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A Conceptual Study Of The Factors Necessary For Making Smart Cities In India Healthy And Livable

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ABSTRACT

As countries move from being primarily agrarian economies to industrial and service sectors, they urbanize and contribute to economic development and a high share of GDP. It is for this reason that cities are referred to as the "engines of economic growth" and function as efficient engines critical to our economic development. Massive urbanization leads to some challenges including deteriorating quality of atmospheric air, transportation challenges, urban unemployment, scarcity of resources, inadequate and poor infrastructure, energy shortages, price instability, global environmental concerns and human health concerns.To accommodate this massive urbanization and to face these challenges, India needs smarter ways to manage complexities, reduce expenses, increase efficiency and improve the quality of life.

This paper highlights and elaborates the concept of smart cities as livable cities and the factors to be considered to make a smart city livable. It also explains that smart city is not just a platform for innovation, where converging technologies transform governance. To be sustainable in the long run, smart cities needs to be livable, information technology is only one of the many technologies that can be used as a tool to make a city worth living in.

Key Words: Urbanization, Smart, Livable, Sustainability

INTRODUCTION

The 21st century has been referred to as "the urban century. By 2050, over 70 per cent of the world's population will live in cities.Urban areas also contribute a higher share of the GDP. The share of the GDP from urban areas in India has been growing. While the urban population is currently around 31% of the total population, it contributes over 60% of India's GDP. It is projected that urban India will contribute nearly 75%

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of the national GDP in the next 15 years. Therefore cities have been called the "engines of economic growth" and they function as efficient engines critical to our economic development. This trend of urbanization that is seen in India over the last few decades will continue for some more time. By 2030 it is expected to have grown by five times, buoyed largely by the country's urban centers. With 2/3rds of GDP already generated in India's cities and rural to urban migration patterns accelerating, the country faces a critical challenge of managing this rapid urbanization in a way that enhances the livability of India's urban spaces. Experts predict that about 25-30 people will migrate every minute to major Indian cities from rural areas in search of better livelihood and better lifestyles. It is estimated that by the year 2050, the number of people living in Indian cities will touch 843 million.

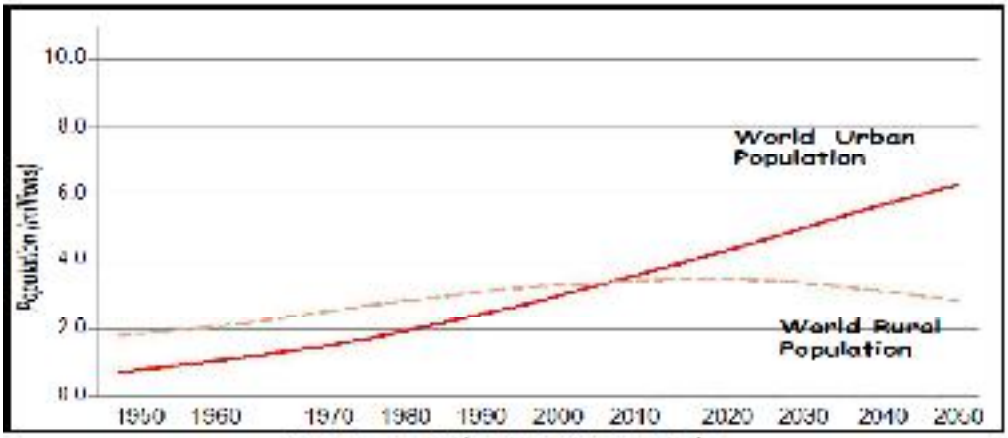

Figure 1: Urbanization Trends

(Source: Concept Note on Smart Cities, Ministry of Rural Development, Government of India,03.12.2014)

