JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

Development of Smart city in India: Issues, challenges, and Potential

Bhup Singh Gaur,
Head and Associate Professor, Department of Sociology, DGC Gurugram, Haryana

Lt Dr Biva Samadder, Lecturer in Sociology, Surendranath College ,Kolkata

Development has always had multiple dimensions at any given point in time and space. Management of developmental activities is one of the core skills of the modern-day world. In this context, smart cities are becoming extremely important in urban planning, population management, sustainable development, environmental protection, etc. The concept of a Smart City' with enhanced technological strength is being discussed at various places of the world. India also took various initiatives in this regard and made significant progress. The way smart city initiative is rolling out in India with its own socio, political and economic dimensions. In this context, the paper takes up some of the perennial questions of smart city building in India and attempts to have comparative case studies of other related experiences beyond India. The paper focuses on the advantages and disadvantages of smart city ide and also analyses the issues and challenges involved in the process. The research also dwells on some of the possible policy solutions regarding smart city management.

Keywords: Smart City, India, Global, Mission, Urban Planning, Sustainable Development, Technology

Introduction

Human civilization developed a lot of tools and processes to lead a good community life. As humans progress with technology and development, human settlements got a whole new shape. Great cities were built all around the world. Today, nation-states and leaders also take pride in the development of cities under their realm. Some of the great cities are not only centers of trade and tourist attraction, but also the source of pride in popular culture. As these cities grew rapidly, there are many issues to address in this relation. Pertinent issues like clean air, mobility, sanitation, water, public safety, etc., are haunting the city administrations. Urbanization favored people in many ways but also brought discomfort, in relation to the environment, infrastructure, and resources.

The development of cities and the migration of the population to cities have brought long-term questions to human civilization. There are many attempts from different corners of the world to address these new questions on urban planning and city development. Because of this, creating a long-term answer is essential.

India is also working towards such initiatives to cater to the needs of a growing population, their aspirations for development, and sustainable development. Launched on June 25, 2015, the Smart Towns Mission's primary goal is to encourage cities to use "smart solutions" in order to improve their residents' access to basic services, the quality of their environment, and the longevity of their communities.

Background and content of smart cities

What does the term ‘smart city’ mean? H does this term is different than other city building techniques? Generally, a city is a place where the physical, social, and economic infrastructure has been significantly and extensively upgraded. Smart cities add a technological edge to handle communication and access to services. Smart cities are planned in such a way that communication, information, technology, etc are used to bring sustainable development. Such smart cities lead to long-lasting and sustainable prosperity.

Today the whole globe is talking about national progress or international progress, it is also evident that there can be no national progress or prosperity without smart cities. Urban dwellers are facing a variety of issues and want to see their standard of living improve. The"smart cities" are an absolute necessity to provide a long-lasting solution for all the contemporary issues of urban planning and urban population. Smart cities can raise their residents' standard of living, they'll be more likely to draw new residents and businesses to the area.

Governemnt of India's initiative on Smart Cities

In 2015, the Indian government initiated the 100 Smart Cities Mission. Here the government made a plan to build smart cities with the above-mentioned amenities. The goal of this mission is to enhance the quality of life in the city by coordinating municipal services and making better use of limited resources. All these efforts should facilitate a peaceful coexistence between the growing population and environmental limitations.

This effort aims at strengthening the protection of the development process and for greater effectiveness in government operations. Improving the liveability, productivity, and sustainability of a city is fundamentally dependent on the widespread adoption of information and communication technologies (ICT). The Ministry of Urban Development in India has already outlined 24 priorities for ‘smart cities' initiatives.

Smart city management incorporates smart-meter management, leakage identification, preventive maintenance, water quality modeling, and many more amenities and technological infrastructures to deal with the basic resources. The government of India outined 24 key areas that deal with water resources in some way. The Sustainable Development

Goals (SDGs) aim to end global poverty, create decent jobs for all people, and ensure that everyone has access to essential services, and the Smart Cities Mission is one of the instruments that will make this a reality on a national scale. Explore the linked page to learn all there is to know about the SDGs.

Integrated Command and Control Centres

To respond to Covid-19, cities activated their Smart Cities Mission Integrated Command and Control Centres (ICCCs). The Mission's ICCCs are tasked for coordinating things like traffic control, surveillance, utility provisioning, and the resolution of complaints. ICCCs in 45 of the 100 towns participating in the Smart Cities Mission are either online or functional. The ICCCs served as Covid-19's command centers, enacting measures such as:

- Cameras watching public areas, leading to protection, security and positive surveillance
- Cases of Covid positivity or any pandemic or health issues were mapped using a Geographic Information System.
- Use of heat maps and other predictive analytics to control the spread of the infection throughout the city.
- Teaching medical professionals in virtual environments.
- Tracking of ambulances and decontamination services in real-time.
- Telemedicine refers to the use of videoconferencing, Tele counseling, and telemedicine to deliver medical care.

