

## Chapter 2

# Can the Smart City Allure Meet the Challenges of Indian Urbanization?

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**Abstract** The core argument of this chapter is that the Smart Cities Mission appears to present a disconnect between the actually existing city development and urbanization, and its primary goal of creating wealth by embedding technology in the built environment without first addressing the basic city problems is flawed. This chapter comprehensively presents the three challenges of urbanization facing Indian cities. These are the challenges of infrastructure with a specific focus on sanitation, the challenges of environment, and the challenges of governance. Separately, these challenges have been discussed but this is the first attempt when urban development challenges are being discussed in the context of the Smart Cities Mission. The chapter further explores smart cities, as conceived and currently being built by the Indian and global corporate builders, could face up to the challenges presented by the Indian urbanization.

**Keywords** Smart city mission • Urban infrastructure • Governance • Sustainable environment • Urban mobility

## 2.1 Introduction

Starting in the year 2008 and travelling through a number of European and Asian countries, the smart city has recently arrived in India, becoming quite a fascination for the Indian political, and business classes and neoliberal intellectuals. The smart city mission quickly took the centre stage during the 2014 general elections in India when the presently ruling political party made it an integral part of its manifesto as well as the development discourse. With opposition political parties failing to present any credible new alternative urban vision, the smart city vision got accepted and adopted as a policy instrument central to urban development in India. Expectedly, the business classes lapped up the smart city mission as a huge business

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opportunity whereby urbanization is directly being used as a site for accumulation of capital. The smart city in India appears to be deployed as an innovation by the capitalist classes to invest in the city for endlessly creating surplus value through built form. However, the spread of smart city discourse is uneven and limited to large existing cities and new developments. Small and medium towns and cities appear to be untouched by the smart cities discourse. Increasingly, it is becoming clear that cities in India are no longer purely perceived as places to live, work, educate and entertainment, they are simultaneously envisioned as commodities to be innovatively conceived, produced, packaged and marketed before being sold in the market place like any other commodity. Involvement and commitment of the private global companies in this endeavour clearly shows that a decisive step has been taken by the capital whereby cities have become the primary arenas of accumulation of surplus value. High surplus value will arise largely out of integration of a complex of high technology and built environment.

In June 2015, the *Smart City Mission Transform-Nation* was launched from Delhi by the Prime Minister. Under the Smart City Mission, Government of India pledged to create one hundred smart cities by 2020 by way of regenerating existing areas through retrofitting, redevelopment, and pan-city application of certain smart solutions to existing infrastructure, and also by developing new areas or greenfields (Ministry of Urban Development 2015: 5–8). According to this Mission comprehensive city planning and development is a long-term goal and cities are advised to work towards this end in an incremental manner. What is to be done presently is to build foundations for achieving that long-term goal by creating what is termed as the ‘layers of smartness’ with primary focus on ‘sustainable and inclusive development’. However, simultaneously the Mission document clearly notes that “the purpose of the Smart Cities Mission is to drive economic growth and improve the quality of life of people by enabling local area development and harnessing technology especially technology that leads to Smart outcomes” (Ministry of Urban Development 2015: 6). Smart city objectives of inclusivity, sustainability and improved quality of life through accelerated economic growth are laudable but problematic at the same time because these are not prioritized giving few clues about how far economic growth will take priority over inclusivity and equitable distribution of material resources created by the smart cities. As the policy document stands today, the emphasis appears to be placed on economic growth at the cost of inclusivity and sustainability will be discussed later in the chapter. If this is found to be true, the Smart Cities Mission could end up achieving exclusionary urbanization whereby people are more prone to displacements and evictions, and the primary questions about urban poverty and unemployment, adequate shelter, access to basic infrastructure and services, and clean environment will remain unaddressed.

Smart City Solutions further mask the contradictions of the Smart Cities Mission. Smart Solutions include six aspects—E-governance and Citizen Services, Waste Management, Water Management, Energy Management, Urban Mobility, and others involving Tele-Medicine, etc.—may not touch the lives of the urban poor as they do not have access to smart technologies and even if they have they cannot afford such solutions. Core argument of this chapter is that the Smart Cities

Mission appears to present a disconnect between the actually existing city development and urbanization, and its primary goal of creating wealth by embedding technology in the built environment without first addressing the basic city problems. These are the challenges of shelter, the challenge of infrastructure with a specific focus on sanitation, and the challenge of governance. Separately these challenges have been discussed several times over. But this is the first attempt where these challenges are being discussed in the context of the Smart Cities Mission. After this critical analysis, it is explored whether the smart cities, as conceived and currently being built by the Indian and global corporate builders, could face up to the challenges presented by the Indian urbanization. This chapter ends with some concluding insights.

## 2.2 Defining Smart Cities

Defining is not setting limits but showing a certain direction for future movement. This movement is political and shows certain ideology. Smart city movement is no exception. The smart city movement originates from an ideology of neoliberalization involving national and global corporations and their constellations. Free markets in a globalized environment play foundational role in defining the smart city. Efficiency, productivity and profitability remain central pillars of the smart city mission. A number of definitions of a smart city are in circulation. Academic journals, books and the Internet are overloaded with such definitions. Several of these definitions overlap but none of them appears to be clearly accepted and adopted by practitioners and scholars of urban studies. Private companies like the IBM and CISCO, and a number of think tanks have clearly placed greater emphasis on technology led urbanization and value creation through the marriage of technology and built environment by providing high end cities.

The most representative definitions of the smart cities are envisaged as "... territories with a high capacity for learning and innovation, which is built into the creativity of their population, their institutions of knowledge production, and their digital infrastructure for communication" (Hollands 2008: 306). As is quite apparent, Holland shows that smart cities house creative pool of talented workers and institutions embedded in information and communication infrastructure. The definition places heavy emphasis on human creativity and technology. Smart cities are those which are rich in human capital and information and communication technology. Smart city economies are knowledge producing economies.

