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Website: www.aarf.asiaEmail : editor@aarf.asia , editoraarf@gmail.com

OPPORTUNITIES AND CHALLENGES IN BUILDING SMART CITIES IN INDIA.

Prof.Roopadarshini.S
Assistant Professor, Department of MBA, VTU Centre for Post Graduate Studies-Bangalore Region-Muddenahalli, Visvesvaraya Technological University Chickaballapur-562101
&
Prof.Lakshminarayana.K
Assistant Professor, Department of MBA, VTU Centre for Post Graduate Studies-Bangalore Region-Muddenahalli, Visvesvaraya Technological University Chickaballapur-562101

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 on the various challenges and opportunities in building the smart cities. The conceptualization of Smart City, therefore, varies from city to city and country to country, depending on the level of development, willingness to change and reform, resources and aspirations of the city residents. A smart city would have a different connotation in India than, say, Europe. Even in India, there is no one way of defining a smart city. Some definitional boundaries are required to guide cities in the Mission. In the imagination of any city dweller in India, the picture of a smart city contains a wish list of infrastructure and services that describes his or her level of aspiration. To provide for the aspirations and needs of the citizens, urban planners ideally aim at developing the entire urban eco-system, which is represented by the four pillars of comprehensive development-institutional, physical, social and economic infrastructure. This can be a long term goal and cities can work towards developing such comprehensive infrastructure incrementally, adding on layers of 'smartness'. In the

approach of the Smart Cities Mission, the objective is to promote cities that provide core infrastructure and give a decent quality of life to its citizens, a clean and sustainable environment and application of 'Smart' Solutions. The focus is on sustainable and inclusive development and the idea is to look at compact areas, create a replicable model which will act like a light house to other aspiring cities. The Smart Cities Mission of the Government is a bold, new initiative.

Key words: Smart city; Smart environment; Smart governance,

1. INTRODUCTION

With the rapid growth of information and communication technologies, there is a growing interest in developing smart cities with a focus on the knowledge economy, use of sensors and mobile technologies to plan and manage cities. The proponents argue that these emerging technologies have potential application in efficiently managing the environment and infrastructure, promoting economic development and actively engaging the public, thus contributing to building safe, healthy, sustainable and resilient cities. The rapid growth of Indian economy has placed a stress on physical infrastructure, Social Infrastructure and Institutional Infrastructure because all these 3 major areas already suffer from a deficit. Smart city could be a possible solution to all these problems. Smart city is mainly concerned with smart governance, smart energy, smart environment, smart people, smart transportation, smart IT and communications, smart buildings and smart living at large. Smart is not just about technology-enabled, but also about power, water, transportation, solid waste management and sanitation. A smart city's core infrastructure is information technology, where a network of sensors, cameras, wireless devices, data centers forms the key infrastructure providing all important services.

Smart cities aim to decrease the challenges that cities face, scarcity of energy resources, health care, housing, water and deteriorating infrastructure – roads, transportation. They suffer from price instability, climate change and better economic opportunities and social benefits. Recent advancements in information and communication technologies aligned with technology cost reduction, such as cheap mobile apps, free social media, cloud computing and cost effective ways to handle high volume data, provides cities with better opportunities and tools to

understand, communicate and predict urban functions. Smart city and smart city projects are seen as a holistic approach to city planning on the government of India's 100 smart cities programmes for making cities better and emphasize the need towards bringing cities to the level where they deliver the quality of life that people are demanding.

1.1 The core infrastructure elements in a smart city would include

- Adequate water supply,
- Assured electricity supply,
- Sanitation, including solid waste management,
- Efficient urban mobility and public transport,
- Affordable housing, especially for the poor,
- Robust IT connectivity and digitalization,
- Good governance, especially e-Governance and citizen participation,
- Sustainable environment,
- Safety and security of citizens, particularly women, children and the elderly, and
- Health and education.

