How digital payments drive financial inclusion in India

GLOBAL FINTECH FEST

MSC MicroSave Consulting

NPCI भारतीय राष्ट्रीय भुगतान निगम NATIONAL PAYMENTS CORPORATION OF INDIA

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I. Foreword

India has been at the forefront of bringing the paradigm shift in the global digital payment landscape. The past five years have seen a massive transformation with UPI hitting record high numbers, AePS transforming the access of subsidies to beneficiaries, merchants conducting digital B2B payments, and FinTechs disrupting the space with unique solutions.

This digital revolution is led by concerted efforts from the ecosystem including the government, regulators, financial service providers, and FinTechs. These efforts can be seen through the launch of *Pradhan Mantri Jan Dhan Yojana* (PMJDY), *Aadhaar*, the India Stack, differentiated banks-small finance banks and payment banks, and improvements in payments infrastructure. National Payments Corporation of India (NPCI) has been at the center of this remarkable journey and has made significant efforts to build an open and secure digital ecosystem, leading to a paradigm shift in delivering digital payment solutions to the masses. We have enabled the public and private sectors to drive innovation, improve the delivery of services, and bring a user-centric experience to a range of digital payment services.

We are observing a shift in consumer sentiment leading to the wide-scale adoption of digital payments across the country. Increased smartphone penetration, a rise in internet connectivity, a higher number of bank accounts (through PMJDY), the introduction of feature phone-based payments, and other changes are going to create a synergistic value proposition to ensure the inclusivity of the larger population in the digital revolution.

This whitepaper has been developed in partnership with MicroSave Consulting (MSC) to showcase the role of digital payments in driving financial inclusion in India. The whitepaper highlights that India's payment systems are dependable, durable, and continue to command a high level of confidence from the mass market. This document provides evidence-backed insights on the evolution of digital payments in India and the different barriers and triggers in the current state of play for providers and users. It also covers critical use cases that can lead the trajectory of the change towards digital payments for the mass market and the collaboration needed from the different stakeholders. We hope you will find it relevant and meaningful. Please connect with us for further conversations and insights on how we can deepen India's digital footprint.

Mr. Rajeeth Pillai

Chief Relationship Management and Marketing

National Payments Corporation of India

II. Executive summary

Digital payments in India have grown phenomenally over the past decade. The COVID-19 pandemic bolstered this further and introduced several first-time users to digital financial services in the past two years. The shift to a "new normal" presents significant opportunities for institutions to make digital payments more accessible and affordable for the ~1 billion people who comprise the country's low- and middle-income segments.

This report highlights the growth story of digital payments in the country and the way forward. We look at the journey of digital payments in India, major events and entities that contributed to India's digital journey, and the products that revolutionized the digital payments space and their performance to date. We also identify existing barriers to the digital payments sector against RBI's envisioned growth and analyze the future of digital financial inclusion through payments for the LMI segment in India.

Several factors have transformed India's payments ecosystem. These include improvements in payments infrastructure, disruptions in information and communications technology, a responsive regulatory framework, a conducive policy environment, and a greater focus on customer-centricity. Besides, the increased adoption of smartphones, greater access to the internet, people's growing comfort with using technology, and improved financial capabilities have also aided this growth.

The COVID-19 pandemic has accelerated a series of concerted efforts from various stakeholders to drive the adoption of digital payments in India in the past two years. These include the launch of the *Pradhan Mantri Jan Dhan Yojna* (PMJDY), *Aadhaar*, the India Stack, the launch of differentiated banks, and the demonetization of high-value currency.

NPCI remains at the core of retail payments in the country. Its efforts to build an open and secure digital infrastructure have transformed how digital payment solutions are delivered to the masses. Products, such as Unified Payments Interface (UPI), *Aadhaar*-enabled Payment Systems (AePS), BHIM *Aadhaar* Pay (BAP), Bharat Bill Payment System (BBPS), RuPay debit, and credit card, among others, have furthered India's journey of digital payments and extended it to the LMI segments. These products have contributed significantly to bridging the divide between the LMI segments and digital payments.

UPI drives India's day-to-day digital payments, with around 300 million active users and more than 3.83 billion average monthly transactions in FY 2021-22. It has emerged as one of the safest and most preferred modes of

online and offline purchases (through QR codes). Since its launch in 2016, UPI has seen an exponential CAGR of 270% by volume until FY 2021–22. Third-party apps, such as PhonePe, Google Pay, and Paytm continue to drive UPI's growth through their person-to-person (P2P) and person-to-merchant (P2M) transactions.

With ~357 million average monthly transactions in FY 2021-22, AePS has boosted in-cash DBT across rural India. It is especially popular among those who lack smartphones and seek assisted access to services. AePS transactions have proliferated at a CAGR of 34% by volume in the past five years. It emerged as a critical cash-out medium during the COVID-19 pandemic for migrants, daily wagers, and other workers in the informal sector, including their families living in rural areas. Transactions grew considerably to support cash withdrawals that resulted from domestic remittances and governments' emergency cash transfer programs, with an average transaction size of INR 757 for FY 2021-22.

BAP, the merchant version of AePS, has been instrumental in driving cashless purchases in a scalable manner at merchant outlets across rural and semi-urban areas. BAP transactions grew at a CAGR of 70% by volume over the past five years. The push from acquiring banks has significantly driven merchants and consumers to adopt BAP initially.

BBPS is consolidating India's recurring bill payments industry under one payment system. It provides customers the convenience of making round-the-clock bill payments to multiple billers from a single platform. Transactions have grown significantly at a CAGR of 73% by volume over the past four years, which indicates a rise in customer preference for using BBPS for bill payments.

By integrating recurring payments, BBPS has added ~20,454 unique billers across 19 additional categories over utility bills and airtime top-ups, such as education fees, loan repayments, insurance, booking of cooking gas, municipality taxes, and subscription fees. In January 2022, BBPS launched the Unified Presentment Management System (UPMS), further easing the process of bill payments for customers. It will automatically fetch bills from billers and enable customers to set up standing instructions on their recurring bill payments for auto-debit across all channels and modes of digital payments.

RuPay, India's homegrown card payment network, offers the value proposition of low processing fees and wide acceptance at ATMs, PoS devices, and e-commerce across India. The market share of the RuPay debit card in total debit cards issued increased from 17% in 2017 to 60% in 2020, buoyed primarily by the issuance of RuPay debit cards to PMJDY beneficiaries.

RuPay transactions, including PoS and e-commerce, have grown at a CAGR of 17% by volume over the past five years. Merchant payments-both offline and online purchases-remain a major use-case for consumers. While RuPay debit cards command 60% of the Indian market, RuPay's average transaction value is half the other debit cards. In general, several factors limit the uptake of debit and credit cards in India, including low active usage, limited use-cases, and poor acceptance infrastructure in rural areas. The effect of such factors reflects on RuPay cards as well, along with other card platforms.

Merchants in India incur a charge of up to 0.9% per transaction on debit and credit cards as the merchant discount rate (MDR). Yet, RuPay card transactions are under a zero-merchant discount rate (MDR) mandate. Transactions using RuPay cards, therefore, can potentially find widespread acceptance among merchants

in India than international card platforms, such as Visa and MasterCard. In such a case, the MDR charge is capped at a maximum of INR 1,000 (~USD 12.6).

The RBI's payments vision documents have guided the planned development and modernization of India's payment systems through the four strategic pillars of responsive regulation, robust infrastructure, effective supervision, and customer-centricity. The Payment Systems Vision 2025 builds upon the initiatives of Payments Vision 2019-21. It covers 47 specific initiatives and 10 expected outcomes to enhance customer experience, empower payment system operators and service providers, enable the ecosystem and infrastructure, and implement a forward-looking regulation. RBI focuses on the 4Es-"E-payment for Everyone, Everywhere, Every time" to provide all users with safe, secure, fast, convenient, accessible, and affordable digital payment options.

Despite an evolving payments landscape and responsive regulatory initiatives, different barriers continue to inhibit the adoption and usage of digital payments in India.

- **Customer-level barriers:** Indicate various behavioral and structural barriers faced by customers that inhibit their adoption of digital payments
- **Provider-level barriers:** Indicate the lack of customer-centric solutions for low- and middle-income (LMI) people in the country to adopt digital payments
- **Ecosystem-level barriers:** Indicate gaps in the acceptance infrastructure and the readiness of frontend and backend systems to enable digital payments

With the COVID-19 pandemic pushing us into a "new normal," the current trajectory suggests a radical shift in how Indians will use digital payments. The new normal presents significant opportunities for service providers to make digital payments meaningful in the daily lives of users. However, the different stakeholders in the ecosystem need to work together to empower users with an exceptionally safe and secure digital payment experience.

Targeted interventions with customized use cases across P2B, P2G, P2P, and B2P channels through digital payment solutions, can help address the specific financial needs of the unserved and underserved LMI customer segments. Stakeholders have a considerable upside potential to digitize payments across these four channels. Promising examples include the digitization of domestic remittances, house rental payments, cash on delivery (CoD) payments in the e-commerce sector, offline merchant payments, repayment of microfinance loans, recurring payments in agriculture and allied value chains, utility bill payments, and transactions in the public transit system.

	Person	Business	Government
Person	**P2P use-cases:** 1) Domestic remittances **Market size: INR 700 mn (USD 9.45 bn)** 2) House rental payments **Market size: 21.72 mn households** Percentage of digital payments across P2P use-cases: **<10%**	**B2P use-cases:** agri payments (FPOs and cooperatives), salaries **Market size: INR 3 bn (USD 40 mn)** transactions annually Percentage of digital payments across B2P use-cases: **20-25%**	
Business	**P2B use-cases:** 1) Online and offline merchant payments **Market size: INR 4.25 tn (USD 56 bn)** 2) MFI loan repayments **Market size: 5.8 bn** repayments Percentage of digital payments across P2B use-cases: **15-20%**	These are large value transactions dealing with institutions and government. In most cases, they are already digitized and are well served by financial players.	
Government	**P2G use-cases:** 1) Utility bill payments **Market size: 680 bn bills annually** 2) Public transit system payments **Market size: 32 bn trips** Percentage of digital payments across P2G use-cases: **10-12%**		

Examples of retail payment use cases which are currently underserved and can be impacted

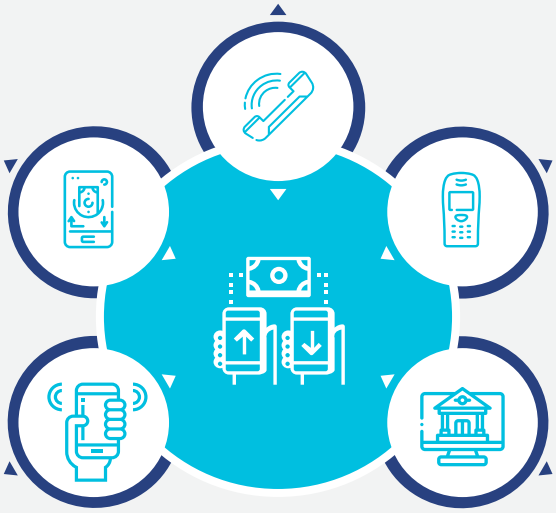
Digital payments in India are no longer an urban phenomenon. Players in the ecosystem increasingly agree that the next set of low-income users will drive the future growth of digital payments in the country. While the road to scaling up the digital solutions is long, here are a few promising solutions that could shape the adoption and usage of digital payments by 2025:

Voice-based payments

Using voice recognition technology to improve access and usage of financial services for the un(der)served segments such as illiterate and oral population

Contactless payments

Using Contactless payments to promote quicker, easier, and safer mode of payments



Offline payments

Using offline payments to improve access and usage of financial services in areas where internet connectivity is low or for people using feature phones

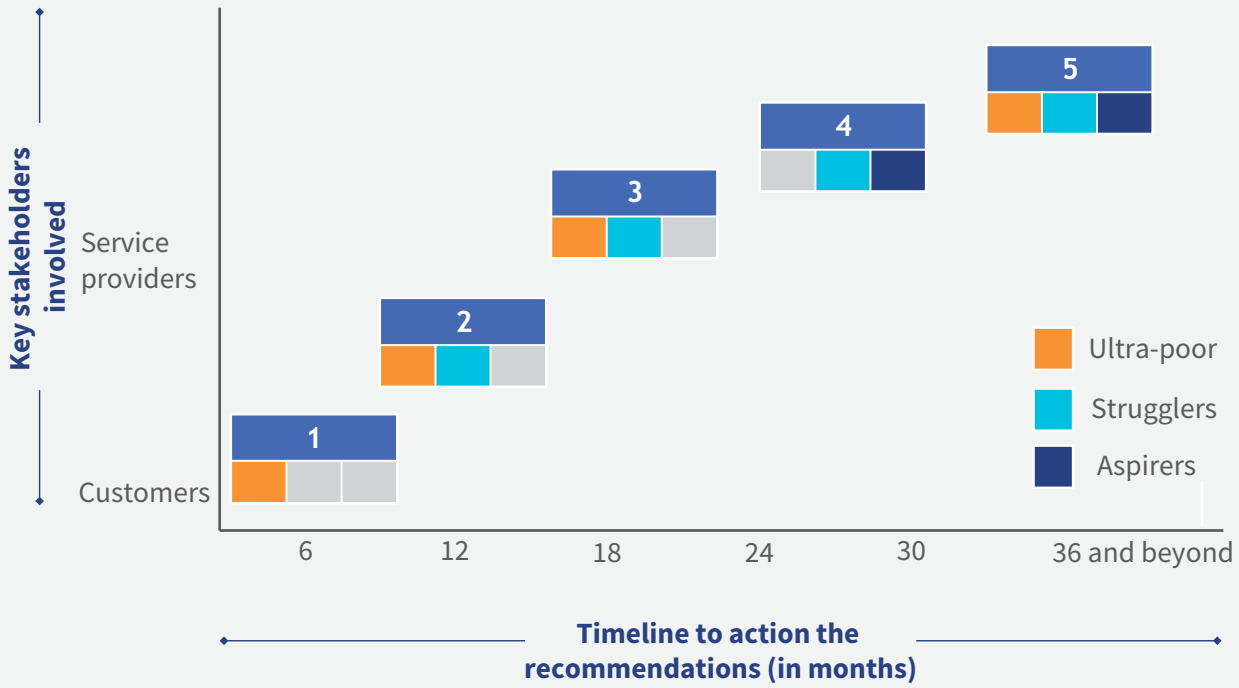
Frictionless payments

Using frictionless payment as a means to enhance customer ease and convenience

Analytics-based solutions

Using data analytics and AI to design and offer value-added solutions to consumers (customers and merchants)

India's evolving digital payments landscape suggests the time is ripe for players in the ecosystem to make concerted efforts and build secure, safe, and interoperable digital platforms as plug-and-play applications. These efforts must align with the preferences and requirements of different customer segments in the country. Based on current trends, here is a roadmap of interventions providers can take to mitigate the barriers and further drive the mass market's adoption of digital payments.



Recommendations

1. Create awareness and develop the right value proposition for using digital payments
2. Create a positive experience for users
3. Create capability and trust in digital payments
4. Improve the acceptance infrastructure for digital payments
5. Enhance collaboration with ecosystem players to drive innovation

Ultra-poor:
Daily household income <USD 2

Strugglers:
Daily household income-USD 2 to USD 4.5

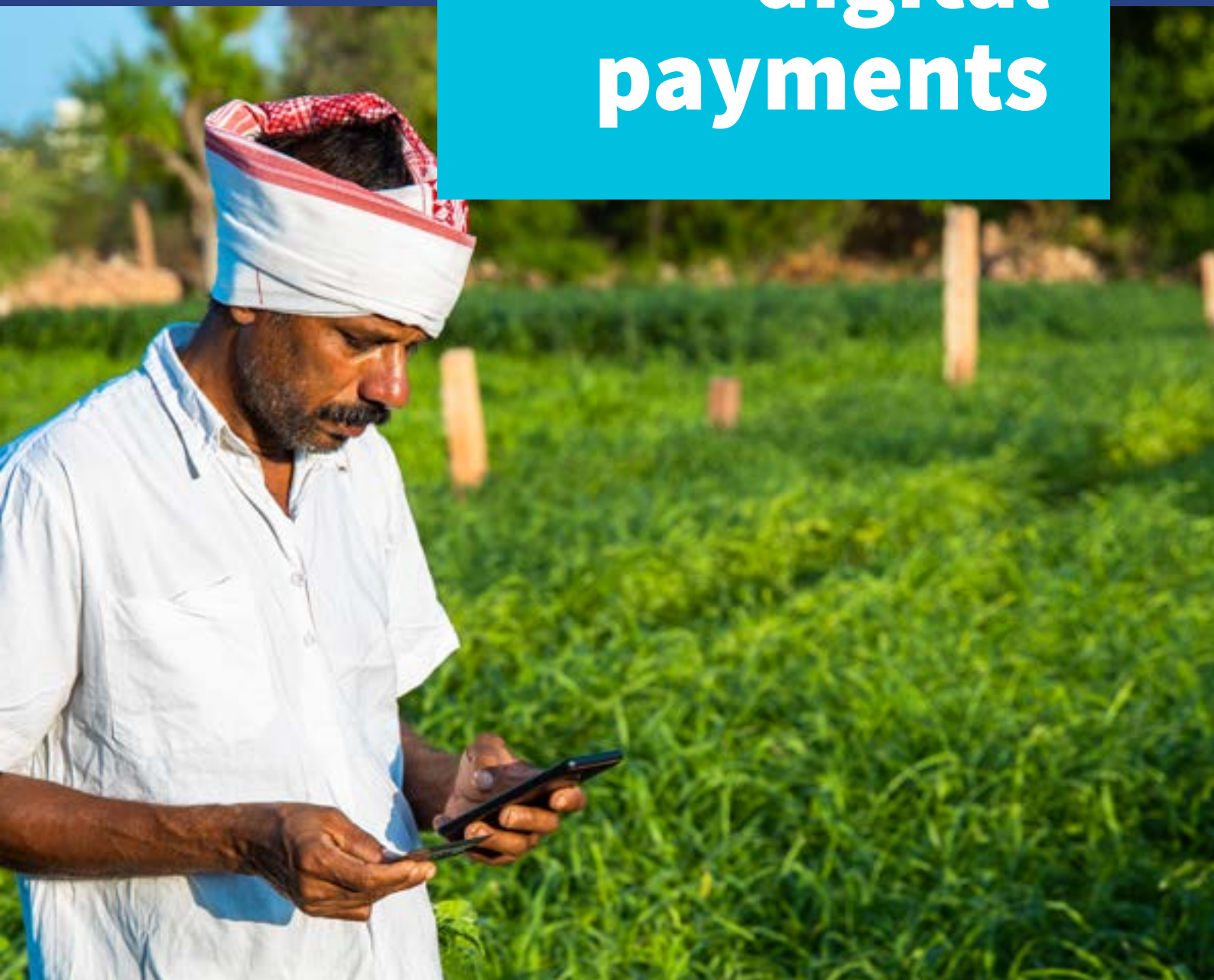
Aspirers:
Daily household income-USD 4.5 to USD 10

The figure above highlights the different LMI segments that will benefit from the proposed interventions. These recommendations are laid out at intervals starting from six months to 30 months and beyond, depending on the level of effort required by the stakeholders to implement them.

The "Ultra-poor" segment currently lacks awareness of digital payments and does not trust it, compared to "Strugglers" and "Aspirers." The segment also lacks a strong use case for switching to digital payments. Hence, the first two interventions will significantly improve the segment's adoption of digital payments. Interventions 3 and 4 will create the maximum impact on "Strugglers" and "Aspirers" as they already have some (but limited) experience with digital payments. These interventions can amplify their usage further. Finally, driving innovation through collaborations will create an equal impact on all three segments. It can open new doors for these segments to try, adopt, and use various modes of digital payments.

Section 1:

India's journey of digital payments



1.1 Evolution of digital payments

India's digital payments landscape has expanded rapidly at a CAGR of 38% by volume and 7.5% by value in the past five years (2017-18[1] to 2021-22[2]). The burgeoning growth happened due to multiple factors, such as enhancements in the payments infrastructure, developments in information and communications technology, and the introduction of a responsive regulatory framework, among others.

Further, new and innovative payment solutions have emerged from a combination of factors, such as the increased adoption of smartphones, greater access to the internet, growing comfort with using technology, and improved financial capabilities. These solutions capitalize on India's demographic dividend and allow consumers to fulfill their basic financial needs-"receive, spend, store, invest, and protect."

Concerted efforts from various stakeholders, including the government, regulators, and financial service providers, have helped pave the path to India's digital highways. Initiatives, such as the PMJDY and the Direct Benefit Transfer (DBT) mission, have created a base for universal access to accounts and their subsequent usage. This furthered financial inclusion in the country. The "Digital India Campaign" has furthered the government's vision to transform the country into a digitally empowered nation. Innovations, such as *Aadhaar* and the India Stack, coupled with licensing of differentiated banks, have helped service providers offer seamless digital payment experiences to their users at much lower costs.

Moreover, policy and regulatory initiatives, such as the waiver of MDR charges, creation of a regulatory sandbox, facilitation of small-value digital payments in offline mode, and internationalization of domestic payment systems, show the regulatory intent to further financial inclusion through digital pathways.

Among these initiatives, NPCI's efforts to build an open and secure digital ecosystem have led to a paradigm shift in delivering digital payment solutions to the masses. Since its inception, NPCI has focused on creating a shared digital infrastructure, enabling interoperability, and building safeguards within digital platforms. It has empowered the public and private sectors to drive innovation, improve service delivery, and offer a user-centric experience for various digital payment services. Products, such as UPI, AePS, BAP, Bharat QR, BBPS, and RuPay credit and debit cards, have provided a seamless payment experience for individuals, businesses, and governments.

