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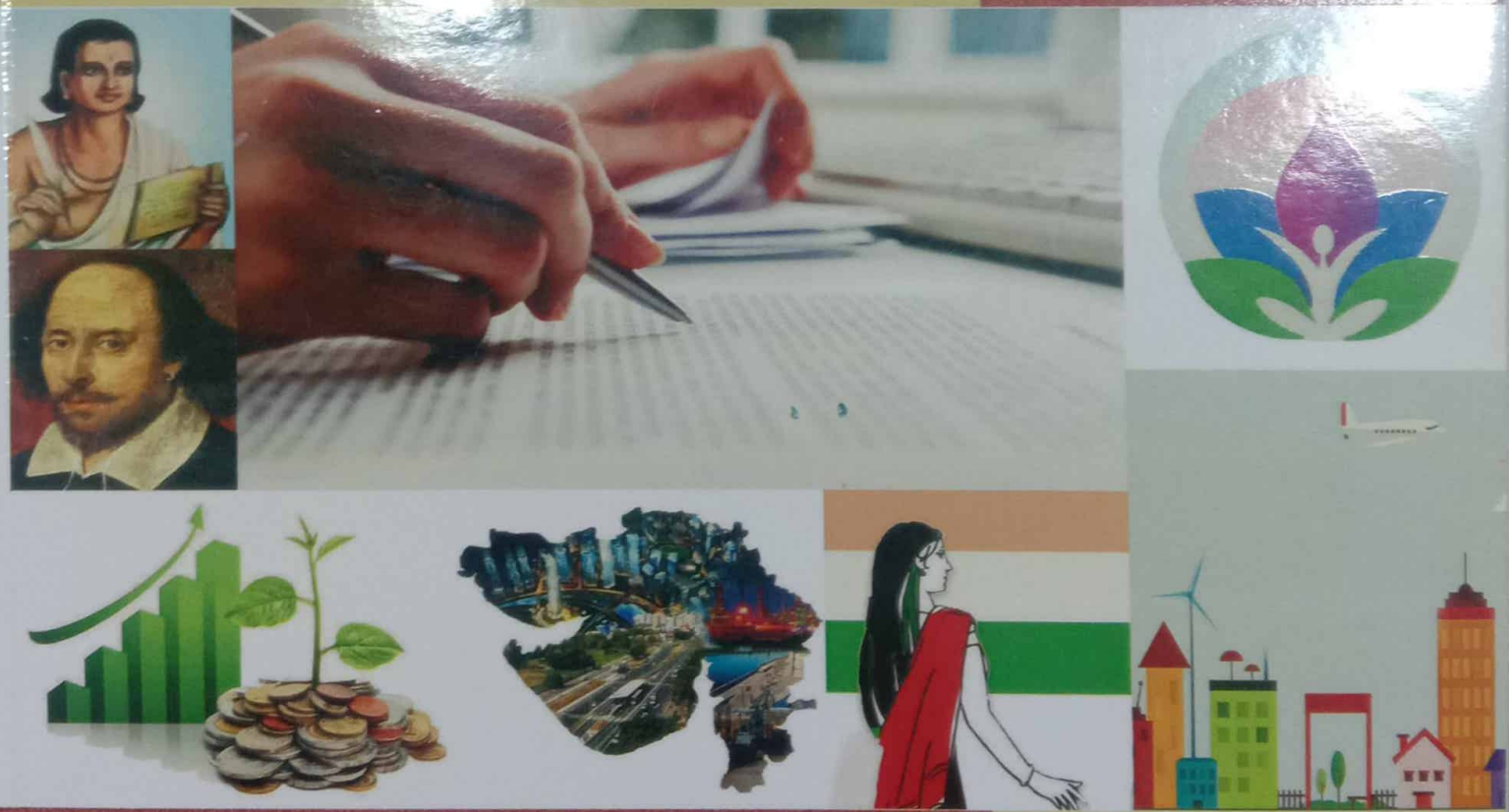

