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NATIONAL PAYMENTS CORPORATION OF INDIA: CUTTING-EDGE FINTECH ECOSYSTEM INNOVATION IN INDIA

Ishtiaq P. Mahmood, Sadat Reza, and Marleen Dieleman wrote this case solely to provide material for class discussion. The authors do not intend to illustrate either effective or ineffective handling of a managerial situation. The authors may have disguised certain names and other identifying information to protect confidentiality.

The National Payments Corporation of India (NPCI) was established in 2008 as a private–public collaboration to improve efficiencies in the country's payment systems by taking advantage of the opportunities emerging from a young and increasingly digitally savvy population in India. NPCI's organizational form was unique: A not-for-profit entity that was initiated by the Reserve Bank of India (RBI), India's central bank, but owned by a consortium of India's leading banks. By creating multiple new products for India's financial payments system, NPCI established its reputation as a trail-blazing financial technology (fintech) innovator. Many of its platforms, which were initially devised as unique solutions for India, had by now attracted the attention of other countries. As NPCI moved on to further streamlining national payment systems in the digital age, the RBI decided to open up the market, allowing banks and other financial services companies to compete directly. Did NPCI have the right structures, processes, and strategies to continue to thrive in this rapidly evolving environment, or should it change the not-for-profit collaborative organizational structures that had made it successful in the first place?

INDIA'S FINANCIAL LANDSCAPE: "CASH IS KING, DIGITIAL IS DIVINE"

In 2018, the RBI came up with a catchy motto: "Cash is king, digital is divine," signalling how far India had come in digital payments.[1] Some analysts claimed that India had surpassed the West in payment technology.[2]

India's journey toward a cashless economy began in the early 1990s when, following economic liberalization, India experienced a significant improvement in economic growth.[3] With the increase in commerce came a wave of banking needs for businesses and individuals, and this resulted in an unprecedented increase in banking activities. Despite practically no change in the number of commercial banks during 1991–2005, deposits and credits grew by an annual average of more than 16 per cent in that period.[4] While the liberalization policies, including the new regulations for the financial sector, contributed to this massive growth in banking activities,[5] an even more important role was played by the proliferation of information technology in handling large-scale increases in payments and settlements.

By 2005, almost all private banks and 77.5 per cent of public sector bank branches were fully computerized, of which, 28 per cent had core banking solutions.[6] There were 21,147 bank-operated automated teller machines (ATMs) nationwide.[7] Also, the acceptance of credit cards for retail payments had increased

sharply, as had the use of various new funds transfer and settlement technologies. Consequently, non-paper-based payments and settlements had increased from 29.4 per cent in 2001–02 to 51.2 per cent in 2005–06.[8]

The digital revolution provided India with an opportunity to surpass more advanced markets through technology. The banking landscape, however, was dominated by several state-owned banks that were lagging in pioneering new technologies. The absence of a common platform offering interoperability across different banks caused delays in payments and settlements. Along with this, a low penetration of bank accounts beyond urban areas was hampering the growth of the burgeoning financial sector. The inefficiencies in interoperability reduced the attractiveness of owning an account, and a low volume of accounts in turn made any investment in technologies mitigating those inefficiencies prohibitively expensive. India's time for overtaking had not yet come.

It fell on the RBI, India's central bank, to look for solutions that could smooth inefficiencies in the financial system. To this end, the RBI had already taken several measures. For large-scale interbank transfers, new real-time gross settlement systems allowed for faster settlements. In addition, the RBI started incentivizing banks to adopt cost-efficient payment technologies while also improving the legal infrastructure for digital payments.[9] However, the RBI also had a broader mandate to pursue financial inclusion, which would require more innovative fintech solutions.[10] In order to achieve its goals, the RBI came up with a road map entitled *Financial Sector Technology Vision Document* (2005), which ultimately led to the emergence of an unlikely homegrown Indian fintech innovator: the NPCI.[11]

THE BIRTH OF NPCI: PUBLIC–PRIVATE COLLABORATION REIMAGINED

By 2005, the RBI was ready to roll out a pilot for its cheque truncation system (CTS), which would reduce cheque clearing time to a single day.[12] However, the RBI recognized that improving cost efficiency in the payments and settlements system was not possible without a greater level of interoperability among banks and other financial service firms. A critical question was who should be responsible for spearheading the development of a new interoperability technology.

