Dreams of a Digital India: Imaginaries of the India Stack project

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Masters Thesis

December 2024

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Acknowledgements

Thanks to everyone - mentors, family, and friends - who helped me through this entire process in so many different ways.

This truly was a group effort.

Abstract

The India Stack project brings together many digital government services as a set of interoperable services such as digital identity, digital payments and documents, built off of the foundational Aadhaar project. Through in-depth interviews with key stakeholders in the Digital India ecosystem who shape the ground realities of the digital revolution, we map out various imaginations behind the campaign. We examine our interview data against the government's promotion of the project to uncover ways in which experiences on the ground align or depart from the government's promotion of the India Stack project. We find that there is a disparity in the branding and on-ground messaging around the digitalization of India. The campaign draws on nationalist imaginations of the future, with little confrontation of sociotechnical inequities in India.

Introduction

In 2015, the incumbent NDA government announced a flagship program called “Digital India’”, with a vision to bring the country into the digital age. This was envisioned through a number of key initiatives, such as improving digital infrastructure through improved phone and internet access, providing government services digitally, and upskilling the population to be employable in the digital age. It built off of the Aadhaar digital identity system which had been introduced by the previous UPA government in 2009, with a vision to provide each Indian citizen with a digital identity proof that can be used to administer public benefit systems while reducing fraud.

The India Stack, a term initially introduced in 2016, expands on this vision to build up a stack of digital applications that are interoperable with the Aadhaar system to provide services like digital document storage and verification, and financial services.This vision has been informally incorporated into the “India Stack”(iSPIRT & the India Stack Pilot – Commercialization of Techno-Creative Innovations, 2016), which is a project that brings together these digital services as a set of APIs and digital public goods that can be combined together to form progressively more complex digital services. To build these Digital Public Goods, the India Stack project is modeled as a government- private sector partnership to conceptualize various government services provided to Indians as digital public goods.

There have been critiques offered about Aadhaar and initial services, however the India Stack project is an extension of the foundation laid by Aadhaar, and there isn’t much critique about it

So far, the reasoning behind the India Stack project and the values embedded in its particular architecture have been offered by a very limited set of people, most of whom have been involved in the building of the project itself.

To understand the various narratives that have thus far shaped the India Stack project, I spoke to key informants involved in the digital india project in various capacities. I also analyzed various press releases, government documents and white papers to understand the narratives used both by the government and the builders of the India Stack project that have contributed to the socio-technical imaginaries of a Digital India. I place these two sources of data in contrast with each other to understand the narratives that have shaped the creation of the India Stack project.

Prior Literature

Technology as an enabler of development in India

Prior work has mapped out how technology plays an important role as an enabler of development in India, and how it is perceived by different demographics within the country. According to (Joshi et al., 2018; Pal, 2017), technology allows people to imagine greater economic opportunities for themselves. Further, it also enables a "leapfrogging" of current socio-economic conditions. (Joshi et al., 2018; Vijayakumar, 2013) have written about how women use technology to construct their aspirations flexibly. Technology skills allow them to participate in the workforce in a respectable job, while also becoming eligible for better marriage prospects. Technical skills are seen as a resource for women in conceptualizing their identities contextually

to their social and economic location, and relationally, in their roles are women in a patriarchal system. (Vijayakumar, 2013)

Technology as Patriotic

Patriotism and self-reliance are common narrative frames used in the promotion of technologies as a developmental tool in India. In the creation and use of Indian made technologies, patriotism and self-reliance are common themes that are employed not just by the government, but also citizens in the way they perceive it. For example, this framing was observed in the case of the large-scale demonetization event in 2016 which pushed many people to start using digital payment technologies. (Pal et al., 2018) While local shopkeepers spoke about the personal losses they suffered during this incident, they also had a positive perception of the moral and political goals behind demonetization, in a patriotic sense.

However, people's perceptions and framing behind the use of technology in developmental work differs widely based on the socio-economic location and the intersectional identities.