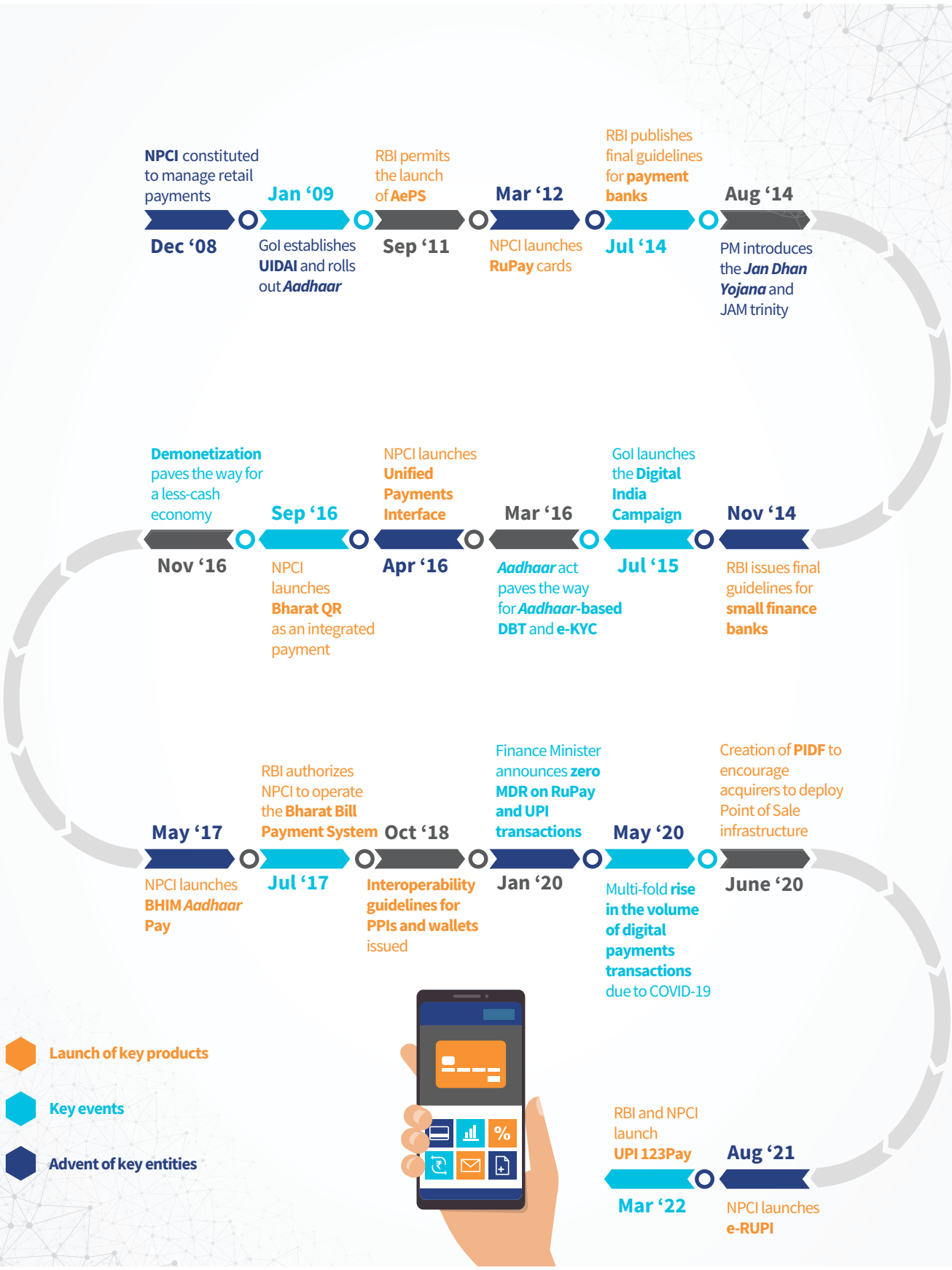
Besides, unprecedented events, such as the government's decision to demonetize high-value currency in 2016 and the COVID-19 pandemic, furthered India's journey of digital payments by spurring a behavioral shift among the masses toward digital payments.

Figure 1 summarizes critical milestones that accelerated India's digital payments journey since 2008. It highlights a series of concerted efforts from various stakeholders, especially NPCI, to drive innovation, improve the delivery of services, and bring a user-centric experience for a range of digital payments services. Please see Annex 4.1 for a comprehensive understanding of the various events and entities that accelerated India's shift to digital payments.

[1] Reserve Bank of India. "Payment System Indicators - Annual Turnover." RBI.org.in. August 25, 2011. Accessed June 23, 2022. https://www.rbi.org.in/scripts/AnnualReportPublications.aspx?Id=1006.

[2] Reserve Bank of India. "Payment and Settlement Systems and Information Technology." RBI.org.in. May 27, 2021. Accessed June 23, 2022. https://www.rbi.org.in/scripts/AnnualReportPublications.aspx?Id=1351

Figure 1: Major milestones that accentuated India's digital payments journey

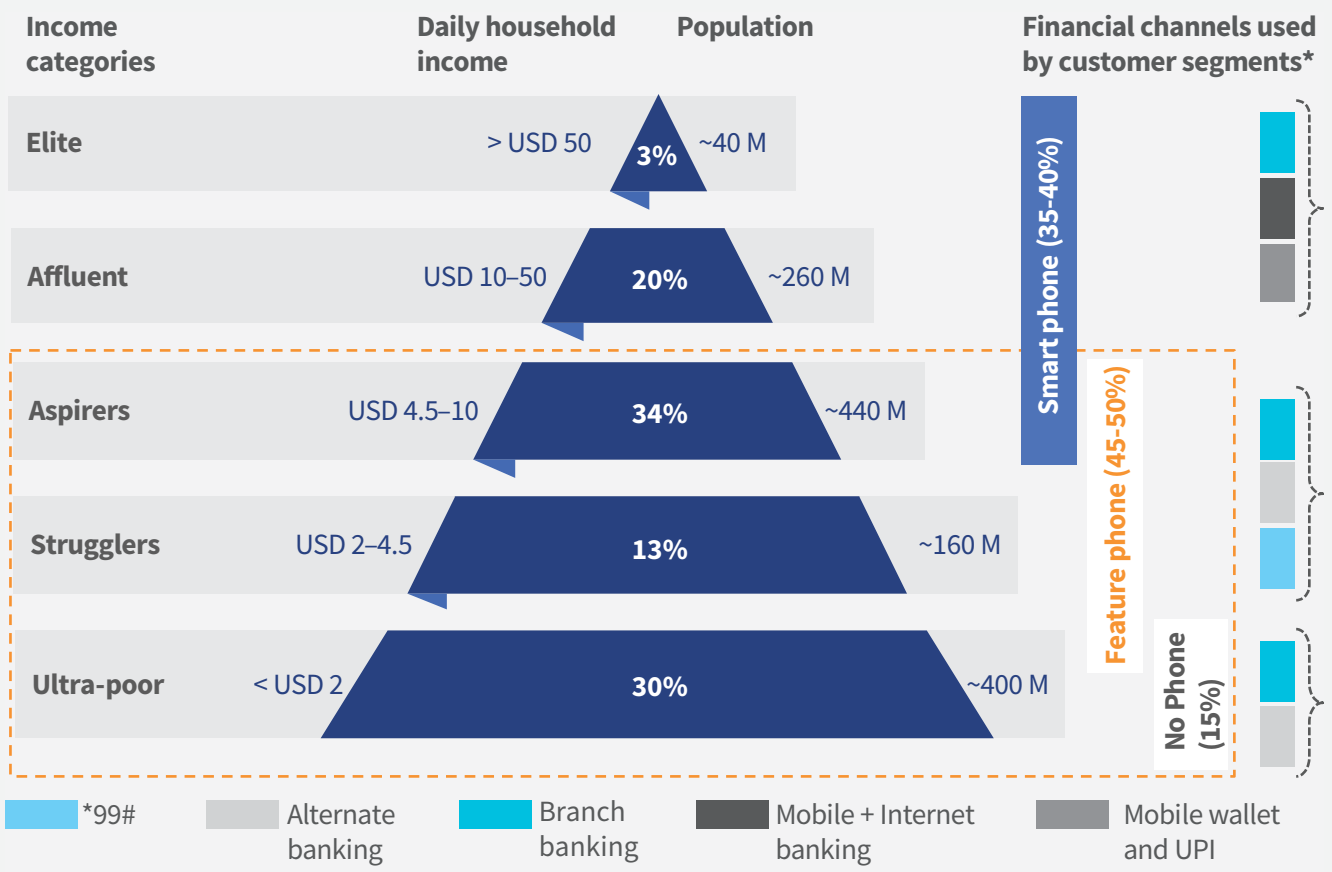


1.2 Products revolutionizing the digital payments space

1.2.1 Need for a product-market fit

An MSC study[3] from 2018 highlights that India's population can be divided into five segments based on their daily household income (as shown in figure 2).

Figure 2: Segmentation based on the household income and financial channels used



The study reveals that the top of the pyramid segments comprises the elite and the affluent. They are financially well-served, possess a smartphone, and enjoy access to multiple financial products and channels.

The bottom-three segments comprise the low-and middle-income (LMI) segment and constitute around 1 billion people. People in the LMI segment typically only possess a feature phone or lack a phone, reside in areas with limited or no data connectivity, and rely on either the bank branches or BC agents to access various financial products and services.

[3] Gupta, Anil, et. al. "FinTech Study to Model Financial Inclusion Lab." Microsave.net. August, 2018. Accessed on June 23, 2022. https://www.microsave.net/wp-content/uploads/2018/10/Fintech_Study_to_Model_a_Financial_Inclusion_Lab.pdf

The adoption of smartphones among the LMI community is low, and its usage is limited to accessing social media platforms and messaging apps. Due to the variation in their knowledge, skills, and capabilities, the LMI segment requires easy access to customized products and services that they can understand easily, use intuitively, and adopt quickly.

The matrix below maps existing financial products to different customer segments based on their needs and preferences, digital and financial capabilities, and ease of access.

Figure 3: Mapping various digital payment products with the customer segments

Customer segments	Digital payment products						
	Credit cards*	Debit cards*	Mobile wallets	UPI	RuPay cards	AePS	BAP
Elite	✓	✓	✓	✓			
Affluent	✓	✓	✓	✓			
Aspirers	✓	✓	✓	✓	✓	✓	✓
Strugglers					✓	✓	✓
Ultra-poor					✓	✓	✓

*Other than RuPay cards

Please see Annex 4.2 for a detailed understanding of the classification of customer segments in India.

1.2.2 Digital payment products for the mass market

We highlight six products that have revolutionized the digital payments space and contributed immensely to fulfilling the person-to-person and person-to-business payment-related needs of LMI customer segments -especially during the pandemic. We have arranged these products into three categories: *Aadhaar*-based payments (AePS and BAP), contactless payments (UPI and BBPS), and card-based payments (RuPay debit card. Here we have only considered RuPay debit cards for our analysis since their uptake is significantly higher among LMI customers than RuPay credit cards.

1.2.2.1 *Aadhaar*-based payments

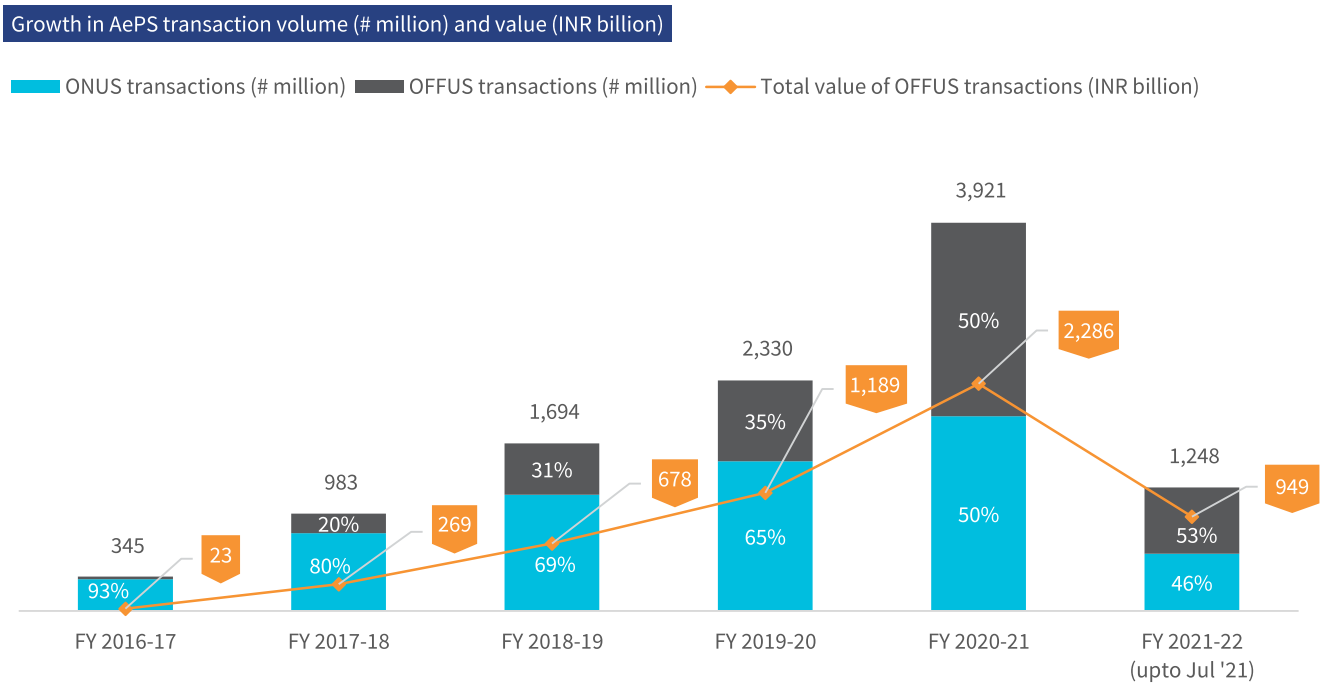
Aadhaar-enabled Payment Systems (AePS)

AePS is a bank-led model that uses *Aadhaar*-based authentication to allow interoperable online transactions in *Aadhaar*-linked bank accounts at a micro-ATM or Kiosk. A user can avail of basic banking services through a simple three-step process of entering an *Aadhaar* number, selecting the *Aadhaar*-linked bank's name, and authenticating the transaction via biometrics at any of the 3.26 million[4] BC agent outlets.

[4] Reserve Bank of India. "RBI Annual Report 2020-2021." rbidocs.rbi.org.in. August 21, 2020. Accessed on June 23, 2022. https://www.rbi.org.in/Scripts/AnnualReportPublications.aspx?Id=1346

AePS dominates rural geographies, riding on cash-in and cash-out (CICO) networks from bank accounts and domestic remittances. It is especially popular among those who lack smartphones and need assistance to access the services. The massive direct benefit transfers to PMJDY accounts have brought AePS into prominence. One out of every six Indians[5] has utilized the facility of doorstep banking through AePS. Presently, 138 live members[6] comprising banks and non-bank entities are live on the AePS platform and provide banking services to more than ~66 million[7] customers.

Figure 4: Growth in AePS transactions in terms of volume and value



AePS transactions have snowballed at a CAGR of 34% by volume and 62% by value over the past five years. During FY 2020-21, AePS emerged as a critical cash-out medium for migrants, daily wagers, and other workers in the informal sector during the pandemic, and its growth remained constant in FY 2021-22 as well with high customer preference in rural markets due to the convenience offered through the product.

AePS has boosted in-cash DBT through agent networks across rural India, with an average of about 357 million* monthly transactions in FY 2021-22. Several payment banks, such as India Post Payment Bank, have become key players in leading AePS transactions in rural markets with their extensive distribution network.

However, recurring transaction failures (especially for OFFUS) and the non-uniform customer experience at BC agent outlets due to these failures arising continue to restrict uptake among the 400 million ultra-poor at the bottom of the pyramid.

* Reserve Bank of India. "Payment and Settlement Systems and Information Technology." RBI.org.in. May 27, 2021. Accessed June 23, 2022. https://www.rbi.org.in/scripts/AnnualReportPublications.aspx?Id=1351

5 National Payments Corporation of India. "AePS 20-21 Product Statistics." NPCI.org.in. Accessed June 23, 2022. https://www.npci.org.in/what-we-do/aeps/product-statistics/2021-22

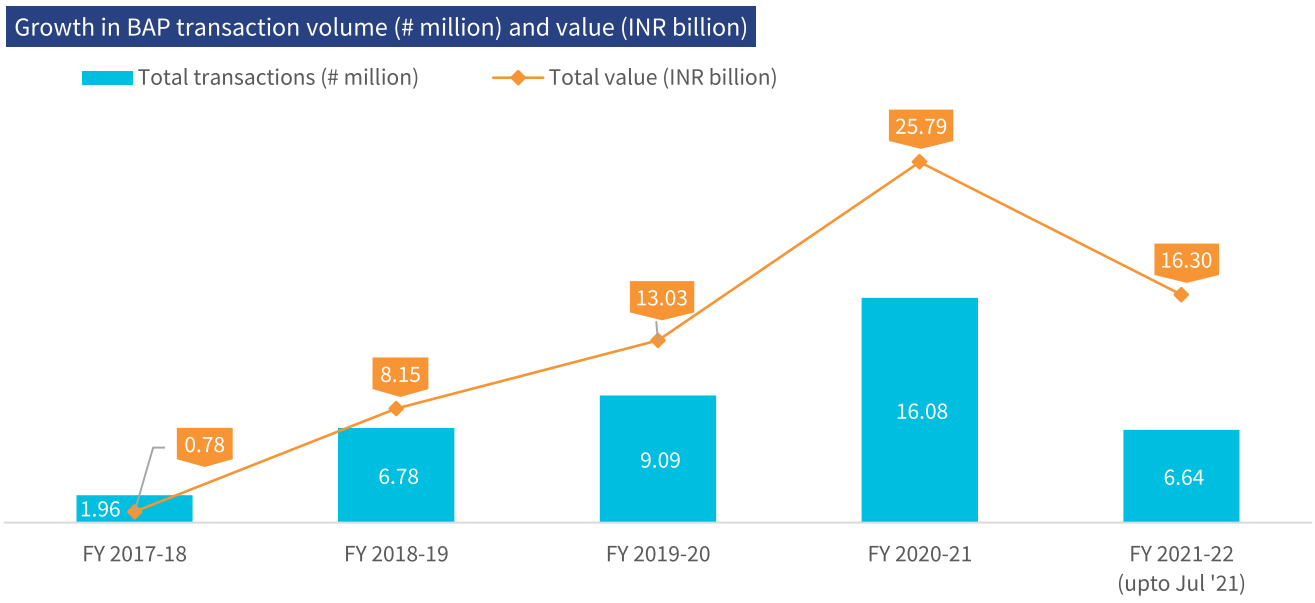
6 National Payments Corporation of India. "AePS Live Members." NPCI.org.in. Accessed June 23, 2022. https://www.npci.org.in/what-we-do/aeps/live-members

NPCI plans to resolve these challenges by using a more accurate authentication mode through iris and face recognition and ensuring a uniform service experience at BC agent points and merchant outlets.

BHIM *Aadhaar* Pay (BAP)

BHIM *Aadhaar* Pay, the merchant version of AePS, enables merchants to receive digital payments from customers through *Aadhaar* authentication. Since the transactions are initiated from the merchants' side using the customer's *Aadhaar* credentials, this mode eliminates the need for a smartphone for customers and the need for them to remember the PIN. As of May 2022, more than 6.17 million[7] PoS devices are deployed countrywide.

Figure 5: Growth in BAP transactions in terms of volume and value



BAP transactions have grown rapidly at a CAGR[8] of 70% by volume and 139% by value over the past five years. The average transaction value has steadily risen from INR 481 (~USD 6.5) in FY 2017-18 to INR 2,645 (~USD 35.75) in FY 2021-22, which indicates that people are increasingly using BAP for large ticket-size transactions.

[7] Digidhan. "RBI. "Payment system indicators" https://www.rbi.org.in/Scripts/PSIUserView.aspx?Id=12 Accessed JuneJuly 21, 2022.
[8] NPCI. "AePS product statistics." NPCI.org.in. Accessed June 23, 2022. https://www.npci.org.in/what-we-do/aeps/product-statistics

Restricted mobility and fear of contracting the virus reduced cash transactions for merchants and increased BAP's adoption during the pandemic. FY 2021-22 has seen a limited increase in the overall BAP transactions, with Q4 FY 2021-22 looking at a fall in the overall volume of transactions as UPI and cash remained key payment modes for merchant-based payments.

While a push from the acquiring banks and the cashback earned on transactions initially drove BAP's adoption in rural and semi-urban regions, it still lacks takers in urban geographies. A lukewarm push from banks, lack of evident customer demand, lengthy transaction process, non-compatibility of biometric scanners, and the initial CAPEX required for biometric devices continued to slow BAP's progress.

NPCI has been working toward reducing the TAT for BAP transactions and creating additional use -cases by onboarding partners, such as MFIs to facilitate the collection of loan repayments.

1.2.2.2 Contactless payments

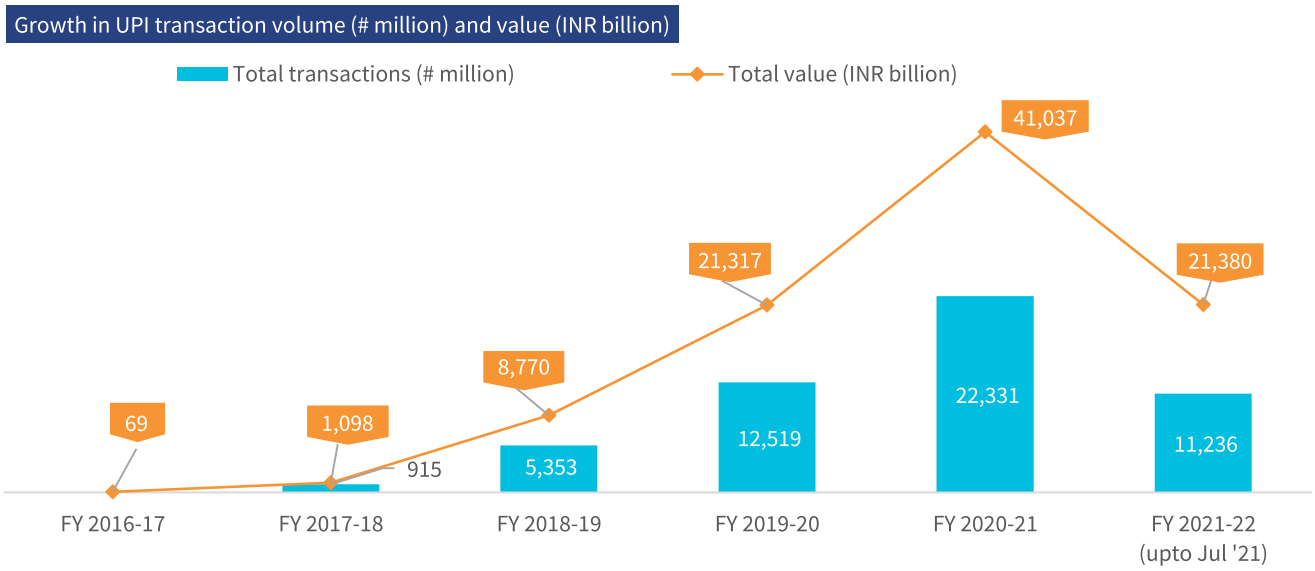
Unified Payments Interface (UPI)

NPCI introduced UPI as a real-time interbank payment system that integrates multiple bank accounts into a single mobile application of any participating bank. It has enabled a seamless payment experience for individuals, businesses, and the government by allowing payment service providers to innovate on top of the existing technology infrastructure to build user-centric applications.

