

## **DIGITAL PAYMENT DEVELOPMENTS IN INDIA**

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### **INTRODUCTION**

This report aims to give an overview of the developments in India's digital infrastructure over the last decade, while also recounting its historical journey of reaching where it is today. This report also includes RBI's vision for the future in terms of digital payment systems and settlements, and how it is incorporating new technologies. The idea for this project came to me while reading about India's advancements in the digital payments sector in the newspaper. It piqued my curiosity to learn more about India's long journey of reaching here. Most of the information in this report is taken from RBI and the Ministry of Electronics and Technology, among other sources mentioned in the bibliography.

India's digital payments landscape has transformed dramatically over the past five years. India has become a model for digital payments adoption for countries across the globe. Digital payments are one of the most important pillars of a financially inclusive country and help in bringing people together under an organised financial system. Digital payments in India continue to grow at a massive rate. This growth can be attributed to the policies implemented by the Government of India and the Reserve Bank of India (RBI) for promoting digital payments, the emergence of FinTech with new technologies to ease user experience and payment service providers building infrastructure to support smooth transaction flows.

Over the next five years, UPI is expected to constitute almost 90% of total transactional volume in retail digital payments by expanding its adoption to rural areas and tier 3 and 4 cities. Credit cards, national electronic toll collection (NETC) and the Bharat Bill Payment System (BBPS) are some of the other instruments that are also expected to grow at a healthy rate. Consumers are increasingly adopting digital payments. With innovations and additions of new use cases, India is on the verge of another boom in increased digital payment transactions. The Government and RBI's focus on regulating the digital payments ecosystem is fuelling the growth in the digital payments space.

RBI has been at the forefront of promoting digitization in India's financial landscape, facilitating the country's transition towards a digital economy. This journey toward digitization has been marked by several significant initiatives and policy measures aimed at fostering financial inclusion, enhancing efficiency, and promoting innovation. RBI launched new features in UPI like UPI 123Pay, UPI Lite, credit card linkage on UPI, UPI on NRE accounts, UPI for foreign tourists and single block multiple debits to further increase the scope of UPI payments and increase the number of UPI users. The digital payment index is something constructed by the RBI to measure the extent of digitisation of payments across the country. It is based on multiple parameters and reflects the expansion of various digital payment modes accurately. It is a first-of-its-kind index to measure the spread of digital payments across the country. Over the years its volume and number of transactions have increased.