Smart cities are based on six axes. "These axes are: a smart economy; smart mobility; a smart environment; smart people; smart living; and, finally, smart governance.... In particular, the axes are based—respectively—on theories of regional competitiveness, transport and ICT economics, natural resources, human and social capital, quality of life, and the participation of society members in cities"

(Caragliu et al. 2011: 70). Here emphasis is placed on six axes to make a competitive city. Everything smart is put into the service of competitiveness and economic growth. Economic advantage is based on integration of technology and built form. Few years earlier the same authors presented a somewhat similar definition of a smart city. They argued that "... a smart city is a synthesis of hard infrastructure (or physical capital) with the availability and quality of knowledge communication and social infrastructure. The latter form of capital is decisive for urban competitiveness" (Caragliu et al. 2009: 45). Here the authors stressed that we should place a greater emphasis on the integration of physical and social infrastructure through technology to produce a competitive city.

A number of information and communication companies, such as the IBM are heavily investing in the smart cities project. In an article titled 'Smarter, More Competitive Cities: Forward-thinking Cities are Investing in Insight Today', the IBM underscore that the smart city is:

Every step towards becoming a smarter city creates efficiency, and every bit of efficiency alleviates some of the strain on city budgets, freeing up time and resources to focus on driving economic development and prosperity. Developments in technology have fundamentally increased the value that cities can generate for their citizens, their city, and the planet. Let's build a Smarter Planet™, city by city (IBM 2012: 3).

The IBM concludes that by "becoming a smarter city is a journey that requires a shift in thinking. Every step drives increased efficiency, and every initiative that delivers return on investment can translate into another project. The resulting smarter city is one that attracts citizens and businesses by delivering on its potential as never before" (IBM 2014: 4). With relentless focus on efficiency, economic development and economic prosperity, the IBM has even greater plans (also see Table 2.1). After examining these definitions of a smart city, it is not difficult to arrive at some of the salient features of a smart city as given below:

- Digital information and communication technology appears to form the core of a smart city project.
- Role of the private sector is central and government is only an enabler in the smart city project.
- To become a smart city, a city must be competitive, efficient and productive.
- To become competitive, a city should house a large number of creative and innovative people. Human capital is critical to the smart city mission.
- Integration of the various elements of a smart city through technology is another central aspect of a smart city.

To say that there is no consensus on the definition of a smart city is fallacious and motivated. Leaving a smart city undefined is useful for the business as it leaves scope for greater human discretion. Certainly, it would also lead to greater elite capture and lower levels of citizen participation.

**Table 2.1** IBM and the Smart City Characteristics (2009)

Today...	What if a city could...	Already cities are...
<i>People</i>		
<ul style="list-style-type: none"> <li>• Cities have difficulty using all the information at their disposal</li> <li>• Citizens face limited access to information about their healthcare, education and housing needs</li> </ul>	<ul style="list-style-type: none"> <li>• Reduce crime and react faster to public safety threats, by analyzing information in real time?</li> <li>• Use better connections and advanced analytics to interpret vast amounts of data collected to improve health outcomes?</li> </ul>	<ul style="list-style-type: none"> <li>• Putting in place a new public safety system in Chicago, allowing real time video surveillance and faster more effective response to emergencies</li> <li>• Giving doctors in Copenhagen instant access to patients' health records, achieving the highest satisfaction and lowest error rates in the world</li> </ul>
<i>Transport</i>		
<ul style="list-style-type: none"> <li>• Transporting people and goods is dogged by congestion, wasted hours and wasted fuel</li> </ul>	<ul style="list-style-type: none"> <li>• Eliminate congestion and generate sustainable new revenues, while integrating all transport modes with each other and the wider economy?</li> </ul>	<ul style="list-style-type: none"> <li>• Bringing in a dynamically priced congestion charge for cars to enter Stockholm, reducing inner-city traffic by 25% and emissions by 14%, while boosting inner-city retail by 6% and generating new revenue streams</li> </ul>
<i>Communication</i>		
<ul style="list-style-type: none"> <li>• Many cities have yet to provide connectivity for citizens</li> <li>• "Going online" typically means at slow speeds and at a fixed location</li> </ul>	<ul style="list-style-type: none"> <li>• Connect up all businesses, citizens and systems with universal affordable high-speed connectivity?</li> </ul>	<ul style="list-style-type: none"> <li>• Merging medical, business, residential and government data systems into a so-called ubiquitous city in Songdo, Korea, giving citizens and business a range of new services, from automated recycling to universal smartcards for paying bills and accessing medical records</li> </ul>
<i>Water</i>		
<ul style="list-style-type: none"> <li>• Half of all water generated is wasted, while water quality is uncertain</li> </ul>	<ul style="list-style-type: none"> <li>• Analyse entire water ecosystems, from rivers and reservoirs to the pumps and pipes in our homes?</li> <li>• Give individuals and businesses timely insight into their own water use, raising awareness, locating inefficiencies and decreasing unnecessary demand?</li> </ul>	<ul style="list-style-type: none"> <li>• Monitoring, managing and forecasting water based challenges, in Galway, Ireland, through an advanced sensor network and real-time data analysis, giving all stakeholders—from scientists to commercial fishing—up-to-date information</li> </ul>

(continued)

**Table 2.1** (continued)

Today...	What if a city could...	Already cities are...
<i>Business</i>		
<ul style="list-style-type: none"> <li>• Businesses must deal with unnecessary administrative burdens in some areas, while regulation lags behind in others</li> </ul>	<ul style="list-style-type: none"> <li>• Impose the highest standards on business activities, while improving business efficiency?</li> </ul>	<ul style="list-style-type: none"> <li>• Boosting public sector productivity, while simplifying processes for business in Dubai through a Single Window System that simplifies and integrates delivery and procedures across a range of almost 100 public services</li> </ul>
<i>Energy</i>		
<ul style="list-style-type: none"> <li>• Insecure and unsustainable energy sources.</li> </ul>	<ul style="list-style-type: none"> <li>• Allow consumers to send price signals— and energy—back to the market, smoothing consumption and lowering usage?</li> </ul>	<ul style="list-style-type: none"> <li>• Giving households access to live energy prices and adjust their use accordingly, as in a Seattle based trial, reducing stress on the grid by up to 15% and energy bills by 10% on average 0.37</li> </ul>

Source IBM Institute for Business Value (2009: 10)

Latest thinking in the IBM has further focused on the city as a system, whose core elements must be made competitiveness and efficient. In a recent report the IBM concludes that “becoming a smarter city is a journey that requires a shift in thinking. Every step drives increased efficiency, and every initiative that delivers return on investment can translate into another project. The resulting smarter city is one that attracts citizens and businesses by delivering on its potential as never before (IBM Institute for Business Value 2014: 4).