People's historic interactions with both technologies and social systems also significantly shape their expectations for technology in the future, particularly government technologies

Scholars (Kapania et al., 2022) call for more work that evaluates the narratives behind the use of certain technologies in India, that might be contextually very different from technology use in Global North. (Kapania et al., 2022) noted in particular that data driven technology systems such

as AI are seen as more neutral than other humans in a system, who might be prone to influence through bribes. AI and similar technology systems are seen as a way to push back against injustices in traditional systems.

Even in cases where the technology was supposed to add transparency to people's interactions with the government, it only served to increase their reliance and trust in their social connections to navigate the system. For example, in the case of technology enabled features in the Public Distribution System (Mudliar, 2021), added features like audio prompts did not serve the needs of the beneficiaries of the system, as they still depended on the dealer to tell them how to navigate the system. Similarly, in the use of digital payments by local shopkeepers, their willingness and ease of adoption of digital payment technologies in the wake of demonetization was closely linked to their personal tech savvy and the use of these technologies by their close connections (Pal et al., 2018).

Further, people's interactions with governmental technologies is also colored by their emotional associations with their usage. For example, people using UPI (a digital payment technology) in India report a high level of satisfaction with its speed, efficiency and convenience. At the same time, a significant number of participants in the same study also reported increased spending due to UPI, since spending digital money does not have the same emotional impact as spending physical money (Dev et al., 2024).

Indian politicians and recently, builders of technology, have been vocal in their support of technology as a developmental tool. Current developmental interventions are failing, so projects which use technology as a developmental tool are encouraged, regardless of the actual outcome of prior ICTD projects (Pal, 2017). Aspiration is offered as a powerful framing tool to encourage technology driven development by politicians. Prior work by (Pal, 2017) has noted how Narendra Modi uses the aspirational and symbolic value behind certain technological artifacts to justify his leadership as a technologically adept leader.

Digital Public Goods have been offered as a new way of building digital government services

Building on the idea of technology for development in India, there are a few emerging narratives in the past decade about how this can be achieved, particularly in the realm of government use of technology. Digital Public Goods (DPGs) have been presented as an alternate way of creating digital services for the Indian population, which can reduce the dominant market effects and power that Big Tech companies currently hold []. This idea is reflected in the India Stack project, which brings together a number of different government services, each constructed as a Digital Public Good. The creators of the India Stack project claim that the India Stack project is a more efficient and targeted way of providing services to the Indian population and that "by lowering the transaction costs of serving the poor, we are able to achieve better inclusion" (Raghavan et al., 2019). They also claim that the India Stack approach to digital services has allowed them to scale quickly, reduce dependency on proprietary solutions, and has led to massive savings in cost. This has led to the creation of a new technocratic order in governance, which seems to

highly value creating efficiency in its processes, and prioritizes this over the “messy politics” of existing institutions. (*How an Amoral Technocracy Powers Modi’s India*, 2023)

Origins of the Digital Public Goods and associated Digital Public Infrastructures idea have been drawn from the idea of the government as a platform (O’Reilly, 2011; Singh & Jackson, 2021). In this framework of thinking about governments, open standards for building technology can enable innovation within governments by getting the private sector involved. Further, opening up the data that governments usually hold can enable private sector companies to build technological innovations that governments do not consider or may not have the resources to build.

These principles are echoed by the designers of Aadhaar, who conceptualized the creation of the Aadhaar system as an hourglass with the Aadhaar number and authentication as the “waist” or choke point between biometric identification innovations below and services that use Aadhaar above (Singh, 2019). This design is reflected in the blend of cultures that makes Aadhaar possible - the innovative, fast pace of IT startups and traditional Indian bureaucratic procedures. This interplay between the private sector and the public in the creation of governmental services is identified as a crucial component to the creation of the India Stack project. (Panday, 2023) says that the state’s sponsorship of the India Stack project allows smaller private companies (which build various India Stack components) to achieve scale, allowing them to be labeled as “Digital Public Infrastructure”.