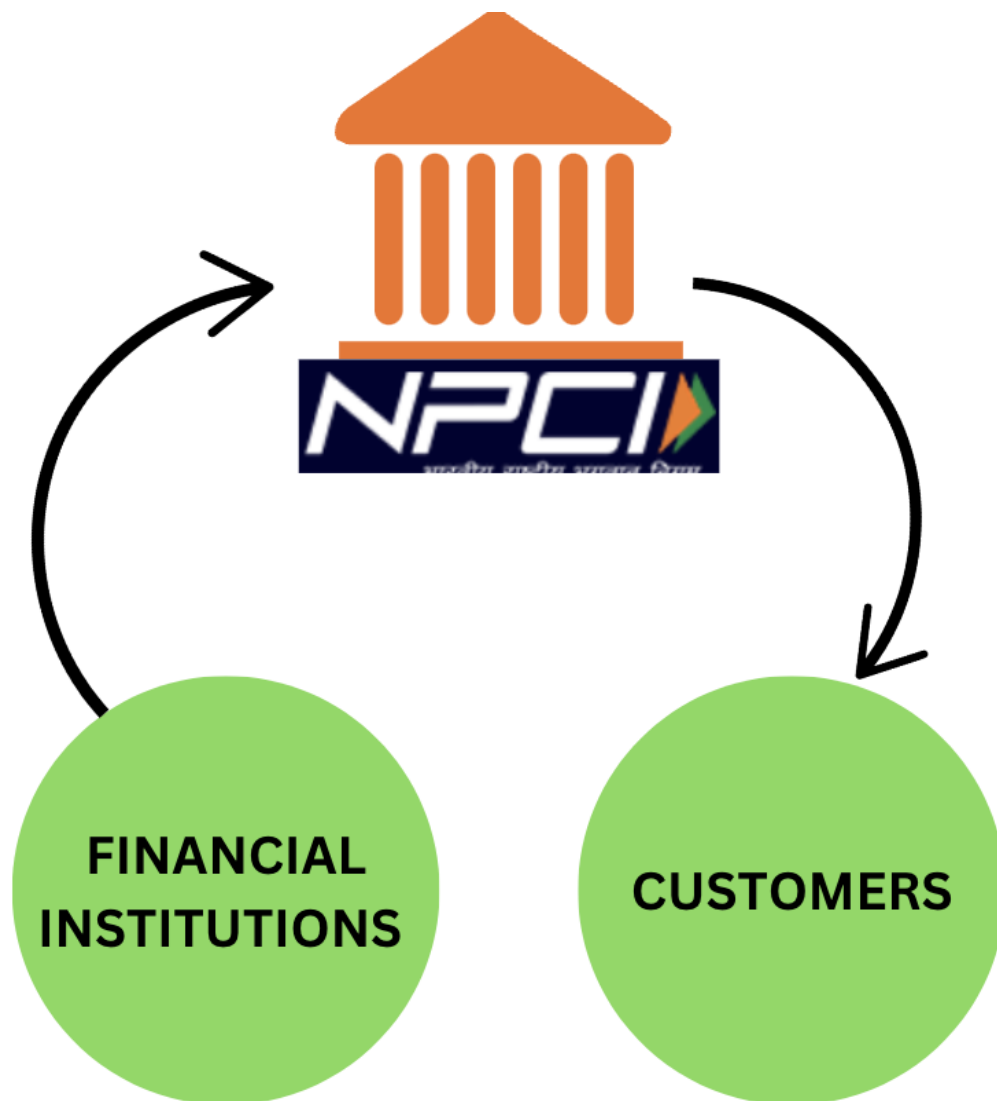
## **INFRASTRUCTURE**

### **A. Institutions**

#### **NPCI**

The NPCI serves as an umbrella organisation for retail payment systems in India. It operates as a non-profit company with the aim of providing high-quality services at affordable prices to member banks and their customers. It was founded in December 2008 under the guidance of the RBI and the Indian Banks Association (IBA). It was established to consolidate the retail payments systems and create a pan-India infrastructure for electronic payments. It has witnessed significant growth, expanding its operations and network, including managing the Cheque Truncation System (CTS) and the National Financial Switch (NFS), which operates a vast ATM network. NPCI has introduced and operates several innovative retail payment products aimed at reaching every Indian. NPCI's retail payment products align with RBI's vision of promoting a 'less-cash' society by offering safe, secure, convenient, quick, and affordable e-payment options to empower every Indian. In April 2020, it also established a subsidiary called NPCI International Payments Limited (NIPL) to focus on the global outreach of NPCI payment systems.

Electronic Clearing Service (ECS) was introduced in 1990, and it facilitated bulk and repetitive payments like salary, interest, and dividends. The National Automated Clearing House (NACH) replaced ECS, offering both credit and debit systems, operated by NPCI.



The table above shows how NPCI is an umbrella organisation for all digital transactions in India. Any online payment made to an institution or vice versa has to go through NPCI. the financial institution could be a business, a bank or the government, which is paying money to any form of customer receiving it. This could be a common man, another business or another financial institution. No matter what type of transaction is taking place, NPCI acts as a backbone organisation, and a stepping stone for the financial interaction to be possible.

### **IDRBT**

Institute for Development and Research in Banking Technology, IDRBT, aims to enhance technology absorption in the banking and financial sector. It was initially focused on serving as the Certifying Authority for digital certificates and conducting research and training activities,

contributing to skill development in the banking sector. Recently, IDRBT has expanded its research initiatives, setting up Research Centres focusing on various areas like Analytics, Cyber Security, and Payment Systems.

### **IFTAS**

The Indian Financial Technology and Allied Services was established as a wholly owned subsidiary of RBI. IFTAS took over key services such as Indian Financial Network (INFINET, a satellite-based communication backbone provided by RBI to the banking and financial sectors, aiming to enhance efficiency, productivity, and customer services through innovative delivery channels like Internet banking), Small Financial Messaging System (SFMS, a domestic messaging standard used for financial messaging in India, which improves efficiency and speed in fund transfer, MIS reports, and information reports, serving both retail and large value fund transfers), and Indian Banking Community Cloud (IBCC, a unique community cloud computing ecosystem that is fully dedicated to the banking and financial services community) from IDRBT with the objective of providing uninterrupted high-quality IT services to the banking and financial sector.

