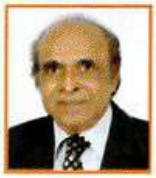
A K Jain



# Infrastructure Development and Urbanisation

***A valuable lesson from Smart Cities Mission is not to put technology at the centre, but people, infrastructure, jobs, greenery, and mobility. This means redefining the urban planning process and replacing the prescriptive Master Plan by a Strategic Spatial Development Plan for 5 years, with a focus on participatory local planning and collective vision.***

India is to become world's third largest economy in 2027. The development of modern infrastructure and sustainable urbanisation would be its backbone. In this task PRAGATI platform provides an innovative and coordinating model for bridging the implementation gap, while accelerating infrastructure development, and to leverage the urban development paradigm.

The rapid and transformative infrastructure development in India, such as the New Pamban Railway Bridge, the First Vertical Lift Bridge at Rameshwaram, inaugurated by Prime Minister Narendra Modi on 6 April 2025 (Fig. 1), besides the Z Morh tunnel at Sonamarg (J&K), inaugurated by Prime Minister Narendra Modi on 13 January 2025 and several mega projects viz. Chenab Railway Bridge in Jammu and Kashmir, (Fig.2) Bogibeel Bridge in Assam and the 21.5 km long Mumbai Trans Harbour Link (Atal Setu) are taking the country towards progress and prosperity.

The timely implementation of these projects has been possible by the PRAGATI, which combines Artificial Intelligence, Big Data Analytics, Machine Learning, Deep Learning, Blockchain, GIS, GPS, DeepSeek, etc. This highlights how innovation can break the barriers of cost and infrastructure allowing context-specific solutions through cutting-edge algorithms and optimisations.

**The PRAGATI (Pro-Active Governance and Timely Implementation) Platform** launched in 2015 by the Prime Minister, has helped the completion of more than 340 major infrastructure projects worth $205 billion, together with effective resource utilisation, environmental sustainability, and ensuring accountability.

**Fig. 1: The vertical lift section of the new Pamban bridge (Rameshwaram)**

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**The PM Gati Shakti Master Plan** focuses on next generation infrastructure for seamless and sustainable connectivity for the movement of people, goods and services. It leverages new technologies in planning, breaking the silos of departmentalisation to achieve synergy in project management. It has collaborated with the Indian Space Research Organisation (ISRO) for spatial planning, utilising BiSAG (Bhaskar Acharya National Institute for Space Applications) and Geo Informatics. The geo-spatial planning tools optimise infrastructure design and reduce its environmental impact. Parivesh platform has streamlined environmental clearances, and greater transparency reducing approval times from 600 days to 70-75 days.

**The Whole of Government Platform** enables easier collaborations across departments for seamless implementation of the plans. Area Development Approach creates convergence of various infrastructure services, workspaces, and social amenities such as education and hospitals, parks, art and cultural spaces, tourism, etc. A digital common platform enables better synchronisation bridging implementation gaps by better co-ordination and cost and time management. Citizen engagement becomes easier and more viable by virtual town halls, and online consultation over plans and programmes of development. The Whole of Government Platform comprises over 1200 GIS-based data layers from Central Government Departments and 755 from the States/Union Territories, covering data on land, soil, geology, water bodies, forests, mines, revenue maps, and administrative boundaries. This helps to plan the projects with ecological and environmental impact safeguards. The National Master Plan provides a micro-view through on-field surveys as well as macro- view from drones. It facilitates district-level planning, including infrastructure services, transport corridors, and facilities, which helps the implementation of the Master Plan with speed and scale (Figs. 6 & 7). PM Gati Shakti Master Plan adopts a horizon of 5 years against the conventional 20-year Master Planning.

