# Smart City Mission, Urbanization and Its Challenges : A Case Study of Haryana

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## ABSTRACT

Mission of Smart Cities has been launched by the Prime Minister on 25th June 2015. A Smart City aims to drive economic growth and improve the quality of life of people by enabling local area development and harnessing technology that leads to Smart outcomes. The objective of the Smart Cities Mission of the Ministry of Urban Development is to promote cities that provide core infrastructure and give a decent quality of life to its citizens, a clean and sustainable environment and application of 'Smart' solutions for inclusive development. Urbanization is not modern phenomenon, but rapid and historic transformation and replaced by predominantly urban culture. Urbanization is a complex socio-economic phenomenon which deals with the behavioral, structural and demographical transformations of the society. The process of urbanization is increasing in both the developed and developing countries. The present study is to clarify the trends and pattern of urban development in Haryana state at different time periods with identification of regional variations. The study find out that rapid urbanization in particular the growth of Haryana large cities and the associated problems of unemployment, poverty, inadequate health, poor sanitation, urban slums and environmental degradation pose dreadful challenges. The state is experiencing unremitting augment in the proportion of urban population as a result of more liberal industrial policies as well as sharing a significant proportion of its area with national capital region.

Keywords : Smart City, Urbanization, Environment, Health, Sanitation, Industrialization, Digital, Technology.

## I.  INTRODUCTION

### Smart City Mission

India is on the path of massive urbanization. From 377 million urban population, living in 7936 cities and towns, it is projected that by the year 2030, 600 million people will live in urban areas and 78 cities in India will become metropolitan (million plus). Although, the cities generate 60 per cent of GDP and 70 per cent of jobs, the state of housing and basic infrastructure services remains awfully poor, impeding sustainability and economy. This haphazard development continues to scar our cities. Notwithstanding the fact that many Indian cities are still abysmally poor, they are the engines of productivity and wealth. The wealth created by urbanization and innovations in housing, services, utilities and technology leads to improvements in people's lives. It is projected that by the year 2031, 70 per cent of GDP and 70 per cent of new jobs will come from the cities.

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Smart Cities Mission has been launched by the Prime Minister on 25th June 2015. A Smart City aims to drive economic growth and improve the quality of life of people by enabling local area development and harnessing technology that leads to Smart outcomes. The objective of the Smart Cities Mission of the Ministry of Urban Development is to promote cities that provide core infrastructure and give a decent quality of life to its citizens, a clean and sustainable environment and application of 'Smart' solutions for inclusive development. The strategic components of the Smart Cities Mission are city improvement (retrofitting), city renewal (redevelopment) and city extension (Greenfield development), plus a Pan-city initiative in which Smart solutions are applied covering the city. Given below are the descriptions of these models of Smart City development.

Smart solutions will enable the cities to act as the engines of growth. The cities which are planned built and serviced as sustainable and smart, will be more networked, automated and connected with high-quality services and construction. Standardization, automation, intelligent interconnected system of services, transportation, information technology, energy efficiency, bionic controls, simulation, robotics, renewable energy, solar mapping, stereo-lithography and nanotechnology are de rigueur of a smart city. It is the manifestation of a new paradigm and a symbiosis of ecology and human functions.

### Making Cities Smart

Cities are composite systems which touch multiple agencies, departments and organizations.
These have become too complex to handle and operationalize conventionally. New ways, systematic changes, and technology can improve their efficiency, services and operations. IT in city services and management helps to develop smart solutions to

urban challenges, as well as make the life of its citizens more comfortable, sustainable and healthy.

Smart city applies the Information and Communication Technology (ICT) to enhance innovation, learning, knowledge and creative approach, along with enhancing economy and productivity of the city. Smart cities use IT and automation intelligently and extensively for delivery of civic services, deal smart grid solution for energy management, have Intelligent Transport System, offer smart traffic solutions to escape traffic jams and congestion, during crisis and emergencies.

The digital infrastructure includes wireless devices, data centers and powerful analytics to enable the government to provide more efficient services sustain a low carbon footprint and create conducive environment for its citizens, improving the quality of life and living conditions of urban areas through state of the art infrastructure and facilities. The advance in technology has multiplied the space, energy and time. With the practical applications of microchips, micro-computers, microwaves, Nano-technology, etc., the urban services can create a breakthrough. New forms of energy, renewable energy and recycling are the key concepts in urban services. The network of society, cyber-space, e-topia is changing the familiar borders like inside-outside, private-public, here-there, city-country and yesterday tomorrow. The world of space and place is considered by online exchange of information, interactions, dynamic networks and floating nodes.