1.2 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

1.3 Smart city features

Some of the typical features of comprehensive development in smart cities are described below.

- **Promoting mixed land use in area based developments:** planning for the unplanned areas containing a range of compatible activities and land uses close to onr another in order to make land use more efficient. The states will enable some flexibility in land use and building bye-laws to adopt to change
- **Housing and inclusiveness**: Expand housing opportunities for all.
- **Creating walk able localities:** reduce congestion, air pollution and resource depletion, boost local economy, promote interactions and ensure security. The road network is created or refurbished not only for vehicles and public transport, but also for pedestrians and cyclists and necessary administrative services are offered within walking or cycling distance
- **Preserve and developing open spaces:** parks, playgrounds and recreational spaces in order to enhance the quality of life of citizens, reduce the urban heat effects in areas and generally promote eco-balance
- **Promoting a variety of transport options:** transit oriented development, public transport and last mile Para-transport connectivity
- **Making governance citizen:** friendly and cost effective increasingly rely on online services to bring about accountability and transparency, especially using mobiles to reduce cost of services and providing services without having to go to municipal offices. Forming e-groups to listen to people and obtain feedback and use online monitoring of programs and activities with the aid of cyber tour of worksites.
- **Giving an identity to the city:** based on the main economic activity , such as local cuisine, health, education, arts and crafts, culture, sports goods, furniture, hosiery, textile, dairy, etc.

- **Applying smart solutions to infrastructure and services** in area based development in order to make them better. For example: making areas less vulnerable to disasters, using fewer resources and providing cheaper services.

1.4 Building Smart City Strategy

The strategic components of area-based development in the Smart Cities Mission are city improvement (retrofitting), city renewal (redevelopment) and city extension (green field development) plus a Pan-city initiative in which Smart Solutions are applied covering larger parts of the city. Below are given the descriptions of the three models of Area-based smart city development:

- **Retrofitting** will introduce planning in an existing built-up area to achieve smart city objectives, along with other objectives, to make the existing area more efficient and liveable. In retrofitting, an area consisting of more than 500 acres will be identified by the city in consultation with citizens. Depending on the existing level of infrastructure services in the identified area and the vision of the residents, the cities will prepare a strategy to become smart. Since existing structures are largely to remain intact in this model, it is expected that more intensive infrastructure service levels and a large number of smart applications will be packed into the retrofitted smart city. This strategy may also be completed in a shorter time frame, leading to its replication in another part of the city.
- **Redevelopment** will effect a replacement of the existing built-up environment and enable co-creation of a new layout with enhanced infrastructure using mixed land use and increased density. Redevelopment envisages an area of more than 50 acres, identified by Urban Local Bodies (ULBs) in consultation with citizens. For instance, a new layout plan of the identified area will be prepared with mixed land-use, higher FSI and high ground coverage. Two examples of the redevelopment model are the Saifee Burhani Upliftment Project in Mumbai (also called the Bhendi Bazaar Project) and the redevelopment of East Kidwai Nagar in New Delhi being undertaken by the National Building Construction Corporation.
- **Greenfield development** will introduce most of the Smart Solutions in a previously vacant area (more than 250 acres) using innovative planning, plan financing and plan implementation tools (e.g. land pooling/ land reconstitution) with provision for affordable

housing, especially for the poor. Greenfield developments are required around cities in order to address the needs of the expanding population. One well known example is the GIFT City in Gujarat. Unlike retrofitting and redevelopment, greenfield developments could be located either within the limits of the ULB or within the limits of the local Urban Development Authority (UDA).

- **Pan-city development** envisages application of selected Smart Solutions to the existing city-wide infrastructure. Application of Smart Solutions will involve the use of technology, information and data to make infrastructure and services better. For example, applying Smart Solutions in the transport sector (intelligent traffic management system) and reducing average commute time or cost of citizens will have positive effects on productivity and quality of life of citizens. Another example can be waste water recycling and smart metering which can make a huge contribution to better water management in the city.