In this line of thinking the term smart could mean efficient and effective use of energy or resources. In this sense all scientific discoveries promoting efficiency and effectiveness are smart. It reminds me of a basic idea of lever, where small amount of energy could result in the movement of a large object. Computational capacities of highly complex modern computers are another instance of efficiency and effectiveness. In both the instances, movement of a large object, and processing of a large amount of data represents efficiency and effectiveness because society and scientist viewed that moving large objects and processing large amounts of data were not humanly possible even if huge costs and longer time was spent performing these tasks.

Smart cities may be a new formulation and appeared globally in 2008. But close cousins of smart cities have been around for some time now. For example, intelligent cities, virtual cities, digital cities, information cities. These are “all perspectives on the idea that ICT is central to the operation of the future city (Batty et al. 2012: 483). Then there are other theoretical perspectives, which closely resemble with the smart city idea. These are:

- Creative Cities (Florida 2002, 2005, 2009): Creative class or ‘high bohemiaans’
- New Urbanism (Calthorpe 1993)
- Smart Growth (Flint 2006): compact, Transit oriented development, and mixed land use development
- Information Cities (Castells 1996, 1997, 1998, 2004, 2007, 2009; Castells and Himanen 2014): The network society and productivity
- Neoliberal City, Revanchist City, Entrepreneurial City (Harvey 2007; Smith 1996).

These are all perspectives on the idea that technology centred economic growth through private sector is central to the operation of the future city.

### 2.3 Challenges Facing the Indian Cities

Everyday experience in Indian cities depends on who is describing that experience. There is no doubt that a slum dwellers’ experience is finer grained and closer to city realities than the middle class and elite experiences of a city which received by them after a lot of filtration made possible by accumulated wealth. One side experiences lack of almost all the things needed for a good life while other side seeks improvements on the acquired endowments and faster economic growth. Overall the Indian cities and towns face a number of serious challenges. First of these includes housing for the masses and not only for the middle and upper income classes as it is accepted today. Sanitation, particularly sanitation deprivation is another big challenge the Indian cities face. Third major challenge is that of mobility, mobility of all income classes. Affordable, safe and environmentally friendly modes of transportation are crucial to the making of smart cities. Related with mobility are the environmental concerns, which are getting aggravated by each passing day. We need to fix these problems and face these challenges aggressively.

Global capital, global financial institutions buttressed by local capital and financial institutions and enabled by governments displaces this crucial agenda with attractive agenda of ‘cities as engines of economic growth’. A clear and positive correlation is increasingly established between rising levels of urbanization and economic growth. Cities are showcased as places of action for people to live better quality of life because major portion of economic growth takes place in urban areas. Global as well as Indian agencies forecast that the level of urbanization is certainly going to be higher in future than what it is today. Some estimates even foresee that by 2050 a majority of the Indian population will live in cities. Future of India thus is likely to be urban. A recent study by the McKinsey Global Institute shows that since the last three decades the Indian economy has grown the fastest from 2002 to 2012. Economic growth from 2002 to 2012 has been “the fastest ... in independent India’s economic history, as GDP grew at 7.7% annually” (Brar et al. 2014: 11). Household consumption also grew rapidly at 7% per year in real terms and fixed investment touched an all-time high of 35% of GDP in the year 2011–2012. This

study also points out that the share of the population below the official poverty line fell from 37% in 2005 to 22% in 2012—the fastest rate of poverty reduction India has achieved since economic reforms of the early 1990s. An impressive 137 million people rose above this threshold (Brar et al. 2014: 11).

The McKinsey Global Institute and the World Bank also predicts that most of future economic growth will take place in towns and cities. In 2012, India had 54 metropolitan cities which together with their hinterlands (65 districts) accounted for 40% of GDP, and 45% of consuming class households. Hinterlands, in this instance, refer to districts in which metropolitan cities are situated and stretch across. India will have 69 metropolitan cities in 2025, and together with their hinterlands they will account for 54% of India's ... GDP from 2012 to 2025 and 50% of India's total income in the terminal year (Brar et al. 2014: 17–18). Another recent report published by the McKinsey Global Institute shows that nearly 600 million Indians would be living in cities by 2030, and cities would generate nearly 70% of new jobs by 2030. Cities would also produce more than 70% of India's gross domestic product. Therefore cities would propel a fourfold increase in per capital income (McKinsey Global Institute 2012).

Think tanks aside, Government of India also believes that cities are engines of economic growth. Based on Census of India 2011 data, the Smart Cities Mission highlights that cities have contributed 63% to the GDP of India. It is expected that by 2030 urban areas will be home to 40% of India's population and these areas would contribute 75% to India's gross domestic product (Ministry of Urban Development 2015: 5). Economic growth therefore will decidedly happen in urban areas. Urban areas therefore are required to be equipped with necessary infrastructure to facilitate this economic growth.

This dominant discourse of 'cities as engines of economic growth' has overshadowed another equally, if not more important, city reality of woefully inadequate or in some cases even non-provision of critical basic services such as water and sanitation, lack of decent housing and shelter, lack of affordable and safe mobility opportunities, scarce employment opportunities in the formal sector, low wages, lack of safety of urban citizens, deteriorating environmental quality, non-transparent and largely unaccountable government. All these factors have become the root cause of social and economic inequalities, which certainly manifest themselves in the city spaces, such as slums and squatters, unauthorized colonies, pavement dwellers, etc. These inequalities perpetuate poverty and informalization of livelihoods as 270 million people (22%) remain below official poverty line of 1.25 dollar a day (Gupta et al. 2014: 11).

