies. They have 180 cameras around the city managed from a control room.

4. Conclusion
In India, administration in the cities are often confronted with a multitude of key problems, like unplanned development, informal real estate markets, inevitable population growth, lack of infrastructure, inadequate transport facilities, traffic congestion, poor power supply, in competent health services, and lack of basic services both within the city and in the suburban areas, poor natural hazards management in overpopulated areas, crime, water, soil and air pollution leading to environmental degradation, climate change and poor governance arrangements are leading the urban citizen life in unhappy. So we plan and build the smart cities in view of resolving these problems.

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