The smart city proposal of each shortlisted city is expected to encapsulate either a retrofitting or redevelopment or green field development model, or a mix thereof and a Pan-city feature with Smart Solution(s). It is important to note that pan-city is an additional feature to be provided. Since smart city is taking a compact area approach, it is necessary that all the city residents feel there is something in it for them also. Therefore, the additional requirement of some (at least one) city-wide smart solution has been put in the scheme to make it inclusive.

For North Eastern and Himalayan States, the area proposed to be developed will be one-half of what is prescribed for any of the alternative models - retrofitting, redevelopment or greenfield development.

2. THE EVOLUTION OF THE SMART CITIES AGENDA IN INDIA

The Government of India announced its flagship programme- the 100 Smart Cities mission in the year 2014 and was launched in June 2015 to achieve urban transformation, drive economic growth and improve the quality of life of people by enabling local area development and harnessing technology. Initially, the Mission aims to cover 100 cities across the countries (which have been shortlisted on the basis of a Smart Cities Proposal prepared by every city) and its duration will be five years (FY 2015-16 to FY 2019-20). The Mission may be continued

thereafter in the light of an evaluation to be done by the Ministry of Urban Development (MoUD) and incorporation of the learnings into the Mission. The Mission aims to focus on area-based development in the form of redevelopment of existing spaces, or the development of new areas (Greenfield) to accommodate the growing urban population and ensure comprehensive planning to improve quality of life, create employment and enhance incomes for all - especially the poor and the disadvantaged. On 27th August 2015 the Centre unveiled 98 smart cities across India which were selected for this Project. Across the selected cities, 13 crore population (35% of the urban population will be included in the development plans. The mission has been developed for the purpose of achieving urban transformation. The vision is to preserve India's traditional architecture, culture & ethnicity while implementing modern technology to make cities livable, use resources in a sustainable manner and create an inclusive environment.

The promises of the Smart City mission include reduction of carbon footprint, adequate water and electricity supply, proper sanitation, including solid waste management, efficient urban mobility and public transport, affordable housing, robust IT connectivity and digitalization, good governance, citizen participation, security of citizens, health and education.

With the election of Prime Minister Narendra Modi in 2014, urbanisation-led to the economic growth in India was firmly framed around a vision of ‘smart cities’, an ambiguous concept, which promotes the integration of information and communication technologies in cities to improve the economic growth, quality of life, governance, mobility and sustainability. Given in its current policy importance, this article examines how the smart cities agenda in India has emerged, what it has encompassed and its potential for transformative urban development. Reviewing policy documents and statements in combination with selected key stakeholder interviews, this article traces the emergence of the smart cities discourse in India, suggesting that the vision and concept of the smart city has shifted over time and has been evoked in different ways to serve different purposes. Overall, the smart cities agenda in India appears to be characterized by a failure to conceptualize and develop an integrated set of policies, and while a clearer (yet contested) concept is emerging, the prospects for success are uncertain.

3. CHALLENGES IN DEVELOPING AND IMPLEMENTING SMART CITIES

- **Channeling Finance to the Smart Cities**

The estimated Per Capita Investment Cost (PCIC) is Rs. 43,386 as reported by the High Power Expert Committee (HPEC)**.** The total estimate of investment in smart city totals up to 7 lakh crore within a span of 20 years and an annual requirement of Rs. 35,000 crore, assuming the population as 1 million people in each smart city. Mobilizing such huge finance is a challenge for any government. The Government can look for Public Private Partnership in order to gather funds via Viability Gap Funding. In other words, the government will contribute, let's say, 20 percent of the investment and the remaining is invested by the state government and other private bodies.