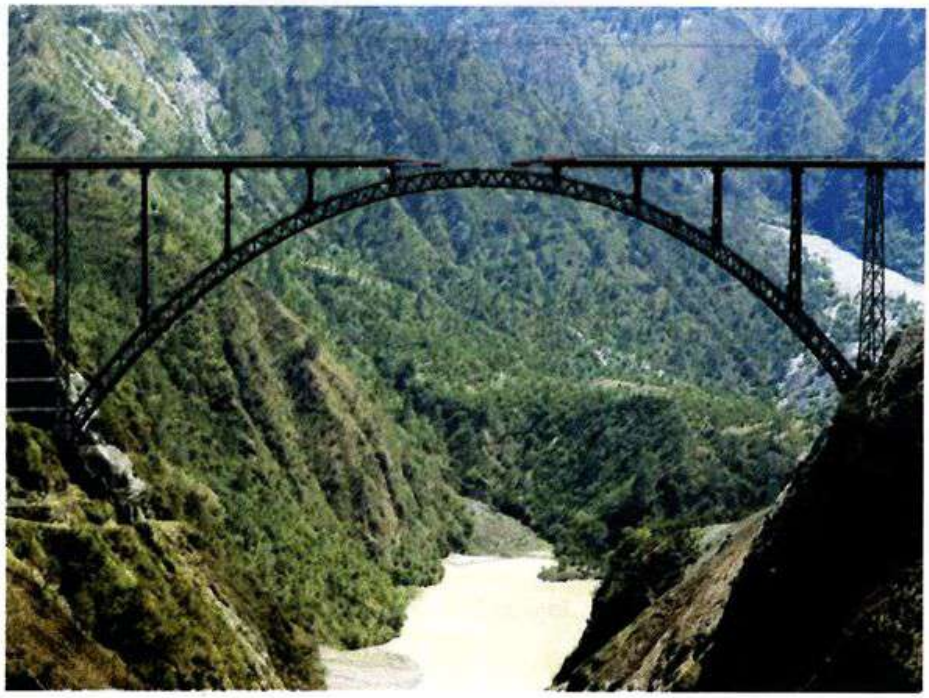

**Fig. 2: Chenab Railway Bridge, Jammu and Kashmir**

## Lessons for Urban Development

The successful implementation of recent infrastructure projects provides important lessons for the urban sector in India, which since its Independence has followed the approach of 20-year master planning. It is often slow and steady with glaring planning–implementation gaps. In 2047, India's urban population is projected to increase from the current 500 million to about 820 million. This means that during the next 22 years, Indian cities need to build as many buildings and infrastructure services as they currently have. Building greenfield cities and retrofitting the brownfields would be like building an entire country once again. This can be an opportunity to change the ways of planning and building which are more resilient and sustainable. The Indian cities face critical sustainability and climate challenges. Urban areas consume more than two-thirds of energy and generate over 60% of greenhouse gas emission. They often experience $3.5^{0}$ C higher temperature than surrounding rural areas due to the urban heat island effect, which is compounded by a loss of blue networks and green spaces.

More than half of the city remains unplanned with slums and unauthorised colonies. More than 80% of the workforce is in the informal sector, which is faced with