Dominant critiques about the Aadhar system center around questions of equity, inclusion and reliability

However, in the 15 years since the creation of the Aadhaar system, there have been many critical perspectives offered about the system, particularly focused on the equity and access aspects. (Singh & Jackson, 2017) notes that places where technology meets existing infrastructure are places where things don't work as expected or Stacking technology pieces for development can work unexpectedly. In (Singh & Jackson, 2021), they outline how the three key processes – enrollment, seeding, authentication – behind Aadhaar lead to the creation of a spectrum of "resolution" for citizens, in which those who are recorded in high resolution (high level of detail) are afforded greater benefits and rights while those in lower resolution have their rights curtailed. Inclusion in systems like Aadhaar is not a one time activity, but a process that happens continuously, each month, when beneficiaries try to access their public benefits (Singh & Jackson, 2017). They say that inclusion and exclusion in Aadhaar is not a static binary, but highly fluctuating and contextual, and not mutually exclusive. The seams in between Aadhaar and the existing Public Distribution System (PDS) infrastructure are the spaces where people experience exclusion, through difficulties in authenticating their biometrics, and errors in the initialization of their details in the PDS system.

Alternate critiques behind the construction of these government technologies have been varied. (*How an Amoral Technocracy Powers Modi's India*, 2023) notes that the nationalistic themes behind the early framings of technology's role in development by some of the founding figures of India are still persistent today in the creation of services like Aadhaar. Emphasis on scale and efficiency privileges the government's needs to track and collect data, rather than the beneficiaries' needs, as in the case of (Mudliar, 2021). Complaints from the beneficiaries of these

systems about authentication challenges and on-ground failures are dismissed, and designs of features that are supposed to improve transparency and that officials say are empowering to beneficiaries are actually of little use to them.

Methodology

I conducted semi-structured interviews with 13 people involved in various Digital India efforts. The interviews were designed to reveal the participants' location within the Digital India ecosystem and how they interacted with the concepts in their daily lives. The participants were chosen for their varied perspectives from a mix of independent technology consultants, journalists, software engineers, academics, and lawyers. They were recruited through an initial sampling of experts in this field, and then a further snowball sampling through recommendations.

Among the participants in this study, many had interacted directly with the India Stack through their software contributions to projects, their legal or journalistic work in the space, and so on. These people were practitioners who worked within the broader Digital India ecosystem in different capacities, and interacted with the rest of the ecosystem through the lens of their work. The semi-structured interviews attempted to capture the varied perspectives among these participants about how they operationalize the broader concept of "Digital India" in their day to day work.

The interviews were conducted virtually through Zoom, and recorded for transcription purposes. They were then transcribed and coded in two rounds iteratively. Participants were based in various locations across India, while the interviewer was based in Ann Arbor, Michigan, USA.

Interviewee	**Area of Work**
P1, P2, P3, P6	Technology Consultancy/Software Engineering
P4, P5	Technology Law and Policy
P8, P10, P12	Journalism
P7, P13	Technology Research
P9, P11	Politically Affiliated Consultancy

I also reviewed 20 press releases, speeches, and social media items put out by the Indian Government, related to Digital India and India Stack. These items were sampled from official press releases through advanced keyword searches for items on the official press release website of the Government of India between 2015 and 2024. Some of the initial keywords used for retrieving these press releases were: “Digital India”, “India Stack” and “Open Source”. Further searches were motivated by some of the initial themes identified from the interviews, such as “aspiration” and “trust”.

Both these sources of data were qualitatively analyzed, coded and iteratively grouped into thematic categories. I compared them against each other to draw out the similarities and

differences in the way narratives were constructed around the work involved in Digital India and India Stack projects.

The documents that were published by the builders of the India Stack program were analyzed for individual themes qualitatively. The various documents were picked for their subject matter, their poster and the type of document. The main themes were extracted from each of these documents and compiled for further analysis.