- **Quick Approval and Clearance**

It is a given that it takes a great deal of time to get approval and clearance from any government institution. This has to be changed while developing smart cities with Big Data and IoT. The project is time bound and all clearances and approvals must be granted with minimum time so that the project sticks to the schedule. The state government should also co-operate in this case and speed up the approval process. If needed, entire approval processes can be automated and made online. A board can be set up to manage approvals for services like water, sewage, draining systems, telecommunication lines, electrical lines, etc.

- **Co-Ordination among Multiple Stakeholders**

This clearly is a challenge that the central government will face while implementing smart cities. The state government, private sector, the central government, and other regulatory bodies are stakeholders in the project. It is very important that all the stakeholders are aligned and are aware of their roles and responsibilities. There should be no room for conflicts in segregation of duties. The involvement of multiple stakeholders in the project adds to the complexity due to the difference in ways of working.

- **Retrofitting Existing Cities**

Retrofitting essentially means adding features to the existing set up to make it more efficient. One of the plans of the central government is to convert existing small and big city to a smart city. The challenge lies in studying the master plan of the city which is not available for more

than 80 percent of the cities. So the central government is left with an inadequate input to start with.

- **Human Resource**

In this context, human resource means the workers and staff required to implement the project. There is a huge need of skilled workers and professionals. It is not an easy task to build 100 smart cities (some cities need to be built from the scratch). It is important that adequate training programs are conducted for the workers employed in this project. The challenge is that only five percent of the entire budget is allotted for training and up skilling. So there is a lot to do with less resource, which is a challenge.

- **Availability of Utility Services**

Smart cities need uninterrupted access to electricity and water. Considering the power generation and distribution systems in the existing states and union territories, this seems to be a challenge in meeting the growing energy demands. States must resort to non-conventional energy resources to meet the energy shortage.

- **Current state of Urban Local Bodies (ULBs)**

ULBs are not financially self-sustaining. Low tariff and inadequate cost recovery are the reasons for ULBs not being self-sustainable. Furthermore, the human resource capability of ULBs is also not adequate which calls for an additional training program to equip the workers and laborers. This means the extra allocation of budget in training and capacity building, which is a challenge.

The fact of the matter is, the Government must factor in above challenges and look for a smart way to overcome these challenges for this project to be successful. Implementing Smart Cities is a prestigious project of the Government of India. It is a very important milestone to achieve for the existing government as this was one of the major promises made by the Prime Minister Mr. Narendra Modi. The future of urbanization in India lies in the success of this project.

- **Capacity building programme**

Building capacity for 100 smart cities is not an easy task and most ambitious projects are delayed owing to lack of quality manpower, both at the centre and state levels. In terms of funds, only around 5 per cent of the central allocation may be allocated for capacity building programs that focus on training, contextual research, knowledge exchange and a rich database. Investments in capacity building programs have a multiplier effect as they help in time-bound completion of projects and in designing programs, developing faculty, building databases as well as designing

tool kits and decision support systems. As all these have a lag time, capacity building needs to be strengthened right at the beginning.

- **Reliability of utility services:**

For any smart city in the world, the focus is on reliability of utility services, whether it is electricity, water, telephone or broadband services. Smart cities should have universal access to electricity 24×7; this is not possible with the existing supply and distribution system. Cities need to shift towards renewable sources and focus on green buildings and green transport to reduce the need for electricity.