### **CCIL**

The Clearing Corporation of India Limited (CCIL) is a Financial Market Infrastructure (FMI) authorised by RBI under the Payment and Settlement Systems Act. It also operates various payment systems and functions as a Trade Repository (TR). It holds the status of a Qualified Central Counterparty (QCCP) in India. It provides guaranteed clearing and settlement for various transactions in money, government securities, forex, and derivative markets. It also acts as a Trade Repository (TR) for specified instruments and operates payment systems for securities, forex, rupee derivatives, etc. Additionally, CCIL serves as a reference point for important benchmarks used in the market, under the supervision of Financial Benchmarks India Limited (FBIL).

## **B. Systems**

### **Paper Clearing Systems**

Paper-based payment systems are very important in any country's historical payment landscape, as initially apart from cash, cheque payment was the only available alternative. Over the years, various cheque clearing systems have modernised and evolved, particularly Magnetic Ink Character Recognition (MICR) clearing, Cheque Truncation System (CTS), and recent innovations like Positive Pay. All these systems have digitised and revolutionised the cheque clearing systems, from being paper-based to happening within minutes on a screen.

### Growth and share of paper clearing



Source: RBI Data

The above graph showcases the growth and share of paper clearing from 2010-2020. In the graph on the left, the increase in the value and volume of paper clearing is showcased. The graph is downward sloping for both, showing how digitization reduced the value of the outdated method of paper clearing, which thereby led to a decline in its volume being produced. On the right, the increase in the use of digital retail is shown, with a subsequent decline in paper clearing, highlighting the prevalence and preference of digital retail over paper clearing. By 2020, paper clearing was almost negligible.

### MICR

It is a technology mainly used in the banking industry to verify the legitimacy of documents. MICR clearing was introduced in the mid-1980s and it brought automation, standardisation and efficiency to the cheque clearing process. It facilitated the electronic clearing of cheques by processing clearing data electronically while physical cheques were exchanged between banks. The MICR code is a 9-digit code printed on cheques to identify the bank and branch participating in ECS. It streamlines cheque processing and clearing, enhancing efficiency in the banking industry.

### CTS

CTS is an online image-based cheque clearing system where cheque images and MICR data are captured at the collecting bank. It enables the use of cheque images for payment processing,

eliminating the need for physical movement of cheques. CTS-2010 standards were introduced in February 2010 to enhance security features on cheques, mandating specific features to prevent fraud banks transitioned to issuing only CTS-2010 standard cheques, and CTS was gradually implemented across different zones in India.

## **ATM**

An Automated Teller Machine is a computerized device that enables individuals to conduct various banking transactions without the need for a human teller. ATMs not only dispense cash but also offer digital services like bill payments, card-to-card transfers, and balance inquiries. Features like interoperable cash deposit and card-to-card funds transfer are enabled at ATMs, with some banks offering bill payment services as well. White Label ATMs (WLAs, ATMs setup owned and operated by non-banks) were introduced in 2012 to facilitate ATM expansion in Tier III to VI centres (smaller cities and towns in India), with a focus on remote areas.

## **Micro ATMS**

A Micro ATM is a mini version of an ATM. Micro ATMs are like modified sales terminals, that can connect to banking networks via GPRS to perform banking transactions. This machine consists of a card swipe facility. Despite not having cash storage or dispensation facilities, these ATMs facilitate transactions such as deposits, withdrawals, fund transfers, balance inquiries, and mini-statements. These devices are linked to the Aadhaar infrastructure and support various means of authentication, including Aadhaar, biometric data, OTPs, and card details. The roles of various participants in micro-ATM deployment include issuing banks, acquiring banks, Business Correspondents (BCs, extended arm of the Bank Branch that provides Financial and Banking services to customers in unbanked and underbanked areas), Technology Service Providers (TSPs, entities that provide technology solutions and technology services), and UIDAI.

## **RuPay**

RuPay, introduced in 2012 by NPCI, is a domestic card payment network. Its adoption increased due to initiatives like demonetization and issuance of RuPay cards for Basic Savings Bank Deposit (BSBD) accounts. Currently, RuPay dominates the market of debit cards, but lags behind that of credit cards, having a market share of just 6%. It has expanded internationally through partnerships with other payment networks, in almost all countries.

## **Real Time Gross Settlement (RTGS)**

Real Time Gross Settlement, **RTGS**, introduced in March 2004 and operated by RBI, settles high-value transactions in real-time on a gross basis. It was upgraded to Next Generation-RTGS

(NG-RTGS) on ISO 20022 standards, offering advanced features. RTGS accounts for the majority of transaction value in Indian payment systems, with an average transaction value of around a crore of rupees. Access to RTGS is regulated by RBI's Access Criteria guidelines, open to licensed banks and other institutions. Furthermore, participants in RTGS include central banks, regular participants, restricted participants, and clearing houses for the settlement of Multilateral Net Settlement Batch (MNSB) files.