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CONTENTS

Aspects of Smart Cities

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Abstract: *India is the 10th, largest economy in the world, even though standing 2nd position in the global population. And 70% of GDP is coming from urban areas, while we are just investing 0.70 for urban development. For the best economic growth, India still needs to be focused much more on the consistently growing sectors like, Infrastructure, Industries, Hospital Services, Tourisms, IT, Foreign Direct Investments, Research & Development under PPP model, foreign collaborated Higher Education Systems, Service Industries, e-Governance in a more better way. So it is the need of an hour that India needs to concentrate in constitution of 100 Smart Cities in fourth coming years under the visionary of Prime Minister Shri. Narendra Modi to upsurge more Gross Domestic Products (GDP). This research article is focusing on the essence of Smart Cities and conceptual views about Smart Cities by different practitioners. More over this paper is also discussing about "Smart Cities of Six Dimensions" in details for understanding this new urban paradigm shift phenomenon. Besides these, this research manuscript also talks about the Smart Cities enablers comprising of Internet of Things technologies and testimonies of different world Smart Cities applications. The best part of this article is depicting of prerequisite considerations*

Keywords: *Smart Cities; Six Dimensions; Smart City Enablers*

I. Introduction:

India is the 10th, largest economy in the world, even though standing 2nd position in the global population. For the best economic growth, India still needs to be focused much more that have been consistently growing sectors like Telecom, Infrastructure, Industries, Hospital Tourisms, IT, Foreign Direct Investments (FDI), Research & Development under PPP model, Foreign collaborated Higher Education systems, Service Industries, e - Governance in a more better way. In addition to all these, building of "100 New Smart Cities" in India could be boosting of much more economic growth on par with other countries across globe like China (Meixi, Zhenjiang), Abu Dhabi (Masdar), South Korea (Sangdo), Singapore, Malta and Russia (Skolkovo).

According to the State of World Population Report, for the first time in human history more than half of the world's population was in urban areas. Besides this according to Global Health Observatory (GHO) which is part of World Health Organization (WHO) revealed that by 1990, less than 40% of global population lived in a cities, but as of 2010, more than half of all people lived in an urban area. By 2030, 6 out of every 10 people will live in a city, and by 2050, this proportion will increase to 7 out of 10 people. India is also

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not exception in the urbanization, the urban population which was 2.96 billion in 2000 has been estimated to be 3.77 billion in 2010.

If we go for India's urban population statistics, in 2011 it was crystal clear that the level of urbanization in India was vastly increased from 27.81% (2001) census to 31.16% (2011) census. Kingsley Davis used the term "over –urbanization where in urban misery and rural poverty exist side by side with the result that city can hardly be called dynamic" and where inefficient, unproductive informal sector becomes increasingly apparent. Another scholar depicts urbanization in India as pseudo urbanization where in people arrives in cities not due to urban pull but due to rural push.

II. SMART CITIES:

Concepts:

Smart Cities is the one of the most buzz words along with its sister technologies like Internet of Things (IoT), Mobile Robots, Big Data Analytics (BDA), Human Augmentation and Cloud Computing. The phrase "Smart Cities" has emerged in the past few years, yet conferences, companies, citizens, and cities around the globe have become enamored with the concept. Smart Cities concept is the new paradigm shift in the new urbanization principles as well as post internet era. All the business corporate houses, software developers, practitioners, national politicians, policy makers, architects, builders, academicians, researchers and last but not least city dwellers are collectively running behind to construct 'Smart Cities'. What does mean by smart cities? If we look at in details, there is no standard world accepted definition up to now. But for understanding of concept, the right definition would be " 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". The vision of the Smart City concept is to improve the capabilities and simplify numerous problems of the city through optimized energy consumption, carbon emission mitigation, maximum recycling, smart transportation, 24×7 services for inhabitants and intelligent security. And also the concept of Smart City will provide the effectiveness for operational performance, controlling and monitoring of the city which leads to create new economic models, improve the quality of life and finally sustainable development. Smart City so features arts and entertainment, attractions, recreation, festivals, restaurants, hospitals, banks, government and corporate offices and then most famous devotional places. You will instantly get access to the information about the city and provides you with all the information you need to know about the things in the city. A Smart City is one that uses technology to transform its core systems and optimize the return from largely finite resources. By using resources in a smarter way, it will also boost innovation, a key factor underpinning competitiveness and economic growth. Investment in smarter systems is also a source of sustainable employment.