The banks did not have enough incentive to invest in developing such infrastructure themselves. The public nature of interoperability infrastructure made investments susceptible to potential free-rider problems. If the RBI were to appoint a single for-profit entity to develop the entire interoperability technology for payments and settlements, an undesirable concentration of market power could potentially result.

As a way forward, the RBI consulted the Indian Banks' Association (IBA) to design a solution. The RBI and the IBA came up with the idea of forming a not-for-profit "co-opetitive" entity—a structure characterized by co-operation among competitors.[13] The new entity would be jointly owned by competing banks and focus on improving inefficiencies in the interoperability system.

It was an intriguing proposition. In a world dominated by faith in the invisible hand of competition, could a not-for-profit collaboration between competing players deliver innovation? Naturally, this not-so-traditional idea raised a few questions: Had such a model ever been tried? Even if the model were workable on paper, would profit-seeking banks be interested in co-operating with each other?

It turned out that a couple of similar examples could, in fact, be found in the financial sector. Interestingly, these came from none other than the bastion of free market capitalism—the United States. Both Visa Inc. (Visa) and Mastercard Incorporated (Mastercard) had been not-for-profit co-operatives, with thousands of banks and credit unions across the United States as members.[14] Only recently had these two credit card

giants become independent firms. While a co-opetitive model among banks was certainly not without precedence, unlike Visa/Mastercard, which were private sector initiatives, it was the regulator that had championed the idea of a coopetition in India.

A creative reimagination of public–private collaboration was warranted to solve this collective action problem inhibiting digital growth. After much deliberation, a road map and scope of operations for the new firm was drawn up by the RBI and the IBA, and the 10 largest commercial banks agreed to go ahead with the plan. These banks included six public sector banks, two private sector banks, and two multinational banks.[15] To overcome potential resistance to co-operation among competitors, the banks were assured that the profits from any transaction would be retained by the bank that executed the transaction, while the co-opetitive firm would focus only on innovation. Thus, NPCI was born.

AN INNOVATIVE ORGANIZATION STRUCTURE

NPCI started its journey in 2008 with the mission of establishing "safe, secure, sound and efficient payment and settlement systems for the country." This new venture—the progeny of public–private collaboration—was intended to leverage technology to significantly reduce transaction time, remain cost efficient, and allow interoperability among banks and other payment platforms. It was decided that NPCI would be incubated by the RBI for the first three years, after which it would operate independently while being regulated by the RBI. According to NPCI's managing director and chief executive officer (CEO), Dilip Asbe, the organization's goal was "to touch every Indian through digital payment platforms."

NPCI's mandate was to develop a homegrown platform that could be scaled up to create a flexible ecosystem for interoperability. One key issue that needed to be resolved was whether to rely on foreign technology or to develop it in-house. The industry norm was to purchase key technologies from specialist vendors or outsource them entirely. For instance, Kenya's money transfer service M-Pesa used technology from Visa, and Bangladesh's bKash service used technology from Huawei Technologies Co. Ltd. NPCI, on the other hand, was completely homegrown, which not only provided flexibility, but also helped in terms of cost efficiency. As Vishal Anand Kanvaty, NPCI's chief of market innovation, explained, "We completely insourced our technology. We didn't want any third-party dependency. We wanted to have complete control of the codes to make changes."

For the new entity to deliver on its promise, the RBI and the IBA needed to make sure that the right people were hired, the right organizational structure was designed, and the right type of rewards metrics were implemented. From the start, NPCI deliberately put together a group of people who were not from the RBI or the banking system but rather primarily from the technology sector. It was important that these hires believed in the mission of NPCI. In fact, NPCI operated very much like a private entity, with its own board, independent of both the RBI and the IBA.

