

Role of ICT in Building “Smart Cities”

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Abstract

The big name “smart city” is closely related to the today’s buzz word ICT. ICT works as a tool to make a city as a smart city. A city is a complex system of systems. Till date there is no standardized definition of smart city. A smart city is that city which has digital technology embedded across all city functions. It basically includes smart home, smart education, smart energy, smart government, smart mobility, smart retail, smart transportation, smart citizen, smart manufacturing and open data. Wide variety of electronic and digital gadgets, implementation of ICT to change human life and environment, embedding these technologies in governmentsystem, making people literate to use these technologies and bringing them closer to new and innovative inventions are the key entities of “smart City”.

This paper aims to highlight the basic concepts of this field and focuses on the role of communication and information technologies in building smart cities that can help cities become interoperable and coherent, more sustainable and efficient, improve governance structures and bring in more autonomy in systems and services thereby improving the overall quality of life of its citizens. The main objective of this paper is to provide comprehensive study in the life of the citizens of smart city. This paper analyzes the difference in the citizen’s life in the process of building a city as a smart city.

Keywords: - ICT, city, Smart City, tools, technologies, communication, information, citizens, people, Google Form

1. Introduction

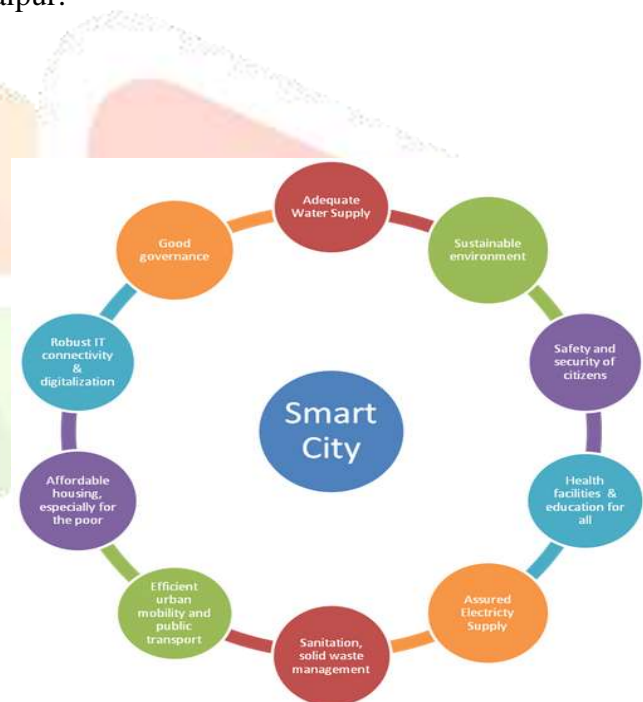
The World Health Organization (WHO) estimates, the global urban population will grow approximately 1.84% per year between 2015 and 2020. According to World Bank projects by 2050, India’s urban population will touch nearly to 857 million and according to the census 2011 31% of India’s population lives in cities generating 63% of nation’s economy. Population of urban cities is increasing at an alarming

rate. Keeping such a pace of change in mind, government has to build over the next 15 years 7.5 billion - 9.7 billion square feet of residential and commercial space each year to keep pace. This exponential generates the requirement for smart infrastructure for sewage, water, transport and electricity and brings in the concept of Smart Cities. Smart Cities will accommodate rapid urbanization, focus on the primary needs and tap new opportunities to improve the quality of life for residents today and the future.

According to honorable Prime Minister of India Mr. Narendra Modi "There was a time in our country when urbanization was considered a big problem. But, I feel differently. We should not consider urbanization as a problem, but consider it as an opportunity." Keeping this strong view in his mind he has started a program under the government of India named "100 Smart Cities mission" on 25th June 2015 with the mission to develop 100 cities across the country by 2019-2020 making citizens and city fully equipped with smart technologies. On 28th January 2016, 20 cities were selected among 98 nominated cities in which Bhubaneswar topped the list followed by Pune and Jaipur.