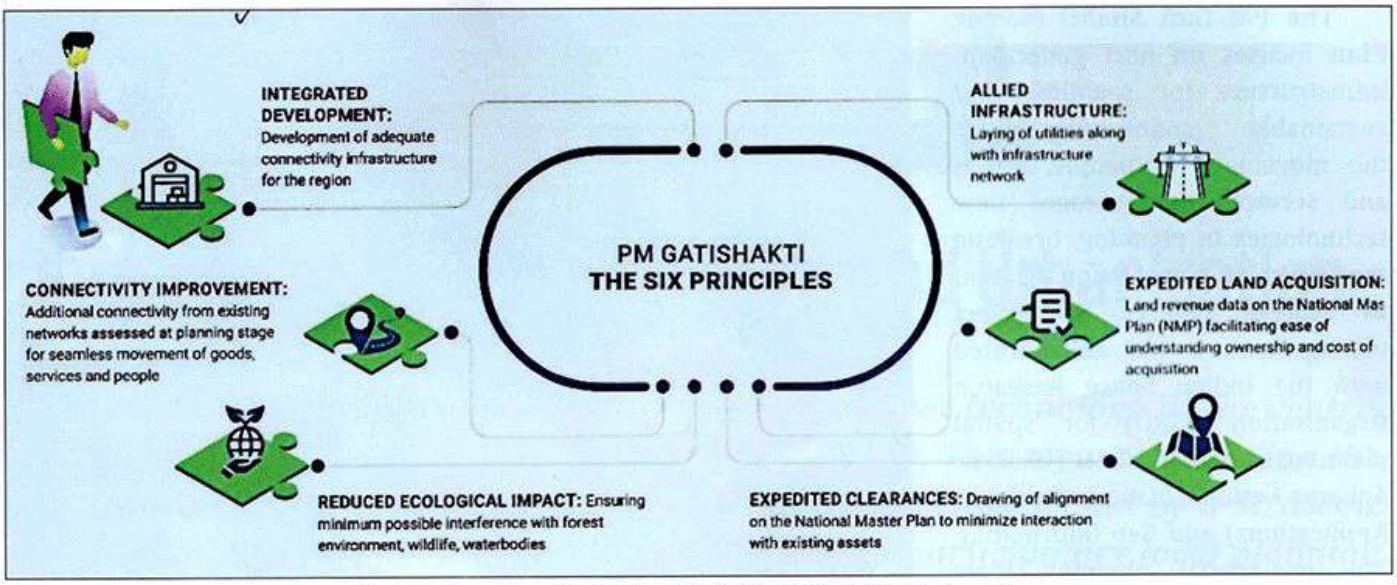


**Fig. 3: The six principles of PM Gati Shakti Master Plan**

*(Source: Ministry of Commerce and Industry, GOI 2023)*

precarious jobs, health, education and food security. Air quality in urban areas is deteriorated often due to the use of fossil fuels, dust and emissions. Water bodies and rivers are polluted with shortage of water supply, sanitation, and sewerage. Transport gridlocks, accidents and lack of parking spaces are the order of the day. The cities are desperately suffering from the issues of urban heat, floods, disasters, housing shortages, crimes and social and gender inequity.

The UN-Habitat World Cities Report 2024 states that about 2 billion people will be exposed to temperature increase of $0.5^0$ C by 2040 and more than 2000 cities 5 meter above sea level, and 2620 cities 10 m above sea level, will be at the risk of flooding. This report estimates that this would need $ 2.5 to 5.5 trillion every year to make the urban infrastructure climate resilient. According to the United Nations Environment Programme (UNEP), cities are responsible for 70% of carbon dioxide emissions, with transport, buildings and energy as the major

