# INDIA'S DIGITAL PUBLIC INFRASTRUCTURE: SHAPING THE FUTURE OF GLOBAL DIGITAL GOVERNANCE

*by*

## Parth Lathiya

The emergence of Digital Public Infrastructure (DPI) has fundamentally transformed governance paradigms, reconfiguring the traditional interface between state institutions and citizens through technological innovation and systemic redesign. Sahasranamam and Verma (2022) argue that India's DPI represents a watershed moment in administrative architecture, creating "a nested ecosystem of interoperable digital platforms that reimagine public service delivery and institutional connectivity". The systemic adoption of DPI can address the challenges of financial inclusion, healthcare, and education sectors and can be used to manage the transition to a carbon-neutral world. Bauer and Salomon (2023) characterise this approach as a "paradigmatic shift from transactional to transformational governance," where digital infrastructure becomes the primary mechanism of state-citizen interaction.

According to the G20 Task Force on Digital Public Infrastructure, DPI differs from our traditional understanding of digital infrastructure, such as connectivity infrastructure for internet access or mobile networks. It has been described as an infrastructure-based approach that uses technology to achieve societal goals through an ecosystem (comprising technology, markets and governance) built in the public interest that leverages competitive private innovation within regulatory guardrails. The DPI can also be understood as interoperable, open, and inclusive systems supported by technology to provide essential, society-wide, public and private services to bring inclusive digital transformation.

While examining the global landscape of digital public infrastructure, we can find exponential differences between various nations. For instance, Unlike democratic models, China's DPI is considered a fundamental extension of state power. It has developed mechanisms such as the Social Credit System and WeChat Pay, which create a comprehensive digital profile of

each citizen, and its scores directly impact individuals' opportunities to access multiple facilities provided by the state and private sectors. On the other hand, the European Union has developed a right-centred DPI, which prioritises democratic values. With the combination of the European Digital Identity Framework and the General Data Protection Regulation (GDPR), the EU has decentralised its DPI, where citizens have control over their digital identity. The examination of the United States' DPI revealed that the country has adopted selective regulatory intervention to prioritise technological innovation by private sectors. The partnership with technological giants such as Google, Amazon and Apple has enabled the US to develop a mature DPI. It allows the country to develop strategic digital capabilities, specifically in the area of cybersecurity and defence, with the help of Agencies like DARPA (Defence Advanced Research Projects Agency).

The developmental trajectory of digital public infrastructure in India is unique as it is not a mere technological platform but rather a transformative tool to address socio-economic challenges. India's DPI is built upon three interconnected layers (Figure 1), collectively referred to as the "India Stack". The first layer is based on creating a 'digital identity' that enables secure authentication of entities, allowing efficient delivery of public and private services. The creation of the Aadhaar — comprehensive biometric identity system in 2009 can be considered a stepping stone as it provides identity proof to over 1.3 billion Indians and helps to accomplish UN SDGs target 16, i.e. providing legal identity for all. India's digital identity infrastructure has its own niche, specifically between developing nations, due to its scalability, low-cost maintenance and efficient service delivery. Countries such as Sri Lanka, Morocco, the Philippines, Guinea, Ethiopia and the Togolese Republic have already adopted the Modular Open-Source Identity Platform (MOSIP), an open-source foundational identity platform developed by IIIT-Bengluru