Findings

The main findings from this study are categorized by the major themes that were observed in both the interviews and government documents. These themes draw on the major values present in the framing of the India Stack project by different groups of stakeholders.

1. Aspiration

Many interviewees mentioned that a pivotal point in their careers in the technology space came when Nandan Nilekani, the co-founder of technology services company Infosys left his position with the company, to work on what was to become Aadhaar, the digital identity project (*UIDAI*, 2010). This move was highly unusual at the time, considering Nilekani's influence and position within Infosys. For many of the interviewees, this move was inspirational, and opened up ways

for them to consider the impact of their technology skills within society. A few of the interviewees attribute this moment as a push for them to consider technology roles with social impact.

"I think that the private sector has a track record of technically sound and innovative work….[and] the collaboration with the government has helped create more scale and impact."

- *Interviewee P6*

One interviewee spoke about how the idea of working in the public sector was more meaningful to him, by nature of the possible scale of impact that could be had, compared to his years of software engineering experience in the private sector. However, he also noted that there was a better track record within the private sector for technological innovations, which was not the case within the government.

The beginning of the Aadhaar project marked a shift in many of the interviewees' careers as a moment when they began to reckon with the impact of their work. Though their paths into the broader Digital India ecosystem were varied, the interviewees who were software engineers in the private sector noted their motivations to contribute their technical skills for broader societal good increased around this event. Perhaps this event marked the creation of an institutional space for creating broader social impact through their existing technical skills where no obvious ones had existed before.

For many, the ideas of impact are closely tied to ideas of scale. Whether the scale of such digital governmental services directly translates to impact is another question, which has been examined by many scholars at length, particularly for the Aadhaar project. However, the number of software engineers working on these projects is a fraction of all software engineers, who are an even smaller fraction of India's population. When viewed through the lenses of class and caste, the conceptions of impact through scale do not leave much space for considerations of values like equity.

However, the government's use of aspiration to champion the India Stack project focuses on how these technologies help boost the aspirations of various groups of people within the country, such as women, youth, and the middle class. This is a common theme present across multiple press releases and speeches made by Prime Minister Modi, and echoed by other members of the government.

"In the world's view, AI means Artificial Intelligence, but we also have another AI—Aspirational Bharat – besides Artificial Intelligence. When the power of Aspirational Bharat combines with Artificial Intelligence, the speed of development naturally accelerates."

"Bharat is equally serious about the other AI—Aspirational Bharat. Whether it's the middle class, the common people, their ease of living, their quality of life, small entrepreneurs, MSMEs, the youth, or women of Bharat—we are formulating policies and making decisions with everyone's aspirations in mind."

- *PM Modi at the NDTV World Summit 2024 in New Delhi*

Further, when making public addresses at a global forum, such as addressing the Indian diaspora in New York City in September 2024, Modi has emphasized how citizens achieving their aspirations can help make the country a digital superpower. A recurring theme in these public forums is the leadership role that India plays in not just operationalizing the India Stack at country scale, but also exporting this technology to other countries.

"Friends, Bharat no longer lags behind. Now, Bharat creates new systems and leads the way. Bharat has introduced the world to a new concept of Digital Public Infrastructure (DPI). DPI has promoted equality and become a powerful tool in reducing corruption. Bharat's UPI is now capturing the world's attention. While you may have a wallet in your pocket, in Bharat, people have both physical wallets and e-wallets on their phones. Many Indians no longer carry physical documents, as they now use DigiLocker. When travelling to airports, they seamlessly use DigiYatra. This has become the launching pad for digital public infrastructure, innovation, job creation, and every related technology."

- *PM's address to the Indian Diaspora, New York, USA*

"We believe in the principle of Vasudhaiva Kutumbakam (the world is one). Those countries that are keen on following India's lead can adopt India Stack according to their needs."

- *Former Minister of State for Electronics & Information Technology and Skill Development & Entrepreneurship*

2. Trust

People who work in the broader digital India ecosystem have to evaluate values of equity, privacy and impact in their work often, as demonstrated in the prior section. However, many interviewees noted how these values were different from the mainstream western notions of them, and how this departure was crucial in thinking about how these digital government technologies have evolved in India. Particularly, privacy as a public value is significantly less important in India compared to the West.

