Understanding state-level variations in India's digital transformation

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Abstract
India's digital transformation is often described in terms of the country's vast internet penetration, growing mobile connectivity, and widespread uptake of digital payments and other online services. Undoubtedly, India has made tremendous progress on all these fronts over the last few years. But digitalisation narratives founded upon aggregate national statistics bear the risk of assuming a homogeneity of digital access and experience in the country. This article highlights some of the state-level differences in digital access, skills, and infrastructure across India—as a basis for dispelling assumptions about the homogeneity and universality of India's digital transformation. The article draws attention to the varying levels of digital readiness within India, and to the need to account for these variations in the design and implementation of the country's digital initiatives.

Keywords
India, digital transformation, digital inclusion, digital readiness, state level

Acknowledgements
This article draws upon elements of a forthcoming CyberBRICS[1] project report. The author is grateful to Larissa Galdino de Magalhães Santos at the CyberBRICS project, and the editorial team at *The African Journal of Information and Communication (AJIC),* for valuable inputs.

DOI: https://doi.org/10.23962/ajic.i30.15082

Recommended citation
Parsheera, S. (2022). Understanding state-level variations in India's digital transformation. *The African Journal of Information and Communication (AJIC), 30*, 1-9. https://doi.org/10.23962/ajic.i30.15082

1 See https://cyberbrics.info. The BRICS countries are Brazil, Russia, India, China and South Africa.

1. Introduction

The Constitution of India describes the country, in Article 1, as "a Union of States" (Republic of India, 1950). The country is divided into 28 states and eight union territories, with the responsibility to administer different functional areas in these territories divided between the central and state governments. At the central level, India's digital transformation strategy is built on the foundational blocks of strengthening access, the adoption of e-governance initiatives, and the empowerment of citizens. These key objectives are articulated in the government's Digital India programme, which has been in operation since 2015 (Government of India, n.d.a). Digital India brings together a number of different schemes and initiatives that include projects with a pan-Indian application, as well as those developed or implemented at the level of state governments.

The success of the Digital India programme is often reported in terms of statistics about the country's growing internet access, mobile penetration, adoption of digital services, and booming start-up culture (Kaka et al., 2019; Prasad, 2022). India has indeed seen tremendous developments on all these fronts. Yet a study of the country's digital trajectory is incomplete without the inclusion of a more localised understanding of how the digital story is playing out in the country's different states (Singh et al., 2013).

Accordingly, this article focuses on the differences in digital adoption and implementation across India's states, and how those differences may contribute to differentiated outcomes for citizens. Based on a review of the available data and literature, this article notes that, in addition to administrative variations, digitisation outcomes are also influenced by factors like the country's rural–urban divide, varying levels of digital literacy and skills, and other socio-economic considerations. All of these play a role in determining how a diverse spectrum of user groups across the country experience, in varying ways, India's digital transformation.

2. A "mobile first" approach to digital transformation

Being the second most populous country in the world, it is unsurprising that many of India's digital achievements are highlighted in terms of the size of its user base. According to official estimates, India currently has more than 1.15 billion mobile connections and almost 830 million internet subscribers (TRAI, 2022). These developments have spurred a "mobile first" strategy that can be seen in the design of services offered by the government, as well as in private offerings. For instance, the government's UMANG (Unified Mobile Application for New-age Governance) app emphasises a "mobile first" approach while seeking to bring together all e-governance initiatives on its platform (MeitY, n.d.). The Jan Dhan-Aadhaar-Mobile (JAM) scheme offers another important example. JAM focuses on leveraging India's mobile phone strength (*Press Trust of India*, 2021) and enrollments in its digital identity programme, Aadhaar (UIDAI, 2022), to push for the adoption of banking services in

the country (PM India, n.d.), on the assumption that most individuals already have a mobile phone and digital identity, thus paving the way for the adoption of other digitally enabled services.

The central government's Direct Benefit Transfer (DBT) scheme is an example of such a service. Under the DBT scheme, disbursements of various welfare benefits are made directly to the bank accounts of individuals, with Aadhaar being the "preferred" mode of authentication (Government of India, n.d.b). In August 2021, the government also introduced a new digital payment solution called e-RUPI, which is a pre-paid digital voucher that can be received by a beneficiary on their phone as an SMS or QR code. It is meant to be used only for certain designated purposes, such as an e-RUPI transfer by the Health Ministry to avail health services at designated hospitals that have agreed to redeem the e-RUPI vouchers. The government's long-term plan is to connect e-RUPI with several other disbursements under the DBT scheme (Ministry of Finance, 2021), meaning that the mobile phone will play an even more central role in an individual's ability to access their welfare entitlements.

The assumption about near-ubiquitous mobile adoption in the country is also visible in the widespread use of one-time passwords (OTPs), received via SMS, for accessing various products and services. In some cases, this electronic means of verification coexists with offline alternatives. For instance, the Income Tax Department currently allows individuals to verify their tax filings through various electronic means, including an Aadhaar-based OTP, as well as by using traditional postal services.