City planning and Planning Cities in India

Initiative for the Revitalization and Improvement of America's Historic Gateways (HRIDAY) Housing for All Program: Yojana Atal Mission for Revitalization and Urban Transformation (AMRUT) PM "Awas Yojana" (Project) "Urban Smart Cities Mission" (Planning) The lack of a common definition of a "smart city" contributed to the early confusion. After learning from the mistakes of earlier Urban Development Missions, the Indian government did not mandate a certain model. Each municipality has to develop its own idea, vision, goal, and plan, tailored to its specific situation, resources, and aspirations.

There is still a long way to go before green and energy-efficient buildings become the norm. Building up the independence of city bodies and Public transportation's market share is falling; to keep up with the demands of growing cities more must be done to expand its reach. Urbanization has led to a rise in both air pollution and traffic congestion, leadingt to new policy complications.

Other experiences of 'Smart City' around the globe

Many of the largest cities in the world have already initiated smart technology adoption. These initiatives brought about by smart technology are things you would not immediately notice, they have a positive influence on how people live in these cities all over the world.

The lone city representing New Zealand on the list of 118 smart cities is still Auckland, which came in ninth in 2021 after coming in fourth in 2020. The City of Sails continues to receive high marks across the board, earning As for Structure and Technology in addition to an A overall. The highest ranking is AAA, and Singapore is the only city to receive this designation for each of the three factors considered in the study.

While this is a crucial manual for smart cities worldwide, there is further anecdotal data that suggests some cities are taking more steps to harness the potential of smart technology, notably the power of the IoT. However, this is not always reflected in the study at hand. London, which came in at number 22 on the list for 2021, Barcelona, which came in at number 58, and Tokyo, which came in at number 84, are all widely regarded as some of the front-runners in terms of how they have adopted smart city technology.

We examine five prominent smart cities from around the world below, along with the manner in which they have adopted smart technology.

The case study of Singapore

Singapore has consistency while being considered the world's smartest cities. In terms of smart technology, Singapore has often demonstrated itself as the best among the best. The population of the nation is aging, and the government is concentrating on digital technology and measures to boost productivity in the advanced economy of the nation. This has included a shift to a digital healthcare system, the normalization of video consultations, and the introduction of wearable Internet of Things (IoT) devices to monitor patients remotely.

The sensors gather a tonne of data about what people do on a regular basis, and they can gauge everything from how packed an event is to how clean a particular place is. In addition, Singapore wants to be the first nation to build a totally car-free eco-smart city.

The case study of Oslo

The goal of Oslo's smart city initiative is to build a sustainable, environmentally friendly environment. A large number of LED lights throughout the city are connected to processing units and can intelligently alter their lighting output dependent on the situation. Oslo has also committed to having only electric cars and trucks in the city by the year 2025. Oslo is not a tiny town. They have made a significant commitment to smart technology and sustainability, and with the significant number of residents, they are now on schedule to do so. Free parking, the use of bus lanes, reduced taxes, and toll rates are some of the existing incentives for zero-emission vehicles are the specialties of this smart city

The case study of New York:

New York City has dispersed hundreds of intelligent sensors around the various neighborhoods. Massive volumes of data are gathered by the program to better manage citywide important services, such as waste collection and management. The city is enhancing connectivity for residents by substituting Wi-Fi-enabled charging stations for

phone booths. Since a few years ago, car sharing has gained popularity in the city, and it is still expanding and changing. Sharing a car can ease traffic congestion and minimise pollution within and around the city. The police force has put HunchLab's web-based software to the test; it combines information such as topography modelling, past crime data, and other data to predict and address crime. Other city agencies are now interested in the test since it resulted in a noticeable drop in violent crime.

The case study of London

If you count on the merit of technology, London is another city that catches people off guard. Over the past ten years, the city has launched a variety of smart city initiatives, all of which are spearheaded by a separate department, which is dedicated to making London a smart city. One illustration is their Civic Innovation Challenge. The challenge aims to assist entrepreneurs and start-ups in creating answers to the increasing number of urban difficulties faced by the city as a whole. Another smart city initiative, Connect London, intends to cover the entire city with fibre optic coverage and 5G connectivity. In order to accomplish these objectives, London has a Smart Metropolis Plan that outlines plans for integrating technology in a city that is anticipated to develop to a population of 10 million within the next ten to fifteen years. The plan covers important topics including energy management, transportation, and healthcare, all of which might gain from smart city solutions.