2. Concept

Looking for the definition of what exactly a smart city is? There is no standard and universally accepted definition of the term. For each common person, researcher, scholar, government body its concept and meaning could change. The definition of smart city can be guided by the mind map of the people, resources available, acceptance to change, reforms etc. The ITU—Telecommunication Standardization Sector (ITU-T) adopts the following definition of a smart sustainable city as "A Smart Sustainable City efficiency of urban operation and services, and competitiveness, while ensuring that it meets the needs of present and future generations with respect to economic, social and environmental aspects".



As per Government of India – Smart Cities would focus on their most pressing needs and on the greatest opportunities to improve lives. They harness a range of approaches – digital and information technologies, urban planning best practices, public-private partnerships, and policy change – to make a difference. They always put citizens first.

3. Technology involved in smart city

The smart city transition would be guided by advance information and communication technology and the deployment of intelligence & information management systems. Dream of Smart cities can be achieved at fasterrate with higher dependence on ICT (information and communications technology)

a. Internet of Things (IoT)

Smart cities use the concept of IoT to collect data, store and analyze it in order to directly interact with city infrastructure and to monitor real-time city assets and community evolution in order to improve operating efficiency and to proactively react to potential problems before they arise. Through IoTthe objects communicate and exchange information to provide advanced services for users. As a result of recent advances in mobile devices equipped with various sensors. Latest Os, interface and communication modules, along with communication network technologies such as Wi-Fi and LTE, the IoT has achieved considerable academic interests.

IoT has many applications in various fields, such as home automation, industrial automation, medical aids, mobile healthcare, elderly assistance, intelligent energy management and smart grids, automotive, traffic management, smart waste management serviceand many others.

b. Big Data and Data Analyst

The concept of big data include capturing, storing, analyzing, searching, transferring, visualizing, querying, updating a large amount on data generated as a result of IoT, remote sensing, cameras, microphones and many others. Big data has application in Government sector. It allows efficiency in cost, productivity and innovation within various government processes. Big data analysis offer cost-effective opportunities to improve decision-making in critical development fields such as health care, employment, economic productivity, crime, security, and natural disaster and resource management. Big data help in manufacturing sector by improving the supply planning and product quality. It also help in education, media, health care and many more.

c. Cloud Computing

“Cloud computing is a technology that allows the users to access software applications, hardware, storage, computing processes directly from the web.” There are end numbers of applications of Cloud Computing. Smart cities is the interconnection of sensors, mobile devices and people which generate tremendous amount of data. Data needs to be stored somewhere and easily accessed by the authorized

people both private and Government. The solution to this issue is only Cloud computing. It helps in sharing of resources, sharing of information, storing large amount of data on web.

d. M2M

Machine to Machine is a network of machine either wired or wireless which works without the human intervention. M2M has applications in four major area i.e. manufacturing, home appliances, health care device management and smart utility management. It helps in automating manufacturing processes. In the manufacturing world, M2M could ensure highly automated equipment maintenance and safety procedures.

e. Open data- Open and accessible data

Open data is that data which is freely available to everyone for use without any type of restriction such as copyright and other means of control. Through open data, data is freely available within a legal and regulatory framework. Data from different sectors are to be made public so that stakeholders inside or outside government can optimally use them for better decision making. It provides data in consistent and standardized format to be used in various Application Programming Interfaces.

f. Sensors

Smart cities are build around various types of sensors. Smart cities are integrated with sensors and various monitoring devices through a network, typically the internet, in an effort to optimize city operation and service efficiency along with improving their interface with citizens directly. The data which is collected can be analyzed to organize many municipal assets such as power plants, water and sewage systems, traffic and transportation systems, and many other community services.

g. Communication Network

Smart City is a collection of living and non living things that is fully connected, adaptive, self secure, auto managed and well informed. These is connectivity is made possible by communication network. IoT, M2M, Big Data, sensors and all the advanced technology of today work only on the infrastructure build on wired or wireless communication network. Security cameras, traffic management system, utility monitoring systems all require availability of network across 24/7. Network is one of the basic pillars on which the smart city can be built.