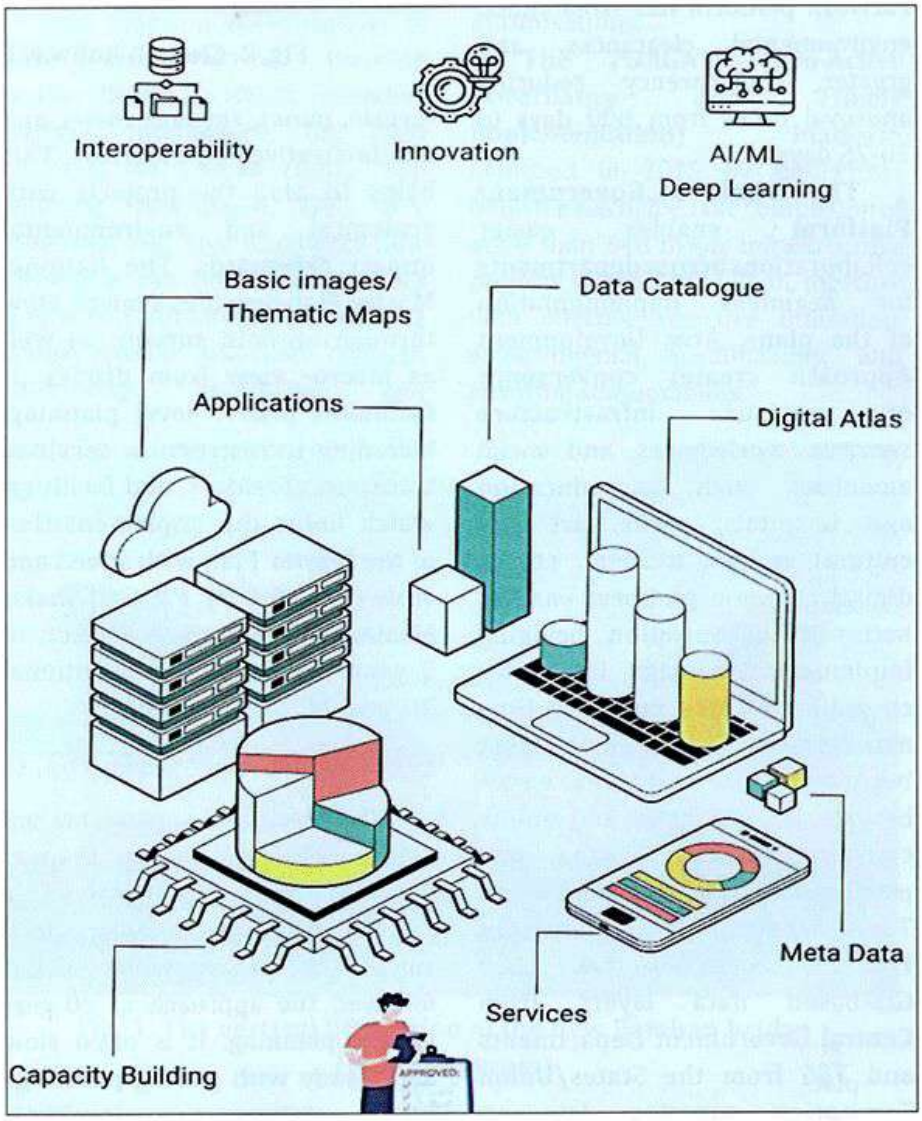


**Fig. 4: Emerging Technologies for PM Gati Shakti Master Plan**

*(Source: Ministry of Commerce and Industry, GOI 2023)*


**Fig. 5: Key Drivers for Digitisation for Sustainable, Inclusive and Resilient Urban Planning and Data Driven Decision Making** *(Source: NIUA (2023))*

sources. The cities also produce enormous amounts of solid waste. According to the UNEP Global Waste Management Outlook 2024 report, it requires an enormous investment of $ 252 billion. There is no option but to resort to a circular economy.

In the book 'Age of the City' (2023), Professor Ian Goldin and Tom Lee Devlin, recommend that for creating resilient cities, abandon the car-based sprawl, which is a colossal waste of resources and also a social and environmental failure. Cars pollute the air, generate heat, take up too much space, and 95% of the time remain in parking spaces. Instead, plan and provide mass transit, bicycle, and walking. Embrace the 15-minute city, the way Paris has done, improving and emphasising its walkability quotient. Carlos Moreno in his book '15-Minute City: A Solution for Saving Our Time and Our Planet' (2024) stresses improving the quality of life by reducing long commutes. It suggests adopting bio-morphic urbanism and ecosystems that are rooted in a place rather than being superficial. Plants, and trees may be a good start, if they belong to the place. Protecting green spaces and water bodies can be like the difference between life and death in a climate crisis scenario, where cities are becoming heat traps of concrete, steel, and glass. Urban planning, zoning laws and building codes can mandate the coexistence of nature through green roofs, permeable pavements, renewable energy, traditional materials, and ventilation. A valuable lesson from Smart Cities Mission is not to put technology at the centre, but people, infrastructure, jobs, greenery, and mobility.

This means redefining the urban planning process and replacing the prescriptive Master Plan by a Strategic Spatial Development Plan for 5 years, with a focus on participatory local planning and collective vision. The Spatial Development Plan focuses on improving the quality of living, working, and infrastructure services through new approaches, balancing the four Es: i.e. economy, engagement, equality, and environment. This needs the script of urban planning rewritten by innovative data-driven paradigms, like the PRAGATI, Gati Shakti Master Plan, and Whole of Government Platform.

Thus, the Spatial Development Plan links urbanism and digitisation for sustainable, inclusive and resilient urban future (Fig. 5). It converges strategic sustainability and sectoral planning with interlinked layers of:

- Sustainability Plan
- Climate Resilience Plan
- Heat Mitigation Plan
- Air Pollution Control Plan
- Comprehensive Mobility Plan, TOD, Transport Nodes Redevelopment Plans
- Heritage Conservation Plans
- Social Development, Recreation, Health, Education and Amenities Plans
- Land Management Plan
- Water Management Plan
- Energy Management Plan
- Sanitation Plan
- Drainage Plan
- Housing, Slums/Informal Settlements, Regularisation and Regeneration, Informal Markets Redevelopment and Upgradation Plans
- Action Plan and programme (timelines, accountability, institutional capacity building, governance, finances and legal regulatory framework)
- Unified Planning and Building Regulations
- Financing and Investment Plan.

Recent innovations and digital transformation, such as the PRAGATI and Whole of Government Platforms, can accelerate urban projects and bridge the implementation gap. ❑