UPI drives India's day-to-day digital payments, with more than 300 million active users and 3.83 billion[9] in average monthly transactions. It has become one of the safest and most preferred modes for P2P and P2M transfers. P2P payments account for about 57% of UPI transactions, while P2M payments account for the remaining 43%[10]. In 2022, NPCI launched UPI123Pay, allowing feature phone users to use the UPI platform. The launch of UPI123Pay points toward the further adoption of digital transactions in the countryside, where most citizens still do not own smartphones.

[9] NPCI. "UPI product statistics." NPCI.org.in. Accessed June 23 2022. https://www.npci.org.in/what-we-do/upi/product-statistics.
[10] NPCI. "UPI P2P and P2M transactions." NPCI.org.in. Accessed June 23, 2022. https://www.npci.org.in/what-we-do/upi/upi-ecosystem-statistics.

Figure 6: Growth in UPI transaction volume and value



UPI transactions grew at a CAGR[11] of 119% and 138% by volume and value in the past five years, from FY 2017-18 to FY 2021-22. P2P and P2M transactions through third-party apps (PhonePe, Google Pay, and Paytm) have driven this significant growth. PhonePe and Google Pay continue to command more than 80%[12] of the market.

Several initiatives contributed to UPI's adoption and growth and added to customer convenience. These include the launch of "AutoPay," the introduction of UPI as a payment method to place IPO bids, the one-time mandate, and invoice-in-the-box feature, the entry of WhatsApp Pay, guidelines on the UPI API's usage, the introduction of B2B as a separate category of UPI payments, the launch of online dispute resolution, and UPI number. Presently, 323[11] banks are live on UPI.

The global acceptance of UPI has also expanded in recent years. Several partnerships have emerged across multiple countries to launch UPI. These will play a crucial role in making the payments of remittances easy and convenient. UPI soft-launched in Singapore in collaboration with Network for Electronic Transfers-Singapore's electronic payment service provider that manages and operates the clearing and payments infrastructure in the country. Its rollout is in advanced stages in South Korea, Bhutan, and the UAE. The most recent partnership includes Lyra Network in France. These initiatives will reinforce the payment alliance between India and partner countries.

However, 40% of the 500 million smartphone users still do not use UPI. A slew of challenges within UPI limit its adoption for consumers. These challenges include the need for multiple prerequisites for usage, a non-uniform GRM process that varies from bank to bank, limited use cases beyond P2P and P2M, and recent transaction failures.[12]

[11] NPCI. "UPI live members." NPCI.org.in. Accessed June 23 2022. https://www.npci.org.in/what-we-do/upi/live-members.

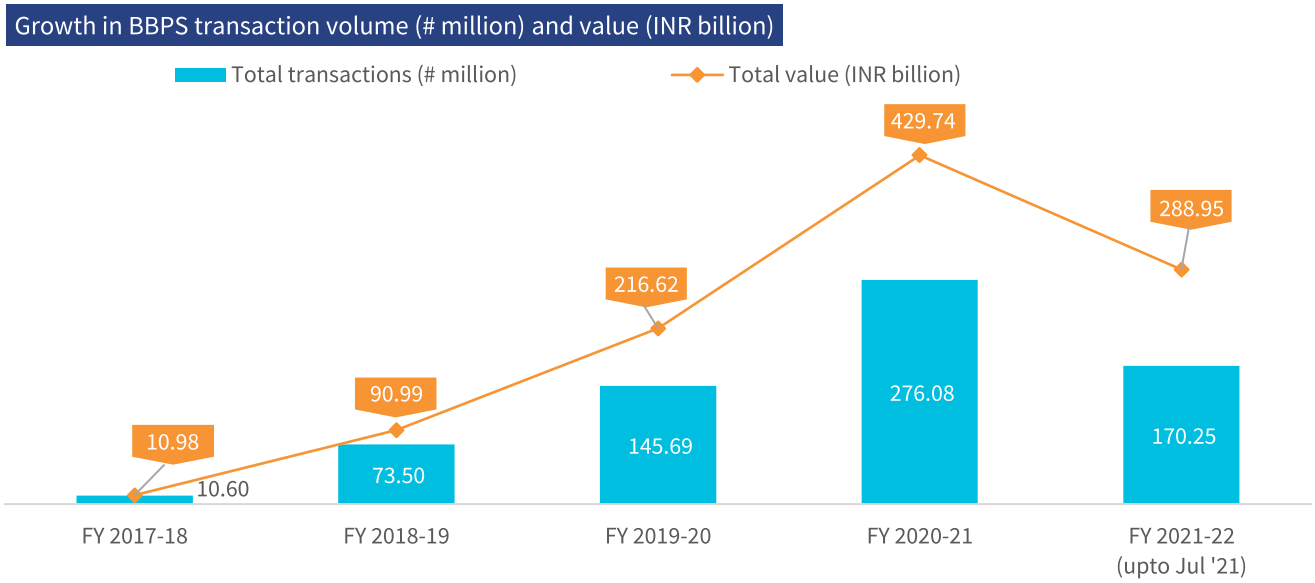
[12] Ghosh, Shayan. "New users and clunky apps add to UPI failures at PSBs." Livemint.com. June 23, 2022. Accessed March 18, 2020. https://www.livemint.com/news/india/new-users-and-clunky-apps-add-to-upi-failures-at-psbs-11614102239479.html.

UPI123Pay will make UPI accessible to a section of society so far excluded from the digital payment landscape-400 million[13] feature phone users. Last year, NPCI also initiated a new process to improve the onboarding mechanism to UPI. Based on this recent change, customers can be easily onboarded to UPI through an *Aadhaar* card and OTP instead of a debit card, which currently remains a prerequisite for making a UPI ID. This will play a significant role in onboarding customers who lack a debit card, especially many PMJDY beneficiaries who have a bank account but have not been issued a debit card. Such developments will bring a transformative shift within this decade across the country's digital payments ecosystem.

Bharat Bill Payment System (BBPS)

BBPS allows consumers to make round-the-clock bill payments to multiple billers from a single platform. The convergence of multiple bill payment platforms into a single integrated platform offers higher ease and convenience to consumers to pay their bills and eliminates their need to learn to navigate numerous payment apps. Consumers can pay from the convenience of smartphones and websites across more than 250+ digital channels and at 200,000+ unique agent touchpoints established at *kirana* shops, BC agent outlets, and bank branches across India in both digital and cash modes.[14]

Figure 7: Growth in BBPS transaction volume and value



BBPS transactions have grown significantly at a CAGR[15] of 73% by volume and 88% by value in the past four years. The average transaction value has seen a steady rise[16] from INR 1,184 (~USD 16) in FY 2017-18 to INR 1,697 (~USD 23) in FY 2021-22, which indicates an increase in customer preference for using BBPS to pay bills.

[13] Times of India. "Explained: What is 123PAY and how you can use it to make UPI payments without internet connection." timesofindia.indiatimes.com. March 9, 2022, Accessed June 22, 2022. https://timesofindia.indiatimes.com/gadgets-news/explained-what-is-123pay-and-how-you-can-use-it-to-make-upi-payments-without-internet-connection/articleshow/90090779.cms.

[14] NPCI. "Bharat Bill Pay Statistics & Updates." npci.org.in. Accessed on June 23, 2022. https://www.npci.org.in/what-we-do/bharat-billpay/product-statistics

[15] NPCI. "Bharat BillPay Statistics." Bharatbillpay.com. Accessed on June 23, 2022. https://www.bharatbillpay.com/statistics#bbpcu-transaction-volume-and-value.

By integrating recurring payments, BBPS added approximately 20,416 unique billers in FY 2021-22 across 19 additional categories across utility bills and recharges. These include payment of education fees, loan repayments, insurance premiums, hospital expenses, booking of cooking gas, municipality taxes, subscription fees, FASTag recharge, and credit card bills, among others.

The vast range of digital channels and agent touchpoints has led NPCI to create a standardized bill payment process and bring uniformity in onboarding billers, branding guidelines, and standardized TAT to address complaints and grievances, among others. However, some barriers hinder its adoption, including a lingering preference of customers for bill payments through cash, limited awareness about BBPS and its advantages among potential billers, and the perception of BBPS as a costly solution.

NPCI plans to further expand the reach of BBPS platform by onboarding many types of bill payment categories for both one-time and recurring payments with the inclusion of B2B use cases, which will digitize the B2B payment ecosystem.

1.2.2.3 Card-based payments

RuPay debit card

NPCI launched RuPay as a domestic debit card for the mass market, comparable to international card platforms, such as Visa and MasterCard. RuPay offered the value proposition of low processing fees and wide acceptance at ATMs, PoS devices, and e-commerce websites across India. RuPay's market share in total debit cards issued was 60%[16] as of 2020 compared to a 15% share in 2017. PMJDY has played a critical role in giving RuPay cards a head start by issuing RuPay cards to new-to-bank customers. Nearly ~315 million PMJDY beneficiaries withdraw cash and transact at offline and online merchants using RuPay debit cards. After the success of the PMJDY initiative, RuPay is now issued with most government schemes, such as the *Pradhan Mantri Mudra Yojna* (PMMY), *Bhamashah Yojna*, *Kisan* Credit Card (KCC), and Punjab Grain Procurement Corporation (PunGrain).

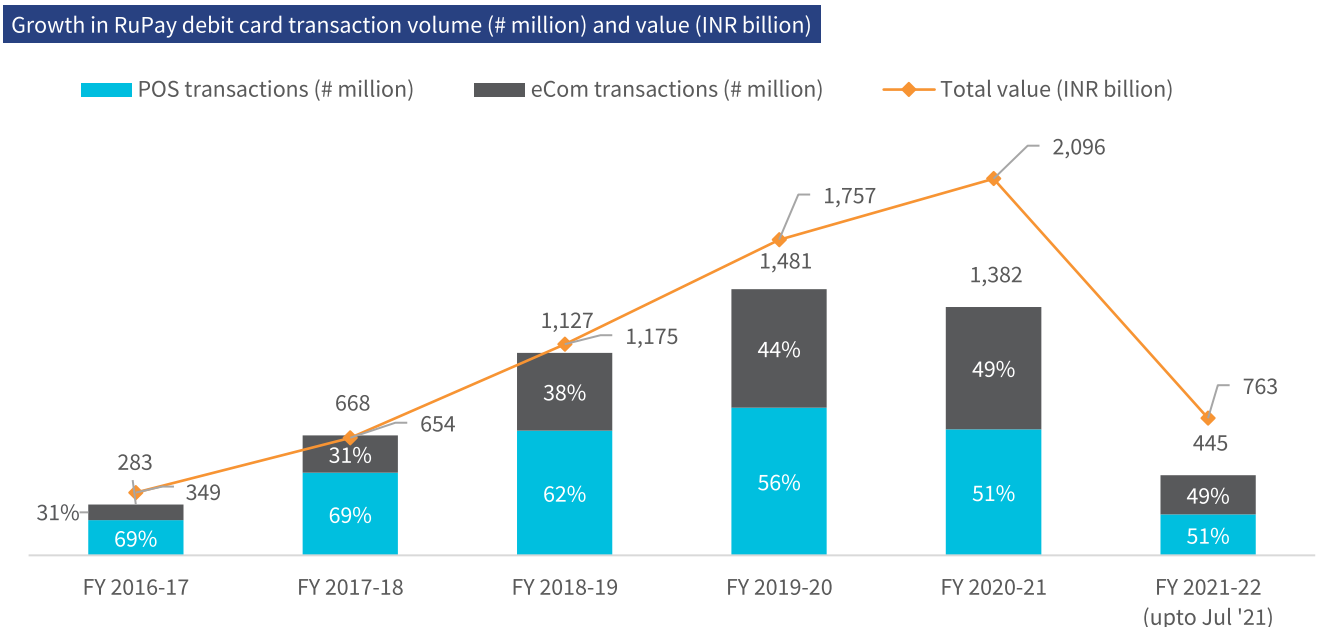
RuPay has also tied up with payment networks, such as Union Pay (China), JCB (Japan), NETS (Singapore), BC Card (South Korea), Elo (Brazil), and DinaCard (Serbia), along with Discover and Diner Club to increase its acceptance to more than 200 countries.[17]

[16] Panda, Subrata. "RuPay's market share tops 60% in total cards issued, says RBI report." Business-standard.com. Accessed June 23 2022. https://www.business-standard.com/article/economy-policy/rupay-s-market-share-tops-60-in-total-cards-issued-says-rbi-report-121012800046_1.html.

[17] RuPay. Accessed June 23, 2022. https://www.rupay.co.in/rupay-advantage/rupay-global#:~:text=At%20present%2C%20all%20three%-2card,200%2B%20countries%20and%20territories%20worldwide.

As an extension to the RuPay card platform, NPCI designed the Bharat eCommerce Payment Gateway (BEPG) to enable e-commerce players to provide seamless payment solutions to their customers. Features, such as tokenization for in-app merchants and quick checkout functionality without an Additional Factor of Authentication (AFA), have enhanced the transaction experience for RuPay credit and debit card users.

Figure 8: Growth in RuPay debit card transaction volume and value



RuPay debit card transactions have grown at a CAGR[18] of 17% by volume and 30% by value in the past five years. Merchant payments-both offline and online purchases-continue to remain a significant use case for consumers.

While RuPay debit cards command 60% of the Indian debit card market and are expanding their footprint internationally, RuPay's average transaction value is half that of other debit cards. This payment trend is mainly driven by PMJDY beneficiaries, as a major share of RuPay debit cards was issued to this user segment. Hence, we can safely assume that these users usually make low ticket-size transactions, thus holding RuPay debit cards' potential at its lower end.

In general, factors including low active usage, limited use cases, and a poor acceptance infrastructure in rural areas limit credit and debit cards' uptake. However, the zero-merchant discount rate (MDR) mandate on RuPay card transactions may result in widespread acceptance among merchants in India compared to international card platforms, such as Visa and MasterCard, for which merchants may incur a charge of up to 0.9% of a transaction. In such a case, the MDR charge is capped at a maximum of INR 1,000 (~USD 12.6).

Recently, RuPay has also launched "SoftPoS" with SBI Payments and other partners, which can convert the mobile phones of merchants into PoS terminals. This will further the cost-effective acceptance infrastructure for small merchants and bring convenience for them. Moreover, RuPay has recently introduced on-the-go contactless wearables, including watches and key chains, among many others, which will provide convenience to customers and free them of the need to carry a physical card.

[18] NPCI. "Retail Payment Statistics on NPCI platforms." npci.org.in. Accessed June 23, 2022. https://www.npci.org.in/statistics

Section 2:

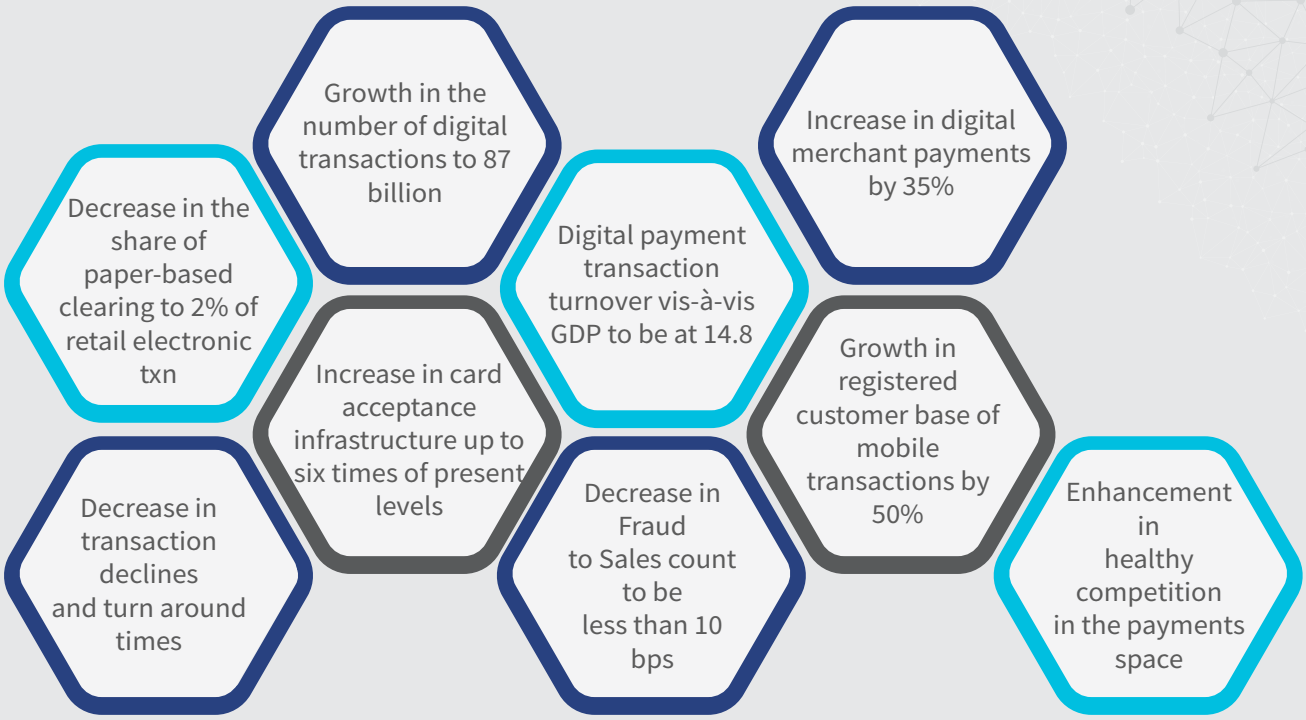
India 2025 and beyond

2.1.1 RBI Payment Systems Vision 2021

Since 2002, the RBI's payments vision documents have guided the planned development and modernization of India's payment systems through the four strategic pillars of responsive regulation, robust infrastructure, effective supervision, and customer-centricity. The payments vision documents have facilitated the growth in acceptance infrastructure, increased the share of retail digital payments, helped launch new products, and accelerated the use of *Aadhaar* in payment systems.

The objective of the Payment Systems Vision 2019-2021[19] was to enhance customer experience, empower payment system operators and service providers, enable the ecosystem and infrastructure, and implement a forward-looking regulation supported by risk-focused supervision. The 2021 version of the payments vision document was based on a 4Cs goal-post framework-competition, cost, convenience, and confidence. It outlined the following expected outcomes for the three years spanning 2019 to 2021.

Figure 9: Expected outcomes of RBI 2021 Vision



The impact of the Payments Systems Vision 2019-2021 on the level of digital financial inclusion has been multifold. Total digital payments have increased by 216% and 10% in terms of volume and value, respectively, for March, 2022, compared to March, 2019. On the other hand, the usage of paper instruments reduced significantly during the same period. Its share in total retail payments declined from 3.83% to 0.88% in volume and from 19.62% to 11.47% in value. In digital payments, UPI, IMPS, and PPI transactions registered a CAGR of 104%, 39%, and 13%, respectively, during the vision period.[20]

[19] Reserve Bank of India. "Payment and settlement systems in India: vision – 2019-2021." RBI.org.in. May 15, 2019. Accessed June 22, 2022. https://www.rbi.org.in/Scripts/PublicationVisionDocuments.aspx?Id=921.

[20] Department of Payment and Settlement Systems, Reserve Bank of India. "Payments Vision 2025." rbi.org.in. June 2022. Accessed September 15, 2022. https://rbidocs.rbi.org.in/rdocs/PublicationReport/Pdfs/PAYMENTSVISION2025844D11300C884DC4ACB8E56B7348F4D4.PDF

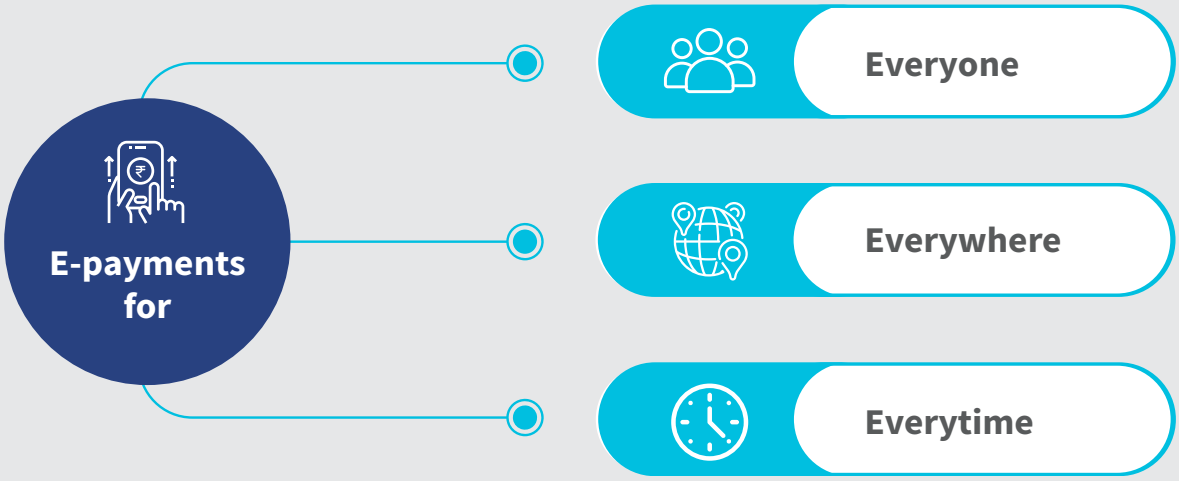
Concerted efforts from various stakeholders, including the government, regulators, and financial service providers, have significantly improved the overall payments landscape against the RBI's envisaged targets. The RBI's Digital Payments Index (DPI)[21] improved from 153.5 in March 2019 to 270.6 in March 2021. Meanwhile, the total digital transaction volumes stood at 55.5 billion by the end of March 2021, which translated to a YoY increase of 21%.