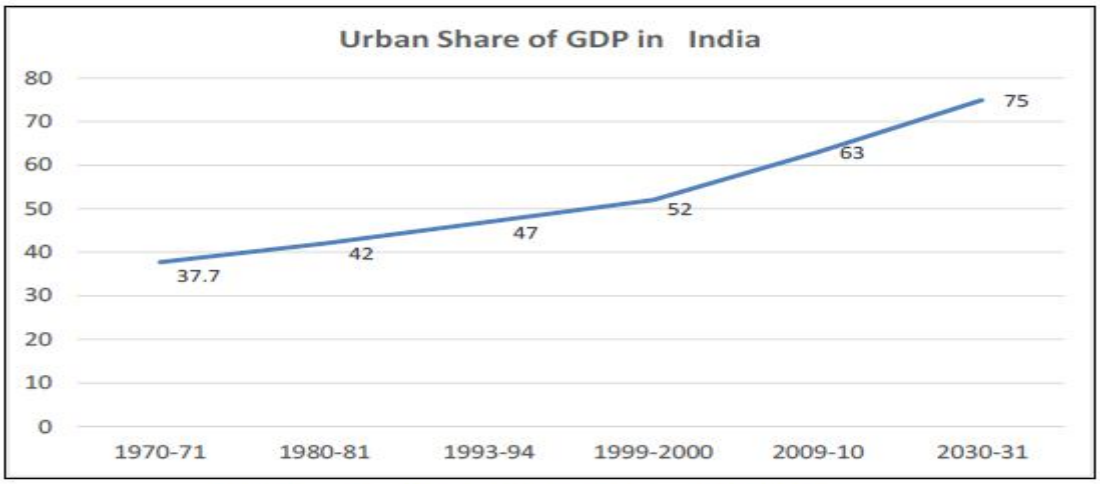

Figure 2: Urban Share of GDP in India

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(Source: Concept Note on Smart Cities, Ministry of Rural Development, Government of India,03.12.2014)

Rapid urbanization in India is posing some challenges which include deteriorating quality of atmospheric air, transportation challenges, urban unemployment, and scarcity of resources, inadequate and poor infrastructure, energy shortages, price volatility, environmental concerns and health concerns.Today's cities are finding it difficult to handle the burden of their current populations: core services like public safety, transportation, energy, water, communications, are inefficient and increasingly decrepit. Cities only occupy two per cent of the landmass of the Earthbut account for over 75 per cent of our total resource consumption thereby enhancing the burden on environment. The shift of millions of rural class to urban Indian cities like Delhi and Mumbai has reached a breaking point.

It is in this context that the Government plans 100 new smart cities and will develop modern satellite towns around existing cities under the smart city programme. Government of India had allocated Rs. 70.6 billion (USD 1.2 billion) for Smart Cities in Budget 2014-15, and it has further allocated Rs. 6 Billion in the budget for 2015-16. The Prime Minister has a vision of developing 'one hundred Smart Cities', as satellite towns of larger cities and by modernizing the existing mid-sized cities. It is estimated that over $40 trillion will be spent by 2030 on city infrastructure projects with over $1 trillion invested just in smart technologies over the coming decade.

To accommodate this massive urbanization and to face these challenges, India needs smarter ways to manage complexities and increase efficiency and improve the quality of life. With the pace of urbanization speeding up, it is important that we create an environment conducive for improving the quality of life substantially. This paper highlights and elaborates the concept of smart cities as livable cities and the factors to be considered to make a smart city livable. It also explains that smart city is not just a platform for innovation, where converging technologies transform governance. To be sustainable in the long run, smart cities need to be livable, and information technology is one of the many technologies that can be used as a tool to make a city worth living in.

CONCEPT OF SMART CITY

Smart cities are identified as cities that promote efficient usage of their resources in areas covering physical, social, intellectual, and environmental infrastructure, leading to sustainable economic development and high quality of life. Smart city concept ensures sustainable economic growth and high standards of living. The concept intelligently manages resources and uses Information and Communication Technology and technology platforms including automated sensor networks and data centers to make living efficient. In other words, a smart city has a mix of residential and commercial (services and manufacturing) spaces, supporting physical infrastructure, social infrastructure, and public utilities.

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The concept of smart cities revolves around the following features: smart energy, smart transport, smart water and waste management,maximization of e-governance services and smart buildings. However, a sustainable and reliable power supply is essential to keep these systems running. The term "smart cities" is a bit ambiguous. Some people choose a narrow definition - i.e. cities that use information and communication technologies to deliver services to their citizens. Smart cities use Information and Communication Technologies (ICT) to be more intelligent and efficient in the use of resources, leading to improved service delivery, cost and energy savings, a better quality of life, and, importantly, a reduced environmental footprint. A city that monitors and integrates conditions of all of its critical infrastructures, including transportation systems such as rail, roads, subways, bridges, tunnels, airports, seaports, communication systems, public utilities such as water and power supply, and even major buildings, can better optimize its resources, monitor safety and security aspects, better plan preventive maintenance activities, while maximizing public services to its citizens. Smart cities herald a new age where information technology, and not roads or buildings, will form the core infrastructure of cities. This digital infrastructure will use a network of sensors, cameras, wireless devices, data centres and powerful analytics enabling the government to provide more efficient services and create an entrepreneurial environment for its citizens, and yet have a smaller carbon footprint.