The case study of Copenhagen

Copenhagen, the capital of Denmark, dropped one spots from sixth place in 2020 to seventh place in the IMD's ranking of smart cities in 2021. Copenhagen is developing its smart city in a sustainable manner, similar to Oslo. The Copenhagen Solutions Lab won an award in 2017 for its advanced systems on traffic trafficking, waste management, energy use, and air quality.

In order to provide a more effective vehicle experience in the city and to be able to gather all of that data in one location, the city is aiming to integrate all of these smart technologies into a single platform. In order to create an intelligent bike system for the city, the city also collaborates with MIT. Of course, there are a lot more instances of cities adopting smart technology and evolving into smart cities from all over the world.

Smart City Experiences from New Zealand

It is wonderful to see Auckland placing among the top ten smartest cities in the world once more. Despite Auckland's decline in the rankings this year, competition is escalating globally as more and more cities look to smart solutions to raise inhabitants' quality of life in general. Is New Zealand keeping up well enough?

Auckland

A smart city infrastructure with connected lighting, smart parking, smart benches, and smart dumpsters will be installed in the Wynyard Quarter by late 2020 thanks to a partnership between SPARK and Auckland Transport.

These smart city technologies were made possible by SPARK's installation of 5G in downtown Auckland, and the installation in the Wynyard Quarter serves as a preview of what the future of the city's larger central business area might entail.

Christchurch

With the help of its Smart Cities Program, Christchurch is one of the New Zealand cities attempting to become smarter. The city is looking into innovative methods and technologies to make our community a better, safer place to live, work, and play. Other advantages of being a "smart city" for Christchurch include improved planning and decision-making, luring in talent from abroad, and opening up new economic prospects. All smart city initiatives are categorised according to the Council's priorities and are intended to make Christchurch a better place for everyone.

With Environment Canterbury and the Christchurch City Council, NEC New Zealand inked a long-term deal in November 2020 to transform the existing bus network into a smart transportation network. These kinds of programmes are what put transportation at the centre of smart growth for a contemporary city.

Environment and smart city

The United Nations projects that by 2050, 70 percent of the world's population will reside in urban regions, leading to a steady increase in both emissions and energy consumption. In other words, another 2.5 billion people will move into metropolitan areas over the next three decades as a result of urbanization.

To put it mildly, this is putting a serious pressure on urban infrastructure. Rapid urbanisation has made it difficult to maintain environmental, social, and economic sustainability, but smart city projects are assisting cities in doing so and laying the groundwork for a more sustainable future.

Merits of Smart City system

Better transportation services & Communication Technology: Smart cities without any doubt provide improved traffic control, the capacity to track public transportation, and better service to its residents. Communication and connectivity will be the positive aspects of any smart city.

Efficient public services: Natural resources are limited in any given space and such resources can be used to satisfy the needs of the population. Smart cities will have the technologies and tools required to reduce our consumption of natural resources and reduce the waste of water, electricity, and other resources without having to reduce any other factors.

Energy Efficiency: Thousands of energy-efficient buildings in a smart city can enhance air quality, utilise renewable energy sources, and lessen reliance on non-renewable energy sources, resulting in a reduced environmental imprint. The ecological influence we have on the environment will be lessened thanks to these.

Opportunities for economic development: By making investments in smart cities, local and international competition will rise, and business will grow and attract new residents. Because the entire city will have access to an open data platform, information and other enterprises will flourish. They might use the technology at their disposal to make shrewd decisions that encourage economic expansion.

Infrastructure upgrade: Old roads, buildings, highways, and bridges require large investments to keep them in good condition and prolong their useful life. However, cities will be able to proactively identify and anticipate the regions that can cause infrastructure difficulties with the use of smart technologies.

Expansion of Jobs and employability: Since everyone will have equal access to fundamental resources like transportation, internet connections, and work opportunities, a smart city will have many businesses and job opportunities.

The decline in crime and a better social environment: Since technology allows the government to closely monitor people's interactions, there will be a decline in crime. Additionally, crime increases in locations with higher unemployment rates and lower employment rates. There will be more work opportunities, but there will also be fewer crimes as a result.

Demerits of smart cities

There are some downsides to Smart City despite its many advantages. Knowing these helps one to better comprehend the opposing viewpoint. The disadvantages are detailed below.