Urban poverty, homelessness, unemployment, lack of basic social and physical infrastructure, lack of mobility, unclean environment, etc. remain central problems of the Indian city. Public policies like the Smart Cities Mission tend to focus on these problems in so far as they appear to become hindrance to economic growth.



### 2.3.1 *The Challenges of Urban Infrastructure*

Urban India is important to the Indian economy, society, polity and the environment in more ways than one. For instance, nearly 600 million Indians would be living in cities by 2030. Cities would generate nearly 70% of new jobs by 2030. Cities would produce more than 70% of India's gross domestic product. Most important of all cities would propel a fourfold increase in per capita income (McKinsey Global Institute 2012; also see Fig. 2.1 for ill maintained community toilets in a slum in Delhi). Some estimates go as far as saying that by 2050 half of India's population is expected to live in urban areas, and it is also expected that over two-third of the gross national product will be produced in these areas. Concentrations of people, capital and infrastructure to service people and capital have huge implications for cities as well as people apart from the physical environment. The trend of cities and towns continue to becoming the storehouse of demographic advantage in the form of most skilled and creative labour living in urban areas and propelling economic growth of the country will be further accentuated. Urbanization and economic advancement will become synonymous reinforcing and contradicting each other or masking each other's limitations.

While cities and towns present momentous opportunity for future economic growth, they also pose several foundational challenges due to lack of critical urban infrastructure including inadequate provision and maintenance of infrastructure,



**Fig. 2.1** Municipality built community Toilet at Kathputli colony in Western Delhi; *Source* Author

lack of finances for investment in infrastructure, uneven development and low quality of infrastructure, and governance of infrastructure.

Infrastructure in Indian urban settlements is inadequate in comparison to the needs of the citizens is a well-known fact. As the Census of India showed 17.24% or 65 million population of the country lived in slums in 2011. This represents not only injustice of global proportions; it also does not help in the reproduction of skilled labour power so essential to creating economic wealth today and in the future. It is not only the urban poor; the middle classes also struggle for securing access to basic infrastructure in towns and cities. Struggles to access basic infrastructure has become critical in small and medium towns in comparison to large metropolitan cities, particularly in relation to urban sanitation as sewerage systems are either not laid out or only provided for a small% of population. According to Census of India, although 81% households have access to latrine facility of some kind or the other, only 33% urban households are connected with modern sewerage system. The most disconcerting aspect of sanitation deprivation is that 9.9 million urban households in India still defecate in the open (Census of India 2011).

According to the Census of India 2011 nearly 13% of urban households resort to open defecation and another 8% use shared toilet facilities. It is disappointing to see that India has over 47% of the world's population practicing open defecation (Mehta 2014). In smaller cities 22% households practice open defecation. In parts of the mega cities like Mumbai, the condition is much worse, we call these areas slums. For example, in Dharavi there is only 1 toilet after 900 persons and people are compelled to start a movement called the Right to Pee. Sanitation specifically poses serious risks to the safety and health of woman and the girl child. As a result tensions between middle class aspirations for a clean and orderly city and bodily needs of the urban poor with no access to toilets repeatedly manifest themselves in parks, playgrounds and other public open spaces. Urban India with global aspirations simply could not afford open defecation in its cities and towns. At the core smartness of Indian cities is connected with access of all households to basic sanitation facilities.

Major obstacle to providing adequate urban infrastructure of good quality requires huge amounts of financial resources. Several prominent committees have made estimates about investments in urban infrastructure. Rakesh Mohan and Isher Judge Ahluwalia led committees are well known for their excellent work on urban infrastructure financing. According to the Twelfth Five Year Plan: 2012–2017, Rs. 108,168 crore are required just to provide potable water in urban areas. Another Rs. 50,780 crore are needed for laying out sewerage systems and treatment of sewage. Urban transport requires an outlay of Rs. 100,000 crore for 20 years (Planning Commission 2013). The Final Report of the Working Group on Financing Urban Infrastructure have noted that investment in the urban sector for building critical infrastructure in the next 20 years from 2012–2013 to 2031–2032 is projected at Rs. 39,20,000 crore. Out of the total projected investment, 44% is to be invested on urban roads and 11.5 on mass transit putting together investments in the transport sector would exceed the half mark of all investments in the urban sector. Another 14.39% investments is required to be made in water supply and sewerage. In other

words water supply, sewerage, solid waste management, storm water drains, urban roads, urban transport, street lighting and traffic support infrastructure would amount to Rs. 31 lakh crore out of Rs. 39 lakh crore over the 20 year period. This means nearly 80% of all investments in the city infrastructure would be made in the above-mentioned 8 core urban sectors as per the Twelfth Five Year Plan's Steering Committee on Urban Development and Management (Planning Commission 2011: 9–10). Most committees on infrastructure finance are unanimous about enhancing spending on urban infrastructure as percent of the GDP. Chaired by Isher Judge Ahluwalia, the High Powered Expert Committee (HPEC) for Estimating the Investment Requirements for Urban Infrastructure Services proposes to increase investment in urban infrastructure from 0.7% of GDP in 2011–2012 to 1.1% by 2031–2032 (Ministry of Urban Development 2011: XXI). Agreeing with HPEC report the McKinsey Global Institute in its own report titled 'Infrastructure Productivity: How to save \$1 trillion a year' argues that an increase in infrastructure investment of 1% of GDP would 'translate into an additional 3.4 million direct and indirect jobs in India...' (McKinsey Global Institute 2013: 4).

Inadequate investment in infrastructure has two immediate consequences. First, the majority urban poor living in slums and unauthorized colonies suffer from severe lack of critical services, such as water, sanitation, education and health causing ill health and income deprivation. Second, inadequate infrastructure negatively impacts India's economic growth by reducing of India's gross domestic product by 1–2% annually. Inadequate sanitation costs India a staggering Rs. 2.4 trillion or over 6% of the GDP (Ministry of Urban Development 2008). Social and spatial inequality of infrastructure becomes a barrier in the reproduction of labour power as well as becomes a major hindrance in achieving right to the city for the urban poor.