Besides, the COVID-19 pandemic furthered India's digital payments journey by setting off a behavioral shift for the masses toward digital payments. Many users now seek digital payments as they desire convenience and wish to keep themselves safe from the risk of infection. The trajectory suggested that the year 2021 witnessed a revolutionary shift in how Indians use digital payments. The post-pandemic "new normal" presents significant opportunities for service providers to make digital payments meaningful in the daily lives of users, especially the 1 billion LMI people in the country. However, the different stakeholders in the ecosystem need to work together to empower the users with an exceptionally safe and secure digital payments experience.

2.1.2 RBI Payment Systems Vision 2025

The Payments Vision 2021 envisaged empowering every Indian with access to a bouquet of digital payment options. It set four goalposts of competition, cost, convenience, and confidence with specific action points and expected outcomes.

Payments Vision 2025[22] builds upon the initiatives of Payments Vision 2019-21. In the latest edition, RBI furthered its focus on an updated core theme of 4Es.



The latest document covers 47 specific initiatives and 10 expected outcomes. Some initiatives implemented include digitally enabling all mobile phone users-both smartphone and feature phone users.

[21] Reserve Bank of India. "Reserve Bank of India announces Digital Payments Index (RBI-DPI) for March 2021." RBI.org.in. July 28, 2021. Accessed June 22, 2022. https://www.rbi.org.in/Scripts/BS_PressReleaseDisplay.aspx?prid=51962.

[22] Department of Payment and Settlement Systems, Reserve Bank of India. "Payments Vision 2025." rbi.org.in. June, 2022. Accessed June 22, 2022. https://rbidocs.rbi.org.in/rdocs/PublicationReport/Pdfs/PAYMENTSVISION2025844D11300C884DC4ACB8E56B7348F4D4.PDF

The RBI has also attempted to secure offline and online card transactions and transactions involving standing instructions by users. RBI has also started efforts to bring critical payment intermediaries into the formal regulated or supervised framework. The directions issued for payment aggregators (PAs) are a step in this direction. The outcomes intend to provide every user with safe, secure, fast, convenient, accessible, and affordable digital payment options. From March, 2019, to March, 2022, digital payments increased by 16%, while transaction volumes and values swelled by 10%, respectively. However, under the latest document, RBI intends a further threefold increase in the transaction volume. Moreover, it plans to reduce the cash in circulation (CIC) as a percentage of the GDP and increase the payment transaction turnover against the GDP to 8 times, among others.

According to this document, the number of unique mobile banking and internet banking users in India spiked by 99% and 18%, respectively, between March, 2019, and September, 2021. This indicates the inclusion of many first-time users in the digital payments ecosystem. This has been mainly aided by people's need to embrace digital and contactless payment and banking modes, instigated by the COVID-19 pandemic. The pandemic has affected users' behavior while bringing about a shift in the ecosystem.

This document reports an increase in excess of 500% among merchants accepting digital payments during the HY1'21 compared to HY1 '19. In the case of UPI alone, the increase exceeds 1,200% over the same period. The deployment of payment touch points has also increased significantly through 5.84 million PoS terminals, 4.83 million Bharat QRs, and 218,610 operational ATMs as of March, 2022, driven by PIDF's implementation.

RBI plans to modify the PIDF scheme by enhancing the subsidy amount and simplifying the subsidy claim process to allow more players to set up payment infrastructure. RBI acknowledges and plans to overcome the challenge of making this an irreversible shift while having plans to seek convenient and tailored payment solutions eventually.

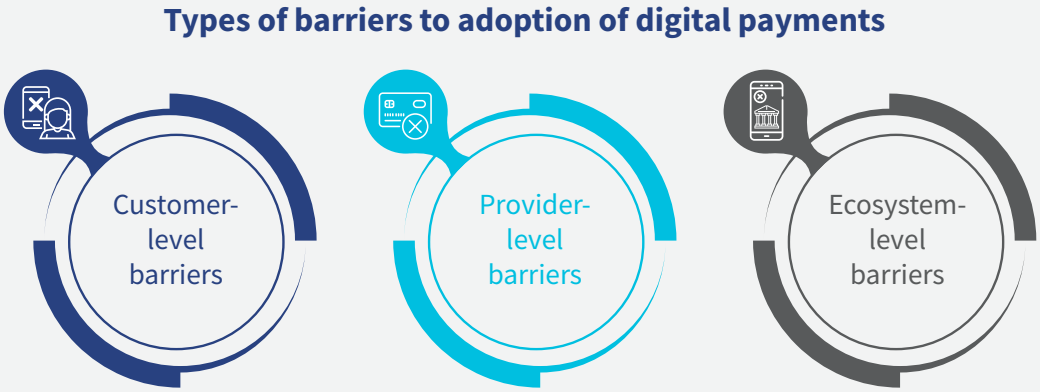
BigTech and FinTech companies are actively expanding their scope of business. They have moved from the initial onboarding of customers for facilitating payment transactions-to taking part in payment systems and providing a host of financial services thereafter. RBI intends to push the system further and help these emerging FinTechs surpass their potential at the national and international levels.

2.2 Barriers to the adoption and usage of digital payments

Despite an evolving payments landscape and responsive regulatory initiatives, different barriers continue to impact the adoption and usage of digital payments for users and service providers. We have organized these stakeholder-level barriers into three categories:

- **Customer-level barriers:** Indicate various behavioral and structural barriers customers grapple with that inhibit their adoption of digital payments
- **Provider-level barriers:** Indicate the lack of customer-centric solutions for LMI segments in the country and highlight gaps on the providers' side to boost the adoption of digital payments
- **Ecosystem-level barriers:** Indicate the lack of an enabling ecosystem in terms of an acceptance infrastructure and front- and back-end system readiness for customers to adopt digital payments

Figure 10: Framework for assessing barriers to the adoption of digital payments



2.2.1 Customer-level barriers

Cash is still the king for customers

Most financial transactions in India continue to occur in cash. Consumers have a strong status quo bias for using cash and lack trust in digital payments, further amplifying this bias. Even during the COVID-19 pandemic, cash continued to coexist with digital payments due to its all-weather acceptance.

However, consumers do not realize the "real" cost of cash. Cash transactions entail charges-both for deposit and withdrawal at bank branches or ATMs. Consumers spend considerable time, effort, and money in transit to get cash and make cash payments. While some of these costs of cash are tangible, most are intangible. Customers struggle to quantify the costs objectively, which leads them to prefer cash over digital modes.

Limited awareness and digital literacy hamper the uptake of digital payments

According to a KPMG survey,[23] inadequate awareness and the associated unease of using technology continue to hinder the adoption of digital payments. Around 90%[24] of India's population is digitally illiterate, while only 24%[25] is financially literate. The issue worsens for vulnerable segments, such as women, 60% of whom may not have used the internet anytime.[26] Such low levels of digital and financial literacy limit the rapid scale of digital payments in the country.

2.2.2 Service provider-level barriers

Most service providers in India lack an in-depth understanding of the financial needs and preferences of people from the LMI segment. They end up creating complex, non-intuitive interfaces, and product designs. designs This is especially true for first-time users, who struggle to complete the onboarding process due to the products' lack of intuitiveness.

[23] KPMG. "Impact of COVID-19 on digital payments in India." KPMG.in. August 2020. Accessed June 22, 2022. https://assets.kpmg/content/dam/kpmg/in/pdf/2020/08/impacting-digital-payments-in-india.pdf

[24] Srivastava, Sumeysh. "International Literacy Day: Bridging India's Digital Divide." Bloombergquint.com. September 08, 2020. Accessed June 22, 2022. https://www.bloombergquint.com/technology/international-literacy-day-bridging-indias-digital-divide

[25] Pandey, Puniti. "Why encouraging literacy in finance matters." Timesofindia.com. September 11, 2020. Accessed June 22, 2022. https://timesofindia.indiatimes.com/home/education/news/why-encouraging-literacy-in-finance-matters/articleshow/78060694.cms

[26] Economic Times. "Digital literacy remains a concern as most Indian-women have never used the internet." December 2020. Accessed on June 22, 2022. https://economictimes.indiatimes.com/magazines/panache/digital-literacy-remains-a-concern-as-most-indian-women-have-never-used-the-internet/articleshow/79736857.cms?from=mdr

Digital payments are characterized by a one-size-fits-all approach with limited flexibility in form factor, anchor use cases, communication, and product design

Most digital payment products are designed as generic offerings for adoption by customer segments that have different needs and preferences. Most products use similar user interfaces, need similar pre-requisites, and have a similar procedure for onboarding and usage. Hence, they cannot meet the needs and capacities of the different segments, including women and other vulnerable people.

India has 264 million[27] tech-handicapped citizens who can barely read the text and fail to decode multi-digit numeral strings. The vulnerable segments, based on age, caste, and location, find it challenging to avail of financial services in the current form and require repeated assistance to develop comfort and trust in digital payments. Many financial service apps also lack multi-language functionality, which is essential for customers who are more comfortable in their local language[28]. These apps also frequently lack chat support or a medium to register grievances, which further hampers the user experience.

Most digital payment products focus on use cases relevant to the urban and more educated class of consumers. These include quick P2P transfers, e-commerce, food delivery, insurance, and mutual funds SIPs. The P2P and P2M use cases, too, have been well established in the urban centers and among the high-income segments. However, they hold limited significance for the rural segments. Use cases, such as agri-value chain payments relevant to the LMI segment and the rural population, have still not been capitalized enough. Moreover, existing use cases do not adequately touch upon recurring payments, which can act as an anchor use case for digital payments among consumers.

Transaction failures have increased, while an adequate GRM is absent

A surge in the volume of digital transactions over the years has given way to rising instances of transaction failures.[29] Failed transactions warrant a robust grievance resolution mechanism. MSC's experience highlights that most consumers from the LMI segment lack knowledge of GRM processes. On several occasions, the frontline staff are not adequately equipped to handle customers' grievances. The customer care or helpline number has a deeply nested IVRS with multiple options, followed by long waiting times. These procedures prove cumbersome because of the lack of capacities and digital readiness of the rural and low-income consumer segments. This leads to non-standard and ineffective GRM across service providers, which severely degrades the customer experience of digital payments.

2.2.3 Ecosystem-level barriers

The solutions rely excessively on internet connectivity

Network connectivity is a critical component for most existing digital payment solutions in India. As per Telecom Regulatory Authority of India[30] (TRAI) data, the wireless teledensity[31] in India stands at 83%.

[27] Matthews, and others. "Digital wallet adoption for the oral segment in India." Microsave.net. May 09, 2017. Accessed June 22, 2022. https://www.microsave.net/2017/05/09/digital-wallet-adoption-for-the-oral-segment-in-india-concept-development-for-mowo-mobile-wallet-for-oral-2/.

[28] Kudva, Roopa, and Siddharth Nautiyal. "The next frontiers – Innovating for the next half billion." OmidyarNetwork.in. January, 2021. Accessed June 22, 2022. https://www.omidyarnetwork.in/TheNextFrontiers-Innovating-for-the-NHB/.

[29] Bose, Shritama. "High volumes, multiple hops push up digital payment failures." February 15, 2021. Accessed June 22, 2022. https://www.financialexpress.com/industry/high-volumes-multiple-hops-push-up-digital-payment-failures/2194706/#:~:text=As%20the%20volume%20of%20transactions,so%20far%20in%20February%202021.

[30] Telecom Regulatory Authority of India. "Highlights of Telecom Subscription Data as on 30th April, 2022." trai.gov.in. June 16, 2022. Accessed June 22, 2022. https://www.trai.gov.in/sites/default/files/PR_No.40of2022_0.pdf

[31] Number of telephone connections for every hundred individuals in a specified geography.

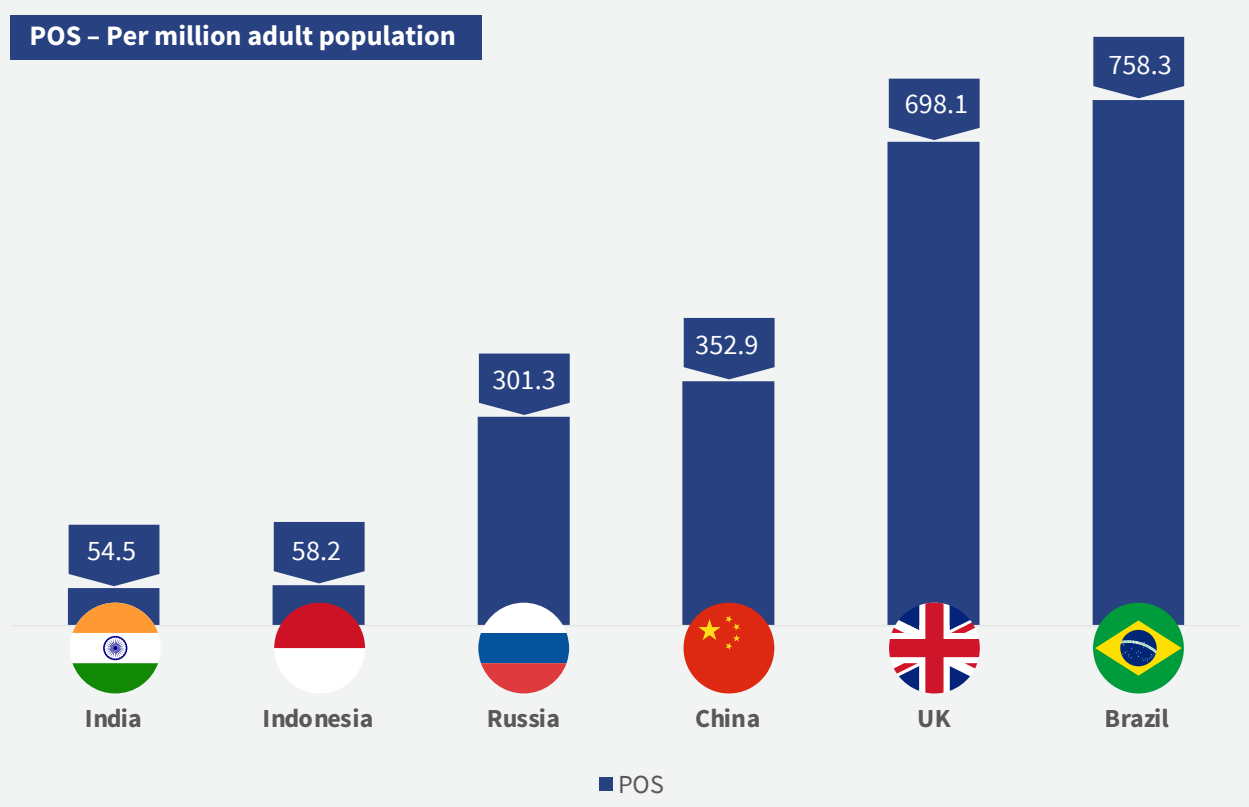
However, it is much lower in the rural areas, at just around 58%. This leaves a significant amount of the population out of the digital ambit.

The quality of service in unserved and underserved areas for mobile internet and broadband is relatively patchy compared to urban areas. This is corroborated by the fact that a mere 20% of the country's rural population can access the internet for digital transactions compared to nearly 65% of urban users[32]. Without a well-functioning network, most digital payment transactions are bound to fail. The lack of safe and robust offline solutions to overcome this reliance on the internet further limits adoption for consumers.

The trailing acceptance ecosystem limits the usage of digital payments

The digital payments infrastructure in India struggles to keep pace with our growing population. A cross-country comparison of financial touch points per million adult populations shows India lagging in acceptance infrastructure compared to other countries[33]. Existing financial touch points in India are considerably skewed toward urban regions.

Figure 11: Comparison of financial touch points in 2021



[32] Kumar, Rohit. "Why Bridging The Digital Gap In Rural India Is Extremely Important." INC42.com. February 14, 2021. Accessed June 22, 2022. https://inc42.com/resources/why-bridging-the-digital-gap-in-rural-india-is-extremely-important/.

[33] BIS. "Number of payment cards and terminals." Accessed June 22, 2022. https://stats.bis.org/statx/srs/table/T4?c=IN

Currently, India has more than 63 million[34] micro-merchants, of whom 96% are still underserved by banks and traditional finance companies[35]. The country has deployed only 6.17 million[36] PoS machines, 1.25 million BAP PoS machines, and more than 4.1 million Bharat QR[37] codes so far. This excludes around 80% of merchants in India from the ambit of digital payments.

The shortfall in acceptance infrastructure is primarily due to the high costs of setting up the infrastructure, low volume or value of transactions, recurring charges, and limited understanding and capability of merchants to use digital means.

An inadequate CICO network limits access to financial services for the LMI segment

The 3.3 million[38] BC agents spread across the country currently serve the financial needs of around 1 billion LMI customers. However, the BC network struggled with operational and financial sustainability for years. BC agents face several operational challenges. These include issues in liquidity management, high costs of setting up and operations, poor internet connectivity, limited capacity of potential agents, and low spread of product offerings.

Multiple studies conducted by MSC on agent networks across India suggest stress in the economics of traditional BC agents. The revenue earned from the commission for services is limited, faring adversely against the high cost of setting up and managing operations. As a result, agents lack enough motivation to continue their business.

2.3 Opportunities in the digital payments space

As highlighted earlier, the LMI segment faces various barriers to adopting, accessing, and using formal financial services. These challenges offer financial providers a chance to mitigate and design need-based, safe, and robust solutions. Targeted interventions, such as customized use cases, can help address the specific financial needs of the unserved and underserved and boost adoption.

Based on the growing demand and evolving lifestyle of customers, we have identified a few promising use cases across P2B, P2G, P2P, and B2P channels that will help drive the adoption of digital payments in the country. We focus on these four channels since most payments between businesses and governments are bulk or of immense value, and most are already digitized. Further, most G2P payments have also been digitized since the advent of the *Aadhaar* Payment Bridge System (APBS). This leaves a considerable potential to digitize payments across the four channels and create a holistic impact on the LMI segments.

[34] Reserve Bank of India. "Report on the Expert Committee on Micro, Small, and Medium Enterprises." June 2019. Accessed June 22, 2022. https://www.rbi.org.in/Scripts/PublicationReportDetails.aspx?UrlPage=&ID=924

[35] Accion. "Ftcash raises 50 crores from Accion Fmo and Ivycap ventures to accelerate access to financial services for micro-merchants." Accion.org. May 2, 2019. Accessed June 22, 2022. https://www.accion.org/ftcash-raises-50-crores-from-accion-fmo-and-ivycap-ventures-to-accelerate-access-to-financial-services-for-micro-merchants

[36] Digidhan. "Digidhan Dashboard." digipay.gov.in. Accessed June 22, 2022. https://digipay.gov.in/dashboard/default.aspx

[37] Reserve Bank of India. "ATM, acceptance infrastructure and card statistics for the month June 2021." RBI.org.in. Accessed June 22, 2022. https://www.rbi.org.in/Scripts/ATMView.aspx?atmid=124.

[38] Reserve Bank of India. "Credit Delivery and Financial Inclusion." rbi.org.in. May 27, 2022. Accessed June 22, 2022. https://www.rbi.org.in/Scripts/AnnualReportPublications.aspx?Id=1346.

Figure 12: Opportunities to digitize critical payment use -cases in India

	Person	Business	Government
Person	**P2P use-cases:** 1) Domestic remittances **Market size: INR 700 mn (USD 9.45 bn)** 2) House rental payments **Market size: 21.72 mn households** Percentage of digital payments across P2P use-cases: **<10%**	**B2P use-cases:** agri payments (FPOs and cooperatives), salaries **Market size: INR 3 bn (USD 40 mn)** transactions annually Percentage of digital payments across B2P use-cases: **20-25%**	
Business	**P2B use-cases:** 1) Online and offline merchant payments **Market size: INR 4.25 tn (USD 56 bn)** 2) MFI loan repayments **Market size: 5.8 bn** repayments Percentage of digital payments across P2B use-cases: **15-20%**	These are large value transactions dealing with institutions and government. In most cases, they are already digitized and are well served by financial players.	
Government	**P2G use-cases:** 1) Utility bill payments **Market size: 680 bn bills annually** 2) Public transit system payments **Market size: 32 bn trips** Percentage of digital payments across P2G use-cases: **10-12%**		

Examples of retail payment use cases which are currently underserved and can be impacted

P2P use cases:

India has the potential to digitize P2P transactions worth more than INR 900 billion[39] (~USD 12.16 billion), which currently depend solely on cash. We highlight two growing use cases that constitute a significant chunk of the transactions flowing through the P2P channel—domestic remittances and informal bill payments, such as rental payments.

Domestic remittances

Migrant workers are the largest users of remittance services in India. About 120 million migrant workers from remote and rural areas account for 80% of the country's domestic remittances, valued at ~INR 700 billion (~USD 9.45 billion).[40] Low on financial awareness and access, around 50% of these migrant workers and their families rely on non-traditional channels for remittances, such as friends, family, and agents. Presently, ~60% of domestic remittance transactions occur through informal and often risky channels, such as *angadias* and other cash-based physical remittances. This offers financial service providers the opportunity to digitize remittance transactions in excess of INR 400 billion (~USD 5.4 billion).

House rental payments

Across India, migration toward urban centers has increased as more people move to cities for employment and education. Therefore, the rental housing market is poised to grow considerably. Estimates by the Observer Research Foundation[41] indicate that India had 21.72 million rented households in 2019. Further, the Economic Survey 2018–2019 projects the urban population in India to increase to 600 million by 2031.

Millennials, the generation born from 1981 to 1996, form a significant proportion of this population. They prefer renting houses over owning them for several reasons. Firstly, most prefer the flexibility of moving around for employment, and having their own home is likely to tie them down. Secondly, the prohibitive real estate costs add a significant EMI burden on the monthly paycheck, and therefore most refrain from applying for housing loans.