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 3D digital city technology makes the process of collecting and interpretation of the data easy. It becomes easy for the urban development authorities, town planners and architects to study the requirements of the inhabitants and aspiring for the best allocation of resources to implement projects and meeting the aspirations. This digital technology 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. European Innovation Partnership, which aims to boost development of Smart City technologies by 2013, has budgeted €365 million for urban technology solutions. For the Smart Cities, the foundation starts with geospatial data. Geospatial information is a key to the development of Smart Cities because all the information collecting from the roads, public transportation routes, sewer systems, smart meters etc. has to be shown on the map. A strong geospatial foundation helps cities better manage their assets and the thousands of incidents that occur each day. Geospatial Information Systems includes Geographical Information System (GIS), Global Position System (GPS) and Remote Sensing (RS).

Testimonies:

The "Change By Us" urban innovation platform, which was first launched by local residents of New York City in 2011. It consists of a webpage on which the citizens of New York can crowd source their ideas as to how the city can be developed. In this way, citizens become partners with local government in developing solutions for the future. Since it was launched, several thousand ideas have been posted on the webpage's notice board. A couple of hundred of these have led to actual city development projects, which have been set in motion. Examples include a composting platform, a local chicken hatchery and taxation on plastic bags. The platform is now run by the City of New York. Smart Phones and Social Media can be used to create feedback systems between the town hall and the citizens, allowing input from citizens to be collected and assessed. One example of such an IoT-enabled feedback system is the 'Giv et praj' application, which was launched in Copenhagen in 2012. This makes it possible for the citizens of Copenhagen to report graffiti, damaged roads or signs, or full litter bins directly to the municipality using smart phones. The application represents an initiative of the municipality of Copenhagen in which the municipality and the citizens take care of the city collectively. When delivering input citizen will instantly be informed about the expected repair/ response time.

Sino-Singapore Guangzhou Knowledge City (GKC) is a Smart City, integrating urban management systems, powered by leading Information and Telecommunication technologies which will drive sustainable economic growth, a high quality of life, and

effective management of natural resources. A Smart City also provides an excellent test bed for leading edge technologies. GKC will exploit Next Generation Information and Communication Technology (ICT), Virtual Computing, Cloud Computing, and the Internet of Things (IoT) to develop a world class city where residents can live and work in a safely, efficient and resource-efficient environment. The government administration will leverage on IoT technology to optimize the services delivery to urban residents and enterprises.

Southampton City council uses smart cards to stress the importance of integrated e-services. It is a multifunctional card which will allow you to access a number of different services in Southampton. It can be your bus pass, donor card, library card, leisure card or the way to pay the toll on the Itchen Bridge. The City of Edinburgh council has formed a Smart City vision around an action plan for government transportation. Edinburgh City Council needs to replace its web content management system (City Web Portal) and develop a new council website and Intranet to develop its web presence and deliver both financial and time efficiencies and an improved customer experience.

Six Dimensions:

The characteristics of Smart Cities are varies from city to city. But there are six main axes or dimensions. These axes are:

(1) Smart Economy (2) Smart Mobility (3) Smart Environment (4) Smart People (5) Smart Living (6) Smart Governance. And these six axes are based on traditional regional and neoclassical theories of urban growth and development. In particular, the axes are based on theories of regional competitiveness, transport and ICT economics, natural resources, human and social capital, quality of life, and participation of citizens in the governance of cities. General list of Smart Cities Dimensions:

1. Smart Economy (Competitiveness) Innovative spirit, Entrepreneurship, Economic image & trademarks, Productivity, Flexibility of labour market, International embeddedness, Cooperation between the public and private sectors, City competitiveness.