Limited privacy: Since the government would have access to security cameras and intelligent technology connected through several spaces, it will be difficult for civilians to maintain their privacy. The use of facial recognition technology and other comparable technologies will fundamentally change how we think about privacy and personal space.

Social control and centralized structure: Those with the ability to track and centralise the information they collect from security cameras will be more powerful. It could be a corporation, the government, or another type of power. They will have access to a citizen's data and be able to easily alter public opinion.

Excessive reliance on networks: Residents of these smart cities might lose their autonomy and get dumb since they would rely almost entirely on technology and networks. They wouldn't be able to reply properly if these tools weren't available.

A lot of training and education are required: Pre-training is necessary since without it, the city's residents won't be able to use the technology. Without instruction, students will find it difficult to apply and irrelevant to their daily lives.

Challenges ahead to make smart cities really smart!

The India Smart Cities Mission was launched in 2015 to make India smarter. The 109-community mission strives to improve quality of life and economic activity through infrastructure. Smart cities are developed around physical, institutional, social, and economic infrastructure. The Indian government has taken steps to assist four development pillars. By using technology for city development, the Smart Cities Mission aims to improve Indians' quality of life. When the government transfers planned urbanisation to cities and states, it faces many challenges. These challenges can hinder smart city development. A list of India's smart city initiative's main challenges follows.

Technical Barriers & Technological Obsolescence: The goal of the smart city mission is to develop the city into a smart one by utilising smart technology. The majority of urban local authorities, however, do not have the necessary technical resources to guarantee the growth of smart cities. The timely and cost-effective deployment of the smart steps is hampered by these technical and technological limitations. Additionally, the investment in technology is made with a 5–10 year time horizon in mind. However, given how quickly technology has advanced in the last 4–5 years—from 2G to 3G to 4G—it seems that this amount of time would not be adequate. Furthermore, many people are still unfamiliar with the idea of the newest technology, the internet of things (IoT). Smart cities risk falling behind by adopting antiquated technologies in a world where technology is always advancing if they do not maintain choices for technical adaptation and upgrade.

Retrofitting Existing Infrastructure: As infrastructure development has drawn the most investment, India's real estate market is poised to experience significant growth as a result of the smart city mission. People are willing to purchase real estate in India and make investments in the country's smart cities as a result of infrastructure development. Finding the city's weak spots that need retrofitting and transformation into smart regions, however, is a difficulty. The difficult part is figuring out where and how retrofitting can be done in each section of the city. Retrofitting the sections with historical significance or that have any heritage value would also be difficult in the effort to make cities smarter.

Budgeting For The Project: It can be difficult for the Indian government to maintain the flow of funding for the objective to build smart cities. The entire cost for the project has increased to 1,91,155 crores, despite the Center having allocated approximately INR 9,940 crores for the smart cities mission in the Union Budget 2018. It can be difficult to secure the necessary funding for the project's completion and later upkeep of the technical advancements in smart cities.

Public Transportation Urbanization: A city can only become smart if its transportation system is intelligent, dependable, sustainable, and economical. Urban mobility is required to smoothly connect people and cities. However,

because of the subpar transportation system that still exists in the cities, urbanising public transportation for urban mobility can be difficult for the Indian government. The transportation infrastructure in Indian cities is insufficient due to a number of problems, including a lack of investment, a high population density, zoning, and bad urban planning. To address this issue, the main goals of smart city initiatives should be to maximise the use of mass transit and urbanise public transportation.

Coordinating Three-Tier Governance: For the smart city solutions to be implemented, there must be effective horizontal and vertical coordination between the various organisations. For smart cities to flourish properly, there must be precise cooperation between the federal, state, and local governments. However, there is a lack of coordination among the three tiers of government, which could provide a significant obstacle to the project's effective completion.

These are some of the main obstacles that the government must overcome in order to realise its vision for smart cities. To realize the goal of transforming more than 100 Indian cities into smart cities, the government must immediately find a way to address these issues.

Conclusion and Suggestions

The potential of infrastructure that is supported by technology, or InfraTech, is tantalising. greener, smarter cities. connected transportation networks. efficient, carbon-free building. longer-lasting, higher-performing investments. quicker reaction times to pandemics.

Governments must foster an environment where infrastructure technology may thrive. They may promote innovation and the uptake of green energy, digital governance, smart transportation and construction, and other technologies powered by AI, automation, the Internet of Things (IoT), drones, and other technologies by adopting a coordinated, national and regional approach.

The next big item in technology can swiftly become obsolete because of how quickly it evolves. Governments must therefore have a futuristic perspective on technologies and the hazards they pose. Laws and regulations sometimes struggle to keep up with the pace of development, which could hold up the implementation of exciting new inventions. The answer may be to make any regulation and procurement requirements as flexible as feasible, focused on future objectives rather than specific technologies.