EVOLUTION OF THE CONCEPT OF SMART CITY

The concept of smart cities dates back to the early nineties. In 1993, Gibson, Kozmetsky and Smilor, in their book The Technopolis Phenomenon-smart cities, fast systems, global networks predict an urban-tech phenomenon to come through a twenty-first century infrastructure , would contribute not only to enhancement of quality of life but also widening the range of global marketplaces. In 1999, certain

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applications of this concept were experienced. Mahizhnan presents the case of Singapore, whose transformation into an information economy on the back of information technologies was made necessary by the lack of island's natural resources and the need to reinvent its traditional industrial economy.Richard Florida's concept of creative concept in 2002 is basedon the assertion that certain occupations specialize in the creative task drawing them to areas providing high quality of life and so it should be an essential development strategy for cities to create an environment that attracts and retain these workers. The concept of digital city or e-city in 2004 focused more on the idea of a "connected community "combining broadband communications with government open data and open industry standards as a way to enhance quality of life of "e-citizens". The concept of knowledge city in 2008 propagated closer connections to a specialized education as a key issue for ensuring a society's long-term quality of life. The Knowledge city was to be a "bridging initiative" to the Intelligent City or better known as Smart City. But despite certain developments in this area, the concept of smart cities only became widely known after 2009. Smart cities have evolved as livable, creative, digital and knowledge cities but drawing heavily on a large technological component. Smart cities tried to improve performance by using information technologies, data, and information to provide more efficient services to citizens, smoothly transforming decisions into actions by means of technological solutions.

SMART CITY DEFINITIONS

There exists a proliferation of smart city definitions. The German National Academy of Technology and Engineering defines "smart city as intelligent, integrated and networked." The definition advocated by the UK Department for Business, Innovation and Skills (significantly changed from Department for Trade and Industry) includes "references to technology and data capture as well as sustainability: smart city brings together hard infrastructure, social capital including local skills and community institutions, and digital technologies to fuel sustainable economic development and provide an attractive environment for all. Smart city harnesses data capture and communication management technologies; smart approaches to services, transport, utilities, waste management transform efficiency and sustainability of urban communities, potential cost and CO2 emission reduction, improvement of quality of life."

Among the many definitions, two main strands of smart cities seem to have established themselves: a narrow understanding promoted by the ICT industry and a wider notion supported by academics and the urban planning and policy community.

Concept of "Smart city" confined to ICT support systems

Smart city is just confounded with high-tech. Such a narrow definition is often used by the ICT industry which is developing remote control and monitoring devices related to energy or other resource consuming urban activities, apparently aiming to

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reduce consumption. In this sense, a smart city is a platform for innovation, where converging technologies transform governance. Therefore,this translates into smart water, smart energy, smart transportation, the key fields in which ICT is being put to use, mostly at the level of buildings and their appliances to control their utilization, and also measure their technical performance.

Concept of "Smart city" in a wider sense

The wider understanding of the smart city includes the social environment with people in mind as an active part of the planning process. Urban communities learn, adapt and innovate. It makes sense to those who advocate the wider notion of smart city to incorporate behavior change and adaptation as a condition to make all the ICT solutions for smart cities viable in practice.

The World Foundation for Smart Communities was created in 1997 at the International Center for Communications in San Diego USA. It defined a smart community as: "A community that has made a conscious effort to use information technology to transform life and work within its region in significant and fundamental rather than incremental ways. The goal of such an effort is more than the mere deployment of technology. Rather it is about preparing one's community to meet the challenges of a global, knowledge economy."

The authors of Smart Cities in Europe give a wider definition of smart city with emphasis on the quality of knowledge communication and social infrastructure. "We believe a city to be smart when investments in human and social capital and traditional (transport) and modern (ICT) communication infrastructure fuel sustainable economic growth and a high quality of life, with a wise management of natural resources through participatory governance."