### **National Electronic Funds Transfer (NEFT)**

A retail payment system owned and operated by RBI was implemented in November 2005 with eight member banks. It is a popular hybrid payment system with no floor or ceiling for transaction amounts, making it suitable for both small and large transfers. Moreover, in December 2019, NEFT was made available as a round-the-clock fund transfer facility without any holidays. NEFT operates in 48 half-hourly batches 24x7, ensuring uninterrupted availability for users. It operates as a straight-through process, with credits made into the destination account based on the beneficiary's unique account number. NEFT is used for various purposes including fund transfers, purchase of goods and services, utility bill payments, and payment of statutory dues. Walk-in customers can avail NEFT fund transfer facility against cash payments up to 2 lakh rupees.

### **Fast Payments Systems**

Retail Fast Payments (also known as instant, real-time, immediate or rapid payments) allow for immediate fund availability to beneficiaries and can be used daily. They are characterized by speed and continuous service availability, with payment message transmission and availability of final funds to the payee occurring in real-time or near-real-time. Currently, Immediate Payment Service (IMPS) and Unified Payments Interface (UPI) are the two fastest payment systems in India, handling a significant volume of transactions daily.

Introduced in 2010, IMPS is a 24x7 fast payment system allowing real-time transfer of funds between remitter and beneficiary with deferred net settlement between banks. It facilitates push transactions with a per-transaction limit of ₹2 lakh and can be accessed through multiple channels including mobile, ATM, internet banking, and bank branches.

Name of system	Limit on transaction amount	Time Taken for transaction to take place
RTGS	Minimum limit of 2 lakhs	Real Time
NEFT	No Limit	30 mins
IMPS	Maximum limit of 5 lakhs	Real Time

## **UPI**

Unified Payments Interface is a smartphone application that allows users to transfer money between bank accounts. It is an Indian instant payment system developed by the National Payments Corporation of India in 2016. The interface facilitates inter-bank, peer-to-peer, and person-to-merchant transactions. It is a mobile-based, 365x24x7 fast payment system enabling instant money transfer using a Virtual Payment Address (VPA) set by users. It has QR code-based payments and can be used over smartphones, feature phones, and at merchant locations. UPI transactions are carried out through mobile devices with two-factor authentication using device binding and a UPI PIN for security. Its framework involves NPCI as a network and settlement service provider, and banks as Payment System Providers (PSPs, such as Paytm, PayPal, Instamojo, RuPay etc.) are third-party providers that help merchants accept payments.

## **Aadhaar Enabled Payment System(AePS)**

Aadhaar (AEPS) enabled payment system is a payment system that allows a bank customer to use Aadhaar as his/her identity to access his /her Aadhaar-enabled bank account and perform basic banking transactions like balance enquiry, cash withdrawal, remittances through a Business Correspondent.

Operational since January 2011, the Aadhaar Enabled Payment System (AePS) allows online interoperable transactions at micro-ATMs ( they are mini versions of ATMs, and modified point of sales terminals. Aadhaar number is used for beneficiary identification and transaction authentication, with Unique Identification Authority Of India (UIDAI, a statutory authority established under the provisions of the Aadhaar Act, 2016 on 12 July 2016 by the Government of India.) handling biometric authentication and NPCI managing switching, clearing, and settlement. AePS offers financial services like cash withdrawal, cash deposit, balance enquiry, and Aadhaar-to-Aadhaar fund transfer, along with non-financial transactions like demographic authentication, Best Finger Detection (BFD. The best finger of a resident is the one that has the highest probability of matching. A resident can possess one or more best fingers, which can be detected during the Best Finger Detection (BFD) process.), and e-KYC.

## **e-Money**

It refers to prepaid value stored electronically, represented by the liability of the e-money issuer and denominated in a currency backed by an authority. In India, e-money is in the form of Prepaid Payment Instruments (PPIs) issued as wallets and cards by banks, e-money institutions, or other authorised entities. PPIs come in three types: Closed System PPIs, Semi-closed System PPIs, and Open System PPIs, each with specific usage and restrictions. Interoperability among



PPIs has been allowed, enabling access to a wide range of merchants for PPI holders and vice versa, without the need for multiple on boarding processes.