### Objectives

To evaluate the Concept Smart city mission in India and Haryana
To examine the urbanization in Haryana with India from 1901-2011

To find out the responsible Challenges of Smart city and urbanization in Haryana

## II. METHODS AND MATERIAL

### Data Sources and Methodology

The present paper is based on framework concept of Smart city project of central government and secondary data obtained from Primary Census Abstracts of India and Haryana State, various census publications of India.

The research paper has been used to retain the different types of maps. Urbanization of Haryana all districts has been divided into four categories namely very highly (more than 32 per cent), highly (between 24-32 per cent), moderate (between 16 to 24 per cent), and low urbanized districts (below than 16 per cent).

### Study Area

Haryana is a state in northwest India between 27o37' to 30o35' latitudes and between 74o 28' to 77o36' longitudes and separated from the state of Punjab on 1st November, 1966. It is surrounded by Uttar Pradesh in east, Punjab in west, Himachal Pradesh in north and Rajasthan in south where river Yamuna acts as the eastern division for administrative purpose. Haryana state extends for about 44,212 sq. kms with

just 1.37 per cent of total geographical area and less than 2 per cent of India's population. Since it ambience Delhi in the northern, western and southern sides, a large area of state is included in National Capital Region (N.C.R.). Chandigarh, a union territory, is the capital of Haryana which is also share by Punjab. The state comprises 21 districts 74 sub districts, 80 statutory towns, 74 census towns and 6841 villages (Census of India, 2011).
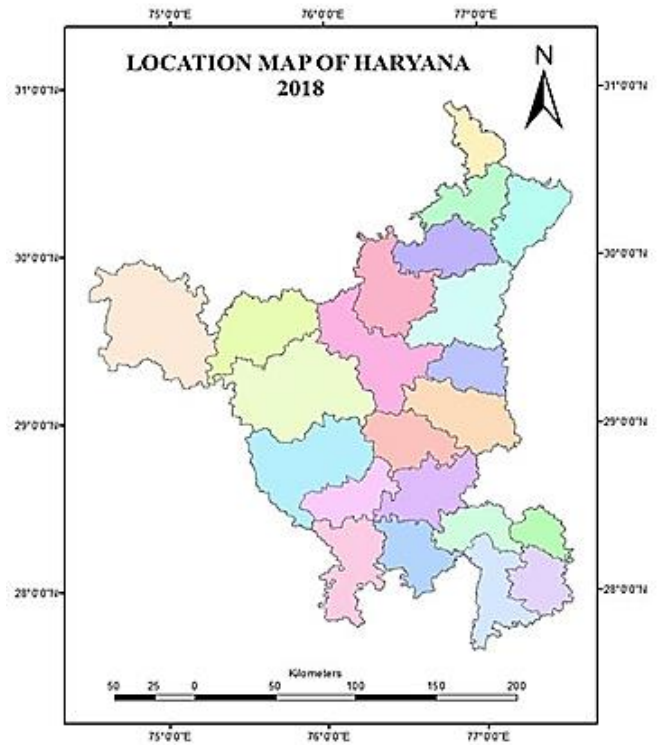


**Urbanization in India and Haryana 1901-2011**

**Table 1:** Urban Population and Its Growth Rate in India, 1901 to 2011

| Census Year | Total Urban Population (in crore) | Urban Population ( per cent) | Decadal Growth (per cent) |
|---|---|---|---|
| 1901 | 02.59 | ---- | ---- |
| 1911 | 02.60 | 10.29 | 0.35 |
| 1921 | 02.81 | 11.17 | 08.22 |
| 1931 | 03.35 | 11.99 | 19.14 |
| 1941 | 04.42 | 13.85 | 31.97 |
| 1951 | 06.24 | 17.29 | 41.38 |
| 1961 | 07.89 | 17.97 | 26.41 |
| 1971 | 10.91 | 19.90 | 38.23 |
| 1981 | 15.97 | 23.31 | 46.02 |
| 1991 | 21.76 | 26.10 | 36.19 |
| 2001 | 28.61 | 27.81 | 31.50 |
| 2011 | 37.71 | 31.16 | 31.18 |

**Source**: Census of India, Primary Abstract

Census1901, 2001 and 2011, Chandigarh, Haryan
Haryana has been predominantly a rural part of India. The urbanization trend in state almost follow the pattern of India as it started with 10.77 per cent in 1911 followed by 11.3 per cent in 1921, 12.38 per cent in 1931 and 13.39 in 1941. In other words, it can be said that up to 1941, the level of urbanization was less than 15 per cent with a highly fluctuating decadal growth rate like the country.

