Smart Cities – An Overview and the Role of ICT

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Abstract- *A large number of people are migrating from rural areas to urban areas for better jobs and to have a better quality life. ICT is playing a leading role in the development of smart cities. It provides better services and improves the well-being of the citizens. Smart cities provide high efficiency and also manages complexity. As the urbanization is growing at a steady pace, the economy is also growing at an unfaltering pace. More and more people are investing their money in the property. The research also predicts that there is a big price hike in the property with the development of the smart cities. This paper discusses the smart gains and price appreciation of the property with the development of the smart cities.*

Keywords- *Smart Cities, infrastructure, economy, urbanization, ICT.*

I. INTRODUCTION

In 2007, a number of people living in cities surpassed the number living in rural areas. It is estimated that the proportion of people living in an urban environment will exceed 70% by 2050. People are migrating to urban areas with perceived better job opportunities but lead to complex issues such as congestion, increased demand for a limited pool of natural and other resources such as water, energy, sanitation, education and health care.

A smart city may be defined as a city, well performing in economy, people, governance, mobility, environment, and living, built on the smart combination of endowments and activities of self-decisive, independent and aware citizens.

A smart city may also be defined as a city that leverages the ICT infrastructure in an adaptable, reliable, scalable, accessible, secure, safe and resilient manner in order to [1]:

- Improve the Quality of Life of its Citizens.
- Ensure tangible economic growth such as higher standards of living and employment opportunities for its citizens.
- Improve the well-being of its citizens including medical care, welfare, physical safety and education.
- Establish an environmentally responsible and sustainable approach which "meets the needs of today without sacrificing the needs of future generations".
- Streamline physical infrastructure based services such as the transportation (mobility), water, utilities (energy), telecommunications, and manufacturing sectors.
- Reinforce prevention and handling functionality for natural and man-made disasters including the ability to address the impacts of climate change.
- Provide an effective and well balanced regulatory, compliance and governance mechanisms with appropriate and equitable policies and processes in a standardized manner.

ICT (Information and Communication Technology) provides services such as security, transport and healthcare for citizens, improved and cost effective power supply for industries, remote working and e-commerce

for businesses, as well as entertainment and communications for individuals [2]. The differentiating element between a digital city and a smart city is Smart People. The following is a graphical representation of a smart city.

Fig. 1:- A smart city [3]

Information and Communication Technologies (ICTs) provide solutions to the issues that the cities are facing. They also ensure that these are more environmentally friendly and economically viable. Potential areas of improvement with ICTs include the management of water, energy, solid waste, public transport, traffic and congestion. The obvious question is - how can cities be made sustainable under such an environment? It can be made possible by making cities 'smarter' by efficient management of resources, efficient infrastructure, greener environment, smart governance resulting in high quality of life of the people.

II. EXPLAINING A SMART CITY & ICT INFRASTRUCTURE – An Equalizer

A 'smart city' may be defined as a developed urban area that makes practical financial improvement and high caliber of life by exceeding expectations in numerous key territories like economy, portability, environment, individuals, living, and government [4]. Smart Cities bring technology, society and government together to enable smart mobility, smart economy, smart living, smart governance, smart people and smart environment.

Core Themes

The ICT Infrastructure has four core themes for a smart city [5]:-

- **Economy** – the city must be able to thrive – jobs, growth and finance.
- **Governance** – the city must be robust in its ability for administrating policies and pulling together the different elements.
- **Environment**- the city must be sustainable in its functioning for future generations.
- **Society** – the city is for its inhabitants (the citizens).

Fig. 2:- ICT Infrastructure [6]

The figure 2 represents the various core themes for a smart city. The four core themes of Economy, Governance, Environment and Society have a host of sub-categories like mobility, real estate and buildings, industrial and manufacturing, utilities like electricity and gas, safety & security, waste, water and air management, education and healthcare which constitute the themes.

Indicators and Attributes

Key indicators and Attributes can be segmented by considering a Smart City through the following "lenses":-

- **Sustainability** – related to City Infrastructure and Governance, Energy and Climate Change, Pollution and Waste and Social, Economics and Health [7].

- **Quality of Life** - Quality of Life (QoL) is a recurrent theme. At the end of the day, what matters is if the Quality of Life for the citizens / people living in urban areas is improving.
- **Urban** - Viewing through an "urban" lens, there are multiple aspects and indicators like Technology and Infrastructure, Sustainability, Governance and Economics.
- **Smartness or Intelligence** – A "smart" or "intelligent" city exhibits implicit or explicit ambition to improve economic, social and environmental standards. Commonly quoted aspects include Smart Economy, Smart Networks, Smart Transit (Mobility), Smart People, Smart Governance, Smart Living and Smart Environment [8].

The ICT infrastructure acts as an equalizer. It is essential for a successful smart city. It acts as the "glue" which integrates all the other elements of the smart city. The ICT Infrastructure is at the core and acts as the nerve center, orchestrating all the different interactions between the various core elements and the physical infrastructure.

Some of the key aspects of the ICT Infrastructure include Networking Infrastructure, Software Applications, Access Devices, Internet Of Things and Mobile Broadband. The infrastructure elements can be thought of as sub-networks of a larger network i.e. "System of Systems" or a "network of networks". When these sub-systems are integrated with one another, they can be thought of as the "Internet of Things" (IoT). This is completely analogous to an IT or Data Communications network, so mainstream ICT based management process and approaches can be utilized with some modifications.

