Reimagining India post-COVID-19: the intelligent infrastructure revolution

2 December 2020

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(4 min read)

While the preliminary successes of COVID-19 vaccines offer hope at the end of a dark year for humanity, the pandemic has challenged us to think differently. The post-COVID-19 age will be defined by radical changes in our lifestyles, social interactions and economic transactions, as well as in our relationship with the natural world. What we've learnt the hard way is that we must cultivate a deeper understanding of our impact on the planet and be more prudent about breaching nature's delicate boundaries.

The traditional approaches to the creation of physical infrastructure, as well as the ways in which it is deployed, are being revisited. It has become clear that infrastructure assets will have to be sustainable: naturally and organically rooted in the local physical environment, and well aligned with the priorities and concerns of surrounding communities.

The scale of India's infrastructure financing requirements (estimated at USD4.5 trillion[1] till 2040, nearly two times the country's GDP) reflects the exigencies of modernising infrastructure across domains such as energy, transport, water, and sanitation. This has emerged as a national priority, not just to improve the quality of lives, but also to absorb the 12 million[2] young people who enter the workforce every year.

The advent of technologies like 5G, Internet of Things (IoT), Machine Learning (ML), Artificial Intelligence (AI), and hybrid cloud will shape the future of infrastructure. It has yielded possibilities for building infrastructure that is leaner - created just-for-purpose and not over-designed; cheaper to use, capable of dynamic preventive maintenance and of multi-functionality, and also more responsive to varying user-requirements. There is an urgent need, particularly in domains like urban transport, to integrate various disparate elements while bringing the user to the foreground. In India's bustling cities, metro-trains, taxis, and buses need to function as part of one seamless system, which is suited to the vagaries of urban commutes. India's struggle to reduce extreme pollution levels, especially in northern regions, necessitates the transition from personal vehicles to public transport for urban commutes. This can happen only if the various modes of urban transport are not only interconnected with common timetables, but also made demand-sensitive by infusing intelligence into the system.

India's water sector—which faces deepening concerns around scarcity and universal availability, as well as quality and sustainability—is another domain that cries out for modern-day infrastructure creation and management. Given the increasing water stress in India, this is a resource that demands careful husbandry, with practically every drop accounted for, and put to optimal use. The consumer also needs to be placed at the centre of India's water ecosystem, which is dominated by large water-delivery agencies in most states. A key measure would be to impart intelligence into the water-delivery ecosystem, using tools like AI, ML, and big data. The National Jal Jeevan Mission, which has the transformative target of providing piped water to every rural Indian household by 2024[3], plans to implant IoT devices in water storage tanks across the country as part of its drive to make the system more responsive and resilient.

The creation of infrastructure that can constantly communicate with users, that is suited to the dynamic needs of various stakeholders, and which is capable of self-correction by learning from experience, is a goal that is well within reach, given the variety of cost-effective technological tools that are now at our disposal. The key challenge in navigating this transition is to change mind-sets and to bolster the capabilities of the stakeholders and agencies which dominate the infrastructure space in India. These changes should start right at the project-inception and planning stage, to ensure that there is adequate focus on the right outcomes, and that the immense possibilities created by these frontline technologies are sensibly deployed to create infrastructure that is efficient, resilient, sustainable, and user friendly.

Although infrastructure creation in India is still overwhelmingly the preserve of government and public agencies, hopefully one of the few beneficial after-effects of the pandemic would be to accelerate measures to create intelligent infrastructure through the wise deployment of cutting-edge technology.

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[1] Economic Survey 2017-18, Ministry of Finance, Government of India – accessed on 18 Nov 2020
[2] Workforce Development in India – Policies and Practices, Asian Development Bank Institute – accessed on 18 Nov 2020
[3] Jal Jeevan Mission, Department of Drinking Water & Sanitation, Ministry of Jal Shakti – accessed on 18 Nov 2020