The driving force behind infraTech is data. It is now considered to be our most valuable resource, powering infrastructure including telecom, power, water, transportation, and digital public services. In recent months, some nations have demonstrated how cutting-edge data analytics can effectively track the spread of COVID-19 as well as monitor the supply chains for food and production.

Governments can speed up infrastructure technology by using a variety of tools. As I've already stated, progressive legislation and regulation, ideally across industries and even nations, can create chances for innovation. If replaced,

large, expensive infrastructure assets risk becoming stranded. Governments are given the freedom to upgrade these assets with newer infrastructure technology when it becomes available by maintaining a long-term perspective on project procurement and contracts. To lower risk, "as-a-service" procurement is also becoming more prevalent.

How can you get investors interested in potentially dangerous InfraTech enterprises with unexpected revenue streams? Offering sector subsidies is one tried-and-true strategy, especially in the early and late phases of a project. These could be grants for R&D, tax breaks, or special financing. Subsidies for renewable energy in the US, Europe, and China have sped up national acceptance and cut costs.

Smart cities are the ideal illustration of why technology should be embraced rather than feared, despite the fact that some of us may have a fear of new technology (sometimes known as "technophobia"). We're rather enthused about connected cities since they promise improved operations and a smaller environmental impact.

References

Bannerji, P. R. (2022). Climate Adaptation Planning for the city. Kolkata — The Colonial City in Transition, 316–328. https://doi.org/10.4324/9781003205968-21

Bhup, S. G., Mangal, S., Tran, V.-P., & Keerthiraj. (2023). Law and Legal Methods. Evincepub Publishing.

Devaiah, N. G., & Keerthiraj. (2021). E-Governance in India: Challenges and Strategies. OrangeBooks Publication.

Kandpal, V. (2019). Smart City Evolution in India: The cases of Dehradun, Nagpur, and Allahabad. Smart City Emergence, 243–259. https://doi.org/10.1016/b978-0-12-816169-2.00011-0

Katukam, R. (2015). Future smart city we can make in India. https://doi.org/10.15623/esat.2015.b0001

Keerthiraj, Suresh, K. G., Raja, A., & Devaiah, N. G. (2022). Research And Teaching In Political Communication: Ideological Asymmetries Determining Media Discourse In India. Webology, Volume 19(No. 3).

Kumar, A., Vidyarthi, S., & Prakash, P. (2020). Efforts to build a modern nation. City Planning in India, 1947–2017, 89–137. https://doi.org/10.4324/9781003055969-3

Langhart, L. P., & Prasad, R. (2022). Breakthroughs in smart city implementation. River Publishers.

Meshram, D. S., & Meshram, S. (2022). The Smart Cities Mission and city planning in India. Future of Cities, 69–93. https://doi.org/10.4324/9781003296218-5

Parida, D. (2021). Fantasy Visions, informal urbanization, and local conflict: Contradictions of smart city imaginaries in India. https://doi.org/10.21203/rs.3.rs-496730/v1

Prasad, D., Alizadeh, T., & Dowling, R. (2021). Multiscalar Smart City Governance in India. Geoforum, 121, 173–180. https://doi.org/10.1016/j.geoforum.2021.03.001

Saha, K. (2017). A remote sensing approach to Smart City Development in India. Proceedings of the Special Collection on EGovernment Innovations in India - ICEGOV '17. https://doi.org/10.1145/3055219.3055232

Singh, B., & Parmar, M. (2019). Reimagining the planning paradigm in India. Smart City in India, 69–85. https://doi.org/10.4324/9780429353604-5

Singh, B., & Parmar, M. (2019). Smart City Mission in India. Smart City in India, 10–26. https://doi.org/10.4324/9780429353604-2

Singh, B., & Parmar, M. (2020). Smart City in India: Urban Laboratory, paradigm or trajectory? Routledge.

Solanki, A. (2021). Artificial Intelligence and Sustainable Computing for smart city: First international conference, AIS2C2 2021, Greater Noida, India, March 22-23, 2021: Revised selected papers. Springer.

Tripathi, S. (2021). Does Smart City development promote urbanization in India? Smart Cities - Their Framework and Applications. https://doi.org/10.5772/intechopen.94568

Vavra, R., & Janos, V. (2019). Comparison of different conceptions of suburban railway transport. 2019 Smart City Symposium Prague (SCSP). https://doi.org/10.1109/scsp.2019.8805699

Email gaurbhupsingh@yahoo.com