The end goal for a smart sustainable city is to achieve an economically sustainable urban environment without sacrificing comfort and convenience / quality of life of citizenry. ICT acts as the "great equalizer" (human to human, human to machine and machine to machine) to connect a variety of everyday living services to public infrastructures, such as utilities, mobility and water.

A smart city will therefore be constantly tuning itself, honing the individual efficiencies of the different vertical infrastructure operations such as real estate, industry, utilities (energy), water, waste, education, healthcare and mobility. However to achieve a higher order of optimization, these very seemingly "independent " vertical infrastructure silos will need to coordinate with each other in order to making living more convenient and comfortable while at the same time balancing the fragile environment.

III. INDIA'S PERSPECTIVE

India has proposed a number of smart cities which include Kochi in Kerala, Ahmedabad in Gujarat, Aurangabad in Maharashtra, Manesar in Delhi NCR, Khushkera in Rajasthan, Krishnapatnam in Andhra Pradesh, Ponneri in Tamil Nadu and Tumkur in Karnataka.

1. Ahmedabad

Ahmedabad, in Gujarat, may become the first smart city in India. It may also be called as Gujarat International Financial Tec City (GIFT). This project will cost around Rs. 70,000 crore. It will be developed over 886 acres. It is 18 kms from the Ahmedabad airport. It is being under construction since 2011. GIFT, currently under construction, has also had a considerable impact on prices in and around the area. Prices of apartments there are Rs 3,000-5,000 per square feet. Certain localities in Ahmedabad such as Valad, Urjanagar and Chandkheda have seen good price appreciation (as much as 30-40% annually). Going forward, one may expect 10-15% annual price rise.

2. Delhi

Wave Infratech is constructing a smart city near Delhi. It will be developed over 4500 acre area. It will be managed by a central command centre. It will feature automated traffic signals, fiber optic connectivity, custom-made water and electricity meters to generate bills,

garbage control, CCTV cameras servicing day and night. It will also have buses that will send messages to inform their arrival. It is expected to have seven new smart cities in India in the next decades. These seven smart cities will be developed along the proposed Delhi-Mumbai Industrial Corridor (DMIC) some which would overlap with the Amritsar-Kolkata plan. The Dholera urban area is part of DMIC.

Fig. 3:- Smart Gains in Wave City [9]

In Wave City, prices have risen from Rs 7,436 per sq ft in June 2012 to Rs 8,102 per sq ft in June 2014, a rise of 9%.

3. Palava

IBM is working on 2,500 smart city projects globally. According to IBM, a smart city uses technology to transform its core systems. Outside Mumbai, the Lodha group has given IBM a contract to build all data systems in their Palava city project.

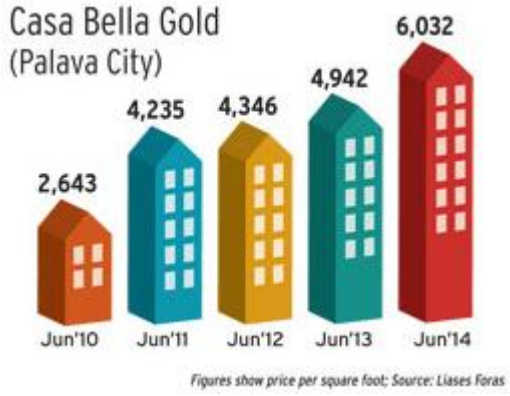

Fig. 4:- Palava City [9]

In Palava City, the rise has been from Rs 2,643 per sq ft in June 2010 to Rs 6,032 in June 2014, an appreciation of 128%.

4. Pune

The Amanora Township in Pune is another such project. It will be developed on 400 acre. It seeks to integrate e-governance and security by having a dedicated internal portal and a multi-use smart card for identification, access and cashless payments [10]. It will also include the person's medical records for emergencies. Smart cities can also be a good option for property investors. The prices of the property are increasing due to the development of smart cities. It can be seen from the following results of the Amanora Township in Pune.

Fig. 5:- Smart Gains in Amanora Township [9]

Kakkanad witnessed big land deals and prices shot up considerably. The region has seen steady price appreciation over the past few years. This is in contrast to other areas in the city where there has been a price correction. After a dull period in 2013, demand from the IT/ITeS sector is picking up, and one can expect 30-40% price appreciation over the next three years.

IV. CONCLUSION

A smart city is a developed urban area that creates sustainable economic development and high quality of life by excelling in multiple key areas like economy, environment, mobility, people and government. Excelling in these areas can be done through strong human capital, social capital and/or ICT infrastructure. The paper provides an insight into what is meant by a smart city and the role

of ICT in developing a smart city. The paper presented the core themes of ICT infrastructure. In addition, the key indicators and categories which should be taken into account for a smart city were discussed. India's perspective has also been mentioned. While these regions are considered good for investors and buyers, one must be cautious. Buyers with a short investment horizon (two-four years) must refrain from investing in these regions because most of these projects are in the implementation stage. It will take several years before they become reality. A large number of people are investing in these areas and it may be fruitful to them in the near future as these areas have substantial scope for price appreciation.

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