Most of the technological innovations which make smart cities have now been adopted by many other cities. The corporate sector's definition is overwhelmingly focused on Information and Communication Technology (ICT) with limited recognition of infrastructure, management, city efficiency, quality of life and the environment. Limited definitions from the government sector indicate orientation towards ICT, governance, people and environment. The point to ponder is how to differentiate smart cities from just other cities. An operational difference is whether smart cities generate greater quality of life than just incorporating technological innovation in different shapes and forms into ordinary planning measures.

Imposing technology at cities will not cure India's urban problems. The majority of new cities built to accommodate the new middle class will not be private developments catering primarily to the rich. In fact, viewing a city just through a technological lens is problematic in itself: cities reflect the values and cultures of the communities that live in them, not the technologies they use. Sustainability, mainly environmental sustainability is the primary agenda to be achieved where quality of life and economy are priority.

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SMART CITY IN INDIA

The Modi Government, immediately after coming to power in 2014, decided to formulate an ambitious program to develop 100 smart cities in the country. As mentioned earlier in this paper the govt. has also allocated funds for this purpose in both the 2014-15 budget and the 2015-16 budget totaling Rs. 76.6 Billion. It issued a concept note for wide ranging discussions in October 2014 where it laid out in some detail its model ofthe smart city.

The govt. identified 4 pillars of a smart city – Institutional infrastructure, physical infrastructure, social infrastructure, and economic infrastructure. While it talks about all the right things required to make these cities livable, the stress seems to be more on institutional infrastructure which is heavily dependent on ICT infrastructure. Because of the stress on IT the project is labeled as 'smart cities'. The stress on IT is also borne out by the conditions precedent to the selection of cities to be taken up for this program. This is likely to create a wrong or skewed impression in the minds of those who will ultimately be involved in planning and executing these projects and therefore urgently needs to be corrected. The operative word for such cities should be "livable" or "quality of life", and not "smart".

The word "smart" has got associated with technology; and the word "technology" has got associated with information technology. But "smart" and "technology" have much more to them than just ICT and cannot be restricted to such narrow understanding. The objective of building "smart cities", in the authors' view, should be to provide a good quality of life to its citizens. Viewed from this angle, information technology is only one of the many technologies (and not the only one) that can be used as a tool to make a city worth living in.

People migrate to cities primarily in search of better quality of life. The govt. has recognized in its concept note that "this would mean that cities will have to provide a very high quality of life (comparable with any developed European City) i.e. good quality but affordable housing, cost efficient physical, social and institutional infrastructure such as adequate and quality water supply, sanitation, 24 x 7 electric supply, clean air, employment opportunities, quality education, cost efficient health care, dependable security, entertainment, sports, robust and high speed interconnectivity, fast & efficient urban mobility etc." However, it becomes evident on a careful reading of the document that prominence in the planning of the new cities has been given to IT.

For India, it is essential to align smart city development objectives with national/regional development goals. Current smart city models sometimes are branding-oriented marketing concepts to formally pursue city development. There is nothing wrong in that as a business model but it poses the risk of promoting functionally segregated spaces, which will be well-endowed technological enclaves

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that serve only the aspirations of a minority - the well-educated middle class. This does not cater to the people at large who also provide essential services to a city's economy. The most fundamental prerequisites for a really 'smart' city system would be cognizance of the complexity of urban ecosystems in a way that enhances the quality of life for all in the community and the awareness that technology is not the savior that provides solutions to all challenges.

CONCEPT OF LIVABLE CITIES

Quality of life is in fact deteriorating the fastest in Indian cities. City-dwellers need cities which are livable. Whether they are smart or intelligent will not really matter as quality of life is something which is most important. In Europe, as city planners and citizens have started working together, the concept of livable cities has been gaining acceptance. It is linked to physical forms of the city like parks and green spaces. For some others, it is about the cultural milieu that the city can provide. A livable city is not possible if does not offer career opportunities to succeed. It needs to have economic dynamism which is possible if it also offers reasonable safety within which to raise a family. From a planning perspective, livability is linked to sustainability as it is to consumer resources like food, water, energy and air. And it generates carbon and other gases along with waste in enormous quantities. The distribution system for supplying a city with food and power and the travel distances involved determine the special spread of cities. To illustrate, Indore, a city which is growing rapidly, has no natural water resource. Water is brought to the city from 60 km away. On an average, electricity transmission travels 200 miles and food travels 1,200 miles in the US, according to a Weber and Matthews study on the impact of cities. These consumption patterns arising out of location increase the energy consumption requirement for a city, especially in a country like India. Paucity of electricity and water supply from the government forces people to fulfill their requirements for generation of their daily power and water needs through diesel generators consuming 20 gigawatt of polluting liquid fuel. This is not sustainable development. Unfortunately, this forms a miniscule part of the discussion on smart cities.

