Conceptual Understanding of Smart Cities

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Abstract: *The paper focus on the perspectives of urbanization, issues related to infrastructure and smart city as a strategy posed to reduce stress on infrastructure, through various components like smart people, smart governance, smart mobility, smart environment related to city and its key parameters. The idea of smart city concept in Vishakhapatnam as a pilot study is discussed and the key areas of intervention like technology, economy, environment, quality of life to make it a global city.*

Keywords: Smart City, Technology, Governance, Environment, Economy

1. Introduction

The cities in the new world order, is growing increasingly larger, more complex and more important as the population of urban areas swell with ever increasing speed (Taewoo Nam, 2011).Today, 54 per cent of the world's population lives in urban areas, a proportion that is expected to increase to 66 per cent by 2050 (see www.un.org). Such enormous and complex concentration of people leads a city in despair, and hence a city face a variety of risks such as difficulty in waste management, scarcity of resources, air pollution, human health concerns, traffic congestion, and inadequate, deteriorating and aging infrastructures are among the most basic technical, physical, and material problems (Hafedh Chourabi, 2012). Another set of problems are not technical, physical or material in nature but are associated with verity of stakeholders involved, government failures, governance mechanism and higher level of interdependencies among the various government departments.
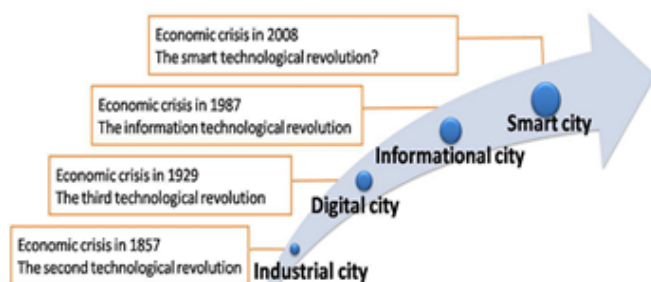

Figure 1: The background of Smart City (Yanlin Zhou 2010)

In this century, it will be the city – not the state – that becomes the nexus of economic and political power. In terms of economic might, consider that just forty city-regions are responsible for over two-thirds of the total world economy and most of its innovation. To fuel further growth, an estimated $53 trillion will be invested in urban infrastructure in the coming two decades(Khanna, 2011). Hence it is evident that in the new world order much emphasis is on cities but due to enormous pressure city problems are becoming wicked and tangled.

To ensure a better living environment within the context of rapid urban population growth a newer concept of 'smarter cities' appeared within recent decade as a mitigation measure. The urgency around these challenges is triggering many cities around the world to find smarter ways to manage them. These cities are increasingly described with the label *smart cities*. Although there is an increasing use of this phrase "smart city", there is still not a clear understanding of the concept. This paper attempts to fill this gap by identifying six core principles of smart city and how this concept can be used in Indian context especially for Andhra Pradesh.

2. Conceptualizing Smart City

As the concept of a smart city is still emerging and not very old and hence has a lesser clarity. There is a need to conceptualize it, as this concept is uses round the globe with different nomenclature, context and meanings. Some use intelligent cities, some say future cities and even digital city, but the basic concept lying behind is to provide a better living environment for the citizens with the ease of life. Several working definitions have been put forward in both practical and academic use. A city well performing in a forward-looking way in economy, people, governance, mobility, environment, and living, built on the smart combination of endowments and activities of self-decisive, independent and aware citizens (Rudolf Giffinger, 2007).

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 (R.E. Hall, 2000).

A city "connecting the physical infrastructure, the IT infrastructure, the social infrastructure, and the business infrastructure to leverage the collective intelligence of the city" (C. Harrison, 2010). "The use of Smart Computing technologies to make the critical infrastructure components and services of a city—which include city administration, education, healthcare, public safety, real estate, transportation, and utilities—more intelligent, interconnected, and efficient" (Doug Washburn, 2010).

A city "combining ICT and Web 2.0 technology with other organizational, design and planning efforts to dematerialize and speed up bureaucratic processes and help to identify new, innovative solutions to city management complexity, in order to improve sustainability and livability."(Toppeta, 2010)

With these much variations in the definition the concepts seems to me moving around ITC, better living environment and smart utilities. Given the conceptual comprehensiveness of a smart city, it could be thought of as a large organic system connecting many subsystems and components. Dirks and Keeling[19] consider a smart city as the organic integration of systems. The interrelationship between a smart city's core systems is taken into account to make the system of systems smarter. No system operates in isolation. It can be achieved through the integration of the six core principles of smarter cities namely smart people, smart governance, smart environment, smart economy, smart mobility and smart living (Deakin, 2010).