But an offline option is not always provided. When the government launched its CoWin portal to manage the administration of COVID-19 vaccinations, it was mandatory for all users to complete an OTP check in order to log onto the system. Access to vaccination bookings was, therefore, predicated on a user having either their own mobile phone or the ability to seek assistance from others who had a phone and were willing to help. The rush for limited vaccination slots in the early days of the vaccination rollout made it clear that the digital-only strategy inevitably favoured mobile-savvy citizens over others (Santuka, 2021).

The assumption about ubiquitous access has, therefore, been challenged in the light of available evidence on the inequities that exist in India's digital ecosystem. The country's digital divide has most notably been demonstrated with respect to both gender (Barboni et al., 2018) and the rural–urban divide (Pandey, 2020; Singh et al., 2013). The latest Mobile Gender Gap Report by GSMA found a 14% gap between Indian men and women for mobile ownership and a 41% gap for mobile internet usage (GSMA, 2022). With respect to the rural–urban divide, 2021 data released by the Telecom Regulatory Authority of India (TRAI) showed rural and urban internet densities (subscriptions per 100 people in the population) standing, respectively, at 37% and 104% (TRAI, 2022). This gap is significant in itself, given that the majority

of India's population (approximately 65%) resides in its rural areas (World Bank, n.d.). The differences become all the more stark when the data is disaggregated at the level of different states.

3. Understanding state-level variations

For the purposes of telecommunications licensing, India is divided into 22 service areas. This demarcation broadly corresponds to the boundaries of India's states, subject to some variations. For instance, states such as Madhya Pradesh, Andhra Pradesh, and Bihar, which have each been bifurcated into two separate states, continue to exist as one service area. Further, a service area may consist of multiple smaller states, as seen in the case of the North Eastern service area, which includes six states from that region (Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, and Tripura).

The data points to significant variations in the state of access across different parts of the country. According to TRAI's reports, internet access density—the number of internet subscribers per 100 people—ranges widely, from the highest figure of 186% in Delhi[2] to the lowest figure of 36% in the Bihar service area (TRAI, 2022). Further, with the exception of one service area (Kerala, which has a rural internet density of 149 per 100 people and an urban internet density of 64 per 100 people), the figures for rural internet density are lower than for urban density in all service areas.

Intra-service area variations can also be seen in cases where two or more states are part of the same service area. The service area of Bihar, which, as noted above, has the poorest internet density in the country, consists of two states—Bihar and Jharkhand—that have widely different internet densities, of 43% and 10% respectively. Similarly, Chhattisgarh, which forms part of the Madhya Pradesh service area, performs significantly worse than its counterpart state, Madhya Pradesh, in the same service area. Chhattisgarh has the country's lowest internet density, at 7%, while internet density in Madhya Pradesh stands at 63% (TRAI, 2022). Finally, data released by the government in 2021, about villages that still remain outside the grid of mobile connectivity, found that there were 25,000 unconnected villages, and the majority of these villages were concentrated in the states of Odisha, Madhya Pradesh, and Maharashtra (Srivastava, 2021).

Another general trend that emerges is that the regions that fare worst in terms of inclusiveness in internet access also perform relatively poorly on other human development indicators (Bhardwaj, 2021; Parsheera, 2019b). A more granular sub-division, down to the levels of districts, blocks, and villages—which are smaller units

2 One of the possible reasons could be that many users have two or more internet subscriptions.

of administration within a state—can be expected to reflect a similar trend. TRAI's data on internet subscriptions does not go down to the level of these units, but other sources offer relevant indications. Intra-state variations have, for instance, been observed in the rollout of the government's BharatNet project, which seeks to provide broadband connectivity to most of India's villages. In the state of Himachal Pradesh, all the Gram Panchayats (village-level units) selected for coverage in the first phase of the project were situated "in the relatively better-off[3] districts of Hamirpur, Mandi and Solan" (Parsheera, 2019a)—thus excluding large portions of the state's tribal groups, which are concentrated in the districts of Lahaul-Spiti, Kinnaur, and Chamba.

In addition, the network experience of users in less developed regions has been found to be poorer, compared to service areas with a higher revenue-earning potential. India's North Eastern Region, which has historically been among the country's most neglected and underdeveloped areas (Gokhale, 2022; Barua, 2011), offers an example. According to an analysis by Open Signal, the average data download and upload speeds in the North Eastern Region were, respectively, 23.4% and 43.3% lower than the national average (Khatri, 2022). The neighbouring state of Assam, which also lies in India's North Eastern Region (although it is a separate telecommunications service area), displayed similar results. This may partially be explained by the unwillingness on the part of telecommunication providers to invest in infrastructure in remote and inaccessible areas with comparatively low revenue potential. In addition to commercial considerations, state-level policies (as discussed in the next section) also influence the quality of digital access available to their residents.