Both the RBI and the IBA had the foresight to recognize the potential advantages and drawbacks of such public–private collaborations. Although being part of a government agency could be useful when it came to offering public goods, such close ties might also attract bureaucratic intervention—antithetical to innovation. Likewise, while private ownership could offer a customer-centric orientation critical for innovation, the typical private sector focus on profitability could slow down investments in common payments infrastructure.

A not-for-profit, multi-bank ownership structure combined with an independent board regulated by the RBI provided NPCI with the best of both worlds. While NPCI's independence gave it much-needed breathing

space to innovate, a not-for-profit structure made it possible for NPCI to focus on long-term collective benefits without having to worry about short-run market pressures.

CREATING THE FINTECH HIGHWAY

NPCI's first set of innovations was meant to improve existing systems in terms of efficiency and speed—something that clearly benefited all banks who used these systems, as well as their ultimate customers. NPCI was able to improve the basic workings of the existing financial system in India. At the time of the launch, the RBI handed over to NPCI the responsibility of finding solutions in three areas: (1) expansion of the National Financial Switch (NFS), (2) implementation of the CTS, and (3) upgradation of the Electronic Clearing Service (ECS). These technologies were already being developed by the RBI.

The NFS became the largest network of shared ATMs in India after NPCI took over its operations from the RBI. In 2009, there were around 50,000 ATMs nationwide under the NFS. As of July 2019, the network connected over 241,000 ATMs.[16] Thus, NPCI was able to bring together under this co-opetitive umbrella not only the large banks, but also many smaller regional and co-operative banks. In fact, NPCI established tie-ups with several international card schemes—namely, Discover Financial Services, Japan Credit Bureau, and China UnionPay International—allowing international cardholders of these organizations to use ATMs connected to the NFS network.[17]

Similarly, the CTS became the standard for cheque clearing in India. The process involved capturing the beneficiary's information encoded in the cheque and sharing it digitally, thereby eliminating the need for physical transportation. This reduced the cheque clearing time by up to nine working days. The benefits offered by the CTS, apart from the faster clearing cycle, included a better verification process, same-day local cheque clearing and next-day intercity cheque clearing, minimized transaction costs, and minimized operational risk by securing the transmission route. Soon after the adoption of the new standards, new peaks were achieved in the cheque clearing process.

At the time NPCI took over upgrading the ECS system from the RBI, multiple systems were in operation at the local, regional, and national level.[18] These systems were platforms that could be used for repetitive and periodic transactions, which were typically large in volume. NPCI consolidated all of these systems running across the country under one web-based solution—the National Automated Clearing House (NACH). Despite being one centralized system, NACH allowed enough flexibility to let the member banks design and customize the associated services for their clients. A few months into its launch, in July 2013, NACH processed around US$170 million. In September 2020, the amount processed through this system was $17 billion.[19]

Almost simultaneously, NPCI started working on developing a more efficient solution for interbank fund transfer, the Immediate Payment Service (IMPS) system. This was the first major platform developed from scratch by NPCI. Transferring funds in real time had been a major problem for the banking industry, and IMPS solved this challenge by allowing real-time fund transfers using the NFS, thereby improving both the safety and economy of such transactions.[20]

The success of these novel interoperability products established NPCI's reputation as a fintech innovator while improving the ecosystem by creating a common "highway" for the banks. According to Kanvaty, "NPCI is the highway that connects all banks on a single platform, where all messages are standardized, and every bank can talk to any other bank in the country."

A HELPING HAND FROM THE GOVERNMENT: THE "JAM TRINITY" AS THE CATALYST

Having successfully innovated and put in place new systems to improve interoperability among existing players and increase their efficiency, the next task for NPCI was to go beyond offering efficiency in interoperability and become a key stakeholder in the nation's financial inclusion drive.

Building trust was key to providing convenient payment solutions for every Indian. As Arif Khan, chief digital officer at NPCI, reflected: "Building trust in the early days laid the foundation for the growth in the ecosystem of payments." NPCI started gaining this trust by facilitating instant bank-to-bank transfers, greater ATM interoperability, and easy linking of bank accounts with mobile phones.