4. Role of ICT in Smart Services in Smart Cities

a. Smart Energy

Smart energy uses these technologies i.e. sensors, analytical tools, advanced meters and digital control to manage and control smart energy.

b. Smart Buildings

Technology here provides building with high level of security, reduce wastage, alert in case of emergency, maximum utilization of electricity and water etc.

c. Smart Transport

Equipped with GPS, sensors, ground stations, GIS, cloud etc, ICT provides Smart Transport Management System. It also reduces the need of transportation by providing virtual transportation.

d. Smart Water

With the use of ICT water can be managed at its optimum level. It aims to provide clean, adequate water at all the places in smart city.

e. Smart HealthCare

The use of ICT in healthcare improves the quality of medical services by introducing new automated machine and data analysis. Smart HealthCare may increase the life span of citizens of smart city.

f. Smart Education

ICT has major impact on Education sector. It has changed the education view in 360 degree. It is considered as a powerful tool for education. It has brought many dramatic changes in teaching learning process. Education has reached "everywhere and for everyone" just at a mouse click.

5. Objectives

- To analyze the impact of ICT in the quality of life and lifestyle of cities population. As with every new invention pros and cons are associated with it, is ICT has positive impact on life of the people.
- To study whether use of ICT in Smart City will improve the overall infrastructure of the city.
- To analyze if public utility services are rendered to the people in convenient and cost effective manner.

- To explore whether use of ICT in building smart city will strengthen the economy and government of the country.
- To analyze how it will affect the security and safety of the city.

6. Research Methodology

To fulfill the objective of this paper I have used two methods, one is Questionnaire and the other is observation. The sample used for collecting data for this paper is BSCIT teachers and BSCIT students. The sample was a mixed collection of male, female and of all age group between 18 to 42.

- In questionnaire I have prepared five objective questions and distributed amongst 50 students.
- In observation I observed around my own locality in Mumbai.

7. Procedure

- With the help of ICT itself prepared a Google Form with 5 questions, each having 3 options and forwarded the line to 50 targeted teachers and students.
- Google Form provides the responses in Excel Sheet, which I further analyzed.
- After analysis prepared chart and summary.
- Observed life style of people around the city and quality of infrastructure, services, security and safety.