One interviewee said:

"I have nothing to hide from the government, I can share my data."

Many interviewees even referenced the same report (Status of Policing in India Report 2023 Surveillance and the Question of Privacy, 2023), in which the average rate of CCTV uptake across India was found to be very high. People seem to report a high degree of trust in technology, which when combined with moderate to high levels of trust in authority, lends itself to a higher degree of trust in government associated technology. In a recent work which examines the level of trust Indians have in Artificial Intelligence (AI) technologies (Kapania et al., 2022), people reported a higher willingness to trust in a seemingly impartial technology such as AI, compared to other people who they viewed as biased, and susceptible to bribes and influence. This indicates a lower level of trust within society compared to higher levels of trust in technologies and the state.

Interestingly, many of the interviewees themselves reported their reluctance in enrolling in some of these digital governmental services such as Aadhaar and UPI. Their work in the field puts them in close proximity to the pitfalls of these technologies, and many reported being in a financial and social position that allowed them to opt out of these technologies. This is in contrast to a wide section of the population who do not have the space or choice to consider questions of trust or privacy. Then, the question of trust for the average citizen becomes one of usability, where the extent to which these technologies like Aadhaar and UPI actually work for them shapes their trust in them.

Some of the interviewees also noted that perspectives that are more critical of the Digital India initiative emerged from limited circles within India's urban centers much in the same way as the creation of the technologies themselves. For Indians not located in the major urban centers of India, some interviewees noted a certain pragmatism in their interactions with the technologies. For many, these questions about trust and privacy get transformed into questions of utility and usability on the day to day.

To say that critiques and consequently awareness of the pitfalls of governmental technologies is limited to urban centers is to discount the rising awareness of scams among the general population. UPI scams related to quick money transfers and news of large scale breaches of Aadhaar data has been on the rise in recent years, which the interviewees say has influenced how the general population might view these technologies.

People's trust in various components of the India Stack is closely related to how usable the technology is for them, on the day to day. For example, one of the interviewees said:

"When service delivery actually becomes more convenient, like scan a QR code and work gets done, then level of trust in this would increase"

"Trust in these instruments… yes, they are supposed to make citizen life more convenient. But this happens if institutions accept these documents and act on them."

However, for many people, the use of Aadhaar and related documents is not a choice. Even in informal settings, where the use of these documents is not mandatory, there is little room for people to push back.

3. Openness

Though many of these digital public infrastructure projects are built in conjunction with the government, public participation is limited to perfunctory open source contributions. Many of these projects are set up as open source projects from their conception. The concept of Digital Public Goods allows these technologies to be created as a set of interoperable technological "public goods" (Gruen, 2017).

By choosing to build a service as a set of generic Application Programming Interfaces (APIs), the builders make software design choices that ensure that the service can now be reused across a

variety of different situations by different governments. Many of these projects are set up as Open Source projects to allow for, in concept, anyone to be able to make a contribution to it, and for anyone to be able to look at the code and see what is happening.

However, in practice, this is not the case. The number of people making contributions to these open source projects is often limited to the people working within the organization. One of the interviewees spoke about how open source contributions from people outside his organization are close to none, though they would like that to change in the future to make the projects "true open source".

One interviewee mentioned her concerns about the open-washing that surrounds these digital government projects. Given that these projects are touted as "open source" there is not enough inquiry into whether this necessarily makes the project more equitable by allowing more people to participate in its creation. Further, it also obscures other concerns that might get brushed aside under the broad umbrella term of open source.

Other interviewees also noted that many projects might start off as open source but the final version that gets used by the government might be a modified closed source version of the underlying open source project, which again obscures the modifications and reduces the overall transparency of the technology.