However, a large portion of the Indian population remained unbanked,[21] due to issues on both the supply and demand side of the financial ecosystem. On the demand side, unbanked people did not seem to have any real use for banking services. They primarily engaged in localized small-scale economic activities, conducting all transactions in cash. Moreover, the low levels of literacy and lack of proof of identity among this population segment were impediments for complex economic transactions. On the supply side, it was simply not financially feasible for commercial banks to provide services to much of the unbanked population. The potential transaction volumes were too low for the banks to make the services accessible to this section of the population. Thus, there was neither demand nor supply for the services among the unbanked population.

Three important pieces eventually came together to help NPCI solve the puzzle on the demand side. First, there was a remarkably high penetration of mobile phones among the unbanked population.[22] Second, the government of India had started issuing Aadhaar cards (national identity cards) to identify much of the population.[23] These cards could be used to resolve the onerous know-your-customer requirements of the central bank. Third, if government subsidies for the unbanked population could be channelled through the banking system instead of through the local administration, then demand for banking could potentially be ignited. This led the government of India to introduce the Pradhan Mantri Jan Dhan Yojana scheme—popularly known as "Jan Dhan" (people's wealth). Under this scheme, individuals no longer needed a minimum amount to open an account, which greatly increased the demand for banking services. Together, these three components—Jan Dhan, Aadhaar cards, and mobile phones—came to be known as the JAM trinity.

CONNECTING THE DOTS WITH RUPAY

With the JAM trinity in place to spur demand, there was a need to improve the supply side. As a way to provide a common channel across multiple banks, NPCI launched an affordable card scheme, RuPay.[24] Developed from scratch, RuPay allowed NPCI to provide similar services as any other card scheme, such as Visa or Mastercard, at just one-sixth of the cost. The ability to launch a card with low fees incentivized the commercial banks to adopt RuPay immediately. Moreover, the pricing structure for RuPay was deliberately kept at a simple flat rate for all customers, unlike Visa or Mastercard. This helped in the adoption of RuPay by both larger and smaller banks.

Another challenge was to understand the needs of the unbanked. In an effort to do so, the banks engaged individuals, known as "bank mitras" (friends of the bank), as local bank representatives to help community members open bank accounts. The bank mitras received a commission for every newly opened account and each transaction. The community members trusted the bank mitras with their finances, as they knew them personally. This concept became an important pillar for NPCI's financial inclusion drive, as it brought financial services to the customer's doorstep. The combination of the JAM trinity, RuPay cards, and bank

mitras thus led to a revolution in financial inclusion. The RuPay card issuance drive, mandated by Jan Dhan, became a massive success, leading to more than 600 million RuPay cardholders across India in 2019.[25]

Subsidies such as home gas subsidies and insurance benefits started coming directly into the bank accounts of beneficiaries.[26] Three hundred and fifty eight million beneficiaries were part of Jan Dhan, with almost $20 billion deposited into bank accounts.[27] Thanks to RuPay and bank mitras, almost 80 per cent of the adults in India had bank accounts by 2017, far outpacing other emerging economies (see Exhibit 1).[28] The high penetration of digital banking also facilitated direct government transfers during the COVID-19 pandemic in 2020.

To take full advantage of the recently built national payments ecosystem, NPCI had earlier launched three other solutions for facilitating financial inclusion. These were (1) the Aadhaar Enabled Payment System (AePS), (2) *99#, and (3) the Aadhaar Payment Bridge (APB) System. NPCI launched AePS in 2011 to allow interoperable transactions through micro-ATMs and through the bank mitras of any bank where customers were able to use their Aadhaar card.[29] In 2013, NPCI launched the *99# service for simple mobile-banking transactions based on unstructured supplementary service data (e.g., transfers and payments).[30] The APB System allowed customers to link their bank accounts to Aadhaar numbers, thus making it easier to receive funds from various agencies without having to inform them about changes in bank account information. These services facilitated digital payments of government transfers and subsidies, thus taking substantial steps toward accelerating digital payments.[31] The next step, then, was to move payments beyond the banking system and unleash a new wave of financial innovations based on NPCI's latest fintech solutions.