The concept of smart city brings about reforms of urban development goals, urban space structure, management mode, etc. While the most notably effect on urban planning is the innovation of planning type and the improvement of urban planning system. The innovation of planning type is bound to brings about series of new related specialized planning types, such as 'smart city development strategic Planning', 'smart city development overall planning', 'pilot smart city construction planning' etc. (Yanlin Zhou 2010)

3. Success factors for smart city initiatives in India

In India, increase of 91.1 million persons to urban population during 2001-2011 (Census of India, 2011) has been pushing cities in the country to deteriorating conditions. As cities are becoming economic powerhouses, they are becoming magnet for migrants. All big cities have to cope up with high population density, imbalance between supply and demand and serious challenges such as air pollution or traffic congestion. There is a challenge to create 'good cities' which are safe, spacious, green, connected and resilient. There is a challenge for planners to develop a citywide command and controlled network in their master plans and to monitor and optimize the delivery of services.

Technology, infrastructure, and social development are keystones of progress in cities. Economic growth is undoubtedly the capstone component to improving urban quality of life. In India, unique challenges and opportunities exist for developing "smarter" cities. A Smart city attracts investment, employ innovative technology, create environmentally sustainable solutions, grow operational efficiencies and improve quality of life. A Smart City is accessible, financially sound, attracts business, and provides a rich social fabric in an environment where people want to live and work. Indian Government has launched its important 100 Smart Cities initiative by pledging over $1.2 billion in investment to this effort over the next year. The investment in each Smart City is estimated to be in excess of

$10 billion, presenting a tremendous economic growth opportunity (Anon., 2014).

To meet this challenge we have used *Giffinger's* model to define six core principles of smart city in Indian context viz. (1) Smart people, (2) Smart governance, (3) Smart environment, (4) Smart economy, (5) Smart mobility, and (6) Smart living.

A. Smart People

Whenever Smart Cities are discussed, there's always a lot of focus on the kind of gee-whiz, futuristic technologies we were promised way back in The Jetsons. London is already experimenting with frictionless payment methods that would allow you to load credits onto your smartphone and simply stroll onto public transit. No need even to remove the device from your pocket or purse. Near field communication will pick up the signal and automatically deduct the fare from your account. No queuing up to buy tickets or load a transit card. That means more efficient travel for you and lower costs for the operator. That's a paradigmatic example of the kind of utopian promise we've come to expect from smart technologies (Anon., 2014).

But after more than a decade of discussion and active implementation of Smart City initiatives, questions about the nature of human interactions in systems, both subtle and fundamental, are beginning to emerge. What does it really mean to be an engaged citizen in the new landscape of technology? That question in itself is quite thoughtful and can be a lesson from the west for the east. This can be achieved through:

Capacity Training: It is the people who have to be smart enough to live into a whole new smarter world and this can be done only by educating them. Hence more schools and universities needed to be formed considering affordability of people. Emphasis must be given on improving technical skills by promoting more institutes for technical education.

E-Learning: Cities in the smarter world will be ITC enabled, thus more focus has to be given on e-learning. Cities must have digital development plans for schools and universities, connectivity to internet in houses, schools and universities, teachers must be encouraged to use newer technologies for educational purposes and these e-learning programs to be promoted widely.

Research & Development: Now-a-days contribution of GDP in research and innovation is seen as a major parameter to measure nation's development and this is why more revenue has to be dedicated to research & development.

B. Smart Governance

To ensure better service delivery, it is necessary to have a good dialogue between the citizens and the government. But currently it is a rare phenomenon and it can be the most probable reason for failure of government in many aspects. To ensure a better relationship between government and citizens the idea of smart governance emerged with following pillars of success:

- **Local Public Spending on ICT:** Ensure to increase the average percentage of public spending on ICT from the total budget. For this, public disclosure law needs to be transparent in nature and should be implemented as part of governance reform for easy access on the spending nature of public funds.
- **Website Availability:** By using website as the main channel of communication with the public. This should be in easy accessible and understand to the common person in bilingual in nature.
- **Strategic plans to promote e-governance and ICT:** Cities to develop E-Governance action plan in terms of preparation of business process re-engineering in the respective urban local bodies which will be in the form of design document
- **On-line Public Services:** Cities to offer on-line public services (the possibility of filing complaints and claims, requesting certificates and reports, making payments and debits, on-line registrations and paying taxes and fees). Also by using digital signatures for municipal procedures so that citizens does not have to wait in queues for payment of services.
- **Transparent Governance:** Cities to provide the public access to municipal information through their websites. The institutional information that is most frequently posted by cities refers to municipal plans, regulations and budgets.
- **E-Democracy:** Cities to develop on-line platform for citizen participation and also electronic voting system.