The second challenge is urban governance. Governance of infrastructure, in the first instance, critically depends on the capacity of urban local bodies to raise taxes. In India urban local bodies largely depend on grants from government. Over the decades, municipalities have been regarded agencies responsible for provision and maintenance of services. But political leaders in the municipalities have not taken upon themselves the responsibility of steering city development as a whole. Dependence upon state and central government funds could reduce if urban local bodies proactively look for generating funds additional and exclusive taxes and levies. Although 74th amendment to the Constitution of India has facilitated decentralized urban local government throughout the country, political devolution with executive powers in the hands of elected representatives have not yet truly happened. Urban local bodies still implement policies framed at central and state levels, and do not really make policies, a critical element of any autonomous urban local government. Financial dependence of three municipalities on Government of Delhi and resulting conflict between the two levels of governments only highlights this point well. A good beginning has been made by decentralization of urban local government throughout the country, but attempts are required to be made now to make these bodies autonomous with clear leadership roles assigned to elected

politicians. A system of directly elected mayors entitled to appointing groups of professionals is required for efficiently running cities and towns.

The third and most important challenge of urban infrastructure is the use of appropriate technologies for the provision and maintenance of physical infrastructure, more particularly sanitation. Use of technology becomes even more important if people responsible for providing certain kind of infrastructure such as sanitation are treated badly by the society as a result of their involvement in these activities. Here, a major problem should be highlighted: the dreadful social practice of manual scavenging. Those of us, who do not know, let me point out that manual scavenging in Indian cities is still practiced. There are about 13 lakh manual scavengers in India according to Vimal Thorat as quoted in *The New Indian Express* of 8 October 2013; Delhi alone had 14,479 scavengers in 2013 and Delhi also had over 10,000 dry latrines in 2013 (*The New Indian Express* 2013). Indian Railways engages manual scavengers on its 14,300 trains transporting 25 million passengers across its 65,000 km of tracks. Human shit goes straight to railway tracks and 172,000 open discharge toilets (Roy 2014: 35–36). This inhuman and degrading social practice can be easily stopped by use of appropriate sanitation technologies. The colonial rulers deployed humans for collection and transportation of human excreta from large cities like Delhi and Mumbai because they found it cheaper. To be a candidate for a smart city would include complete elimination of manual scavenging and honourable resettlement and rehabilitation of those involved in this inhuman social practice.

Urban infrastructure is not only about pipes, bricks and mortar, even when we acknowledge its materiality is visibly important as use value as well as exchange value. Understanding of the politics, sociology and economics of infrastructure is equally significant. Economics of infrastructure is being given its due place by placing greater emphasis on financing of infrastructure. However, sociology of infrastructure is largely ignored without critically making it part of sanitation policies. Polity and economy of the Indian cities is largely controlled by the middle classes. How it is then the middle classes complain about absence and quality of urban infrastructure?

### ***2.3.2 The Environment Challenge***

The environmental challenge involves climate change, disturbing the natural environment, disturbing the natural drainage patterns, destruction of natural habitat of flora and fauna, etc., degradation of natural resources, degradation of land, degradation of air, and degradation of water resources. From 30 November to 12 December 2015 the Paris Agreement was drafted, negotiated and adopted by consensus in Paris on 12 December 2015, and on 22 April 2016 the Paris Agreement was signed by 195 countries. The Agreement is aimed at reducing greenhouse gas emissions (United Nations 2016). Cities appear to be the main offenders. Although cities cover less than 2% of the earth's surface, they consume

78% of the world’s energy and produce more than 60% of all carbon dioxide and significant amounts of other greenhouse gas emissions, mainly through energy generation, vehicles, industry, and biomass use (Central Pollution Control Board 2011: 90).

In order to ameliorate the environmental challenge, comprehensive and land use planning could play a vital role. For example, developing and redeveloping cities in such a manner that natural drainage patterns are not disturbed or minimally disturbed. Filling up of lakes in Mumbai and Bengaluru are examples of blocking drainage systems and causing floods. Air, water and land pollutions, particularly in the mega cities, could be reduced to a significant level by promoting green technologies, green buildings, clean energy, promotion of reliable, efficient and affordable public transport systems. Since 2002 Delhi Metro has shown the way forward by offering environmentally sustainable, affordable and safe mode of transport (see Table 2.2 for major cities).

Transportation is one of the main contributors to air pollution in urban India (The Times of India 2015; also see Fig. 2.2).

Post the Industrial Revolution, cities have been brought to limelight and considered as the main reason behind climate change. Cities are blamed for generating most of the world’s greenhouse gases. Generation of these greenhouse gases is determined to some extent by the pattern of urban mobility, housing design and distribution, organization of food and water systems and a person’s lifestyle (Label et al. 2007). With technological, industrial and agricultural advancements, coupled with increase in population growth, growth of cities, increase in number of vehicles on roads, growing energy consumption, evaporation of fuels from petrol pumps, and waste production, and lack of strict implementation of environmental laws and regulations have increased the discharge of pollutants into air as well as water, and soil have exacerbated this situation. Thus it could be safely concluded that the cities are the main culprits causing climate change. Evidence keeps on mounting. For example, although cities cover less than 2% of the earth’s surface, they consume 78% of the world’s energy and produce more than 60% of all carbon dioxide and significant amounts of other greenhouse gas emissions, mainly through energy generation, vehicles, industry, and biomass use (EcoSeed 2014).