Sustainability and therefore less dependence on fossil fuelsfor living and commuting have to be one of the guiding principles in planning a livable city. Thus, planning such cities means that governments use a thumb rule that every citizen can walk for his daily requirements. Schools for children, health care, leisure areas such as parks or open spaces, and entertainment are all within walking distance. The current model of city planning is based on an outdated Le Corbusier concept that the city needs to be flat. Chandigarh is a very well planned city, but it is not a smart city on the test of walkability. A housing project's 'walk score' is determined by how many shops, clinics/hospitals, parks, playgrounds, restaurants and coffee shops are within walkable distance. While the 'walk-to-work' option is unrealistic in most cases, Pune's home buyers give a much higher preference to having their daily needs, shops, schools, colleges, hospitals within walking distance of their homes.

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The logic is simple, yet profound. A family's happiness quotient depends more on family members back at home being able to walk for daily necessities in a housing project than on how soon the breadwinner (or, in the case of Pune's every-increasing dual income families, breadwinners) can get to and from work.

There are many models of livable cities worldwide. One of the models which large multinational organizations refer to for expatriate managers' location and compensation is The Mercer Quality of Living Survey which is described below.

QoL INDEX

Concurrent with the start of the Local Agenda crisis, in 2005, a new set of global indicators appeared. Quality of life indicators were proposed as a way of assessing a city's livability. The livability city initiative monitors a city's welfare and well-being with a quality of life(QoL) index. The term quality of life should not be confused with the concept of standard of living, which is only related to income. The standard set of QoL indicators proposed by both Mercer and The Economist Intelligence Unit includes data on wealth, employment, urban environment, social health, education, time-use, family and community services. In both cases, an aggregated index summarizes a QoL set of indicators. QoL data is collected from two different sources: life-satisfaction surveys of citizens, providing a subjective view of a population's emotional well-being in various life domains, and quality of life indicators providing an objective evaluation of socio-economic factors.Two most widely recognized quality-of-life index accepted worldwide are: Mercer's Quality of Living Survey and The Economist Intelligence Unit Index. However, unlike Mercer's index, The Economist index, which uses data from Mercer, ranks both countries and cities and uses fewer indicators: 9 against 39 taken by Mercer.

MERCER QUALITY OF LIVING SURVEY

The promoter of this urban monitoring of quality of life was a private corporation, Mercer, a human resources and related financial services consultancy, with its headquarters in New York city. Mercer is the world's largest human resources consultancy, operating in more than 40 countries. Mercer's Quality of Living survey evaluates living conditions in 440 cities looking at 39 factors including political stability, crime, media censorship, medical supplies and services, availability of international schools and public transportation. Mercer evaluates local living conditions in more than 460 cities it surveys worldwide. Living conditions are analyzed according to 39 factors, grouped in the following 10 categories:

- Political and social environment
- Economic environment
- Socio-cultural environment
- Medical and health considerations
- Schools and education
- Public services and transportation

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- Recreation
- Consumer goods
- Housing
- Natural environment

Vienna has the best overall quality of living, according to the Mercer 2015 Quality of Living rankings. Overall, European cities dominate the top 10, with Zurich, Munich and Dusseldorf leading the pack. Auckland, New Zealand, comes in third among the major cities with Vancouver, Canada, the highest-ranking city in North America, rounding out the top five. Vancouver is the region's only city in the top 10. Singapore is the highest-ranking Asian city, while Dubai ranks first across Middle East and Africa. While no U.S. cities were featured in the top 20, San Francisco, Boston and Honolulu were the highest ranking cities in the country in 27th, 34th and 36th place, respectively.