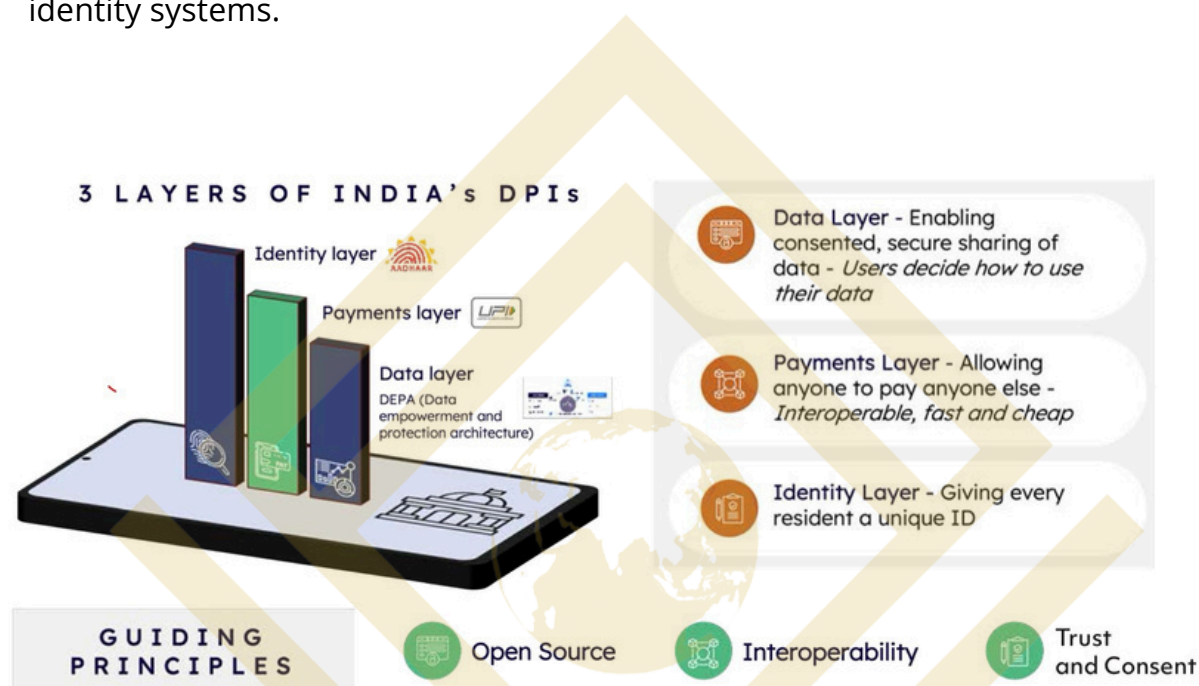which provides a customisable and scalable solution to implement digital identity systems.



**Figure 1**

The second layer is based on creating a 'payment layer' that facilitates secure real-time transactions between entities. It has increased access to services, improved the standard of living, and fostered ease of doing in the public and private sectors. The introduction of the Unified Payment Interface (UPI) and RuPay card has unlocked techade as it links bank accounts to any UPI-enabled app, leading instant transactions across various platforms. Private fin-tech players such as Paytm and PhonePe have also supported the growth of the ecosystem by building business models around it. These players are now providing credit to merchants who earlier didn't have access to credit, helping with financial inclusivity. India has developed highly affordable and accessible digital infrastructure to serve the bottom of the pyramid. For India, DPI has become an indigenous Digital Public Good (DPG), which implies that it's non-excludable, non-rivalrous and non-depletable by

its digital nature; in this vein, the aim is for digital tools to be leveraged to create maximum welfare and ease of living for citizens.