Therefore, cities are also highly vulnerable to climate change. Large concentrations of population and economic activities in urban areas have serious implications not only for climate change but also climate is bound to affect these populations. Increased precipitation has implications on cropping patterns and

**Table 2.2** Air quality index in major cities 2015

S. no	Name of the city	Air quality index	Quality
1.	Delhi	279	Poor
2.	Pune	68	Good
3.	Kolkata	65	Good
4.	Mumbai	56	Good

Source SAFAR@MoES-IITM-IMD (2015) as quoted in The Times of India, 7 May 2015



**Fig. 2.2** Traffic on Delhi's roads; Source [http://www.mpg.de/5928050/global\\_air-pollution](http://www.mpg.de/5928050/global_air-pollution)

causes flooding. Urban floods have direct and indirect implications on economy and health of society at large. The most rainfall was recorded on 26 July when the city received 944 mm of rain in one day (37 in.). The floods caused extensive damage to Mumbai and surrounding areas. Mumbai Metropolitan Area authorities reported 700 human casualties, 244,110 houses with total or partial damage, 97 collapsed school buildings, 5667 damaged electricity transformers, together with losses to national highways and transportation systems (52 broken local trains, 41,000 taxi cabs, 900 buses, 10,000 trucks). In addition to the direct impacts, the flood event had cascading effects at different scales. Informal settlements were one of the worst affected sections in the city (Chatterjee 2010: 342). According to the Global Sustainable Development Report, Mumbai floods of 2005 caused death of around 1000 people and economic loss of US\$750 million (Chakraborty 2015: 18). December 2015 Chennai floods have already killed nearly 300 persons and there is huge loss of property. Chennai Airport has to be closed for days and the Indian Railways could not operate its trains from Chennai as the railway station was under water. Clearly environmental degradation has economic costs.

What are the driving forces of climate change? According to Government of India (2013) report on 'Statistics related to Climate Change-India' in India unregulated and unplanned economic activities are the main driving force behind human induced climate change:

- Increase in production of consumer goods and services with increase in purchasing power.
- Changes in the production structure.
- Increased mobility.



- Increase in demand for all kinds of consumer goods, etc.
- Changes in land use patterns, decreasing green cover, increasing built up area, deforestation and land clearings are some of the main factors.
- Continued dependence on fossil fuels to meet ever increasing demand for energy particularly for travel through private vehicles.
- India continues to depend upon coal, oil and natural gases and derived products to meet country's energy needs for all its economic activities.
- The primary issue is the emission of carbon dioxide as a residual product resulting from the burning of these fossil fuels.

Increasing geographical size of cities due to urban sprawl and peripheral urban development around large cities has led to longer average trip lengths. For example, Delhi has an estimated average trip length of 16 km, which causes additional use of fossil fuel based energy through private modes of travel causing air pollution and fuel wastages.

Traditionally cities in India got built in the form of mixed land uses with activity systems located alongside each other. In modern times, particularly since early 1900s when modern urban planning came into existence in India, cities have been planned by separation of land uses. Each area is used for a specific land use such as residential, industrial, commercial, public and semi-public, etc. This creates additional need for travel making mobility critical to city life. As shown here principle reason of air pollution is vehicles in the city.

Increased conspicuous consumption in cities has also given rise to unsustainable developments like malls, multiplexes, etc., which use loads of energy without care. Apart from climate change, degradation of land, water and air resources are some of the other environmental challenges to urban development. Scarcity of land and benefits it is endowed with in the context of increased population pressure leads to degradation of land. Increasing the proportion of built up area, especially in urban areas, affects drainage patterns and results in increased amount of surface run-off. Natural drainage patterns have been disturbed by filling up lakes in Mumbai and Bengaluru to carry our urban development. This has blocked the natural drainage systems and has caused periodic floods during monsoons.

Increase in built up area has also led to reduction in open spaces, and increase in impervious surfaces such as buildings, roads, parking lots, rooftops, driveways and sidewalks, and compacted soils lead to reduced infiltration and increase in surface runoff. With increase in population, supply of developed land has become very limited, leading to creation of high density pockets in urban areas or another form of slums. Air, water and land pollutions, particularly in mega cities, could be reduced to a significant level by promoting green technologies, green buildings, clean energy, and promotion of reliable efficient and affordable public transport systems. Delhi Metro has shown the way.

Slums and squatters represent failure of sustainable land use planning and the policy framework. Dharavi, the second largest slum in Asia, is located in Mumbai. But slums can be seen as providing housing to around 800,000–1 million people in just 2.39 km<sup>2</sup>. The slum has a density of approximately of 334,728 persons per

square kilometer, which is way high for a decent human habitat (Census of India 2011).

Growth of slums imposes environmental, governance and demographic challenges. With the increase in urban population due to natural growth and immigration from surrounding towns and villages, housing demand, particularly affordable housing demand, also increases. Inability of government (land use planning) to provide affordable housing units at the same pace as the increase in demand, has led to proliferation of slums. At the same time inability of city governments to control land mafia makes slums as the governance challenge. Slums also represent oppression in the form of evictions and threat of evictions by authorities to the slum dwellers. Slums also represent a demographic challenge as large numbers of people immigrate to cities. With increase in urban population, demand for water has increased tremendously exerting pressure on surface and ground water resources.

Centralized and inefficient sewage treatment facilities in cities coupled with lack of connectivity to sewer lines in major parts of cities is one of the main causes of water pollution, which leads to dumping of untreated or partially treated sewage in surface water sources. Unregulated and illegal groundwater extraction further reduces depth of groundwater table. Dumping of solid wastes (inclusive of wastes generated during religious and social practices) and industrial effluents into water bodies is another cause for concern. Flow of untreated storm water into rivers also leads to water pollution as this water carries with it toxic chemicals swept off from built up areas, pavements and roads. This is a part of the environmental challenge because inappropriate sewerage system causes water pollution and land pollution as a significant part of the sewage never reaches sewage treatment plants.

Nearly 80% of the sewage generated in India flows untreated into its rivers, lakes and ponds, turning the water sources too polluted to use. Almost 40% of the total sewage treatment capacity of the country exists in just two cities—Delhi and Mumbai. Water pollution is a multi-dimensional environmental challenge. First part comprises of supply of adequate potable water and effective water supply network for treatment and distribution of water to residences, industries, commercial spaces, etc. Second part of water pollution is that used water has to be carefully and effectively disposed of through modern sewerage network. Third dimension of this challenge is dumping of untreated storm water into rivers, etc. again leading to pollution (Dhar 2015).