The idea of openness is closely related to broad themes of inclusion. This is evident in the way inclusion is commonly used as a frame by the government to promote India's work in building

Digital Public Goods, especially in international forums. The government has also referred to the open sourcing of these technologies as soft diplomacy.

"Bharat has demonstrated that technology is a tool for inclusion, transparency, and empowerment, not for control and division."

"We have now created an online Global Public Digital Goods Repository - the India Stack. This is to ensure that no one is left behind. Especially our brothers and sisters from the Global South."

- *PM's video message during G20 Digital Economy Ministerial Meet*

4. Public Private partnerships

ISpirt (Indian Software Products Industry Roundtable) is a consortium of members responsible for creating Aadhaar, digilocker and many of the different components that are today housed under the label of "India Stack". They work in conjunction with the Indian government to create technical standards and specifications for these projects, in collaboration with other industry stakeholders.

The team consists of a small group of core volunteers and a larger group of casual short-term volunteers. These volunteers are compensated through individual donations from industrialists and so on, and are not directly paid by the government. This relationship with the government

and mode of working brings out unique attributes to the Indian model of digital government service creation, compared to other countries across the world.

Discussion

In this work I have attempted to build on some major themes from prior literature that are outlined below:

1. **Government as a platform**

   Initial work on Digital Public Goods in India drew from (O'Reilly, 2011), building on the concept of Government as a Platform. The structure of the India Stack project expands on this idea, by creating a unique structure for private companies to work with government entities. Government acts as an enabler of innovation by providing services at scale through collaborations with private companies. In the India Stack scenario, iSPIRT provides both technical and policy designs for many India Stack products, by working in collaboration with different government bodies.

   In this situation, a small group of engineers and designers have outsized influence on the design and development of digital technologies that affect the lived experiences of the entire Indian population. Although the structure of this private-public relationship allows the culture of technology start-ups to influence the bureaucratic nature of government bodies, it is also subject to the drawbacks of the same culture which prioritizes speed and efficiency over concerns of equity.

2. **Patriotism and self-reliance as narratives for technology development in India**

(Pal, 2017) talks about how various political figures, including the BJP government of India and PM Modi use aspiration as a frame for promoting technological development. In early technology for development projects, Indian politicians often spoke about how building homegrown technology can help India break away from the influence of big tech corporations, and become more self-reliant. This frame is also evident even in the narratives used in the initial promotion of Aadhaar, and India Stack.

However, there seems to be an emerging narrative of patriotism and nationalism associated with the export of digital public goods to other countries, particularly to other countries in the global south. Recently, in speeches at global forums such as G20, Modi has been actively promoting the leadership role played by India in creating innovative digital public goods that have been implemented at population scale. India's diplomacy efforts in exporting these technologies is now framed as a way of extending this leadership to other countries.

3. **Extending some critiques of Aadhaar to the India Stack**

Some of the prevalent critiques about Aadhaar address the issues of exclusion, reliability, and privacy. For example, (Singh & Jackson, 2017) talks about how inclusion and exclusion are continuous processes that happen at the seams where Aadhaar's processes meet existing infrastructure, such as the PDS. To extend this idea, within the India Stack project, there are a large number of digital government services that now interface with each other using Aadhaar as the basis. The multiple seams between these different

services are sites where different levels of inclusion and exclusion can occur. Stated goals like financial inclusion are not a foregone conclusion as a result of a one time enrollment process. Inclusion must be thoughtfully designed for, at every unique site of interaction that the citizen has with the socio-technical system, enabled by the India Stack.

Limitations

The number and variety of the interviewees chosen was limited, and hence, the content of the collected data did not reach saturation in the interview process. Interviewees were primarily from an urban area, and the interviews were conducted in English, so this might further limit the diversity of perspectives included in the study.

Future Work

Perspectives offered by specific subsets of interviewees could be explored further to understand the motivations and dynamics behind the creation of the India Stack project. For example, software engineers in particular enjoy a privileged position within the Indian technology ecosystem, and have played an important role in shaping the development of the country through these projects.

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