C. Smart Economy

The environment plays an important role in the development of any city which can be seen foreseen in two perspectives; one is living environment and second is built environment the living refers to the surroundings and the natural environment which emphasis on the lesser dependency on nature. This is possible only through sustainable integrated urban development, including through sustainable urban drainage, soil desealing measures, rehabilitation of contaminated sites, and rehabilitation of cultural infrastructure.

This further protects and promotes natural and cultural assets; investment in green infrastructure will also reduces the transport related air pollution, in particular retrofit or replacement programmes for bus fleets, incentive schemes for cleaner transport, improved public transport infrastructure and promotion of alternative forms of transport. The built environment showcases the operational efficiencies in terms of using renewable energy resources in built environment for e.g. solar photovoltaic (PV), solar thermal collectors and biomass; which maximizes the sustainable efforts and maintains eco-friendly environment.

D. Smart Economy

The penetration of ICT use in the business environment boosts the local economy of the city in terms of its productivity, formal activities, employment opportunities etc. By promoting and strategizing these sectors, either by developing sectoral strategic plans or by promoting certain industries, especially those based on technology, innovation

or creativity the economic pattern of the city influences and captures global market. This will attract and retain local talent in their territory.

The entrepreneurship activities through skill development programme needs to be enhanced to make them competitive enough to withstand itself as a smart city. Cities need to develop infrastructures and allied activities to support their business activities in their territories, such as science or technology parks, industrial parks and business incubators which influence global competition to invest in the territories.

E. Smart Mobility

ICT infrastructure accessibility and Connectivity plays a vital role in accessing internet facilities within the cities. The facilitation of the schemes will improve the user connections and coverage within the municipal boundaries, improves the broadband subscription, and improves the percentage of subscriber to mobile phone services and people who use mobile internet services. In terms of public internet access, Cities are encouraged to have more and more Wi-Fi hotspots around town with the aim of extending the benefits of the Information Society to all citizens. In core public spaces, computers with Internet connection are provided at the disposal of the public. Recently, In Bangalore, the initiative has been successfully implemented. Provision of such activity in public spaces will help and gain opportunity of subscribing a high-quality Internet connection at reasonable prices. This inferences that the impact of ICT in evolving a smart city strategy.

F. Smart Living

The use of technology impacts human health to an extent in terms of health services. Through the use of technology innovations, citizens can enjoy a number of on-line medical services, including key services such as requesting an appointment on-line or the possibility of having a digital record. It also develops and encourages electronic health card system. Further, it also initiates and improves the health services in the remote home services, alarm systems or remote patient monitoring systems. Accessibility and e-inclusion helps cities to drive digital inclusion programs for social groups at risk of exclusion.

4. Rational to Andhra Pradesh

Government of India has planned to launch the initiative of smart cities in India where Vishakhapatnam in Andhra Pradesh has been identified as one of the pilot cities to implement on lines of smart city. Vishakhapatnam is the largest city in Andhra Pradesh with population of 17, 30, 320 as per census 2011 with geographical spread of 681.96 km^2. It is gateway of Central India which is set to grow exponentially due to inherent advantages such as location, conducive socio-economic climate. This acts as a commercial hub of Andhra Pradesh with GDP of $26 billion USD. It has high economic potential in terms of ports, tourism, IT/ITES services, Ship building industry, fisheries hub, leading pharmaceutical cluster etc.

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The process of initiation of smart city is in the process and the focus areas of intervention would be in the prime areas of energy, sanitation, transportation, security, governance. This will be identified in specific areas of technology projects, tourism sector, transportation connectivity, linking the East Coast with the West Coast for sea transport connectivity, infrastructure as different components of smart city. This will help city to foster development and make city to emerge as global city. As part of funding and assistance, United States has agreed to develop city as a global city for its balanced growth.

5. Conclusion

With the incremental growth of population, cities have been endowed with unprecedented power on economic, technical, environment aspects. The concept of smart city has been an alternative approach and an attempt for the inclusive development of the cities to counter the issues of infrastructure, governance and make ourselves capable and competitive enough to counter the issues of sustainable development and bring together people, industry institutions, from different parts of the country to make our cities smart, eco-friendly, energy efficient and better place to live in and growth friendly through tailored innovative solutions.

6. Acknowledgment

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