India is also exporting its DPI as a Service (DaaS) model, i.e., a single consolidated bundle that will contain pre-packaged DPI building blocks as cloud solutions. This approach enables smaller nations with limited technical capacity to adopt DPI affordably and efficiently. Presently, over 30 countries are either adopting or in early discussions to implement UPI, Aadhar, and Beckn (protocol) in their respective countries to boost social & financial inclusion (Figure 2). Singapore and Russia have set up bilateral partnerships with India to take UPI at the global level. Singapore has integrated PayNow with UPI to instantly transfer funds between the two countries. Similarly, Russia is also discussing launching Rupay and Mir cards with UPI-FPS interaction. The true potential of UPI 2.0 lies in reducing the remittance costs for UPI global transactions. Remittance costs can come down from 4% to 1%. For instance, India would have saved over $3 bn in remittance costs in 2022, when India received $100 bn foreign funds.
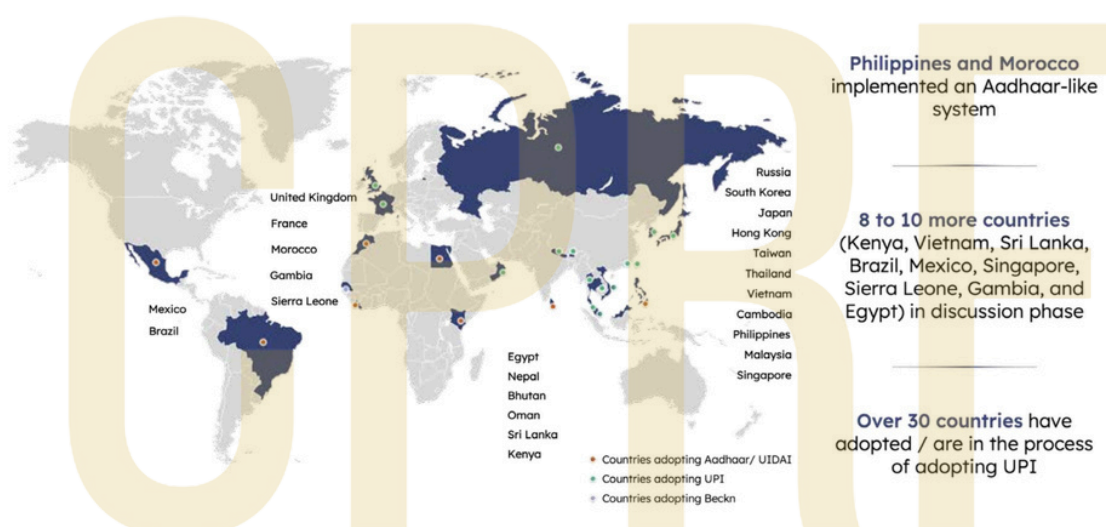


**Figure 2**

To supplement the identity and payment layer, India has incorporated a Data Exchange layer to safeguard individual privacy and secure the collection, storage and use of data. India's regulatory approach seeks to promote technological innovation while preventing the weaponisation of financial data, which poses a threat to the agency and sovereignty of the nation. The digital architecture of India is in sharp contrast with the surveillance-heavy model like China or the data-monetisation model like the US. The system is based on the 'privacy by design' principle, where the account aggregator (AA) secures consent-based sharing of data with private and public entities. Additionally, implementing a federated data storage structure rather than consolidated into a central repository reduced the risk of data breach and misuse. The launch of DigiLocker, under the digital India mission, has allowed users to store, access, and share important documents digitally. It is widely used for KYC processes in financial services, education admissions, and government schemes.

India, through its G20 presidency in 2023, mainstreamed the idea of DPIs as an instrument to accelerate the pace of economic development, especially in the Global South. In G20 New Delhi Leaders' Declaration (NDLD), India has launched a Global Digital Public Infrastructure Repository (GDPIR), a virtual repository for the exchange of information and best practices from countries. India also proposes to build the One Future Alliance (OFA) with the Social Impact Fund (SIF), an initiative aimed at building capacity and providing technical assistance and adequate funding support for implementing DPI in Low and Middle-Income Countries. On a bilateral level, India and France underscore shared belief in developing open, free and democratic DPI through InFrastructures (India France Structures) and InFinity (India France Innovation in Information Technology). At the heart of India's internationalisation of its DPI know-how is NPCI (National Payment

Cooperation of India) International Payments Limited (NIPL) of India. The primary objective of NIPL is increasing acceptance of NPCL's UPI and RuPay Products. NIPL has successfully established partnerships with Discover Financial Services (DFS) in the U.S., Japan Credit Bureau (JCB) in Japan and Union Pay International (UPI) in China. Additionally, India's digital framework has made it possible to address each of the SDGs and improve the lives of the citizens, both economically and socially. The digital solutions developed by India are by design, open source, highly interoperable and customised. These solutions, if implemented globally, can help countries solve similar challenges and help improve the lives of their citizens (Figure 3).