### ***2.3.3 The Governance Challenges***

Decentralization is defined as devolution of functions, apart from functionaries and finance, to lower level jurisdictions, and transfer of powers or delegation of powers from central or state authorities to regional and local authorities. In the case of Indian cities, 74th Amendment to the Constitution of India paved the way for devolution of powers from the state governments to directly elected urban local



bodies: municipal corporations, municipal councils, and nagar palikas. De facto challenges still remain and are being faced by urban local self-governments every day. First, it must be highlighted that still urban local bodies are being run primarily by appointed civil servants, and not by elected representatives. Second municipalities do not have financial autonomy.

Despite the efforts of the State Finance Commissions (SFCs) to devolve financial resources from time to time to local governments, urban local government continues to depend upon state and central government grants to a larger extent. Third, important functions such as land use planning and land development still remain in the hands of development authorities controlled directly by the states. Fourth, capacity building is another issue, particularly in relation to urban planners because India does not really produce sufficient number of planners so that each city could have at least one planner. Polycentric form of governance, elected mayor (empowered) and economically stronger ULBs through SFC functioning properly could successfully face the governance challenge.

As far as land use planning is concerned, the Constitutional Amendment also provided for the setting up of District Planning Committees which were tasked to prepare District Development Plans. Entire country now has District Planning Committees. However, functioning of DPCs need to be made more effective and DDPs need to be urgently prepared in all states? Even where District Development Plans have been prepared, they are not being implemented fully. There appears to be a wedge between *de jure* and *de facto*, very similar to master plans for cities as convincingly shown by Pethe et al. (2014). Development plans (both district development plans and master plans) in their official form do not get implemented, and reality does not in any way resemble with what was officially intended. Under these circumstances, instead of unsympathetically criticizing development plans, we may work towards making plans dynamic in the form of strategic documents rather than comprehensive blueprint plans. Strategic dynamism is necessary for making official development plans move and change like the free markets do in accordance with changing context (Pethe et al. 2014: 129).

Other related governance challenges to city planning and development include:

- Under resourced town and country planning organizations at the state level
- Lack of adequately trained human resources, particularly land use planners
- Non-operational and non-existent metropolitan planning committees and district planning committees
- Lack of public participation involved in the preparation of development plans including non-preparation of district development plans and metropolitan development plans
- Overlapping of jurisdictions of a large number of organizations dealing with the same geographical areas
- Lack of well-defined roles and responsibilities of urban local bodies.

Apart from the above-mentioned issues, capacity building remains a central institutional challenge in Indian cities. For example, number of town planners in

India is over 4000 only as registered with the Institute of Town Planners of India or ITPI in comparison to the number of towns in India according to the Census of India (2011) is 7953 (Ministry of Human Resource Development 2011; Census of India 2011). So the first issue is that on an average, for every two towns, there is only one town planner. Second issue is that majority of these registered planners are concentrated in major cities of Delhi, Mumbai, Jaipur, etc. and involved in institutions like Delhi Development Authority, City Industrial Development Corporation, Jaipur Development Authority, Chennai Urban Development Authority, Haryana Urban Development Authority, etc. In order to realize economically buoyant and socially equitable cities in India, multi-disciplinary teams comprising of land use planners, urban economists, and social scientists (geographers, sociologists, anthropologists), civil engineers and architects are required to be appointed in each city to carry forward the agenda of sustainable land use planning and faster economic growth. Although there is a problem of supply of adequate land use planners at the moment (currently Government of India is in the process of setting up additional new planning institutions), at the same time enough employment opportunities are not being created for trained planners and their positions are taken up by other professionals.

## 2.4 The Smart Cities Mission and Smart Cities in India

Given the serious implications of the challenges of city development in India, we could reasonably expect that among other city planning policies, the Smart Cities Mission in India would address these challenges. Smartness of Indian cities could be determined by examining whether the Smart Cities Mission addresses urban challenges and to what extent it addresses these issues. The Mission can be treated as an urban policy reform. If reforms mean policy adaptations to changing social, economic and political circumstances, then reforms are needed, even necessary.

Nobel Prize winner economist and philosopher Amartya Sen argues that three factors are required to be considered before undertaking any policy reforms. These are “reach, range, and reason - or more elaborately: (1) the reach of the results to be achieved, (2) the range of the ways and means to be used, and (3) the reason for choosing the priorities we pursue” (Sen 2005: 1971). Reach refers to reforms being *person-related* and *even-handed*. Person related means that reforms positively contribute to the lives people want to live and freedoms they want to enjoy and even-handed means interests and freedoms of all, particularly the poor, are looked after. Reforms therefore must pursue inclusionary ends. Range refers to diversity of means such as nature of economic growth, social commitments and democratization. Thus instruments to achieve ends include range of reforms in the economic, social and political spheres. Reason refers ‘the constant willingness to ask why exactly they are doing what they are doing’ (Sen 2005: 1973). Reason constantly poses a question to policy makers or reformers why a policy is being implemented and why they are doing so. Among other things the smart cities discourse in India

against Sen's range, reach and reason can also be evaluated (also see Fanelli and Squire 2008: xi–xxxiv).

### 2.4.1 *Smart Infrastructure*

The Smart Cities Mission focuses on application of 'smart solutions' for the development and maintenance of infrastructure and services. In all the policy document lists 21 smart solutions, ranging from smart water metres through to smart parking, integrated multi-modal transport, and telemedicine and tele education. A smart city infrastructure includes 'adequate water supply, assured electricity supply, sanitation including solid waste management, efficient urban mobility and public transport, intelligent traffic management, affordable housing, especially for the poor, robust IT connectivity and digitalization, good governance especially e-governance and citizen participation, sustainable environment, safety and security of citizens particularly women, children and the elderly, and health and education.

Could the Smart Cities Mission meet the challenges of urban infrastructure? The policy intent is present but it lacks details about how to build and maintain smart infrastructure. With Rs. 100 crore per city per year from central government and another Rs. 100 crore from state government, it is woefully inadequate funding for making a city smart. An arterial road construction in a city would cost nearly Rs. 2 crore per kilometer and a single low floor bus would cost about Rs. 55 lakh. Construction of a metro line per kilometer costs Rs. 175 crore. Even BRT costs Rs. 15–20 crore per kilometer ([www.rediff.com](http://www.rediff.com) Business 2006). Similarly laying out sewer lines would cost heavily. There is little indication about sources of funds for building and maintaining the smart infrastructure.