Tenants typically pay house rent in cash and some via bank transfers. Domestic rental transactions do not occur through any specific digital payment product. With the vast quantum of rented households in the country and an upward trend[42] for its preference, we anticipate a sizable opportunity to digitize the monthly rent payments for millions of consumers.

[39] MSC analysis

[40] Nielsen. "Payments banks have Rs 40k crore domestic remittance market tap." Mydigitalfc.in. February 22, 2018. Accessed June 22, 2022. https://www.mydigitalfc.com/companies-and-markets/payments-banks-have-rs-40k-crore-domestic-remittance-market-tap

[41] Jha, Ramanath. Urban Rental Housing in India: toward 'Housing for All'. Orfonline. Org. December 08,2020. Accessed june 22, 2022. https://www.orfonline.org/research/urban-rental-housing-in-india-toward-housing-for-all/#_edn42https://www.orfonline.org/research/urban-rental-housing-in-india-toward-housing-for-all

[42] Pandey, Pallav. "Why millennials prefer renting over buying a house." businesstoday.in. October 30, 2018. Accessed June 22, 2022. https://www.businesstoday.in/opinion/columns/story/why-millennials-prefer-renting-over-bu ing-a-house-149829-2018-10-30

P2B use cases:

Merchant payments constitute the largest share of transactions flowing through the P2B channel. Many of the 63 million micro-merchants in the country live in rural or remote areas. While financial service providers have acquired around 10 million merchants, most are in urban areas and do not fall under the category of micro-merchants. This allows financial service providers and regulators to digitize the cash-based transactions conducted by these micro-merchants. We highlight a few examples of online and offline merchant payments that offer financial service providers a vast potential to drive digital payments in the country.

Cash-on-delivery (CoD) payments in the e-commerce sector (online transactions)

The rapid growth of the e-commerce sector in India has encouraged merchants to increasingly adopt digital payments. India's e-commerce sector is currently worth INR 2.6 trillion (~USD 35.1 billion) and is forecasted to grow at a CAGR of 23%[43]. Presently, around 17%[44] of the total e-commerce transactions in India occur through the CoD payment method, so cash-based transactions in the e-commerce sector are worth ~INR 450 billion (~USD 6.08 billion).

Consumers prefer the CoD method to ensure they pay for the merchandise only after receiving it at their doorsteps. Some use the CoD payment method as they do not want to divulge their card information on an online platform or lack trust in the delivery of the merchandise after online payment.

[43] India Brand Equity Foundation. "E-commerce industry in India." IBEF.org. Updated February 10, 2021. Accessed June 22, 2022. https://www.ibef.org/industry/ecommerce.aspx

[44] JP Morgan. "E-commerce payments trends: India." JPMorgan.com. Accessed June 22, 2022. https://www.jpmorgan.com/merchant-services/insights/reports/india.

Converting even a conservative 10% of these cash transactions to digital presents an opportunity for digitizing transactions worth INR 45 billion (~USD 608 million). While a few service providers already use UPI links, QR codes, or portable PoS machines to accept payments digitally at the doorstep, such solutions have limited popularity in capturing the CoD market and gaining the customer's trust in transacting digitally.

Offline merchant payments

Of the 63 million micro-merchants in the country, around 90% currently transact exclusively in cash. This creates a massive potential to digitize cash-based transactions worth INR 4.2 trillion (~USD 56 billion). The digitization of the offline merchant space has started recently, drawing the attention of some players. However, the lack of concerted efforts to onboard, educate, and train merchants to use digital payments has ended up excluding them from digital financial services. Moreover, both customers and merchants in rural areas lack awareness of digital payments, which has further led to the low uptake of digital payment products.

Micro-merchants are cost-sensitive and value cost over convenience. Yet, industry experts believe that the under-penetrated digital payments market offers a significant opportunity to drive transactions based on PoS, UPI, and QR codes. Moreover, the advent of WhatsApp Pay (and WhatsApp's 530 million-strong active user base in India[45]) and UPI 123Pay (and its 400 million-strong active feature phone user base[46]) is expected to create increased demand for UPI and UPI 123Pay and bring a big chunk of their customers to the digital payments platform. This presents a significant business case for merchants to adopt and accept digital payments.

Repayment of microfinance loans

Today, India has 97 registered microfinance institutions (MFIs) operating with a branch network of 16,284 and 136,000 employees, per the MFIN India Micrometer report[47] and the RBI[48]. These MFIs have more than 34 million unique clients (primarily women) with an outstanding loan portfolio of about INR 965.6 billion (~USD 13 billion) as of March, 2022. MFIs typically lend INR 20,000 to INR 50,000 per person (~USD 270 to 675), which the recipients repay in small weekly or monthly installments.

MSC's research suggests that more than 95% of these loan repayments are conducted in cash through MFI field agents, which highlights a potential to digitize 5.9 billion transactions[49] annually. Digitizing these MFI transactions can act as anchor use cases for women borrowers and deepen the reach of digital payments among women in India.

B2P use case:

Salaries comprise the most significant use case of payments made through the B2P channel. However, most payments are already digitized. Individual contract payments or payments for agri-inputs and allied sectors constitute the next prominent use case under the B2P channel.

[45] Upadhyay, Harsh. "Govt says WhatsApp has 530 Mn users in India." Entrackr.com. February 25, 2021. Accessed June 22, 2022. https://entrackr.com/2021/02/govt-says-whatsapp-has-530-mn-users-in-india/.

[46] Times of India. "Explained: What is 123PAY and how you can use it to make UPI payments without internet connection." timesofindia.indiatimes.com. March 9, 2022, Accessed June 22, 2022. https://timesofindia.indiatimes.com/gadgets-news/explained-what-is-123pay-and-how-you-can-use-it-to-make-upi-payments-without-internet-connection/articleshow/90090779.cms.

[47] MFIN India. "Issue 41. Micrometer. Data as on 31 March 2022. Synopsis." mfinindia.org. March 31, 2022. Accessed June 22, 2022. https://mfinindia.org/assets/upload_image/publications/MicrometerSynopsis/Micrometer%20Q4_FY_21-22_Synopsis.pdf.

[48] Reserve Bank of India. "List of NBFC-Micro Finance Institutions (NBFC-MFIs) registered with RBI (As on January 31, 2022)." rbidocs.rbi.org.in. February, 2022. Accessed June 22, 2022. https://rbidocs.rbi.org.in/rdocs/content/DOCs/NMFI012014FL.xlsx.

[49] MSC analysis

More than INR 3 billion (~USD 40 million) transactions flow through this channel each year. Yet, only 20% has been digitized so far. This highlights the massive opportunity to digitize B2P payments.

Agriculture and allied value chain payments

The agriculture and allied sector is the primary source of livelihood for more than 70% of rural households in India as per FAO[50]. Agriculture contributes about 20%[51] to the GDP of India, summing up to a gross value of INR 27.4 trillion[52] (~USD 370 billion). The farm-to-fork value chain consists of several intermediaries. Hence, many transactions take place along the value chain. Most transactions currently occur in cash due to the higher comfort associated with handling cash, lower digital readiness, and lack of digital and financial literacy among consumers.

With such a vast volume and value of financial transactions in the agri and allied value chains, converting even a small percentage of it to digital can significantly increase the transaction volume. Some potential use cases that can be digitized include agri-input purchases, transport payments, warehousing transactions, and the sale of produce. Considering the largely rural and lower-income population involved in agriculture and allied activities, digitizing these payments can serve as a strong hook for this segment to gradually adopt digital payments.

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50 Food and Agriculture Organization of the United Nations in India. "India at a glance." FAO.org. Accessed June 22, 2022. http://www.fao.org/india/fao-in-india/india-at-a-glance/en/.

51 Press Information Bureau, Delhi. "Contribution of Agriculture Sector toward GDP." pib.gov.in. August 03, 2021. Accessed June 22, 2022. https://www.pib.gov.in/PressReleasePage.aspx?PRID=1741942.

52 Press Trust of India, New Delhi. "Govt revises FY21 GDP growth to -6.6% from -7.3% earlier." business-standard.com. January 31, 2022. Accessed June 22, 2022. https://www.business-standard.com/article/pti-stories/indian-economy-contracts-by-6-6-pc-in-2020-21-122013101226_1.html#:~:text=%22Real%20GDP%20or%20GDP%20at,said%20in%20the%20revised%20national.

P2G use cases:

Transactions worth more than INR 36 trillion[53] (~USD 486 billion) occur under the P2G channel. These include payments for government services, donations, bills, and taxes. Yet, more than 80% of transactions occur in cash due to the consumers' limited awareness and capability regarding digital payments and the complex legacy systems of the institutions involved.

Utility bills payments

Utility bill payments form a significant chunk of recurring payments for most households in India. These payments include electricity, water, cooking gas, telephones, broadband, and satellite TV. Approximately 163 million people in India pay utility bills, resulting in 72 billion utility bills annually[54], of which 70% are paid in cash[55]. Assuming even a modest 30% incremental conversion from cash to digital presents a massive opportunity to digitize approximately 25 billion bills across the country.

Yet, the complete integration of billers across all categories on BBPS is yet to happen. This signifies the underlying potential for financial service providers to digitize bill payments.

Public transit system

About 785 million[56] people, or 56% of India's population, currently travel occasionally or commute daily for work using public transport modes, such as buses, railways, and subway trains. With a growing population across the country and the subsequent congestion in the movement of people, the need for mass rapid transit systems will continue to proliferate. These include suburban trains, metro trains, monorails, and buses that ensure fast and convenient connectivity along with the urban centers.

People make approximately 88 million trips[57] on public transport each day in India, with 70 million trips by buses, about 18 million by railways, and 0.23 million by air. Most people also use multiple means of transport, including auto rickshaws and cycle rickshaws, in their daily commute. This presents a significant opportunity for financial service providers and institutions such as NPCI to convert the massive number of ticketing transactions from physical to digital payments.

[53] MSC analysis
[54] MSC analysis
[55] Bose, Shritama. "Bill payments drive digital payment volume recovery in first half of May." Financialexpress.com. May 19, 2020. Accessed June 22, 2022. https://www.financialexpress.com/industry/bill-payments-drive-digital-payment-volume-recovery-in-first-half-of-may/1963398/
[56] MSC analysis
[57] KPMG India. "Reimagining public transport in India." KPMG.in. October 12, 2017. Accessed June 22, 2022. https://home.kpmg/in/en/home/insights/2017/10/technology-public-transport-india.html.

Section 3:

The way forward for digital payments in India

The rising number of FinTechs and their collaboration with banks, initiatives by the government, and changing consumer demand will continue to boost digital transactions in the country. PwC estimates indicate that the volume and value of digital transactions in India will reach INR 167 billion (~USD 2.25 billion) and INR 238 trillion (~USD 3.21 trillion) by 2025.[58]

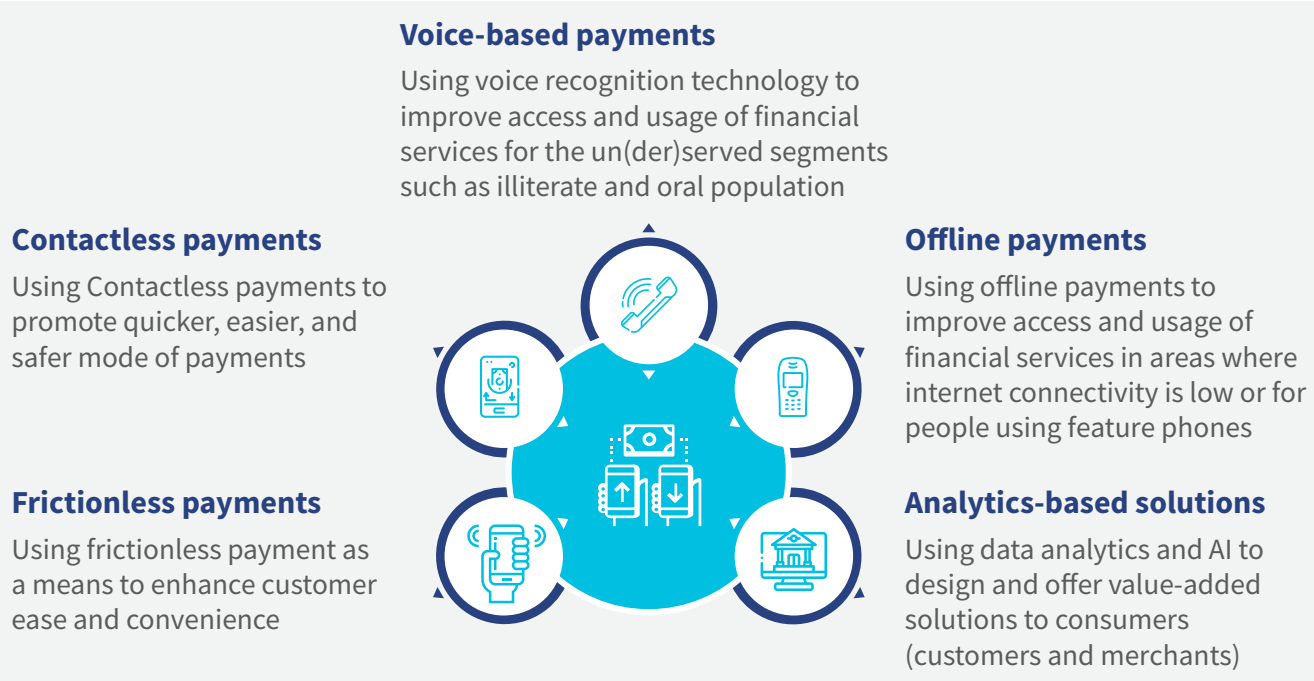
However, digital payments in India are no longer an urban phenomenon. Players in the ecosystem increasingly agree that the next set of low-income users will drive the future growth of digital payments in the country. These low-income users vary drastically in terms of their financial needs, preferences, and usage and even face different challenges in terms of access to financial services, as discussed earlier. Therefore, providers must address these changing needs in a granular manner and build convenient, easy-to-use, and safe products for such users.

3.1 The future of digital payments

Rising competition and innovation in the digital payments space have led to providers creating several solutions to cater to customers' needs. Recent trends suggest that mobile payments and wallets are here to stay and are expected to gain mass adoption in the future.

While the road to scale up the digital solutions is long, a few promising solutions could shape the adoption and usage of digital payments by 2025:

Figure 13: Solutions that will drive the adoption of digital payments by 2025



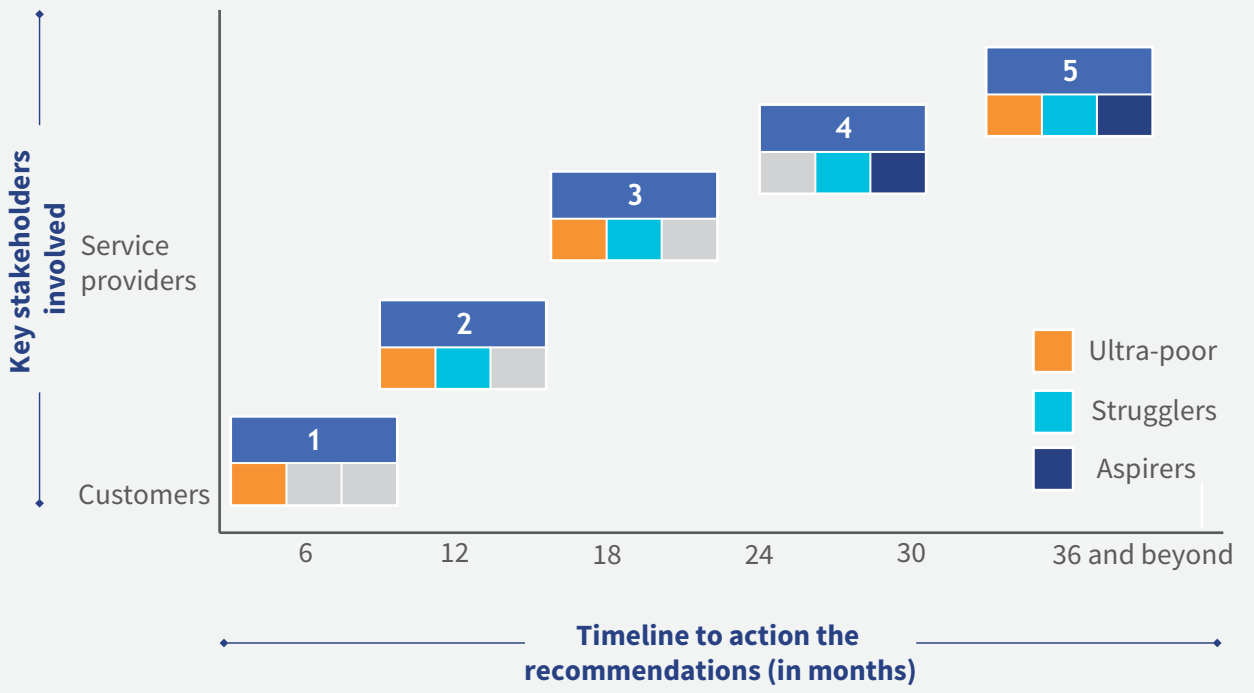
Please see Annex 4.3 for a comprehensive analysis of the varied innovative solutions that will likely drive the adoption of digital payments by 2025.

[58] PwC. "The Indian Payments Handbook 2020-2025". www.pwc.in. December 2020. Accessed June 22, 2022. https://www.pwc.in/assets/pdfs/consulting/financial-services/fintech/payments-transformation/the-indian-payments-handbook-2020-2025.pdf

3.2 Key recommendations

MSC's global experience of working with the LMI segments and understanding their aspirations, perceptions, and behavior across multiple regions highlight a gap in the understanding of financial service providers around customer needs. This gap hinders the adoption journey of customers, eventually leading to customer dropouts or inactive usage. Several interventions are required in the adoption journey to improve uptake, from onboarding to conducting transactions and repeat usage.

Figure 14: Impact of the interventions on the customer segments



Recommendations

1. Create awareness and develop the right value proposition for using digital payments
2. Create a positive experience for users
3. Create capability and trust in digital payments
4. Improve the acceptance infrastructure for digital payments
5. Enhance collaboration with ecosystem players to drive innovation

Ultra-poor:
Daily household income <USD 2

Strugglers:
Daily household income-USD 2 to USD 4.5

Aspirers:
Daily household income-USD 4.5 to USD 10

India's evolving digital payments landscape suggests the time is ripe for players in the ecosystem to undertake concerted efforts and build secure, safe, and interoperable digital platforms as plug-and-play applications. Based on current trends, we propose a roadmap of interventions for providers to mitigate the barriers and further drive the adoption of digital payments by the mass market.

Figure 14 highlights the different LMI segments that will benefit from the proposed interventions. These recommendations are laid out at intervals starting from six months to 30 months and beyond, depending on the level of effort needed from stakeholders to implement them.

The "Ultra-poor" segment currently lacks awareness and trust in digital payments compared to "Strugglers" and "Aspirers." The segment also lacks a strong use case for switching to digital payments. Hence, the first two interventions will significantly nudge the segment toward adopting digital payments. Interventions 3 and 4 will create the maximum impact on "Strugglers" and "Aspirers" as they already have some (but limited) experience with digital payments. These interventions can amplify their usage further. Finally, driving innovation through collaborations will create an equal impact on all three segments. It can open new doors for the segments to try, adopt, and use various modes of digital payments.

3.2.1 Create awareness and develop the right value proposition for using digital payments

Despite rising smartphone penetration, internet access, and the availability of many digital payment products, most low-income users lack the knowledge and awareness to conduct digital transactions independently.

Moreover, rising instances of fraud and transaction failures further erode trust in digital payments. The ease of use and simplicity that cash offers also discourage these users from shifting to digital payments. Hence, providers need to generate more awareness for digital payments while creating safeguards for first-time users, especially in rural areas.

Every customer segment has varied needs and pain points and responds to different adoption drivers differently. This highlights that a "one-size-fits-all" approach does not work in a diverse country like India. Providers need to understand their target segments well and gather a thorough understanding of customer pain points to develop a unique value proposition for them.

For example, introducing pull-based transactions rather than push-based transactions in rural areas garners more acceptability from rural customers as it requires minimum inputs from their side.

Develop anchor use cases for various customer segments to ensure sustained usage

- Providers must create dedicated, need-based anchor use cases to adopt digital payments for multiple sub-segments of the population, such as women, farmers, merchants, and poor urban segments. Targeted use cases may include:
    - Using UPI for salary payouts (B2P channel), agri input payments in the rural areas, and recurring payments, such as mutual fund SIPs
    - Using *Aadhaar*-based payments to pay workers' salaries or contract payments in factories, commission payouts to insurance agents, and MFI loan repayments are some promising use cases that cater to specific user needs
- Payment solutions that cater to varied use cases are more likely to find acceptability and uptake in the long run among customer segments. Our research[59] indicates that most LMI customers prefer convenience over affordability and are willing to pay for services that offer ease of use and convenience—provided these services address their specific needs.

3.2.2 Create a positive experience for users

Post COVID-19, we see more users willing to experiment with digital payments, and therefore stakeholders have an imperative to create a positive experience for their sustained usage. The varied customer segments in the country mandate the design of multiple, suitable form factors that customers can use as per their capability and convenience. For example, designing smartphone-based solutions for women who typically do not own a phone themselves may create barriers to adoption and hamper the overall customer experience.

[59] Gupta, Anil, et. al. "FinTech Study to Model Financial Inclusion Lab." Microsave.net. August, 2018. Accessed June 22, 2022. https://www.microsave.net/wp-content/uploads/2018/10/Fintech_Study_to_Model_a_Financial_Inclusion_Lab.pdf

Conduct UI/UX testing of the product to ensure an intuitive product design

- Before designing a product, providers must clearly understand the customer's adoption journey and financial needs and preferences. Providers should test their product's UI with their target segments to increase its usability and adoption. The design needs to be seamless, efficient, intuitive, and guide the user through various product features. For example, the non-intuitive design of *99# resulted in limited adoption among the LMI segments.