It has also been found that the ability of different user groups to benefit from e-governance solutions is highly dependent on their level of digital skills. In this context, researchers have found that only 38% of households in India are digitally literate—61% in urban areas and 25% in rural areas (Mothkoor & Mumtaz, 2021). (A household is regarded as digitally literate if at least one person can operate a computer and use the internet.) In certain regions—such as Uttar Pradesh, Madhya Pradesh, Chhattisgarh, Bihar, and parts of Jammu and Kashmir—the rural digital literacy rates are less than 20%. In contrast, states such as Goa and Kerala have achieved more than 70% digital literacy in both rural and urban areas. The researchers attribute this to specific digital literacy initiatives undertaken by those states, such as a computer literacy programme in Kerala and a memorandum of understanding to promote digital literacy entered into by the state of Goa with Google (Mothkoor & Mumtaz, 2021).

3 In terms of economic development and annual rate of growth of the district's income (Government of Himachal Pradesh, 2018).

4. Right-of-way policies

Ensuring "broadband for all" is contingent upon the establishment of the necessary infrastructure in the form of optical fibre, copper cables, telecommunication towers, and other apparatus required for the operation of networks. The establishment of such infrastructure requires permissions for use of public land and public rights-of-way. In terms of India's constitutional dispensation, the legislative responsibilities are divided between the central government and the states, with some sectors driven by the former and others by the latter. The power to make laws relating to posts, telegraphs, and communications is vested in the central government (Entry 31, List 1, Seventh Schedule, Constitution of India, 1950). But responsibility for land use policy, law, and regulation, which have an important bearing on the setting up of telecommunications infrastructure, falls under the domain of state governments (Entry 18, List 2, Seventh Schedule, Constitution of India, 1950). This allows the states to determine the policies, costs, and timelines for land-related permissions for laying down telecommunications infrastructure.

The inconsistent implementation of right-of-way policies in India has been found to delay the expansion of India's telecommunications infrastructure (GSMA, 2020; Marwah, 2019). This has been a problem not only for private operators but also for the roll-out of the government's own BharatNet project, which, as noted above, aims to achieve universal broadband access (TRAI, 2016). In addition to permissions from state governments (and local authorities within them), right-of-way permissions are sometimes also required from central government bodies like the National Highway Authority of India and the Indian Railways (TRAI, 2016). As a result, the requirement of authorisations from multiple authorities often results in extensive delays and exorbitant fees.

In some cases, government functionaries have observed a direct correlation between low broadband penetration and non-alignment of right-of-way rules by the state governments (Aulakh, 2021). Right-of-way challenges also contribute to the low rate of fiberisation of telecommunications towers in the country, i.e., the low proportion of towers that are connected to a fibre-based backhaul. At present, only about 30% of India's towers (and fewer than 7% of households) are connected to fibre (Surya, 2021). The rates of fiberisation are lowest in mountainous states such as Himachal Pradesh, and in remote parts of the North Eastern Region (*The Economic Times*, 2022).

In a bid to streamline these processes, the central government issued the Indian Telegraph Right of Way Rules in 2016, providing for the expedited processing of applications for setting up underground and above-ground infrastructure (Government of India, 2016). The rules provide for mechanisms such as a single window clearance system (option of a single electronic application process for facilitating approvals by all authorities within a state), fixed timelines for processing,

and a cap on the fees for administrative expenses. However, the implementation of the rules still remains under the domain of the state governments, and the practices that have evolved have not been consistent or sufficiently effective (Dua, 2020; Standing Committee on Communications and Information Technology, 2021). Through the Draft Indian Telecommunication Bill, 2022, the central government is now proposing legislative changes to streamline the right-of-way permissions involving both public and private properties.[4]

In another attempt to address the right-of-way backlogs, the government recently launched the GatiShakti Sanchar Portal, which is described as a "collaborative institutional mechanism between all stakeholders" to act as a single interface for right-of-way approvals (Department of Telecommunications, n.d.). If successful, this initiative can play an important role in the delivery of the BharatNet project and in the forthcoming roll-out of 5G services, which require fiberisation levels far beyond the country's current levels.

5. Conclusion

India is characterised by great diversity in the living conditions of its population—a diversity that is also reflected in variations in digital access, digital skills, and digital outcomes. The importance of addressing these differences risks being obscured in digitisation initiatives founded upon aggregate national statistics that paint a picture of robust mobile penetration and internet access. This article has sought to highlight some of the state-level differences present in respect of digital access, skills, and infrastructure across India—as a basis to dispel assumptions about the homogeneity and growing universality of the country's digital transformation. However, the article's objective is not to make a case against the pursuit of digital transformation on these grounds. Rather, the aim is to highlight the realities of India's federal structure and the varying levels of digital readiness that need to be accounted for in the design and implementation of the country's growing number of digital initiatives.

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