DEMOCRATIZING PAYMENTS THROUGH THE UNIFIED PAYMENTS INTERFACE

To move further into the digital financial payment space, NPCI began introducing new innovations targeted at the digitally savvy urban-banked population, who now had many choices of payment platforms. While the traditional banking platforms were now more interoperable and efficient, this was not the case for the non-bank payment platforms that were popping up everywhere. With the advent of Paytm, Google Pay, PhonePe, and other payment platforms, some of which had been introduced by the banks themselves, the need arose to make these bank and non-bank payment platforms interoperable. NPCI therefore had to move beyond its original purpose of providing interoperability infrastructure primarily for the banks. In addition to providing interoperability for banks and fintech players, NPCI also created its own products. As Praveena Rai, NPCI's chief operating officer, commented, "Yes, it is infrastructure, but it goes beyond offering [only] the platform."

The digital innovation drive led to the development of the Unified Payments Interface (UPI)—a first of its kind globally and NPCI's source of pride. This was essentially a payment highway where any payment platform could connect and seamlessly execute inter- and intra-platform transactions. The end-users only needed to remember their UPI ID, and they could use any payment platform of their choice. UPI allowed peer-to-merchant and peer-to-peer transactions, such as payments at retail stores; transferring money to others; requesting a payment; or authorizing a payment. Kunal Kalawatia, chief of marketing at NPCI, claimed, "One of the innovative things we've done with UPI is that I can not only send money, but I can also send a request to you saying you owe me this much, please pay up. And you can authorize it. So, this helps the merchants. UPI is also replacing cash-on-delivery."

Perhaps the most significant impact of UPI was allowing the democratization of the payment systems, of which there were several aspects. To begin with, UPI was built on protocols that could interact with a variety of payment solutions. It could be used by not only traditional bank and credit card solutions but also the more recent payment platforms, such as Paytm, WhatsApp Pay, and Google Pay, among others, including NPCI's very own Bharat Interface for Money (BHIM) payment app.

Further, the open-source technology that NPCI had chosen for UPI made the system more efficient. It also made the system more democratic by reducing the cost of innovation for small fintech players. As Khan explained, "The moment you use open source and open stack, by definition, it allows many more people to participate with you." Also, UPI allowed individual users to pick and choose their payment service providers. For instance, it was now possible for customers to keep their funds in one trusted bank while using specialized fintech services for greater convenience. Lastly, the greater accessibility lowered the barriers to entry and led to more collaboration between the legacy institutions (such as banks) and fintech organizations. Khan added, "Typically, the legacy financial organizations see fintech as competitors, and they don't really collaborate. UPI actually allowed the fintechs—the giant fintechs and the start-ups—to come together and co-create experiences under a clearly defined set of rules."

In the first three months after the launch of UPI in August 2016, transactions through UPI were approximately $11 million, with 26 banks using the platform. In the second quarter of 2020, transactions through UPI reached $83 billion, with 155 banks using the platform.[32] NPCI also launched several other platforms that were compatible with UPI.[33]

NPCI launched the UPI Chalega (loosely translated as "UPI is accepted here") campaign in early 2020 to increase widespread acceptance of UPI at merchant locations. In hindsight, the campaign turned out to be highly prescient—the benefit of cashless digital transactions was apparent during the COVID-19 pandemic, which called for social distancing.

With NPCI, individual banks, and other fintech players all creating innovative products, the challenge was now to achieve greater acceptance for these innovations. To extend the products' reach, NPCI put a substantial amount of time and effort into reaching every Indian. It offered its BHIM app in 17 languages and offered one for the visually impaired. Yet, around a quarter of the adult population was not fully able to read or write.[34] NPCI was actively working on the use of icons in its payment systems interface so that people lacking in literacy were able to interpret and make transaction choices, thereby helping to increase financial literacy.