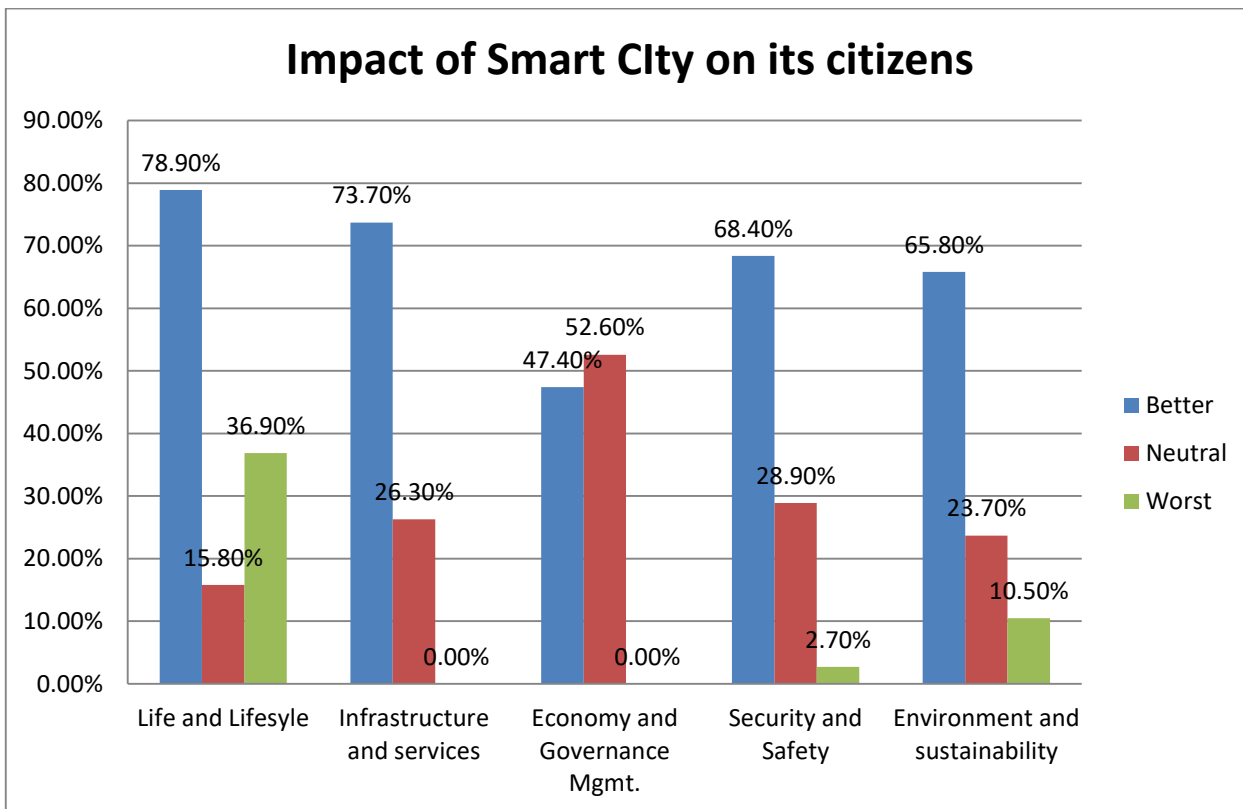
8. Data Analysis

Data analysis is done through Microsoft Excel. As the questionnaire was created through Google form, I got the responses in Excel sheet. Then by summarizing data and preparing chart I analyzed the data.

Following table summarizes responses of 50 participants.

	Better	Neutral	Worst
Life and Lifestyle	78.90%	15.80%	36.90%
Infrastructure and services	73.70%	26.30%	0.00%
Economy and Governance Mgmt.	47.40%	52.60%	0.00%
Security and Safety	68.40%	28.90%	2.70%
Environment and sustainability	65.80%	23.70%	10.50%

Graphical representation of above data



- Above chart depicts that 78.9% of the population are of the opinion that use of ICT in building Smart Cities will improve their life and lifestyle.
- 73.7% of the respondents said ICT will enhance Infrastructure and basic services like healthcare, water management, and waste management.
- 47.4% of the sample were of the opinion that ICT will affect the economy and Governance Mgmt. in positive manner.
- Above chart reflects that 68.4% of respondents believe use ICT in cities will improve security and safety of both people and the city itself.
- Above chart depicts that 65.8% of respondents were of the opinion that environmental condition will improve and this change is not temporary but it will sustain for a long time.

8. Conclusion

In the light of above discussion, it can be concluded that ICT plays a crucial role in the making of Smart City. Dream of smart city is completely based on the Information and Communication Technology. It forms the basic pillar on which the smart and sustainable city can be build. Smart city can be build with the effective use of a rapidly evolving ICT. ICT can be recognized as the true enabler of the smartness in every aspect of the smart city paradigm, it is rightly considered as a horizontal layer in the smart city framework rather than one of the pillars. There is a need of consensus among city administration, consulting companies, service companies and technology companies on what the ICT components are necessary and how cities

should approach this agenda. Use of ICT in cities will improve Waste Management, Power Management, water Management, healthcare, education, transportation etc. it will provide efficient urban mobility and public transport, affordable housing, especially for the poor, good governance, especially e-Governance and citizen participation, safety and security of citizens, particularly women, children and the elderly, and sustainable environment.

Last but not the least it will improve the overall quality of life of its citizens.

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