  However, UPI 123Pay is a new service launched by the RBI that intends to enable feature phone users in the country to make real-time digital payments without smartphones or an internet connection. Through it, users can make digital payments in four different ways[60]. Customers can place an interactive voice response (IVR)-based call, use the app functionality in some feature phones, use proximity sound-based payments, and use the missed call functionality. We count on UPI 123Pay becoming a game changer, which can help onboard a significant chunk of the 400 million[61] feature phone users onto a seamless and improved digital payments ecosystem.

[60] Times of India. "Explained: What is 123PAY and how you can use it to make UPI payments without internet connection." timesofindia.indiatimes.com. March 9, 2022. Accessed June 22, 2022. https://timesofindia.indiatimes.com/gadgets-news/explained-what-is-123pay-and-how-you-can-use-it-to-make-upi-payments-without-internet-connection/articleshow/90090779.cms

[61] Times of India. "Explained: What is 123PAY and how you can use it to make UPI payments without internet connection." timesofindia.indiatimes.com. March 9, 2022. Accessed June 22, 2022. https://timesofindia.indiatimes.com/gadgets-news/explained-what-is-123pay-and-how-you-can-use-it-to-make-upi-payments-without-internet-connection/articleshow/90090779.cms

Develop a seamless, transparent, and efficient GRM for users

- The growing rate of transaction failures in UPI and AePS hurt customer experience. In 2020, UPI recorded a 3% failure rate, as reported, and AePS saw at least one in three transactions fail due to multiple technical and product-level barriers. Resolving these failures can result in a positive customer experience, improve their adoption manifold, and enhance trust in the products. The increase in digital payment volumes has mandated the need for a centralized GRM platform with a standardized TAT and fast dispute resolution mechanisms.
- NPCI has been working to introduce a centralized platform for major retail payment instruments in the country to tackle the growing rate of transaction failures uniformly. This is expected to boost digital payments considerably.

3.2.3 Create capability and trust in digital payments

Offer assisted transaction support to build confidence in digital payments

- Adopting a physical + digital or "phygital" model will help ensure last-mile connectivity while offering customers the convenience of using digital transactions in an assisted manner until they are digitally savvy and capable of conducting transactions independently.
- Providers should use BC agents or appoint feet-on-street at the block or district level to create further awareness of digital payments, provide in-person demonstrations in their preferred language and assist in onboarding customers and merchants to improve their confidence further.
- Products, such as BAP and BBPS (through its offline channel), are designed to help customers conduct digital transactions in an assisted manner. IPPB offers a first-of-its-kind assisted UPI service using a default

Virtual Payment Address (VPA) ID generated at the time of account opening. Providers should capitalize on these products to create awareness and build customer capability on digital payments.

Build a community of facilitators and end-users to drive the uptake of digital platforms

- A vibrant digital community of end-users and facilitators will help improve universal access to services, drive end-user engagement, and create an environment of trust for adopting digital platforms.
- Local champions can conduct awareness activities and onboard customers. Moreover, empowering rural establishments, such as *panchayats*, primary agricultural societies, and other rural-level institutions to transact and onboard customers digitally can also improve the uptake of digital solutions.

Ensure open communication through multiple channels

- Providers also need to think of innovations in customer communication through channels that all sections of the population can access. COVID-19 triggered WhatsApp as a preferred mode of communication for many customers. Many financial service providers now use the communication platform to inform their members and customers about product features and make other important announcements.

3.2.4 Improve the acceptance infrastructure for digital payments

The RBI and the GoI introduced various measures to boost the digital payments infrastructure. These included scrapping the MDR on UPI and RuPay card transactions, setting up the Payments Infrastructure Development Fund (PIDF) to improve acceptance infrastructure, and launching PM WANI (Prime Minister Wi-Fi Access Network Interface) Scheme to enhance digital access. In her Union Budget 2021-22 speech, the Finance Minister also announced a corpus of INR 15 billion (~USD 202 million) to incentivize digital payments and further develop the country's payments infrastructure[62], which will continue in 2022-23.[63]

Improve internet connectivity in remote areas and develop offline solutions to conduct transactions in regions plagued by low connectivity

- Unstable internet connectivity in the hinterlands continues to make digital payments difficult for users who live in these locations. This creates an urgent need to develop offline payment solutions that can process transactions without a data connection or process them when a data connection is available for users in remote rural locations.
- Many FinTechs have been piloting offline solutions using prepaid cards and NFC smart cards. However, providers must focus on driving offline payment solutions by creating awareness among customers and

[62] Hindustan Times. "Union budget 2021: INR 1500 crore scheme to boost digital payments." Hindustantimes.com. February 02,2021. Accessed June 22, 2022. https://www.hindustantimes.com/budget/union-budget-2021-rs-1-500-crore-scheme-to-boost-digital-payments-101612219947317.html

[63] Subramanium, Nikhil. "Union Budget 2022: Big Push For Digital Banking, But No Relief From Zero MDR For Payments Startups." Inc42.com. February 01, 2022. Accessed June 22, 2022. https://inc42.com/buzz/union-budget-2022-inr-1500-cr-digital-payments-scheme-75-digital-banking-units-more/.

merchants about the solutions, improving merchant adoption, designing solutions in regional languages, and controlling failures through better technical solutions and fraud through improved GRM.

Onboard merchants digitally in rural areas and deploy more devices or modes for merchants to accept digital payments from customers

- The PIDF scheme is an excellent step toward improving acceptance infrastructure. However, the fund only covers acceptance devices for card-based transactions (including QR). The increasing use of payment instruments, such as *Aadhaar*-enabled devices compared to the traditional PoS machines, presents an interesting case for such devices to be included under this scheme's purview, besides card-based transactions.
- Meanwhile, providers should deploy more PoS devices at subsidized rates, such as smart PoS devices, BAP devices, and even Bharat QR codes, to improve the country's acceptance infrastructure and build merchant capabilities. Devices, such as smart PoS can facilitate card payments and provide UPI transactions, pull-based transactions, and QR codes, among others. These devices can also use data analytics to offer payment-plus services, such as credit and insurance. Further, partnering with phygital firms, such as Vakrangee, can expand the outreach of billers in rural areas and create a truly integrated bill payment system through BBPS.

Strengthen the CICO network to provide access to financial services for people from the LMI segment

- The COVID-19 pandemic exacerbated agent economics and reduced the viability of agent business. However, specific measures[64] by banks, BCNMs, FinTechs, regulators, and policymakers can help improve the CICO network extensively:
  - Segment the agents into service agents and sales agents[65] to optimize the spread of agents as per population coverage,
  - Geotag the agent locations to enable customers to identify agent outlets easily and allow banks and BCNMs to take up monitoring activities,
  - Incentivize agents to undertake cashless transactions to reduce the prevalence of physical cash,
  - Conduct a costing study to identify the financial viability of agents and re-design compensation structures accordingly,
  - Create a dashboard that shows data on the performance of BCs, their active or dormant status, and offers a centralized support mechanism to address grievances
  - Empower CICO-agent models[66] in India to cater better to the LMI segments (specifically through AePS cash-outs).

[64] George, Bhat, and Gupta. Re-imagining the Last Mile – Agent Networks in India. Microsave.net. August 2016. Accessed June 22, 2022. http://www.microsave.net/wp-content/uploads/2018/11/PB_15_Re_Imagining_the_Last_Mile_for_Agents.pdf

[65] Srivastava, Morchan, Tiwari. "Optimizing Agent Network Distribution." Microsave.net. July 31, 2019. Accessed June 22, 2022. https://www.microsave.net/2019/07/31/optimizing-agent-network-distribution-2/

[66] Bhavnani, Sood. "Predominant Cash-in Cash-out (CICO) models in India." microsave.net. April, 2022. Accessed June 22, 2022. https://www.microsave.net/wp-content/uploads/2022/04/220426_CICO-models-and-MSC-pilots_v1.0.pdf

3.2.5 Enhance collaboration with ecosystem players to drive innovation

Banks and financial service providers use various technologies to design products, services, and fraud management practices. However, most players struggle to navigate their legacy systems and use customer data effectively to offer customized solutions. Innovation in the industry needs to improve by incumbent financial service providers such as banks, MFIs and others sharing more open APIs with relevant FinTechs and other technology partners. These open APIs help reduce barriers to entry and create more value for the customers.

Collaborate and create "super apps" to offer higher ease and utility for customers

- Super apps are platforms that offer customers the convenience and utility of multiple apps in a single app. Besides allowing users to make digital payments, these apps provide services, such as ticket booking, games, e-commerce, and consumer finance.
- The emergence of super apps is one of the primary reasons for UPI's rise in transactions since demonetization. The success of these payment super apps has established India as a major digital economy and exceeded growth expectations regarding the value and volume of digital transactions.

We see a significant opportunity for financial institutions amid the growing demand for a one-stop-shop solution for accessing products and services. Financial institutions can build customized product offerings for the LMI segment and host super apps that respond to the specific needs of different customer segments.

- The super apps also create more significant engagement with the customer. Using technologies such as AI/ML and big data, startups amass large amounts of data that includes the customers' preferences and purchasing behavior, which can help create customized solutions. Moreover, offering varied use cases in a single app also helps such startups gather behavioral insights on how much time customers spend online and how they spend that time, among other insights.

Section 4:
Annexes

4.1 Key events and entities that accelerated the shift to digital payments

4.1.1 *Pradhan Mantri Jan Dhan Yojana* (PMJDY)

The GoI launched the PMJDY program under the National Mission for Financial Inclusion. Its objective is to provide every household with universal access to banking facilities, with at least one basic banking account per household. PMJDY also offers financial literacy, access to credit, insurance, and pension facilities.

PMJDY formed a critical pillar of the *Jan Dhan-Aadhaar*-Mobile (JAM) trinity to digitize G2P payments and reduce leakages.[67] As of May 2022, more than 457 million[68] people now have access to formal financial services. Nearly 67% of these beneficiaries belong to rural and semi-urban areas, which indicates PMJDY's success in bridging the gap in terms of access to accounts between rural and urban areas. During 2014-2017, account ownership increased by around 30%[69] among adults in the poorest households, which comprise two-fifths of India's total population. Encouraged by the success of the program's first phase, GoI launched PMJDY 2.0 in 2018.

Despite concerns around the low usage of these accounts by the low-income segments, recent data[70] suggest a steady decline in the number of accounts with zero balance since 2015. According to the Press Trust of India, the number of zero-balance accounts declined to 7.9% of the total accounts in December 2021 from 58% in 2015. This decline points to a steady improvement in the usage of bank accounts. While cash withdrawal continues to be the largest use–case, PMJDY accounts have helped beneficiaries build savings to lead a better life and absorb shocks in their income. As of June 2022, the total deposits[71] in PMJDY accounts stood at INR 1,698 billion (~USD 23 billion).

[67] MSC. Pradhan Mantri Jan Dhan Yojana (PMJDY) – Ideas and lessons from India. April, 2020. Microsave.net Accessed June 22, 2022. https://www.microsave.net/wp-content/uploads/2020/05/PMJDY-1.pdf

[68] Pradhan Mantri Jan Dhan Yojana. "PMJDY – progress report." PMJDY.gov.in. Accessed June 22, 2022. https://pmjdy.gov.in/account.

[69] World Bank. "The little data book on financial inclusion." GlobalFindex.WorldBank.org. April 19, 2018. Accessed June 22, 2022. https://globalfindex.worldbank.org/sites/globalfindex/files/countrybook/India.pdf.

[70] Press Trust of India, New Delhi. "Deposits in bank accounts opened under Jan Dhan scheme cross Rs 1.5 trn." business-standard.com. January 10, 2022. Accessed June 22, 2022. https://www.business-standard.com/article/current-affairs/deposits-in-bank-accounts-opened-under-jan-dhan-scheme-cross-rs-1-5-trn-122010900345_1.html#:~:text=As%20of%20December%208,%202021,had%20informed%20Parliament%20last%20month.

[71] Pradhan Mantri Jan - Dhan Yojana. "Progress-Report." June 15, 2022. Accessed June 22, 2022. https://pmjdy.gov.in/account.

4.1.2 *Aadhaar* and India Stack

The UIDAI launched *Aadhaar*, a 12-digit unique identifier, to provide a universal ID to every resident in the country. *Aadhaar* has helped create a foundational ID for 95%[72] of adults in India. The growth of *Aadhaar* is entwined closely with PMJDY. It has enabled customers to open a bank account using the electronic repository of demographic details and photographs verifiable through biometric authentication.

Aadhaar has also empowered several public and private market players to offer a host of financial and non-financial services to the unserved and underserved segments. *Aadhaar* became integral to several flagship government programs, such as the PAHAL, MGNREGS, and PDS. It curbed leakages and allowed the actual beneficiaries to benefit from these programs.

Besides *Aadhaar*, other layers of the India Stack-paperless layer through eKYC, e-Sign, and DigiLocker, cashless layer through *Aadhaar*-based payments, UPI, and the consent layer-have transformed India's payments and financial services industry. India Stack is an independent open framework that enables various FinTechs and service providers to use the platform and develop sophisticated and customer-centric products for the Indian populace. This technology stack has significantly reduced customer acquisition and service costs. It continues to be the basis for the range of services launched by the public and private sectors.

[72] Totapally, Swetha, et. al., "State of Aadhaar Report 2019". 2019. Accessed on June 22, 2022. https://stateofaadhaar.in/assets/download/SoA_2019_Report_web.pdf?utm_source=download_report&utm_medium=button_dr_2019

4.1.3 Demonetization

The demonetization of high-value currency in 2016 catalyzed the adoption of digital payments. The use of cards, mobile money wallets (PPIs), UPI, and mobile banking increased rapidly after demonetization. The volume of debit card PoS transactions in December 2016 was 196%[73] higher than in October 2016. The temporary MDR waiver further encouraged merchants and customers to use digital payments. Within less than a year, acquiring banks had deployed ~2.9 million[74] PoS terminals across the country, up by almost 95% from the preceding year. Demonetization also boosted the growth of UPI as transactions soared by approximately 1,346% and 2,000%[75] in terms of volume and value, respectively, in just four months after demonetization.

An MSC study[76] reveals that demonetization had a varied impact across different consumer segments. Salaried consumers and their dependents were the least impacted owing to the formal nature of their employment and digitized salary payments. Farmers, traders, "self-employed" consumer segments, and "informal sector workers" faced considerable challenges due to the shortage in cash supply. Their high dependence on cash, limited digital capabilities, and lack of trust in digital payment solutions further aggravated this impact.

Nonetheless, in the absence of cash, demonetization created awareness and built a push for digital payments and solutions for most customer segments. However, as cash returned to circulation in the early months of 2017, the transaction volume of several digital payment modes plummeted, highlighting its short-term impact on the ecosystem.

4.1.4 Smartphone and internet ownership

As of April 2022, India had more than 1.14 billion[77] wireless telecom subscriptions. The increased adoption of smartphones, greater access to the internet, and growing comfort in using technology have enabled financial service providers to design innovative solutions for the unserved and underserved segments. The penetration of smartphones among the Indian population has increased from 26% in 2014 to 61% in 2022. Further, India's total smartphone users will likely rise to 1 billion[78] by 2026.

Rural India has largely propelled this digital revolution as it witnessed a rise in smartphone penetration from 9% in 2015 to 25% in 2018[79]. India had more than 761 million[80] mobile internet users as of March, 2022. The number of mobile internet users in urban India (~416 million) outnumbered rural users (345 million) by 17%[81].

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73 Reserve Bank of India. "Bankwise ATM/POS/CARD statistics." RBI.org.in. Accessed June 22, 2022. https://rbi.org.in/scripts/ATMView.aspx

74 Lele, Shekhar, and Aarushi Jain. "Demonetization effect: digital payments gain new momentum." PWC.in. November 15, 2017. Accessed June 22, 2022. https://www.pwc.in/consulting/financial-services/fintech/fintech-insights/demonetisation-effect-digital-payment-gain-new-momentum.html.

75 Reserve Bank of India. "Macroeconomic impact of demonetization - a preliminary assessment." RBI.org.in. March 10, 2017. Accessed Jun 22, 2022. https://m.rbi.org.in/Scripts/PublicationsView.aspx?id=17447.

76 MSC. "Demonetisation and Digitisation – a diagnostic study." MicroSave, March, 2017. Accessed June 22, 2022. http://www.microsave.net/wp-content/uploads/2018/10/Demonetisation_and_Digitisation_Diagnostic_Study.pdf

77 TRAI. "Highlights of Telecom Subscription Data as on 30th April, 2022." trai.gov.in. April 30, 2022. Accessed June 22, 2022. https://www.trai.gov.in/sites/default/files/PR_No.40of2022_0.pdf.

78 Deloitte Global. "Technology, Media, and Telecommunications - Predictions 2022." February, 2022. Accessed June 22, 2022. https://www2.deloitte.com/in/en/pages/technology-media-and-telecommunications/articles/tmt-predictions-2022.html.

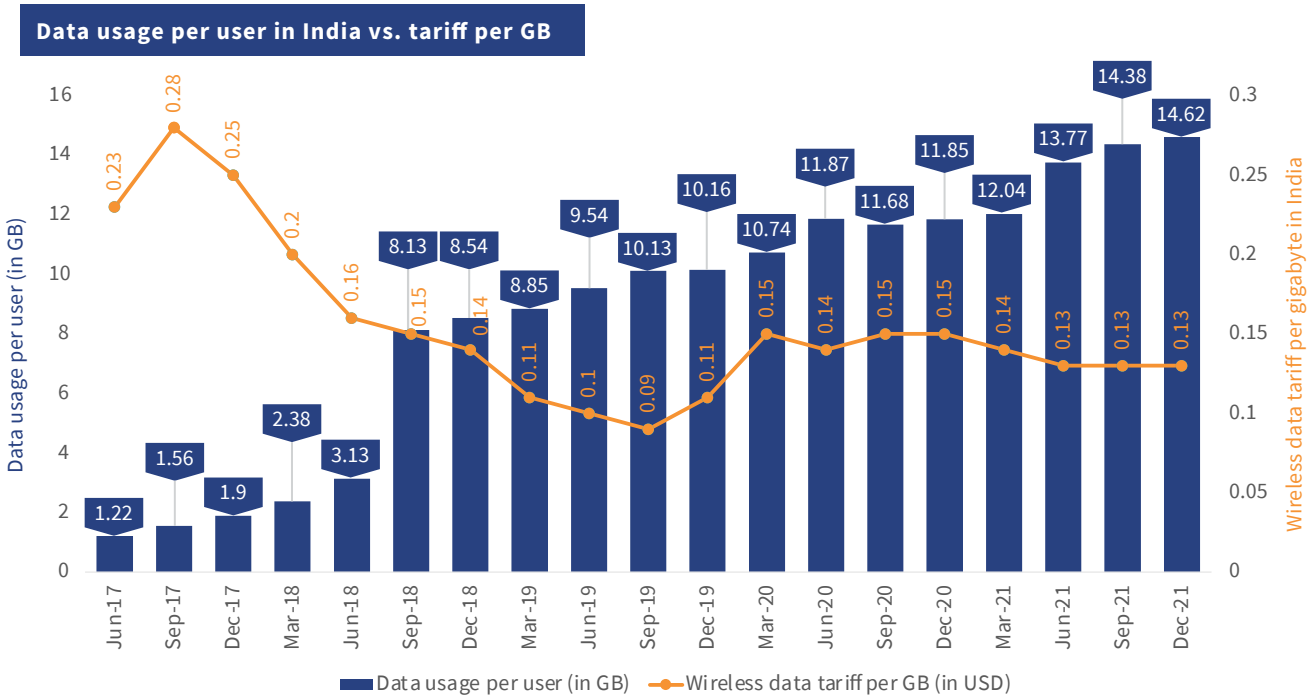
79 India Cellular and Electronics Association. "Contribution of Smartphones to Digital Governance in India." Icea.org.in. July 2020. Accessed on February 20, 2021. https://icea.org.in/wp-content/uploads/2020/07/Contribution-of-Smartphones-to-Digital-Governance-in-India-09072020.pdf

80 TRAI. "Highlights of Telecom Subscription Data as on 30th April, 2022." trai.gov.in. April 30, 2022. Accessed June 22, 2022. https://www.trai.gov.in/sites/default/files/PR_No.40of2022_0.pdf.

81 TRAI. "Highlights of Telecom Subscription Data as on 30th April, 2022." trai.gov.in. April 30, 2022. Accessed June 22, 2022. https://www.trai.gov.in/sites/default/files/PR_No.40of2022_0.pdf.

Access to content in local languages and a rise in video-streaming apps have been driving the internet boom in rural areas.

Figure 15: Wireless data usage and tariff



The growth of 4G services has also added many first-time users, with rural India witnessing a 45% increase in new internet users since 2019. As of December 2021, an average wireless internet subscriber in India consumes 14.97 GB per month at INR 9.91 (~USD 0.13) per GB[82], which remains the cheapest internet worldwide. Affordable access to low-cost internet and smartphones will continue to expand the digital frontiers to new generations of mobile-first internet users..

4.1.5 National Payments Corporation of India (NPCI)

The NPCI was established in 2008 under the RBI and the Indian Banks Association (IBA). It functions as a hub for all retail payment and settlement systems in India. Starting with the National Financial Switch (NFS) in 2010, NPCI continues to play a critical role in pushing India toward a less-cash economy.

NPCI works with different stakeholders, including regulators, banks, payment service providers, and FinTechs, to design solutions that address the needs of the mass market. It focuses on:

- Creating the shared digital infrastructure for financial service providers;
- Using state-of-the-art technology to design a diverse range of consumer-centric products and services;

[82] Telecom Regulatory Authority of India. "The Indian Telecom Services Performance Indicators." May 4, 2022. Accessed June 22, 2022. https://www.trai.gov.in/sites/default/files/QPIR_05052022.pdf.

- Ensuring safeguards within digital platforms; and
- Improving the delivery of services through innovation.

Figure 16: NPCI's role as a payment infrastructure enabler

Figure 16 highlights NPCI's products and services other entities, such as SFBs, PBs, and FinTechs, use to deliver digital payment solutions to their customers.