The use of UPI and the products it supported grew tremendously, allowing NPCI to revolutionize India's payment systems. Asbe, NPCI's CEO, pointed out that UPI also stimulated India's economic growth. Sateesh Palagiri, head of mobility solutions for NPCI, remarked, "UPI brought about a paradigm shift. It acted as a stepping stone for a lot of fintechs and emerged as the first choice for a lot of global giants to venture into retail payments. When I look at the daily volumes today, I feel humbled at the enormity, magnitude and scale."

KEEPING THE INNOVATION CYCLE GOING

While its initial journey had been as a business-to-business firm, NPCI became a business-to-business-to-consumer firm with a large range of innovative products and solutions. How had NPCI been able to innovate and launch solution after solution in such a short period of time? When it came to developing novel solutions, both NPCI's extreme customer focus and active stakeholder participation had been instrumental. Kalawatia said, "There are 60 banks of various representations giving us inputs in the product development process . . . and the process involves reaching thousands of customers through the participating banks. This experience you cannot replicate in a research."

Anubhav Sharma, head of international business for partnership, business development, and marketing at NPCI International Payments Limited, a subsidiary of NPCI, and former head of UPI and the IMPS at NPCI, concurred. He added that such links to the member banks made all the difference:

> NPCI worked closely with member banks as stakeholders to align expectations, features and functionalities. It is aligned to the democratic philosophy of NPCI that the users of the product and platform have their say in building and shaping it. This not only helped NPCI build UPI as a platform of citizen scale, but also helped member banks remain in control of the innovation at the front-end driving consumer behavior and preferences.

When it came to implementing those innovative solutions, the unique organizational structure of NPCI offered important advantages. The primary customers of NPCI solutions were the banks, who were also the owners. As pointed out by Nalin Bansal, head of RuPay and the NFS, "Typically, the adoption [of new solutions] takes a lot of time . . . the fact that NPCI is owned by multiple banks made adoption easier."

To keep the innovation cycle going, NPCI identified several important areas that would need careful handling. First, NPCI needed to continuously upgrade and refresh its talent pool to keep up with new technologies. For instance, capabilities such as blockchain could be valuable one day, but the technology could take a different direction the next day, requiring NPCI to update its human resources accordingly. Second, NPCI would have to encourage a culture of risk-taking. Operating at the frontier of fintech, with disruptive solutions launched frequently, NPCI needed to look beyond the existing products and solutions and venture into the unknown. Thus, the firm made a deliberate decision to inculcate a culture of risk-taking, within acceptable limits. The third area was the acceptance of potential cannibalization due to innovation. With several highly successful products, NPCI had to decide between being protective of these products or engaging in its own Schumpeterian creative destruction.

In addition to the above, NPCI also benefited from innovation and stimulated this in others. For instance, it launched an accelerator program to encourage collaboration among solution developers in the broader community. This was essentially a web portal that allowed start-ups to connect with the application programming interfaces (API) of NPCI and other global API providers to develop solutions for the banking, financial services, and insurance industry.[35]

MAKING INDIA THE GOLD STANDARD FOR DIGITAL PAYMENTS

While NPCI was busy creating new innovations, the government moved ahead with its successful Digital India program. An influential committee set up by the RBI concluded that "India, with its uniquely rich payment ecosystem, is now emerging as a global leader in innovative population-scale payment systems."[36] NPCI had played an important role in this significant achievement for such a large emerging market as India.

To cement India's role as a global leader, the committee advised the RBI to grow digital payments even further by fine tuning the system domestically and by linking it up globally. The committee also advised the RBI on how to mitigate the risks associated with digital payments. With the launch of UPI and RuPay, NPCI managed an enormous amount of funds daily. Managing and operating these seamlessly without any glitch was NPCI's primary security and risk-management concern. The RuPay card, for instance, was launched in 2012, when there were 375 million credit and debit cards in use in India.[37] In 2019, that number reached 900 million, with 600 million cards being RuPay alone. NPCI had to ensure the systems were always available without downtime, interruptions, disruptions, or data loss.