Only one-sixth of its total population lived in urban areas at the time of independence in 1947. In 1951 there was 17.07 per cent urban population in the state which has increased 17.22 and 17.66 per cent in 1961 and 1971 respectively against the national urban proportion of 17.97 and 19.90 per cent in the same years. In 1981 this proportion has reached up to 21.88 per cent and 28.92 per cent in 2001. In 2011 census, the urbanization share has been recorded 34.88 per cent that is more than Indian share of 31.16 per cent (Table 1).

The low level of urbanization in Haryana was associated with the subsistence nature of agricultural economy. Industries, commerce and service sector, which provide the major stimuli for urban growth, had not made a breakthrough in the state. The partition of the country in 1947 stimulated the process of urbanization in this part of the country. A large number of refugees migrated from Pakistan to the Indian Punjab and settled down in towns of Punjab and Haryana, known as 'camps'. This led to the explosive growth of cities and towns in the state.

However, level of urbanization in the state (17.22 per cent) was still low in 1961 as compared to that of Punjab (23.10 per cent) and the national average of 17.97 per cent. After its formation as a separate state in 1966; Haryana experienced a rapid acceleration in growth of urban population. Rapid developments in the agricultural sector during the Green Revolution period led to the establishment and growth of 'Mandi Towns' in various parts of the state. Thus, with 34.88 per cent of its population as urban and state had a total urban population of 88, 42,103 persons who lived in 154 urban centers of different classes.

**Table 2 :** Urban Population and Its Growth Rate in Haryana, 1901 to 2011

| Census Year | Total Urban Population | Urban Population ( per cent) | Decadal Growth (per cent) |
|---|---|---|---|
| 1901 | 574074 | ---- | ---- |
| 1911 | 449,704 | 10.77 | -21.66 |
| 1921 | 481,195 | 11.30 | 07.00 |
| 1931 | 564,743 | 12.38 | 17.36 |
| 1941 | 705,945 | 13.39 | 25.00 |
| 1951 | 968,694 | 17.07 | 37.19 |
| 1961 | 1,307,680 | 17.22 | 35.58 |
| 1971 | 1,772,959 | 17.66 | 35.58 |
| 1981 | 2,827,387 | 21.88 | 59.47 |
| 1991 | 4,054,744 | 24.63 | 43.41 |
| 2001 | 6,115,304 | 28.92 | 50.82 |
| 2011 | 8,842,103 | 34.88 | 44.59 |

**Source**: Census of India, Primary Abstract Census1901, 2001 and 2011, Chandigarh, Haryana

## ICT-Enabled Infrastructure Services

The smart city provides all infrastructure services such as water, sanitation, drainage, Solid Waste Management, sewage, energy and transportation with smart and intelligent networks. A smart city focuses on intelligent computing infrastructure with cutting–edge advances in cyber– physical systems, and innovation support. Since a city is composed of numerous buildings, these also need to be smart and green. By innovation and renewal of existing operations, it may be possible to reduce energy consumption. Integration of major systems on a common network helps optimize use assignment and space configurations, eliminating unused or underperforming space. The smart city concept includes the following:

### Smart Energy

In the city power demands are growing exponentially, generation of which emits about one-fourth of carbon footprint. Besides action to decrease the power demand, the energy systems need to be smart and sustainable. For most energy and utility companies, success will be achieved through transforming the utility network, improving generation performance, and transforming customer operations. They are making investments to upgrading the capabilities of the grid and to enable consumers to take a more active role in managing their energy use via smart meters, connected appliances and web portals. Utilities are set up technologies that improve the efficiency of the grid and developing new capabilities for integrating renewable energy into the grid, and equipment for storing energy, so power can be prepared available when it is needed.