NPCI's efforts to build an open-source and safe digital ecosystem have led to a paradigm shift in delivering digital payment solutions to the masses. Products such as UPI, AePS, BAP, Bharat QR, BBPS, RuPay cards, CTS, NACH and IMPS are recognized for their innovation and inclusiveness. These products have created a seamless payment experience for individuals, businesses, and governments. Further, NPCI recently introduced a separate, wholly-owned, "for-profit" entity, the NPCI International Payments Limited (NIPL)[83], to create global acceptance for UPI and RuPay cards.

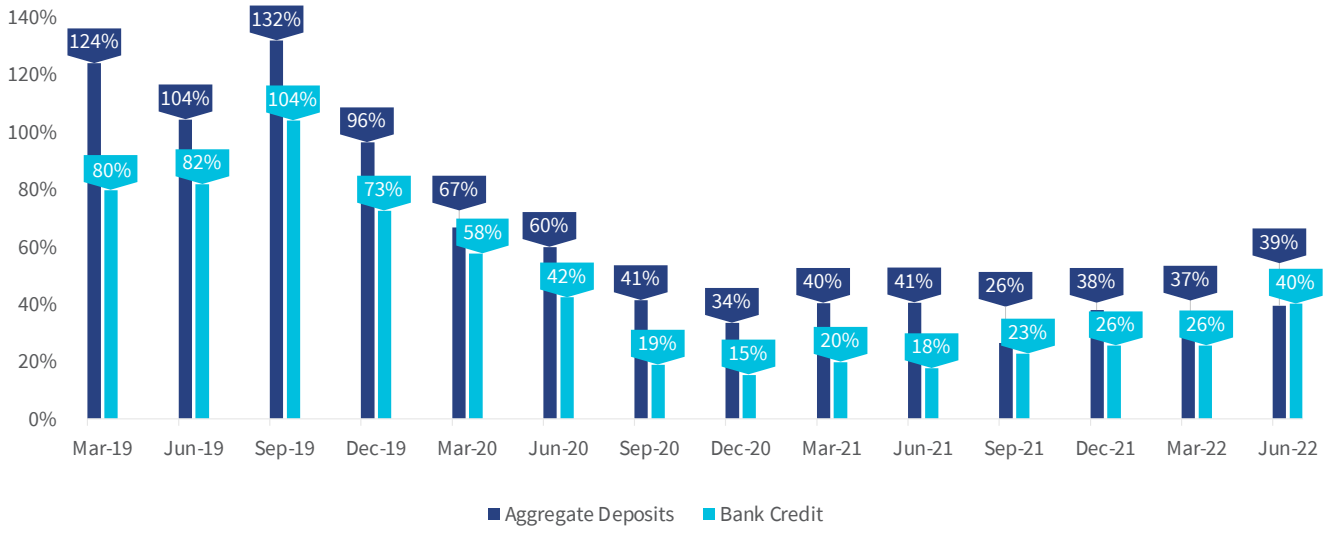
4.1.6 Small finance banks

The RBI issued licenses to 11[84] entities to set up small finance banks to further financial inclusion. The objective was to provide savings and credit services to small business units, small and marginal farmers, micro and small industries, and other unorganized sector entities through technology-enabled low-cost operations. While SFBs have shown significant growth in aggregate deposits and bank credit, their operations remain highly people-intensive. Besides, SFBs also grapple with challenges around the adoption of technology and management of the liability side of the business.

[83] National Payments Corporation of India. "About NIPL." NPCI.org.in. Accessed June 22, 2022. https://www.npci.org.in/who-we-are/group-companies/npci-international.

[84] Nair, Vishwanath. "RBI issues 10 small bank licenses." Livemint.com. September 16, 2015. Accessed June 22, 2022. https://www.livemint.com/Industry/1Jqz0fDRUpIUeYSJs8tCmK/RBI-grants-small-banks-licence-to-10-applicants.html.

Figure 17: Quarterly growth rate of bank deposits and bank credits in SFBs (per cent)



COVID-19 dealt a severe blow to small finance banks' business. Their collections dwindled, and delinquency rates rose sharply while customers struggled to repay their EMIs amid widespread unemployment and migration. Subsequently, growth[85] in deposits and credit fell by 97% and 130%, respectively, between December 2019 and 2020 (as seen in figure 17). However, these have slowly started picking up post the peak of the pandemic. As of December 2021, these deposits and the credit percentage have seen a YoY growth of 12% and 50%, respectively, since households are back in business, as usual.

Many SFBs resorted to virtual modes to connect with clients and collect repayments through UPI, app-based payments, and QR code-based payments to cope with the adverse situation which led to increased adoption of digital payments by their clients.

4.1.7 Payments banks

Based on the recommendations of a committee headed by Dr. Nachiket Mor, RBI envisaged payments banks (PBs) to address the financial needs of vulnerable sections of the population, such as migrant laborers, MSMEs, low-income households, and the unorganized sector through products, such as small savings accounts, payments, and remittance services. PBs were conceptualized to use technology to reduce customer acquisition costs and improve the delivery of financial products and services for the unserved and underserved segments.

While RBI granted in-principle approval to 11 applicants to set up payments banks, only six PBs are currently operationally active[86]. These PBs faced teething issues, such as difficulty chalking out a profitable business plan within the purview of the strict regulatory requirements long after their launch.

[85] Reserve Bank of India. "Database on Indian economy – Quarterly statistics on deposits and credit of scheduled commercial banks." dbie.rbi.org.in. May, 2022. Accessed June 22, 2022. https://dbie.rbi.org.in/DBIE/dbie.rbi?site=publications#!3.

[86] Reserve Bank of India. "Websites of Banks in India." rbi.org.in. Accessed June 22, 2022. https://rbi.org.in/scripts/banklinks.aspx

However, the business model is now looking up as Paytm PB, a leading player with an extensive payments network in India, reported profits[87] of USD 200 million[88] in FY 2021-22. another player, Airtel PB, also reported profits[89] with a revenue of INR 10 billion (~USD 135 million[90]) in FY 2021-22. Further, in 2019, RBI issued on-tap licenses to allow PBs to transform into SFBs after five years of operations.

4.1.8 FinTechs

India is home to 4,827 registered FinTechs[91] and is the third-largest FinTech ecosystem in the world. The rising use of smartphones and the Internet, India's growing demographic dividend, emerging trends in e-commerce, and progressive regulatory policies have aided the FinTech ecosystem. Demonetization accelerated the growth of FinTechs and added 150 million customers and 10 million merchants to the FinTech sector[92]. Today, due to COVID-19, alongside other enabling factors, India has the highest number of FinTech adopters in the world at 87%[93], compared to the global adoption of 64%.

The rising usage of digital financial services by customers has allowed FinTechs to understand and predict customer behavior and risks using these new data streams. The use of data, coupled with innovative technology, such as Distributed Ledger Technology (DLT), artificial intelligence (AI), and machine learning (ML), offers tailwinds for FinTechs to segment, target, and reach out to customers. Regulatory sandbox and hackathons by the RBI and the NPCI have encouraged FinTechs to foster innovation.

Moreover, the entry of players, such as WhatsApp, with a customer base of more than 530 million[94], will create more competition in the market for FinTechs to foster disruptive innovation and further promote digital payments.

87 Tyagi, Gaurav, and Vardhan, Jai. "Paytm shrinks losses by 42% in FY21 but operating revenue falls to the tune of 15%." Entrackr.com. June 06, 2021. Accessed August 31, 2021. https://entrackr.com/2021/06/paytm-shrinks-losses-by-42-in-fy21-but-operating-revenue-falls-to-the-tune-of-15/.

88 Paytm. "Earnings Release Quarter ending Mar'22." paytm.com. May 20, 2022. Accessed June 22, 2022. https://paytm.com/documents/financial-results/fy2021-22/Paytm-Q4-FY-2022-Earnings-Release-USD-Version.pdf"

89 Majumdar, Romita. "IPO-Bound Fino Turned Profitable In FY21, But Expenses Remain High." INC42.com. August 10, 2021. Accessed August 31, 2021. https://inc42.com/features/what-the-financials-ipo-bound-fino-turned-profitable-in-fy21-but-expenses-remain-high/.

90 Press Trust of India. "Airtel Payments Bank customer deposit surges 75% to Rs 1,000 crore in 2021." financialexpress.com. January 27, 2022. Accessed June 22, 2022. https://www.financialexpress.com/industry/banking-finance/airtel-payments-bank-customer-deposit-surges-75-to-rs-1000-crore-in-2021/2417247/.

91 Kaur,INC42. "https://inc42.com/reports/state-of-indian-fintech-infocus-bnpl-q1-2022-report/ Accessed, July,21,2022

92 Maji, Priyadarshini. "Demonetisation keeps digital payments up; cashless transactions grow 13.5% in September." BusinessToday.in. November 08, 2017. Accessed February 13, 2021. https://www.businesstoday.in/money/banking/demonetisation-digital-payments-cashless-transactions-ewallets-credit-card-debit-card-paytm/story/263466.html

93 Sharan, Gunja. "India Has More Fintech Adopters At 87% Compared To Global Average Of 64%: Report." inc42.com. May 02, 2022. Accessed June 22, 2022. https://inc42.com/buzz/india-has-more-fintech-adopters-at-87-compared-to-global-average-of-64-report/.

94 Upadhyay, Harsh. "Govt says WhatsApp has 530 Mn users in India." Entrackr.com. February 25, 2021. Accessed June 22, 2022. https://entrackr.com/2021/02/govt-says-whatsapp-has-530-mn-users-in-india/.

4.1.9 COVID-19 and beyond

While the COVID-19 pandemic imposed significant limitations on people's lives, it also accelerated the adoption of digital payments by consumers through a behavioral shift-after the government's initiative to demonetize high-value currency in 2016.

The government promoted digital payments to reduce contact among citizens, as the fear of contracting COVID-19 was prevalent. It helped create a surge in the growth of digital payments. A KPMG[95] report highlighted that by June 2020, the value of digital payments grew faster than its volume as the ticket size of digital payments increased by approximately 10%-20% across various sectors to maintain social distancing.

While the economy contracted by an estimated 10%[96], we saw a record surge in transaction volumes of *Aadhaar*-based payments (by 61%) and contactless payments (by 75%) due to COVID-19 in 2020[97]. Online grocery stores, pharmacies, over-the-top (OTT) platforms, online gaming, airtime top-ups, and utility or bill payments were among the use cases that drove digital payments in the country.[98]

[95] KPMG Assurance and Consulting Services LLP. "Impact of COVID-19 on digital payments in India." KPMG.in. August 2020. Accessed June 22, 2022. https://assets.kpmg/content/dam/kpmg/in/pdf/2020/08/impacting-digital-payments-in-india.pdf.

[96] Estimates by various rating agencies such as Moody's and Goldman Sachs

[97] Pathak, Akshat, and others. "Analysis of India's payment system indicators in 2020." March 2021. Accessed June 22, 2022. https://www.microsave.net/wp-content/uploads/2021/03/Analysis-of-India%E2%80%99s-payment-system-indicators-in-2020.pdf

[98] Zubin Tafti, and others. "Impact of the COVID-19 outbreak on digital payments." May 2020. Accessed June 22, 2022. https://www.pwc.in/consulting/financial-services/fintech/dp/impact-of-the-covid-19-outbreak-on-digital-payments.html.

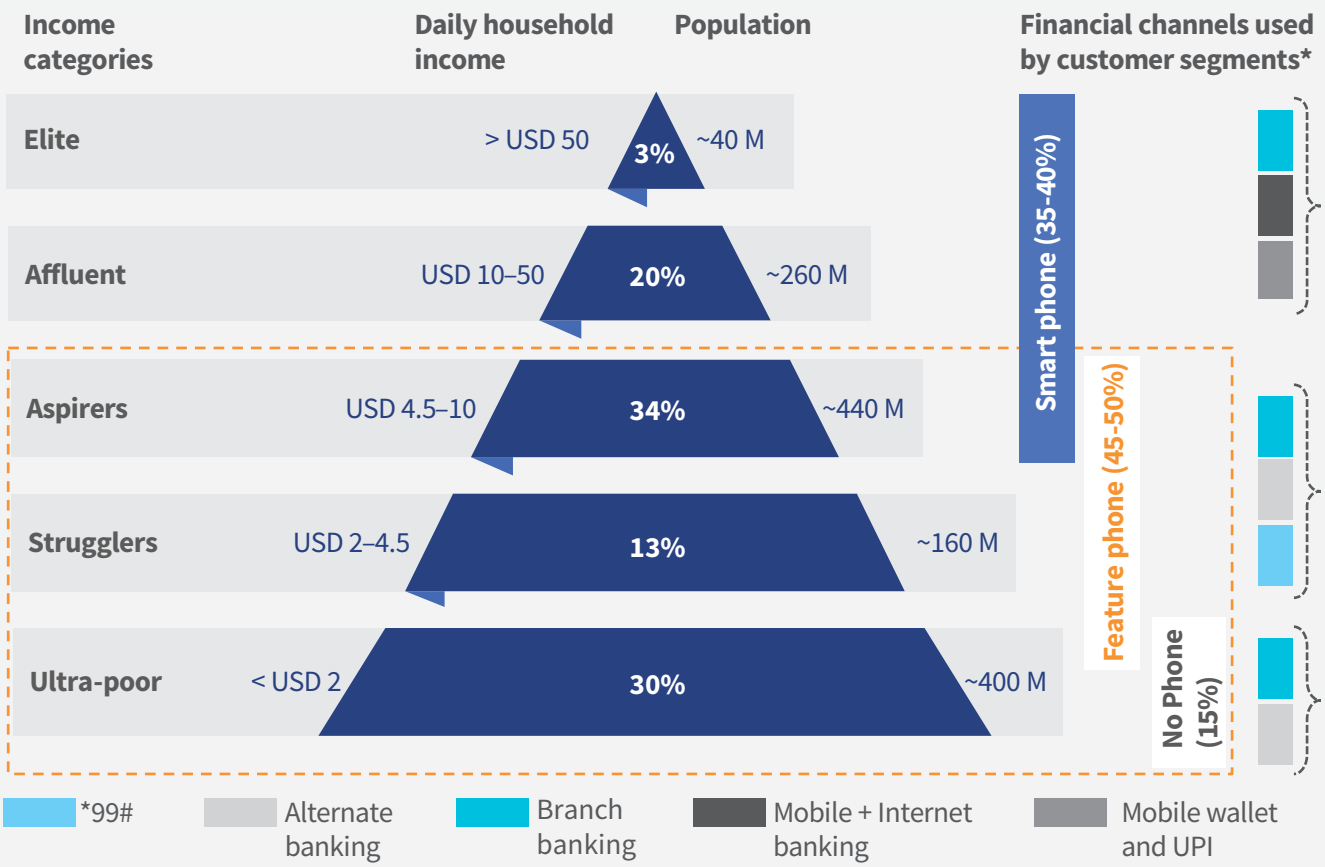
India experienced a second wave of the COVID-19 pandemic during HY1'21, which reduced consumer spending on non-essential goods. Interestingly, while the demand for digital payments soared, we also observed a strong preference for cash among consumers. The average amount of currency with the public remained at INR 28.6 trillion[99] (~USD 386 billion) in 2021. Growing concerns about the pandemic and looming economic uncertainties led people to prefer safeguarding cash.

On the other hand, contactless payment modes, such as UPI and BBPS, witnessed a sharp rise in transaction volumes once the lockdown restrictions were relaxed and most businesses resumed full or partial operations. While UPI became one of the most preferred payment modes for online and offline purchases during the first and second wave of the pandemic, the ease of making round-the-clock bill payments to multiple billers from a single platform helped improve the adoption of BBPS. At the end of HY1 '21, BBPS clocked 201 million[100] transactions.

COVID-19 also provided a fillip to *Aadhaar*-based payments as government cash transfers during the pandemic created a massive demand for withdrawals, leading to all-time high transactions for AePS. The government's cash transfer programs, such as PMGKY and PM-KISAN, to support vulnerable citizens during the pandemic created a massive demand for cash withdrawal. Further, the second wave affected banking services, with several branches closing and working hours shortened due to operational difficulties, increasing people's reliance on AePS transactions. BAP, the merchant version of AePS, also helped merchants digitize small ticket-size transactions due to the reduced usage of cash during the pandemic.

[99] MSC analysis based on RBI data. "Data on money supply." RBI.org.in. Accessed June 22, 2022. https://www.rbi.org.in/Scripts/Data_MSupply.aspx.
[100] MSC analysis based on NPCI product statistics.

4.2 Classification of customer segments in India



We have defined the customer segments in the country based on their daily household income. Each of these segments possesses varying financial needs and can be differentiated based on various parameters as follows:

- **Ultra-poor:** These are the poorest of the poor segments, with a daily household income of less than INR 150 (~USD 2). They typically do not own phones and live in rural areas with limited or no internet connectivity. The unemployed population, senior citizens in rural areas, etc., are some examples of the ultra-poor segment. They depend extensively on social security schemes and rely on the assisted mode of financial transactions through *Aadhaar.* They are highly wary of digital channels due to a lack of awareness and trust in digital channels.
- **Strugglers:** Strugglers earn a daily household income between INR 150 (~USD 02) and 330 (~USD 4.5) and comprise roughly 13% of India's population. Daily-wage earners, migrants, homemakers, etc., are some examples of strugglers. They are primarily feature-phone users and also use alternate channels to access financial services since traditional FSPs fail to reach this segment. They have limited awareness of digital channels and lack a clear value proposition to adopt digital payments.

- **Aspirers:** Aspirers, together with the strugglers and the ultra-poor, constitute the low and middle-income segments in the country. Aspirers earn a daily household income of up to INR 740 (USD 10) and form the most significant chunk of the population at 440 million. Similar to strugglers, these segments also typically possess feature phones. However, a few users are gradually shifting to smartphones now. Small merchants, salaried professionals, students, etc., are some examples of aspirers. They access formal financial services through multiple channels, such as branches, USSD-based channels (*99#), and alternate channels, such as FinTechs, and have moderate awareness about digital payments.
- **Affluent and elite:** These segments are financially well-served by FSPs and have access to multiple banking channels ranging from bank branches, mobile banking, internet banking, mobile wallets or UPI, and FinTechs. Their daily household income typically lies between INR 740 (USD 10) and INR 3,700 (USD 50) in the case of Affluents and more than INR 3,700 (USD 50) per day in the case of elites. They are active users of smartphones and the internet and prefer digital modes over physical means to access financial services.

4.3 Future of digital payments

4.3.1 Frictionless payments

- Frictionless or invisible payments allow consumers to set a time limit on the duration they intend to use particular services and pay for them based on their usage. Apart from offering ease of use, frictionless payments also optimize cost by reducing the waiting time for transactions and can be used in online and offline modes.

  The industry currently has the capability and technology to make seamless frictionless payments. Queue-less checkouts, recurring bill payments, and QR codes are some examples of frictionless payments. All UPI-enabled apps in India support scanning Bharat QR and UPI QR to enable digital payments and permit easy transactions. Various public sector entities have also started to accept bill payments via Bharat QR. Currently, about ~4.9million[101] Bharat QR codes are deployed in the market, through which ~250 million transactions are processed monthly[102].

- The growing focus on frictionless payments among regulators and public and private sector players is evident from the recent policy changes by RBI. According to a media report[103] in 2019, RBI is considering developing a sovereign digital currency in the country, which will promote frictionless payments. Moreover, the RBI mandated the tokenization of cards-currently applicable only on credit cards-which

[101] Reserve Bank of India. "Payment System Indicators." dbie.rbi.org.in. Accessed June 22, 2022. https://dbie.rbi.org.in/BOE/OpenDocument/1608101729/OpenDocument/opendoc/openDocument.faces?logonSuccessful=true&shareId=3

[102] Bhalla, Kritti. "UPI QR Caters To 250 Mn Transactions Monthly, But Numbers Still Low, Says RBI." inc42.com. August 05, 2020. Accessed June 22, 2020. https://inc42.com/buzz/upi-qr-caters-to-250-mn-transactions-monthly-but-numbers-still-low-says-rbi/#:~:text=Share%20story-,UPI%20QR%20Caters%20To%20250%20Mn%20Transactions%20Monthly,Numbers%20Still%20Low,%20Says%20RBI&text=Digital%20payment%20system%20Unified%20Payments,an%20RBI%20report%20has%20revealed.

[103] Livemint. "RBI explores the possibility of digital rupee." January 25, 2021." Accessed June 22, 2022. https://www.livemint.com/news/india/rbi-considering-digital-rupee-11611586649207.html

may provide a much-needed boost to the virtual card segment. As per industry estimates[104], frictionless payments are expected to reach INR 5.6 trillion (~USD 75 billion) in annual transactions by 2022.

4.3.2 Contactless payments

- Contactless payments enable customers to make payments without using any type of card or needing to enter a PIN. These constitute about 15% of India's digital payment transactions. COVID-19 accelerated the growth of contactless payments massively in the country. The FIS PACE pulse survey Q3 2020 states that most (83%) of the surveyed respondents note that they would use contactless payments instead of cards or cash for in-store shopping in the aftermath of COVID-19.
- Touchless solutions, such as the National Common Mobile Card (NCMC) and original equipment manufacturer (OEM) mobile apps or wallets, have gained prominence over the past few years. The emergence of such solutions may impact[105] more than 931 million debit cards[106] and more than 72 million credit cards outstanding as of March 2022. While transit is projected as one of the principal use cases of NCMC, these cards have multiple use cases across the entire digital payments ecosystem.

  The digitization of payments will further increase the acceptance of NFC-based infrastructure and mobile-based solutions. Moreover, NPCI plans to expand the PoS infrastructure's NFC capabilities.

[104] Doyle, Megan. "Advanced Payment Solutions are Revolutionizing the Retail Experience." Accessed June 22, 2022. https://www.americanexpress.com/us/foreign-exchange/articles/advanced-payment-solutions-in-retail-sector/

[105] Lele, Saigal. "NCMC: Another step toward a less-cash India." pwc.in. May, 2019. Accessed June 22, 2022. https://www.pwc.in/industries/financial-services/fintech/fintech-insights/ncmc.html#:~:text=NCMC%20may%20impact%20more%20than,outstanding%20as%20of%20February%202019.&text=While%20transit%20is%20projected%20as,across%20the%20entire%20payments%20ecosystem.