Another concern was the cost of digital payments and how to keep them as low as possible for consumers. The committee made various recommendations, including stimulating interoperability and allowing more competition for UPI, something that was also being discussed in the Indian media.[38] It suggested leaving the so-called merchant discount rate—a significant source of income for NPCI—to market forces. While in some quarters NPCI was seen as a monopoly, Rai clarified that "each product that we created competes with one or the other." The RBI was trying to find the right balance between market forces, common infrastructure, and

interoperability. The opening up of the market could have implications on the collaborative structure of NPCI, enticing some of the member banks to break away from NPCI and create separate interoperability systems.

Finally, besides fine tuning domestic digital payments, the committee strongly recommended NPCI to go global. This involved enhancing the BHIM UPI to allow for currency conversion and overseas remittances, with connections to global payment systems. Moving beyond India was a new thrust for NPCI, adding to its already busy set of priorities ahead. As Asbe said:

> Having created a strong infrastructure for digital payments in India, NPCI is all geared-up to foray into international markets. With a successful pilot launch of RuPay and UPI in Singapore, we wish to realize our ambition and redefine the payment system internationally. It is our vision to be the best payments network globally.

Other countries were already paying attention. UPI had the potential to move beyond India and become a public good for the world, supporting other countries in building real-time payment systems. In fact, *The Economist* reported in 2020 that Google LLC had written to the US Federal Reserve, asking it to endorse a similar model for America.[39]

WHAT NEXT: REMAINING FIT FOR PURPOSE

An extraordinary combination of tech innovation and national pride had led NPCI to become a large and successful organization. Looking back, several factors could account for NPCI's unprecedented growth beyond its own innovations. Asbe stressed the important role of the Indian government and the RBI in NPCI's growth as well as the nurturing of the top banks in India, especially in the initial years. The government's innovation policies, such as the JAM trinity, had accelerated demand for digitalization in India while the RBI's forward-looking guidance and regulations allowed for a common digital payment ecosystem to flourish. Collaboration among the top banks had been instrumental in making it possible for NPCI to roll out its innovations quickly.

After years of stellar growth and innovation, NPCI was now at a critical juncture. While the emergence of various non-banking financial technology services was creating new competitive challenges for NPCI, it was also facing ambitious government targets and pressure by the government to decrease costs to consumers—while also being expected to step up to the global stage.

NPCI's rise had also been driven by its unique not-for-profit co-opetitive organizational structure, with major incumbent banks as shareholders and the RBI as the change agent. The history of Visa or Mastercard, however, suggested that transforming from a not-for-profit co-operative to a private independent firm with a profit objective could potentially allow a firm the kind of flexibility needed to sustain the rate of innovation while stepping into a global role. With the changing competitive landscape, it was an open question as to whether the current structure of NPCI would remain optimal. No matter what form NPCI took, Asbe was confident that its future would be bright and digital, saying, "With the privilege of having sharp minds and robust infrastructure at NPCI, we aim to maintain our leadership in driving changes in the ecosystem. NPCI embarked on a journey of digital revolution. With the support of our stakeholders, we are looking forward to witnessing 'Digital India' soon."

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EXHIBIT 1: PROPORTION OF ADULTS OWNING A TRANSACTION ACCOUNT (%)

	2014	2017
India	35	80
Developing Countries	42	54
South Asia	33	46
East Asia and Pacific	55	68
Latin America and Caribbean	39	52
Sub-Saharan Africa	24	34
Middle East and North Africa	20	32
Central and East Europe	45	60
China	64	80
Indonesia	20	49
Brazil	56	70
Russia	48	76
Pakistan	10	21
Bangladesh	40	50
South Africa	54	69
Sri Lanka	69	74

Source: "Global Financial Inclusion (Global Findex) Database," The World Bank, updated October 15, 2018, accessed April 15, 2020, https://datacatalog.worldbank.org/dataset/global-financial-inclusion-global-findex-database.

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[13] A co-opetitive entity was an alliance among competitors for efficiency gains in operations costs or in expanding the markets wherein the owners competed for market share.

[14] David S. Evans and Richard L. Schmalensee, *Paying with Plastic: The Digital Revolution in Buying and Borrowing*, 2nd ed. (Cambridge, MA: MIT Press, 2005).