2. Smart People (Human Capital):

Level of qualification, Capability standard, Affinity to lifelong learning, Social and ethnic plurality, Flexibility, Creativity, Cosmopolitanism or open-mindedness, Participation in public life, People with professional Techniques and Intelligent government

3. Smart Living (Quality of Life)

Cultural facilities, Medical service, Health conditions, Individual safety, Housing quality, Education Facilities, Touristic Attractively, Social cohesion and Intelligent green building sustainable groups

4. Smart Governance (Participation) Public participation in decision-making, Transparent Governance, Digital Infrastructure, Public and social Services, 24×7 Emergency System, Political strategies & Perspectives, Policies & Regulations, Urban Digitalization and Urban monitoring & measuring,

5. Smart Mobility (Transportation)
Travel choices, Local Accessibility, (Inter-) national Accessibility, Availability of ICT infrastructure, Innovative and safe transport systems, Improving transportation congestion and Energy conservation & carbon reduction.

6. Smart Environment (Natural Resources)
Attractively of natural conditions, Air Pollution, Environmental protection Sustainable resource Management, Energy conservation & Renewable energy and Decrease in the amount of waste and the number of trash trucks

III. SMART CITY – ENABLERS:

According to "Smart Cities Readiness Guide: The planning manual for building tomorrow's cities today", Smart Cities can radically improve all of the responsibilities through the power of Internet of Things (IoT) technologies. IoT can make buildings more efficient, water more affordable, transportation quicker and neighborhoods safer. The primary Internet of Things technologies which are playing a vital role are but not limited to RFID, Wi-Fi, Nera Field Communication (NFC), Barcode, IPv6, Electronic Product Code (EPC), ZigBee, Artificial Intelligence (AI), Ambience Intelligence (AI), Robotics, Bluetooth, Sensors, Actuators, Big Data Analytics (BDA). The enablers of Smart Cities are broadly categorized into seven categories including of (1) Instrumentation and Control (2) Interoperability (3) Connectivity (4) Security and Privacy (5) Data Management (6) Computing Resources (7) Analytics.

All the city domains including transportation, educational systems, hospitals, municipality organizations and etc. are embedded with many electronic devices and technologies including with computers, laptops, smart phones, smart devices, sensors, actuators, RFID smart cards, IP cameras, CCTV and other related computing, communicating chips and smart software which can monitor and control city.

Smart Cities, green buildings, smart infrastrucre developments, and intelligent managements systems are gradually transforming the world urbanisation. Security is one more vital aspect in these Smart Cities. The basic foundation of any Smart City is safety of its citizens and vital resources. These security issues should be free from crime, accidental and disasters aspects by mounting huge number of IP cameras in all public places, gardens, airports, railway stations and government offices. Sensors usage in natural disaster places in prior will give green signal notifications. RFID, biometric and

facial recognition technologies have to be used for identification of people, objects and incidents in the real time.

Data from citizens, systems, and general things are the single most scalable resources available to Smart City stakeholders today. This data may be in different formats including structured, semi structured and unstructured. This Big Data is constantly captured through sensors and other smart devices, social networks from open data sources. More and more data services for city officials, utility services, citizens become available, which allows efficient access, use of Big Data, a necessary requirement for Cities. In Smart Cities data is going to be generated in Gbps through various connected devices.

When all the components are get connected through internet and generating huge number of data, there needs to be high level computation devices throughout the city inorder to compute, distribute, communicate, control and serve to end user devices. The important resources are Virtual Computing, Grid Computing, Cloud Computing and Big Data Analytics. With these technologies and analytics entire city information can be easily predicted in terms of transportation, governance and services and crime and weather forecasting. Analyzing of electric power, gas and water usage is also possible.

IV. CONCLUSION:

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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