[106] Reserve Bank of India. "Payment System Indicators." dbie.rbi.org.in. Accessed June 22, 2022. https://dbie.rbi.org.in/BOE/OpenDocument/1608101729/OpenDocument/opendoc/openDocument.faces?logonSuccessful=true&shareId=3

Presently, approximately 20% of PoS terminals are NFC-enabled[107]. NFC will further extend the reach of UPI transactions for offline merchants using PoS devices. It will also help the NPCI compete with global card networks like Visa and MasterCard that have deep associations with banks in terms of contactless payments, dubbed "tap and go," made via their NFC-enabled chip cards.

4.3.3 Voice-based payments

- Globally, Amazon Pay, Google Pay, and Apple Pay are in the process of introducing voice payments. India, meanwhile, is fast adopting voice technology. This is evident in the increasing number of smart speakers, voice assistant-embedded devices, and voice searches done over smartphones. More than 1 million[108] smart speakers were shipped to India in 2020, and the number has only grown since.
- India boasts more than 200 million people with voice technology access on their Jio devices. This voice-based technology is designed to provide a smooth user experience. It benefits the ~1 billion LMI population, who are either illiterate or belong to the tech-handicapped segment and are more comfortable conversing in their local language. The voice technology helps these users conduct assisted transactions in the language of their preference, resulting in improved trust and confidence to conduct more such transactions.
- Several FinTechs and financial institutions in India now use voice recognition technology to offer access to financial products and services. Many financial institutions in the lending space already use voice technology through bots to serve customers. This might soon become a reality to transfer payments as well.

4.3.4 Offline payment solutions

- Despite having more than 1.1 billion wireless telecom subscribers and about 761 million mobile internet users in India, as of March 2022, internet connectivity issues continue to plague consumers. This is why the RBI and NPCI are pushing companies to develop offline modes of retail payments through cards, wallets, and mobile devices. While payment companies have been acquiring offline or physical store merchants and pushing them onto digital payment platforms through PoS devices and QR codes, the RBI now seeks innovative solutions that do not require access to internet data.
- The most used options for digital transactions beyond urban areas are PoS devices and QR codes. Yet both options depend on internet connectivity, and transactions can fail due to network issues. Challenges such as high infrastructure and servicing costs further limit the deployment of PoS devices in rural areas. By introducing offline solutions, we could see the acquisition costs come down for merchants additionally.
- Although a few offline payment solutions, such as RuPay Contactless or *99#, exist already, their adoption is limited. The latter is cumbersome due to the unavailability of the service on several mobile networks. UPI 123Pay is a new service that the RBI has launched, which intends to enable (but is not limited to)

[107] Bansal, Nalin. "Mobile Proximity Solutions: Exploring The Possibilities." npci.org.in. Accessed June 22, 2022. https://www.npci.org.in/blogs/mobile-proximity-solutions-exploring-the-possibilities.

[108] Techarc. "AMAZON LEADS SMART SPEAKER MARKET IN INDIA BOTH IN VALUE AND VOLUME MARKET SHARES. XIAOMI RANKS 2ND BY MARKET VALUE SHARE (10%) IN ITS 1ST YEAR OF MARKET ENTRY." techarc.net. February 17, 2021. Accessed June 22, 2022. https://techarc.net/smart-speaker-shipments-cross-record-1-mn-in-2020-apple-widens-the-choice-for-consumers/

around 400 million feature phone users in the country to make real-time digital payments without the need for smartphones and internet connections. Through this latest payment mode, users can make digital payments in four different ways[109]-

- App-based functionality: An app would be installed on the feature phone through which several UPI functions, available on smartphones, will also be available on feature phones.
- Missed call: This will allow feature phone users to access their bank account and perform routine transactions such as receiving, transferring funds, regular purchases, bill payments, etc., by giving a missed call on the number displayed at the merchant outlet. The customer will receive an incoming call to authenticate the transaction by entering UPI PIN.
- Interactive Voice Response (IVR): UPI payment through pre-defined IVR numbers would require users to initiate a secured call from their feature phones to a predetermined number and complete UPI onboarding formalities to start making financial transactions without an internet connection.
- Proximity sound-based payments: This uses sound waves to enable contactless, offline, and proximity data communication on any device.

- Also, the GoI has recently launched[110] e-RUPI-a one-time contactless, cashless voucher-based payment mode that enables users to redeem the voucher without a card, digital payments app, or internet banking access. It is a person-specific and, in some cases, a purpose-specific digital voucher. e-RUPI does not require the beneficiary to have a bank account, which is a prominent distinguishing feature compared to other digital payment forms. It ensures an easy, contactless, two-step payment and redemption process that does not require sharing of personal details either. Moreover, e-RUPI is also operable on feature phones, which empowers users who have feature phones or lack an internet connection to conduct digital payment transactions.

4.3.5 Analytics-based value-added solutions

- Technologies like blockchain and AI/ML are now studied and discussed worldwide in the payments sector because they can improve how payments are processed and meet customers' demands. Such technology can help process payments faster, ease reconciliation, and offer greater transparency.
- While blockchain-based payments are still developing, NPCI has been gearing up to set up a blockchain-based platform called Vajra. This platform intends to offer secure and tamper-evident transactions in a distributed and immutable database. Vajra will help process payments securely with multiple authorized payment entities that can process transactions via web interfaces[111].

[109] Times of India. "Explained: What is 123PAY and how you can use it to make UPI payments without internet connection." timesofindia.indiatimes.com. March 9, 2022. Accessed June 22, 2022. https://timesofindia.indiatimes.com/gadgets-news/explained-what-is-123pay-and-how-you-can-use-it-to-make-upi-payments-without-internet-connection/articleshow/90090779.cms

[110] Press Information Bureau, Mumbai. "Know all about e-RUPI, the new digital payment instrument." pib.gov.in. August 6, 2021. Accessed June 22, 2022. https://pib.gov.in/PressReleasePage.aspx?PRID=1743056

[111] Rawat, Aman. "NPCI launches blockchain based Vajra platform to secure payments." inc42.com. January 06, 2020. Accessed June 22, 2022. https://inc42.com/buzz/npci-launches-blockchain-based-vajra-platform-to-secure-payments/

- On the other hand, many companies use AI/ML to create personalized value-added solutions for customers and merchants using their behavioral and transactional data. Financial service providers have been creating more value and delivering users an enhanced experience through additional services. These services include payment reminders, automated debit instructions, individual cash management, analytics based on consumer spending, and the geolocation of merchants who accept digital payments.
- Providers offer such value-added solutions to merchants to create a strong value proposition to switch to digital payments. Services, such as customer relationship management, working capital management, access to digital credit, and business intelligence insights on the sales data, among others, are some offerings that providers offer to merchants-especially smaller merchants. The increasing use of technology is expected to create more demand for such value-added solutions among consumers.

4.4 International replication of Indian payment systems

India's digital payments space witnessed a much sharper rise in the growth trajectory than many advanced less-cash economies. A gamut of innovations spurred this growth over the past decade. According to a FIS survey[112], India has an evolved digital payment ecosystem based on round-the-clock availability of services, adoption, and immediacy of payments, compared to 25 other countries, including the UK, China, and Japan.

Experts perceive India as a pioneer[113] in the digital payments space. It successfully built and managed platforms that promoted open, interoperable, and low-cost real-time payment systems. Such platforms led to a surge in the acceptance of digital payments in India, which can be replicated in other countries. While many initiatives have been scaled up and replicated worldwide, here we have identified a few initiatives that can act as lessons for other countries and their customers:

4.4.1 India Stack

The Indian government led the creation of the India Stack-a secure technology stack to seamlessly extend identity and payments-related services, among others, to the Indian populace. The robust and reliable platform enabled the Indian government and regulators to combine the concept of a shared national identity with a standard national API through a digital system.

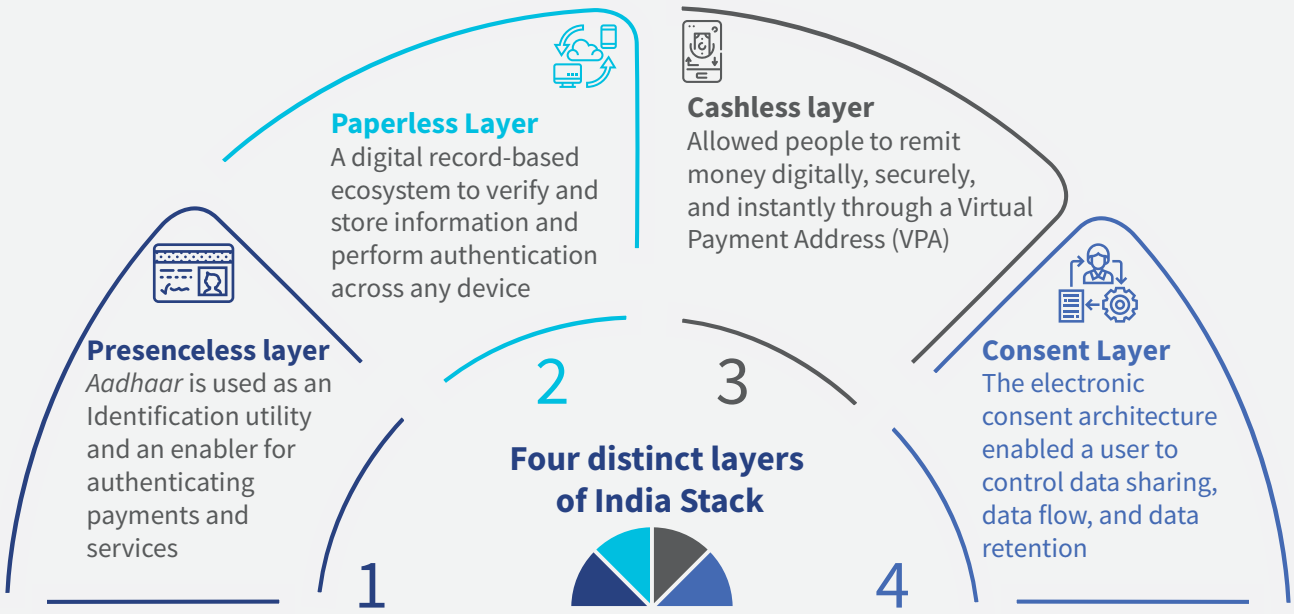
Experts looked up to India while it marked its place as one of the first countries to embrace a platform-first ecosystem[114]. Four distinct layers play a crucial role in India's digital foundation and evolution. These are:

[112] Knowledge centre, IBEF. "Digital payment industry in India." Ibef.org. January 04, 2019. Accessed June 22, 2022. https://www.ibef.org/blogs/digital-payment-industry-in-india.

[113] Lee, Yoolim. "Gates Calls India's Digital Finance Approach a Global Model." Bloombergquint.com. December 08, 2020. Accessed February 03, 2021. https://www.bloombergquint.com/business/bill-gates-calls-india-s-digital-finance-approach-a-global-model.

[114] Global Fintech Fest. "India Stack is brilliant; next step to make it globally interoperable: says Shivananda, CTO, PayPal, at the Global Fintech Fest." PRnewswire.com. July 23, 2020. Accessed June 22, 2022. https://www.prnewswire.com/news-releases/indiastack-is-brilliant-next-step-to-make-it-globally-interoperable-says-shivananda-cto-paypal-at-the-global-fintech-fest-301098608.html.

Figure 18: Distinct layers of India Stack



India Stack has been working toward a presence-less, paperless, and cashless service delivery. The stack was built layer by layer and connected over time. It hosted ambitious platforms for digital payments, featuring the world's largest biometric database and an API-based digital infrastructure to remit money between any bank, smartphone app, or prepaid instrument (PPI). India Stack has built an independent open framework that enables various FinTechs and service providers to use the platform and develop sophisticated and customer-centric products for the Indian populace.

India Stack's implementation had a significant impact on the Indian population. As per data from UIDAI and India Stack, above 1.33 billion[115] *Aadhaar* numbers had been issued by June 2022, with more than 86%[116] of bank accounts seeded with *Aadhaar*. It significantly reduced the costs to deliver financial products and onboard customers while providing access to a whole new range of customers and paving new roads for the FinTech and digital payments ecosystem in India. Seeking to build a similar platform, many countries have already approached Indian payment experts associated with designing India Stack for guidance. Future disruptions will further test its limits and possibilities.

4.4.2 NPCI international is growing well through RuPay card and UPI expansion

NPCI's board identified the scope for global expansion after considering the growth potential of Indian payment systems and remittance services through active participation and cooperation in international fora.

[115] Unique Identification Authority of India. "*Aadhaar* dashboard." uidai.gov.in. Accessed June 22, 2022. https://uidai.gov.in/*Aadhaar*_dashboard/india.php.

[116] Unique Indentification Authority of India. "Annual report 2020-21." uidai.gov.in. Accessed June 22, 2022. https://uidai.gov.in/images/UIDAI_Annual_Report_2020-21_English_final.pdf.

Following this, NPCI introduced a wholly-owned "for-profit" separate entity-NPCI International Payments Limited (NIPL)[117]. It was established to export NPCI's indigenously developed offerings and technological expertise.

RBI, in close collaboration with the GoI and NPCI, has been working toward building a vast acceptance network for UPI and RuPay cards while easing remittances into India. This will help Indian travelers to make payments using indigenous payment methods in their destination country of travel. NIPL will co-create payment systems with other nations and aid those countries by enhancing their digital payment capabilities.

Several countries in Asia, Africa, and the Middle East sought the NPCI's knowledge and experience to establish a "real-time payment system" or "domestic card scheme" in their market to meet the rapidly evolving need for fast-growing global business. Following this, the NPCI successfully established partnerships with Discover Financial Services (DFS) USA and Network for Electronic Transfers (NETS) Singapore, among others.

As payment modes, products, such as UPI and RuPay cards, proved to be cost-effective, secure, convenient, and instantaneous. This encouraged several foreign nations to replicate similar models. While RuPay cards have established worldwide acceptance[118], they have only been issued in Bhutan so far.

The UPI model has unique features, such as an open platform, two-factor authentication, a facility for service providers to build on top of existing infrastructure, access to multiple bank accounts in a single application, and interoperability with bank accounts and PPIs, among others. Such attributes have made it appealing to other nations as well. After Singapore, UAE, Nepal, and Bhutan, France[119] will be the next country to accept payments using the Unified Payments Interface (UPI) and RuPay Cards.

The joint development of country-specific products and central digital payment facilitators of other economies can ensure UPI's successful implementation. UPI's soft launch was executed in Singapore in collaboration with NETS. Its rollout is in advanced stages in South Korea and UAE. Any economy without a strong card and digital payments network can utilize UPI's P2P transfer facility[120].

Compared to similar products, such as China's Alipay and WeChat, UPI offers a superior edge as it is much simpler to use and facilitates direct bank transactions, besides providing other advantages[121]. Moreover, NIPL has recently partnered with PPRO[122] and TerraPay[123] to expand and empower the growth of India's digital payments ecosystem at a global level.

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[117] National Payments Corporation of India. "About NIPL." NPCI.org.in. Accessed June 22, 2022. https://www.npci.org.in/who-we-are/group-companies/npci-international.

[118] Reserve Bank of India. "Booklet on payment systems." RBI.org.in. January 25, 2021. Accessed June 22, 2022. https://www.rbi.org.in/scripts/PublicationsView.aspx?Id=20315#CH22.

[119] CNBC-TV18. "India's UPI, RuPay Cards will soon be accepted in France." cnbctv18.com. June 17, 2022. Accessed June 22, 2022. https://www.cnbctv18.com/technology/upi-rupay-cards-will-soon-be-accepted-in-france-13854572.htm.

[120] Rai, Nidhi. "As UPI gears up for global markets, Indian fintechs smell opportunity." Business-Standard.com. December 19, 2019. Accessed June 22, 2022. "https://www.business-standard.com/article/companies/as-upi-gears-up-for-global-markets-indian-fintechs-smell-opportunity-119121801213_1.html."

[121] Mitra, Arnab. "UPI could become first Made in India brand to take the world by storm." IndiaIncgroup.com. November 05, 2020. Accessed June 22, 2022. https://indiaincgroup.com/upi-could-become-first-made-in-india-brand-to-take-the-world-by-storm/.

[122] NPCI International Payments Ltd (NIPL). "NPCI International and PPRO collaborate to offer Indian consumers hassle-free payments across the globe." npci.org.in. November 17, 2021. Accessed June 22, 2022. https://www.npci.org.in/PDF/npci/press-releases/2021/NPCI-International-and-PPRO-collaborate-to-offer-Indian-consumers-hassle-free-payments-across-the-globe.pdf

[123] Livemint. "TerraPay, NPCI International partner to enable real-time, international payments." livemint.com. January 27, 2022. Accessed June 22, 2022.https://www.livemint.com/companies/news/terrapay-npci-international-partner-to-enable-real-time-international-payments-11643278725965.html.

4.4.3 Use of biometrics for payments-fingerprint, iris, face recognition

India implemented the world's largest biometric project as part of its unique identification (UID) system to deliver a distinctive, biometrically-verifiable digital identity to each resident (regardless of citizenship). A UID is supported with fingerprint or iris scan recognition or face authentication. This provided the Indian government with the tools to uniquely identify every Indian resident and drive financial inclusion and digital payments.

Biometric authentication allows users to withdraw cash, deposit, transfer funds, and check bank a/c balance through payment products, such as BHIM *Aadhaar* Pay, and AePS. It eliminates the need for traditional PoS terminals to finalize digital transactions and makes it hassle-free for consumers. To make these platforms more accurate and secure, *Aadhaar* holders can use their iris and face to authenticate transactions. The UIDAI and NPCI ran a pilot project[124] to test the functionality of facial recognition-based authentication for financial services.

However, the most extensive implementation of the *Aadhaar* database has been for disbursements and withdrawal of government subsidies. It has found extensive use in various national and state schemes, such as *Ujjwala*, PAHAL, and MGNREGS, where the amount is sent directly to the *Aadhaar*-linked bank accounts via APBS. It has helped GoI reduce leakages in the system and save more than INR 75 billion[125,126] (USD 1.01 billion).

Several Indian experts have guided and supported Indonesia, Zambia, and Bangladesh, among other countries, to create a biometric technology for payments and beyond.

[124] Barik, Soumyarendra. "UIDAI, NPCI piloting face authentication for *Aadhaar*." Medianama.com. October 06, 2020. Accessed June 22, 2022. https://www.medianama.com/2020/10/223-*Aadhaar*-facial-recognition/.

[125] Singh, Lokesh Kr., and Ritesh Rautela. "Savings achieved through fps automation: step for greater efficiencies." Microsave.net. March, 2016. Accessed June 22, 2022. http://www.microsave.net/files/pdf/IFN_130_Savings_Achieved_through_FPS_Automation_Step_for_Greater_Efficiencies.pdf.

[126] Aadil, and others. "Designing beneficiary-centric 'direct benefit transfer' programs: lessons from India-part I." Microsave.net. September, 2016. Accessed June 22, 2022. http://www.microsave.net/wp-content/uploads/2018/11/PB_17_Designing_Beneficiary_Centric_Direct_Benefit_Transfer_Programmes_Lessons_from_India.pdf.

4.5 Abbreviations

Abbreviation	Full-Form
AePS	*Aadhaar* enabled Payment Systems
Agri	Agriculture
AI	Artificial Intelligence
APBS	*Aadhaar* Payment Bridge System
API	Application Programming Interface
APP-store	Mobile application store
ATMs	Automated Teller Machines
AUM	Asset under management
B2P	Business-to-person
BAP	BHIM *Aadhaar* Pay
BBPS	Bharat Bill Payment System
BC	Business correspondent
BSE	Bombay Stock Exchange
BTCA	Better Than Cash Alliance
CAGR	Compound annual growth rate
CMS	Complaint Management System
CoD	Cash on Delivery
COVID	Coronavirus disease
CTS	Cheque Truncation System
DBT	Direct benefit transfer
DFS[1]	Department of Financial Services
DFS[2]	Discover Financial Services
DPI	Digital Payments Index
E-commerce	Electronic or online commerce
EdTech	Education technology
EMI	Equal monthly installment
E-wallet	Electronic wallet
FinTech	Financial technology
FSPs	Financial Service Providers
FY	Fiscal year
GDP	Gross domestic product

Abbreviation	Full-Form
GDS	Grameen Dak Sevaks
GoI	Government of India
GRM	Grievance Redress Mechanism
IBA	Indian Banks Association
ICS	International Card Schemes
IFMS	Interoperable Fare Management System
IMPS	Immediate Payment Service
INR	Indian Rupees
IPO	Initial Public Offering
IPPB	Indian Post Payments Bank
ISPIRT	Indian Software Products Industry Round Table
JAM	*Jan Dhan-Aadhaar*-Mobile number
KCC	*Kisan* Credit Card
KYC	Know your customer
LMI	Low- and middle-income
LPG	Liquid Petroleum Gas
MDR	Merchant discount rate
MFIs	Microfinance institutions
MGNREGS	Mahatma Gandhi National Rural Employment Guarantee Act
MoF	Ministry of Finance
MSME	Micro, small, and medium enterprise
NACH	National Automated Clearing House
NBFCs	Non-banking financial company
NCMC	National Common Mobility Card
NEFT	National Electronic Fund Transfer
NETC	National Electronic Toll Collection
NETS	Network for Electronic Transfers
NFS	National Financial Switch
NIPL	NPCI International Payments Limited
OD	Overdraft
OTP	One-time password
OTT platforms	Over-the-top platforms
P2G	Person-to-government

Abbreviation	Full-Form
P2M	Person-to-merchant
P2P	Person-to-person
PAHAL	Pratyaksh Hanstantrit Labh
PBs	Payments Banks
PDS	Public Distribution System
PM	Prime Minister
PMJDY	Pradhan Mantri Jan Dhan Yojana
PoS	Point-of-sale
PPI	Pre-paid payment instrument
QR	Quick response
RBI	Reserve Bank of India
SBI	State Bank of India
SFBs	Small finance banks
SIPs	Systematic investment plan
SP	Service provider
TAT	Turnaround time
TRAI	Telecom Regulatory Authority of India
UAE	United Arab Emirates
UID	Unique Identification Number
UIDAI	Unique Identification Authority of India
UPI	Unified Payments Interface
USD	United States Dollar
USSD	Unstructured Supplementary Service Data
VPA	Virtual payment address
Y-o-Y growth	Year-on-year growth

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