Smarter grids also stand to be more resistant to attack and natural disasters. A next-generation grid that anticipates, detects, and responds to problems quickly has the potential to reduce wide-area outages to near zero, and at a lower cost. Consumers empowered with better information can make smarter choices about how they use energy. By integrating energy from renewable sources like solar and wind onto the grid, overall impact on the environment can be curtailed, and cities can be more self-sufficient in energy.

### Smart Utilities

The aim at high quality water supply, drainage, sewerage, streets, waste management in catering to growing population. For water supply, the ICT solutions such as SCADA system enable enhanced efficiency and transparency. Similar benefits are available in respect of solid waste management and other utilities. ICT controlled three bins recycling accept separate bins for trash, recyclable and compost. Collection charges drop as trash drops. Satellite controlled park and lawn micro-irrigation system cuts water consumption and pumping power.

### The Smart Mobility

Intelligent transport solutions in the smart city can provide seamless, safer, efficient and effective management of public transport systems. Similar results are also noticeable from use of IT in the planning and management of transport infrastructure and services like taxies, autos, goods transport, signaling system, signage, transport simulation, parking, etc.

### Intelligent Community Frameworks

The Community facilities such as health, education, recreational and other neighborhood services need to be planned to the highest standards of leadership in

energy and environmental design, as they save energy, materials and emissions. A smart neighborhood strives to achieve infrastructure efficiency, conservation of water, energy and natural resources in the city.

## Smart and Green Neighborhood and Buildings:

The smart cities can provide energy saving up to 30 per cent, reduce carbon emissions, provide higher efficiency and comfort with lesser energy consumption. The city and buildings have not only to be comfortable, green and efficient, but also intelligent and integrated. Super-insulated windows quadruple the thermal performance of double panes and can be made from the glass in existing windows. A sensor controlled photo-voltaic cell and smart glass technology save on air- conditioning and high energy cost.

## ICT enabled Public Services

The ICT can assist coordination and e-governance, together with sharing the information amongst the various city departments, residents and other stakeholders.

## Ecological Pathway

The smart city is a pathway towards ecological, sustainable development. It is an intelligent way to conserve natural resources (land, vegetation, air and water) energy efficiency, waste management, low carbon, public transit and environmental management. Main service areas and specifics of a smart city is leads it towards sustainability.

## E-Governance

In any city, there are more than 100 citizen services that require engagement with civic authorities for enquiries, registration, form submissions, payments, grievances, etc. It is a time taking procedure for the citizen. The availability of e-gateway for citizen

service delivery has attracted much attention in municipal governance and bringing out a silent revolution in many city corporations, breaking away barriers of distance, class and gender. The GIS assists any citizen to take photo on mobile and send an SMS to the administration. The dashboard will capture and address the complaint and even intensify the matter to higher authorities, if unaddressed. Smart city has 60 layered features of GIS mapping which is geo-referenced and include the following:

(1)Complaint redressal platform, (2) Town planning permission and licensing, (3) Water and property tax administration, (4) Public works- estimates and payments, (5) Octroi management, (6) Birth and death certificate, (7) Property registration, (8) Land services and slum surveys, (10) GIS based Spatial Data Infrastructure.

The digital systems are increasingly creating an emerging sociology of urban space. It is redefining and imbibing the idea of exclusion and inclusion. The travel smart card is already being adopted for seamless travel in public transport, access to public spaces, payment system/gateway and social services. It also makes terminated to travel to local offices, banks or government departments for public services. Digitized revolution is also helping in adopting innovative and eco-friendly urban practices, such as virtual town hall, security, traffic simulation, property registration, taxation, etc.

Smart chips and systems can be entrenched almost in every urban service and structure, making them smart and intelligent. These enable self-diagnosis and self- repair. The future is already upon us, and with digital chips getting embedded in a city's epidermal and exoskeleton level and also its connective tissues, cities are increasingly getting digitally scripted and coded.

## Safety and security

Safety and security are the emerging concerns in Indian cities, which involve various levels, departments and service agencies. The victims are regularly tossed from one department to another due to administrative jurisdictions and domains. It is necessary to set up an Emergency Response and Safety Centre as a common platform to provide instant response, rescue and relief to the citizens by coordinated action. Digitization and networked technology is applied to build up a unified command and information platform, which offers comprehensive emergency services, both for natural disasters and manmade hazards, crimes and accidents, providing, Police, Fire, Medical, Traffic and other services and assistance. Disaster resilience comprising six R's- rapidity, robustness, redundancy, resourcefulness, reform ability and recoverability is the key to manage the risks, dangers and disasters.