[15] The 10 promoter banks for NPCI were as follows: in the public sector, State Bank of India, Punjab National Bank, Canara Bank, Bank of Baroda, Union Bank of India, and Bank of India; in the private sector, ICICI Bank and HDFC Bank; and, multinational banks, Citibank NA and HSBC Bank.

[16] National Payments Corporation of India (website), accessed April 15, 2020, https://npci.org.in.

[17] "NFS Product Overview," National Payments Corporation of India, accessed April 15, 2020, https://www.npci.org.in/product-overview/national-financial-switch-product-overview.

[18] "Frequently Asked Questions: Electronic Clearing Services," Reserve Bank of India, October 21, 2015, accessed April 15, 2020, https://m.rbi.org.in/Scripts/FAQView.aspx?Id=55.

[19] "NACH Product Statistics," National Payments Corporation of India, accessed October 19, 2020, https://www.npci.org.in/product-statistics/nach-analytics-20-21-mtd; All dollar amounts are in US dollars; conversion from Indian Rupee to US dollar was done using exchange rates for corresponding periods published by International Monetary Fund, accessed April 27, 2020, https://data.imf.org.

[20] "IMPS Product Overview," National Payments Corporation of India, accessed: April 15, 2020, https://www.npci.org.in/product-overview/imps-product-overview.

[21] "Global Financial Inclusion (Global Findex) Database," The World Bank, accessed April 15, 2020, https://datacatalog.worldbank.org/dataset/global-financial-inclusion-global-findex-database.

[22] By early 2012, more than 500 million people in India subscribed to cellular services; "Global Database," CEIC, accessed April 14, 2021, https://info.ceicdata.com/en-products-global-database.

[23] Unique Identification Authority of India, *Annual Report 2017-18*, 15–17, 2018, accessed March 23, 2021, https://uidai.gov.in/images/Annual-Report-ENG-2017-18-Final-18072019.pdf.

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[25] Priyanka Pani, "RuPay Makes a Quantum Leap in 4 Years," *Hindu BusinessLine,* May 17, 2019, accessed April 13, 2020, https://www.thehindubusinessline.com/money-and-banking/rupay-makes-a-quantum-leap-in-4-years/article27164842.ece.

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[27] Ibid.

[28] "Global Financial Inclusion (Global Findex) Database," op. cit.

[29] "Milestone," National Payments Corporation of India, accessed April 15, 2020, https://www.npci.org.in/milestone.

[30] Ibid.

[31] Ibid.

[32] "UPI Product Statistics," National Payments Corporation of India, accessed: April 15, 2020, https://www.npci.org.in/product-statistics/upi-product-statistics.

[33] These included (a) Bharat BillPay, which allowed households to pay all their utility bills from one single app; (b) BharatQR, which allowed merchants to receive payments from any other platform using one QR code; and national electronic toll collection, which allowed automatic highway toll payments.

[34] UNESCO Institute for Statistics, "Literacy Rate, Adult Total (% of People Ages 15 and Above) – India," The World Bank, September 2020, accessed April 27, 2020, https://data.worldbank.org/indicator/SE.ADT.LITR.ZS?locations=IN.
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[36] Reserve Bank of India, *Report of the High Level Committee on Deepening of Digital Payments*, 11, May 2019, accessed October 22, 2020, https://m.rbi.org.in/Scripts/PublicationReportDetails.aspx?UrlPage=&ID=922.
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[38] "E-pay Platform NPCI to Face Competition," *Economic Times*, February 12, 2020, accessed March 24, 2021, https://economictimes.indiatimes.com/small-biz/startups/newsbuzz/e-pay-platform-npci-to-face-competition/articleshow/74094142.cms.
[39] "In Bleak Times for the Banks, India's Digital Payments System Wins Praise," *The Economist*, May 9, 2020, accessed December 31, 2020, https://www.economist.com/finance-and-economics/2020/05/09/in-bleak-times-for-banks-indias-digital-payments-system-wins-praise.