Mercer identified several 'emerging cities' that are becoming increasingly competitive to traditional business and finance centers. These so called 'second-tier emerging cites' are particularly investing in infrastructure to improve their quality-of-living standards and ultimately attract more foreign companies. Hyderabad and Pune in India, Xi'an and Chongqing in China, Wroclaw in Poland, Durban in South Africa and Manaus in Brazil were included in this group. Hyderabad has been ranked top among Indian cities in the quality of living. According to Mercer's Quality of Living Report 2015, the city is ranked at 138 globally in the quality of living and is highest among the Indian cities, ahead of Pune, Mumbai and New Delhi. The survey

highlights that Indian cities haven't made much progress on the quality of living scale, scoring nearly the same as they did last year. Over time, Hyderabad has emerged as a city of choice due to factors such as improved options for international schools and a fine choice of reputable English-speaking schools. Additionally, Rajiv Gandhi International Airport is located 22 km from the city and offers a good range of international flights, which improves its ranking on account of public services. Both Hyderabad and Pune rank higher for quality of living than the country's more traditional business centers, Mumbai and New Delhi which ranked at 152 and 154 respectively. While other factors have remained constant, considerable population increases in Mumbai and New Delhi, in the recent decades, have increased existing problems, including access to clean water, air pollution, and traffic congestion. The World Health Organization (WHO) recently published data on pollution around the world suggesting that 13 of the world's 20 most-polluted cities are all in India, and impacts the overall scores of Indian cities.

MANAGERIAL IMPLICATIONS

The current concept paper issued by the central government talks of creating smart cities, and therefore concentrates primarily on the use of IT to improve delivery of governance. But if the objective of building smart cities changes to building livable

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cities it brings in a whole new dimension to the strategy of urbanization. Livable cities require that the size of the city's population be limited to a number that can be efficiently managed. Livable cities will also give importance to the design and building of urban infrastructure such that the needs of people such as schools, colleges, hospitals, work places etc. are provided and within easy reach. Design of utilities such as power, water, and sewage will have to be such that they are available to all and at affordable prices. IT will help in the delivery and maintenance of services and governance.

The performance measurements for cities will also change from just the performance of IT services to the quality of living. Cities will be compared and performance rated on the basis of quality of living indices such as housing, economic environment, educational facilities, health facilities, environment, transportation, recreation, socio-cultural environment, and, after that, on political environment and public services where IT will play an important role.

There are therefore major managerial implications on shifting the focus to 'livability' from 'smart'.

FINDING AND CONCLUSIONS

India, today, is a very exciting place to live in. It is one of the most noticeable emerging countries and given Prime Minister Narendra Modi's thrust on creation of smart urban infrastructure in the country, technology will definitely play a major role in the transformation of city infrastructure. But the real challenge is to create smart cities from the ground up and to improve quality of life through better administration and citizen services, and transform the existing cities intolivablesmart urban infrastructures. The onus is to create new "Quality of Life" townships which will greatly solve urban challenges like security, water supply, and traffic, among other services using digital technology and thus enhance the quality of living standards of the residents of these cities. If we talk about the cities of National Capital Region like Noida,Gurgaon,Greater Noida and Faridabad, we observe that not enough planning was done to make such cities worth living. Forget about other things, in the absence of proper public transport system, it is not easy to live in such places. Power shortage and lack of uniformity in terms of power tariffs among NCR cities and Delhi clear proved the point that our policy planners hardly make any long term policy to make such cities livable.

The government's implied assumption that a smart city will also make it livable is flawed. The model as shown in the government's concept note concentrates on 'competitiveness' of a city and assumes quality of life as one of the contributing factors. But the objective, in the authors' view, should shift from competitiveness to quality of life. This change in objectives has huge implications in terms of planning the future cities of India. ICT is only one of the tools which will help in improving the livability of these cities.

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Looking at global discourse and practices in Smart City, mainly revolving around the use of ICT, we suggest that most important aspect of ICT is not its capacity to build smart cities but its capacity to offer opportunities to be integrated in to a wider political, economic and social environment.While building a smart city, it ideally has to be self-sustained in most aspects like residential, commercial, retail, educational, as well as industrial areas and, at the same time, be able to address at least the basic needs of residents. The 100 smart cities in India should be planned with the objective of improving quality of life taking into consideration some of the factors mentioned in the Mercer Quality of Life, Survey 2015. The Mercer model will have to be customized with respect to the Indian perspective.

City-dwellers need cities which arelivable. Whether they are smart or intelligent will not really matter as quality of life is something which is the most important and it is deteriorating the fastest in Indian cities. From a planning perspective, livability should be linked to sustainability. Technology is important to generate data about mobility, urban land use, and governance, but it is not the sole purpose for upgrading these cities. A city is also about the cultural milieu that it can provide. A smart livable city should not only offer career opportunities to succeed but should also offer reasonable safety within which to raise a family.The prime objective of developing the next 100 cities must be livability.

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