The smart cities in India should discourse the needs of the society poor, women, children and informal sector. They should relate with local culture and climate. More important than international style greenery and glass buildings are the public places, basic health and education facilities, affordable housing, public transit, water supply, sanitation, public toilets, renewable energy and solid and liquid waste management. A Smart city should be comprehensive that provides jobs, livelihoods, local economic dynamism and a venue of cultural expression, learning and communication. Several smart city projects have been started in India, which includes a network of smart cities on Delhi-Mumbai Industrial Corridor and GIFT, Gandhinagar. Various State governments are preparing the blueprints for the smart cities, Ananthpur, the new Capital for Andhra Pradesh being the latest.

## Delhi-Mumbai Industrial Corridor (DMIC)

The Delhi -Mumbai Industrial Corridor  is one of the biggest urban development projects, which is expected to create 24 smart cities and 7 Industrial Regional, spanning six Indian states, including Uttar Pradesh, Haryana, Rajasthan, Madhya Pradesh, Gujarat and Maharashtra. The key features of the cities along DMIC include digital planning and governance, compact, vertical development, efficient public transport, technology for smart grids and better management of civic infrastructure, recycling of sewage water for industrial use, green spaces and easy access to goods, services and other community activities. This project has the potential to be a benchmark in showcasing smart urban infrastructure and low carbon development in India.

## Smart City, Gurugram

The population of 2016 was 23,76,324 (India online pages, 2016). The population has increased from 1,00,877 in 1981 to 9,01,968 in 2011 which is a 769.34 percent increase in 3 decades. In the Census years, 1991, 2001 and 2011 the population was 1,35,884, and 2,29,243 which further increased by 293 percent to 9,01,968 in 2011. The increasing population resulted in increased density. The population density in 2001 and 2011 was 716 and 1204 respectively which is an increase of 68.16% (Source).

The liberation policy of Government, setting up of Maruti Factory and GE-BPO led to spurt in city's growth. There has been marginal increase in area from 1981 to 2001but between 2001 and 2011 the increase has been from less than 50 sq km to more than 200 sq km due to the jobs generated in the city clubbed with private housing development which has been steered by government's development plans. The area is expected to be 332.72 by 2031 as per the Gurgaon Manesar Urban Complex Development Plan.

**Table 3.** Smart cities have key service areas specifics of the following:

| | Key Service Areas Specifics | Specifics |
|---|---|---|
| 1 | Energy | 1. Energy networks, smart grids<br>2. Smart meters, smart buildings<br>3. Renewable energy grid<br>4. Electric vehicles<br>5. Power quality monitoring<br>6. Energy conservation, efficiency and monitoring<br>7. Bionic Controls<br>8. Intelligent management/maintenance, MIS |
| 2 | Public Utilities | 9. Intelligent water and sewerage networks with minimum losses and leakages<br>10. Intelligent metering, billing and payment<br>11. Waste management<br>12. Plug the Non-Revenue Water (NRW) losses<br>13. Identifying leaks using non-invasive techniques and advanced analytics, by managing the pressure in the network at pumps and valves, reducing energy consumption |
| 3 | Smart mobility | 14. Simulation modeling<br>15. Smart cards<br>16. Smart signals, traffic controls, variable signage, mobile enabled real time<br>17. maps/routes, way finding<br>18. ICT enabled traffic control<br>19. Safety and security, accident monitoring, forensic analysis<br>20. Infrastructure integration<br>21. Maintenance, MIS and management |
| 4 | Intelligent Communit Frame-work | 22. Guide for Intelligent Community Planning<br>23. Education and health infrastructure<br>24. Mixed land use, compact and smart neighborhoods |
| 5 | Smart and Green Buildings | 25. Integrated environment measures<br>26. Smart building<br>27. Building Information Management<br>28. City Administration Centre<br>29. Environment management<br>30. Technology and Innovation Centre |
| 6 | Telecom Network, Public Service and Governance | 31. Land Information System, digitized mapping, SDI, Geo-portal, GIS based property records, plans and transactions<br>32. On line building plan approval<br>33. Broadband development<br>34. Home automation and Internet access.<br>35. ICT support and training<br>36. Business centers for small businesses<br>37. A networked portal for Public Security System and Safety<br>38. Digital business center, automated messaging, SMS<br>39. Consolidated billing<br>40. Climate street<br>41. Electronic trade and retail centers<br>42. Geo-portal , mobile/e-governance |