4. OPPORTUNITIES IN BUILDING SMART CITIES IN INDIA

Smart is a relevant word and has an altogether different interpretation when it comes to the Indian context. The recent proposals of 20 Smart Cities predominantly captures the creation of basic civil infra, security, transport, connectivity and e-governance services, which has nevertheless brought a lot of alacrity and excitement among the people. It is a huge opportunity for the enterprises as well. With the recent win of smart city implementation projects for Gandhinagar & Jaipur, Sterlite Technologies is all set to align to the Smart City initiative of the Government of India. This paper elaborates on the Smart City opportunity in terms of the total CAPEX vis-à-vis ICT CAPEX and percentage of ICT CAPEX in Total CAPEX basis the smart city proposals submitted by 20 cities. The development of smart cities serves two purposes. First, smart infrastructure, such as smart water meters and electricity grids, can reduce usage and costs by raising awareness among individuals about how much they are using, but also by automatically reducing consumption at times of limited demand. For instance, in Mumbai, India, about one-half of water was wasted until recently due to poor infrastructure; however, after installation of "smart" metering technology the amount of lost water decreased by one-half, according to an article from the Center for Data Innovation, a leading think-tank studying the intersection of data, technology and public policy. Secondly, smart infrastructure can also improve a city's environmental sustainability, affordability, business climate and general "livability" as in quality of life.

- **Retrofitting existing legacy city infrastructure to make it smart:**

There are a number of latent issues to consider when reviewing a smart city strategy. The most important is to determine the existing city's weak areas that need utmost consideration, e.g. 100-

per-cent distribution of water supply and sanitation. The integration of formerly isolated legacy systems to achieve citywide efficiencies can be a significant challenge.

- **Financing smart cities:**

The High Power Expert Committee (HPEC) on Investment Estimates in Urban Infrastructure has assessed a per capita investment cost (PCIC) of Rs 43,386 for a 20-year period. Using an average figure of 1 million people in each of the 100 smart cities, the total estimate of investment requirements for the smart city comes to Rs 7 lakh crore over 20 years (with an annual escalation of 10 per cent from 2009-20 to 2014-15). This translates into an annual requirement of Rs 35,000 crore. One needs to see how these projects will be financed as the majority of project need would move through complete private investment or through PPPs (public-private partnership).

- **Availability of master plan or city development plan:**

Most of our cities don't have master plans or a city development plan, which is the key to smart city planning and implementation and encapsulates all a city needs to improve and provide better opportunities to its citizens. Unfortunately 70-80 per cent of Indian cities don't have one.

- **Financial sustainability of ULBs:**

Most ULBs are not financially self-sustainable and tariff levels fixed by the ULBs for providing services often do not mirror the cost of supplying the same. Even if additional investments are recovered in a phased manner, inadequate cost recovery will lead to continued financial losses.

- **Technical constraints of ULBs:**

Most ULBs have limited technical capacity to ensure timely and cost-effective implementation and subsequent operations and maintenance owing to limited recruitment over a number of years along with inability of the ULBs to attract best of talent at market competitive compensation rates.

- **Three-tier governance:**

Successful implementation of smart city solutions needs effective horizontal and vertical coordination between various institutions providing various municipal amenities as well as effective coordination between central government (MoUD), state government and local government agencies on various issues related to financing and sharing of best practices and service delivery processes.

- **Providing clearances in a timely manner:**

For timely completion of the project, all clearances should use online processes and be cleared in a time-bound manner. A regulatory body should be set up for all utility services so that a level playing field is made available to the private sector and tariffs are set in a manner that balances financial sustainability with quality.

- **Dealing with a multivendor environment:**

Another major challenge in the Indian smart city space is that (usually) software infrastructure in cities contains components supplied by different vendors. Hence, the ability to handle complex combinations of smart city solutions developed by multiple technology vendors becomes very significant.

5. CONCLUSION

India's smart cities mission is a catalyst in defining the first roadmap of urban transformation of the Indian cities and towns into smart and sustainable urban eco system. We are really lucky to have our great visionary leader like Shree Narendra Modi in institution of 100 New Smart Cities. Even though it is 7060 Cr for the initial investment for set out Smart Cities, let we put hands together to make India more economically brighter. In addition, the global warming can be reduced in constituent of these Smart Cites. Let us hope soon India will provide Quality of Life (QoL) to its citizens on par with other Smart Cities like Barcelona, Helsinki, San Fransco, New York, Singapore. Welcome to the Future of 100 Smart Cities in India, with a positive way collectively and cheerfully.

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