The e₹ is a digital currency started by the Central Bank of India (CBI) and acts as a legal tender issued by the bank in a digital form. The conversion rate is 1 e₹ = 1 Rupee. E₹ can be accepted as a medium of payment, legal tender and a safe store of value. India is the first country to have such a model in place in the world.

### **Bharat Bill Payment System (BBPS)**

BBPS was created to streamline the bill payment process in India by offering interoperable and accessible services through a network of agents with multiple payment modes and instant payment confirmation. The pilot phase of BBPS began on August 31, 2016, followed by live operations starting on October 17, 2017. Initially, it covered five mandatory biller categories: electricity, water, gas, telecom (landline, mobile post-paid, broadband), and Direct-to-Home (DTH). In September 2019, BBPS was extended to include all categories of billers who raise recurring bills (except prepaid recharges), ensuring digital options for bill payments. BBPS framework consists of two main entities.

Bharat Bill Payment Central Unit (BBPCU) is responsible for clearing, settlement, and defining operational, technical, and business standards. NPCI is the designated BBPCU.

### **BENEFITS**

#### **A. Payments Infrastructure Development Fund (PIDF)**

It aims to subsidize acquirers for deploying PoS acceptance infrastructure in tier-3 to tier-6 centres to address supply-side issues. PIDF focuses on increasing acceptance infrastructure in tier VI and tier V centres, followed by tier IV and tier III centres, as well as the north-eastern region, and gets various sectors such as government payments, fuel pumps, PDS shops, healthcare, and Kirana shops. PIDF supports multiple payment acceptance devices, including MPoS, GPRS, PSTN, and QR code-based payments

#### **B. Financial Market Infrastructures (FMIs) and Retail Payment Systems**

Financial market infrastructure (FMI) generally refers to systemically important payment systems, which are large in terms of value viz. Central Securities Depositories, Securities Settlement Systems, Central Counter Parties, and Trade Repositories that facilitate the clearing, settlement, and recording of financial transactions. While FMIs play a critical role in the financial system and the broader economy and contribute to maintaining and promoting financial stability and economic growth, they also concentrate risk, if not properly managed.

In June 2020, RBI released a revised framework titled 'Oversight Framework for FMIs and Retail Payment Systems' to clarify oversight objectives and policies. This framework covers legal aspects, scope, oversight activities, supervisory considerations, and cooperation with regulatory authorities.

Offsite supervision involves analysis of data, fraud monitoring, meetings with Payment System Operators (PSOs), market intelligence, and oversight reports and surveys. Card payment networks and Cross-border Money Transfer operators are regulated through offsite supervision due to institutionalisation in foreign jurisdictions.

Onsite inspections complement offsite monitoring based on the risk profile of entities derived from their self-assessment. RBI conducts onsite inspections of various entities including CCIL, NPCI, PPI issuers, White Label ATM Operators, and TReDS Operators.

## **CHALLENGES AND SOLUTIONS**

Despite the digital infrastructure of India being robustly developed, there are quite a few challenges in implementing it.

The biggest challenge being faced in relation to India's Digital Infrastructure is Cybersecurity. Financial fraud, data theft, and even highly sophisticated hacking attempts have all increased across India's cyber landscape. The Indian Computer Emergency Response Team (CERT-In) reported a significant increase in cyber threats in recent years. In 2020, CERT-In recorded over 11.6 lakh (1.16 million) cyber security incidents, marking a 50% increase from the previous year. These incidents include phishing attacks, malware infections, website defacements, and more.

Further, cash is considered to be anonymous, convenient, flexible, and a swift mode of transaction. There is no doubt that digital payments have brought in more ease and convenience in people's lives, however not many people have put it into practice. This owes to the lack of Digital Financial Awareness (DFA) and Digital Financial Literacy (DFL). A lot of efforts have been put on this front, by PSOs in the past years, however there is still a long way to go. According to the Telecom Regulatory Authority of India's (TRAI) data published in March 2021, the internet penetration rate in India is around 42.5%, which leaves around 675 million people unconnected.

Non- smartphone users do not have the same options for digital payments like smartphone users do, leaving them at a disadvantage to access most online banking and payment facilities.

Another challenge is internet connectivity. Not every region in India has a high-speed broadband network, making it harder for them to access online payment methods. A report by the National

Sample Survey Office (NSSO) suggests that around 53% of households living in villages and 75% of households living in urban areas were dissatisfied with the broadband speed.