| Key challenges | Sector | India's digital solution | SDG goals of UN |
|---|---|---|---|
| Financial and social inclusion for the citizens | Financial services | UPI, AEPS, NPCI, PMJDY | • No poverty<br>• Zero hunger<br>• Partnership for goals |
| Access to healthcare | Healthcare | ABDM, ABHA, e-Sanjeevni | • Good health and well being |
| Effective governance & delivery of government services | Governance | Aadhaar, DigiLocker, DIGIT | • Industry innovation and infrastructure<br>• Reduced inequalities<br>• Climate action<br>• Gender equality<br>• Peace justice and strong institutions |
| Access to education | Education | NDEAR, Diksha | • Quality education<br>• Decent work and economic growth |
| Decentralization and inclusivity in commerce | Retail and E-commerce | ONDC | • Industry innovation and infrastructure<br>• Decent work and economic growth |

**Figure 3**

To gain a competitive advantage in the global landscape of digital public infrastructure, India needs to incorporate cutting-edge AI technology into the robust Digital Public Infrastructure, which can amplify its capabilities and efficiency even further. India is characterised by a multitude of local languages. In such contexts, AI can help to overcome the challenge of limited data availability to a large extent in Indian languages by enabling language localisation. The Natural Language Processing (NLP) models can be

trained on diverse datasets to understand and process Indian languages, making DPI more inclusive and accessible to all citizens, which is also one of the principles of the 2019 G20 AI principles. Bhasini in India is one such example of NLP. The seamless fusion of Digital Public Infrastructure (DPI) with artificial intelligence propels us into a new world of 'Digital Public Intelligence'. The integration of AI with DPI can also enhance cybersecurity measures within DPI by continuously monitoring for threats and anomalies. It can improve service delivery across various sectors such as health, education, agriculture, and finance.

The story of India's Digital Infrastructure is a unique case of a public-private-led initiative with limited resources. According to Nasscom's India's digital public infrastructure report, It is estimated that by 2030, the economic value added from DPIs to India's GDP could reach 2.9% to 4.2%, already at 0.9% in 2022. For India, DPI has become an indigenous Digital Public Good (DPG) due to its open-standard and inclusive nature. Countries, specifically the European Union (EU), can collaborate on the EU's Global Gateway project, where India can bring its expertise in implementing DPI on a large scale, which can increase global connectivity and help to achieve sustainable goals.

**Reference**

Maheshwari, A. (2023). Digital public infrastructure in india. *Global Media Journal, 21*(63), 1-3. https://doi.org/10.36648/1550-7521.21.63.370

Desai, A., & Manoharan, A. P. (2024). Digital Transformation and Public Administration: The Impacts of India's Digital Public Infrastructure. *International Journal of Public Administration*, *47*(9), 575–578.

https://doi.org/10.1080/01900692.2024.2350762

Keyzom Ngodup Massally, Rahul Matthan, and Rudra Chaudhuri, "What Is the DPI Approach?" Carnegie India, May 15, 2023,

https://carnegieindia.org/2023/05/15/what-is-dpi-approach-pub-89721.

Rudra Chaudhuri, "Decoding the G20 Consensus on Digital Public Infrastructure: A Key Outcome of India's Presidency," Carnegie India, September 1, 2023,

https://carnegieindia.org/2023/09/01/decoding-g20-consensus-on-digital-public-infrastructure-key-outcome-of-india-s-presidency-pub-90467.

Image Source: NASSCOM, "Digital Public Infrastructure 2022-2024," https://community.nasscom.in/sites/default/files/publicreport/Digital Public Infrastructure 22-2-2024_compressed.pdf

Protean Technologies, "Decoding Digital Public Infrastructure in India," https://proteantech.in/articles/Decoding-Digital-Public-Infrastructure-in-India/

India's digital revolution: transforming infrastructure, governance, and public services. (n.d.). https://pib.gov.in/PressReleasePage.aspx?PRID=2082144