## III. RESULTS AND DISCUSSION

**Smart city challenges**

**Infrastructure smart city**

There are a number of latent issues to consider when reviewing a smart city strategy. The most important is to determine the existing city's weak areas that need utmost consideration, e.g. 100-per-cent distribution of water supply and sanitation. The integration of formerly isolated legacy systems to achieve citywide efficiencies can be a significant challenge.

### Financing smart cities

The High Power Expert Committee on Investment Estimates in Urban Infrastructure has assessed a per capita investment cost of Rs 43,386 for a 20-year period. Using an average figure of 1 million people in each of the 100 smart cities, the total estimate of investment requirements for the smart city comes to Rs 7 lakh crore over 20 years (with an annual escalation of 10 per cent from 2009-20 to 2014-15). This translates into an annual requirement of Rs 35,000 crore. One needs to see how these projects will be financed as the majority of project need would move through complete private investment or through PPPs (public-private partnership).

### Master plan and development plan of smart city

Most of our cities don't have master plans or a city development plan, which is the key to smart city planning and implementation and encapsulates all a city needs to improve and provide better opportunities to its citizens. Unfortunately 70-80 per cent of Indian cities don't have one.

### Financial sustainability of ULBs

Most ULBs are not financially self-sustainable and tariff levels fixed by the ULBs for providing services often do not mirror the cost of supplying the same. Even if additional investments are recovered in a phased manner, inadequate cost recovery will lead to continued financial losses.

### Technical constraints of ULBs

Most ULBs have limited technical capacity to ensure timely and cost-effective implementation and subsequent operations and maintenance owing to limited recruitment over a number of years along with inability of the ULBs to attract best of talent at market competitive compensation rates.

### Three-tier governance

Successful implementation of smart city solutions needs effective horizontal and vertical coordination between various institutions providing various municipal amenities as well as effective coordination between central government (MoUD), state government and local government agencies on various issues related to financing and sharing of best practices and service delivery processes.

### Providing clearances in a timely manner

For timely completion of the project, all clearances should use online processes and be cleared in a time-bound manner. A regulatory body should be set up for all utility services so that a level playing field is made available to the private sector and tariffs are set in a manner that balances financial sustainability with quality.

## Dealing with a multivendor environment

Another major challenge in the Indian smart city space is that (usually) software infrastructure in cities contains components supplied by different vendors. Hence, the ability to handle complex combinations of smart city solutions developed by multiple technology vendors becomes very significant.

## Capacity building programs

Building capacity for 100 smart cities is not an easy task and most ambitious projects are delayed owing to lack of quality manpower, both at the center and state levels. In terms of funds, only around 5 per cent of the central allocation may be allocated for capacity building programs that focus on training, contextual research, knowledge exchange and a rich database. Investments in capacity building programs have a multiplier effect as they help in time-bound completion of projects and in designing programs, developing faculty, building databases as well as designing tool kits and decision support systems. As all these have a lag time, capacity building needs to be strengthened right at the beginning.

## Reliability of utility services

For any smart city in the world, the focus is on reliability of utility services, whether it is electricity, water, telephone or broadband services. Smart cities should have universal access to electricity 24×7; this is not possible with the existing supply and distribution system. Cities need to shift towards renewable sources and focus on green buildings and green transport to reduce the need for electricity.

## IV. CONCLUSION

We are really lucky to have our great visionary leader like Shree Narendra Modi in institution of 100 New Smart Cities. Even though it is 7060 Cr for the initial investment for set out Smart Cities, let we put hands together to make India more economically brighter. In addition, the global warming can be reduced in constituent of Smart Cites. Let us hope soon India will provide Quality of Life (QoL) to its citizens on par with other Smart Cities like Barcelona, Helsinki, and San Fransco, New York, Singapore. Welcome to the Future of 100 Smart Cities in India, with a positive way collectively and cheerfully.

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