Second it does not mention anything on the serious issues of open defecation and manual scavenging. The reforms are therefore neither person-related nor even-handed. Talk of inclusivity is mere policy rhetoric. However, effective implementation of sanitation centred policies and programmes will help make Indian cities smart. For example, under the Swachh Bharat Mission, 28,948 community and public toilets have been completed till October 2015 as per information displayed on the Dashboard Swachh Bharat Mission of the Ministry of Urban Development. Similarly the National Urban Sanitation Policy does make mention of 'safe management of human excreta', as more than '37% of the total human excreta generated in urban India is unsafely disposed'. It recommends that '100% of human excreta and liquid wastes from all sanitation facilities including toilets must be disposed of safely'. This policy also addresses the pressing issue of open defecation and suggests concrete measures to make Indian cities open defecation free cities and towns. The issue of manual scavenging is also taken up in this policy (Ministry of Urban Development 2008: 1–2). Funding for providing latrines to tackle the problem of open defecation will come from the Integrated Low Cost Sanitation scheme run by the Ministry of Housing and Poverty Alleviation where central government will provide 75% subsidy, state government will provide

another 15% subsidy and remaining 10% of the cost will be borne by individual beneficiary households. ‘The main objective of the scheme is to convert around 6 lakh dry latrines into low cost pour flush latrines by 31st March 2010 ... the Scheme for Integrated Low Cost Sanitation ... essentially focuses on provision of latrines to prevent open defecation in order to eliminate manual scavenging’ (Ministry of Urban Development 2008: 9–10).

Convergence of a number of urban policies is significant for making the smart Cities Mission successful as far as building and maintenance of basic infrastructure is concerned. The Smart Cities Mission is fully aware of integrating number of ‘other programmes and schemes with the Smart Cities Mission’ (Ministry of Urban Development 2008: 17).

### **2.4.2 *Smart Environment***

One of the core infrastructure elements in a smart city is ‘sustainable environment’ whose meaning is left unexplained. The word environment appears in Annexure 4: Challenge Stage 2: Criteria and Indicative Table of Contents, where a specific question is asked about the impact of a certain proposal on the environment and can significantly impact the selection process due to high score awarded to this question (Ministry of Urban Development 2015: 35). Whether this concern and criteria involving impact of a proposal on environment will also result in compulsory environmental impact assessment is unclear. But these provisions should be read with relevant environmental laws and regulations. For example, environmental impact assessment has been made mandatory under the EIA 2006 notification made under the Environmental Protection Act, 1986 where prior environment clearance is required for all projects listed in Schedule of that notification including Common Effluent Treatment Plants, Common Municipal Solid Waste Management Facility, building and construction projects of  $\geq 20,000 \text{ m}^2$  of area  $150,000 \text{ m}^2$  of built up area, townships and area development projects covering an area  $\geq 50 \text{ ha}$  and built up area  $\geq 150,000 \text{ m}^2$  (Ministry of Environment 2006).

### **2.4.3 *Smart Governance***

The Smart Cities Mission will be implemented by an organizational arrangement dubbed as the Special Purpose Vehicle. The SPV is a limited company incorporated under the Companies Act 2013, and will be promoted by equity share holding of 50% each by state government and an urban local body. Private sector and financial institutions could hold equity shares in the SPV if equal share of equity shares between a state government and urban local body are maintained. The SPV will perform several functions. “The SPV will plan, appraise, approve, release funds, implement, manage, operate, monitor and evaluate the Smart City development

projects. Each Smart City will have a SPV which will be headed by a full time CEO and have nominees of Central Government, State Government and ULB on its Board” (Ministry of Urban Development 2015: 12 and 35–36). The SPV must ensure that it is a credit worthy organization in the market, which is able to raise resources from the market. The SPV is allowed to implement projects through joint ventures, subsidiaries, public–private partnerships, turnkey contracts, etc.

This kind of organizational arrangement is highly focussed on efficiency, productivity and profitability. Elected local government appears to have little or no role in the implementation of the Smart Cities Mission except some participation of selected mayors and municipal commissioners or chief executive of ULBs in the State Level High Powered Steering committee and limited participation of some ULBs in the Board of Directors of the SPV. Central government expects that ‘the rights and obligations of the municipal councils with respect to the Smart City project [are delegated] to the SPV (Ministry of Urban Development 2015: 39).

On the other hand, national level Apex Committee headed by the Secretary, MoUD with representatives from related Ministries and organizations will approve proposals for Smart Cities Mission, monitor their progress and release funds. This Committee will consist of Secretary, Housing and Poverty Alleviation, Secretary (Expenditure), Joint Secretary, Finance, MoUD, Director NIUA, Chief Planner, Town and Country Planning, select Principal Secretaries of States and select CEOs of SPVs as members with Mission Director as the Member Secretary. Further, the Representatives of organizations, such as UN Habitat, World Bank, TERI, Centre for Development of Advanced Computing, Centre for Smart Cities Bangalore and other bilateral and multilateral agencies and urban planning experts could be invited (Ministry of Urban Development 2015: 15). On similar lines state level committees headed by respective state Chief Secretaries would be established with the exception that such committees would also include selected mayors and municipal commissioners or chief executive of ULBs, and heads of concerned line departments.

## 2.5 Conclusions

The Smart Cities Mission appears to focus on the selected aspects of smart city project including the use of information technology embedded in the built environment, and efficiency leading to economic growth at the direct cost of tackling the crucial and impending issues of urban development challenges of infrastructure, environment and governance. It has little to say directly on the environmental challenges and it has a lot to say on running the Smart Cities Mission through CEOs of companies known as the Special Purpose Vehicles. This could reduce the significance of elected urban local governments’ already fledgling status due to limited financial and human resource capabilities. Even on the challenges of urban infrastructure, the Mission would succeed only if it sought convergence with other

urban policies such as the National Urban Sanitation Policy and Swachh Bharat Mission Urban.

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