



The Rise of the India Stack: Addressing India's Digital Public Infrastructure Revolution

Over the past decade, the gradual rollout and success of the India Stack has allowed the country to emerge as an unexpected global role model for facilitating rapid economic growth, financial inclusion, and the creation and refinement of a nationally sanctioned digital public infrastructure (DPI). From the 2009 conception and implementation of Aadhaar, its novel biometric digital identification system, to the 2016 launch of the Unified Payments Interface (UPI), an interoperable and increasingly secure digital payments application and infrastructure, India continues to expand on the capabilities of its DPI and position itself as a leader in both technological innovation and social progress.

To learn more about the current state of the India Stack, as well as where it is headed, Egon Zehnder's Directors Development program had the pleasure of hosting an insightful session with **Dr Pramod Varma**, former Chief Architect of Aadhaar, India's digital identity program and former Chief Architect

of India Stack. Here are just a few key takeaways:

Defying the Odds

Back in 2009, India was faced with no shortage of pressing economic and social challenges. For example, only 17% of the country's population had a bank account at the time, and this lack of financial access, not to mention access to a secure identity, had a disproportionate impact on women. Moreover, as a social welfare nation with no reliable infrastructure or processes for authentication, up to 40% of funds being allocated to subsidies were not actually reaching people in need, resulting in roughly \$25 billion leaking out of the system each year.

Importantly, Varma reminded us that all of this was happening alongside a veritable golden age of technological advancement and digital transformation, which included the ongoing rise of cloud computing, as well as the introduction

of Android smartphones and eventually the iPhone. Put simply, despite having a clear and almost desperate need for technological innovation, India remained well behind the curve.

Fortunately, this was the same year that India developed Aadhaar, a first-of-its-kind, revolutionary biometric digital identification system, which would soon supply more than a billion Indian residents with an easily accessible, secure, and trusted means of proving their identity, and ultimately simplify access to a variety of public and private resources.

In addition to its sheer novelty, what made Aadhaar such a crucial turning point was that it set the stage for building out India's broader DPI, or what is known around the world today as the India Stack. This includes, of course, the 2016 launch of UPI, an intuitive and increasingly utilized digital payments infrastructure for Indian residents, as well as other critical tools like DigiLocker, a flagship platform from the Ministry of Electronics & IT (MeitY) that allows residents to easily access authenticated personal documents directly from their mobile phones.

To put the existing power of the India Stack into perspective, Varma pointed to a study published by the Bureau of International Settlements (BIS) in 2020, which noted that in ordinary circumstances it would've taken India up to five decades to bring its mere 17% bank penetration in 2009 to the 80% it has already achieved today.

"They were blown away," he said.

"Something they had never seen in the world had happened here in India. Instead of waiting until 2060 to deliver bank accounts to Indian residents, and even achieve gender parity regarding identity and bank account access, we did it all in seven and a half years."

From Platforms to Protocols

Today, the monumental success of the India stack has given the country a new and well-deserved status as a hub of social and technological innovation. However, to fully appreciate these existing tools, their societal impacts, and the continued advancement of India's overall DPI, it's important to understand what makes the underlying approach different than anything that has happened in other nations.

According to Varma, it all comes down to pivoting India's "entrepreneurial energies" away from a platform-based mindset to one concerned with innovation at the network or protocol level. For example, UPI was built not as a single platform or payment provider, but as an open digital infrastructure on which more than 350 banks can transact through their own applications, and even offer their own unique innovations to their customer base without sacrificing interoperability.

"Think of it like new cars coming onto the highway, or new innovation happening, but the highway remains the same," he said. "This is the playbook; we build interoperable digital rails like highways, digital rails on top of which private innovation can thrive."

This approach, Varma says, is the reason why transactions on UPI recently exceeded \$10 billion, and why that growth will only continue as both private and public players offer their own technological improvements, from voice access and authentication to the integration of new language features. Moreover, this approach need not be viewed as being exclusive to payments or banking, and in fact the India stack's capabilities have already been expanded to accommodate consumers and small businesses through the Open Network for Digital Commerce (ONDC), and continue to be built out in other critical areas such as education, mobility, and healthcare.

“If we want innovation in India to continue on this trajectory, we have to continue moving more toward an Internet-like, protocol-based thinking. UPI was itself a product of this mindset, which is why its scale has been unimaginable; it wasn't a platform play, it was a protocol play, and this makes all the difference.”

he said.

A Call to Innovation

Varma closed out his talk with an inspiring call to action, urging participants to utilize what has been learned over the years to ensure that innovation in India continues on an upward trend and that the further advancement of its overall DPI creates additional positive economic and societal impacts for the country.

More specifically, he summed up the India Stack's story as being one of publicly

raised private innovation and highlighted that future success depends on using the existing progress as a roadmap for continued development. Reiterating that the success of programs like Aadhaar, UPI, and ONDC have been grounded in interoperability and the consolidation of platforms into open, flexible protocols, he encouraged a focus on immediate innovation in obviously burgeoning industries, such as clean energy.

For example, Varma pointed out that there's no reason we can't use this Internet-like, protocol-based approach to solve issues like the lack of interoperability in electric vehicle (EV) charging systems. “Why is EV charging not interoperable,” he asked, “why can't I find any charging station on any app while I'm driving and simply book it and pay for it? This is going to happen. It's bound to happen.”

Finally, as one last reminder to avoid the costly, convoluted, and overall inefficient processes of the past, Varma insisted that regardless of the individual product or service in question, we must not lose sight of our primary focus: the actual customer. In the context of the progress India has already made, this means understanding that if we hope to truly optimize experiences through an interoperable digital ecosystem, as well as comply with regulations around data privacy, we need to ensure we're not just *receiving* user data, but *returning* it back to the customer.

“You can't only use a customer's data and not give it back,” he said, “because this leads to the same cycle and closed-off infrastructure of the past. And as we have seen before, this is far too costly and, most importantly, it simply doesn't work.”

India Stack refers to various India Stack layers such as eSign, Digital Locker, and Unified Payment Interface (UPI), and Data Empowerment and Protection Architecture (DEPA), and all of which are now working at population scale in India.

- During the last decade, India built the world's largest G2P payment infra \$322 bn Transferred | \$27 bn Savings | 1,000+ Programs | 860 mn Beneficiaries.*
- UPI made transactions cashless. In 2016, India used mostly cash. But, within 6 years, India had the highest volume of digital payments globally.*
- Teledensity blitz scaled using eKYC from 37% to 93% in 8 years, and the cost of mobile data plummeted.*
- Digilocker made transactions paperless | 175 mn+ users | ~6 bn+ digital credentials/docs.*
- GSTN + eInvoices + eWayBill + FasTag created a single physical market across 28 states which cut waiting times at tolls from days to minutes and made tax compliance seamless via any app.*

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