Most of the digital infrastructure is mostly focused on the Urban areas, and not the rural. There is still a large gap in ensuring these services reach rural regions as well. Furthermore, the vast number of languages and regional dialects in India makes it harder for the digital infrastructure model to be accessed by all.

However, there are various solutions that can be implemented as well.

#### **A. Customer Protection, Convenience, Complaint Redress**

Measures like Additional Factor Authentication (AFA), PIN requirements, and transaction alerts enhance the security of card transactions. Mandates for AFA ensure authentication for online transactions, while PIN entry is required for physical transactions.

AFA is mandated for online transactions using credit and debit cards issued in India, ensuring security and trust between merchants and customers. The requirement for PIN entry is relaxed for certain transactions like PPI-MTS(prepaid payment instruments- mass transit systems) and contactless transactions within specified limits.

RBI mandated the use of EMV Chip and PIN-based debit and credit cards from January 1, 2019, enhancing security against fraud. Magstripe cards( magnetic strip cards embedded with codes that identify the user and provide other information) were disabled, and all ATMs/micro-ATMs were required to process EMV chip transactions.

Banks are required to send online alerts to cardholders for all card transactions, enabling prompt action against misuse. Alerts are mandatory for transactions above a certain value and for all types of transactions since June 30, 2011.

Tokenization replaces card details with a unique code ('token'), enhancing security by reducing the risk of data breaches. RBI issued a framework for tokenization in January 2019, allowing authorised card networks to offer tokenization services.

Issuers must enable cards for use only at ATMs and PoS devices within India at the time of issue/reissue. Existing cards may have online, international, or contactless transactions disabled based on risk perception. Cardholders have a 24x7 facility to switch on/off and set/modify transaction limits through various channels.

## **B. Positive Confirmation**

Positive confirmation was introduced for NEFT transactions from March 1, 2010, and for RTGS from January 15, 2019. This feature provides acknowledgement to the originating bank immediately after credit is afforded to beneficiary accounts, enhancing transparency and customer confidence.

RBI mandated storage of payment system data within India to ensure safety and supervisory access to transaction details. Data storage requirements cover end-to-end transaction details and foreign leg transactions, if any.

RBI's e-BAAT ( an electronic banking awareness and trading programme) program aims to enhance digital literacy and promote electronic payments among all sections of society. Customer education and awareness are essential for increasing digital footprints and achieving a less-cash payment ecosystem. RBI regulates the Merchant Discount Rate (MDR) for debit card transactions and ATM interchange charges. Frameworks for MDR and ATM charges aim to ensure transparency and fairness in charges levied by banks and service providers.

RBI announced a phased approach for implementing an Online Dispute Resolution (ODR) System for failed transactions across all authorised Payment Systems. ODR aims to provide efficient, transparent, and technology-driven dispute resolution mechanisms for digital transactions.

## **C. Other Possible Solutions**

There has been a development of a Self-Regulating Organization (SRO) that can engage with the supervisor and also be responsible for setting rules and regulations for the PSOs.

Offline payments have also been introduced for mobile transfers so that rural areas and areas with remote internet connectivity have access to digital payment methods.

The Digital Payment Index helps RBI get a better sense of the extent to which the digital infrastructure has penetrated the country and the extent to which payments have been digitised, which is updated frequently to give an accurate representation of the country.

Apart from this, increased awareness and promotion initiatives from the RBI and the government would help increase people's knowledge about Digital Financial Literacy, and therefore increase participation.

CPFIR( Central Payment Fraud Information Registry) is a web-based platform for online payment fraud reporting by system participants. It helps identify deficiencies, strengthen controls, and devise additional risk management measures.

SAR scope was revised in January 2020 to cover various aspects including information security governance, access control, network security, vendor risk management, incident management, etc.

BCP(business continuity planning ) plans were tested during situations like the failure of major banks or pandemics, with measures taken to ensure seamless operation of payment systems. SOPs were put in place for situations like bank moratoriums to ensure uninterrupted operation of payment systems.

## **RECENT INNOVATIONS**

### **A. Digital Payment Enablers**

RBI has always been the primary institution enabling digital payments in India. India follows the ‘bank-led’ model, where banks are at the forefront of payment system operations since they are better regulated, and hence are better equipped to take payment systems forward.

Payment system providers have taken advantage of the phenomenal growth of mobile cellular networks and increasing mobile internet users. Banks have also taken advantage of the widespread availability of smartphones, by offering banking services through Short Messaging Service (SMS), Unstructured Supplementary Service Data (USSD), and mobile applications. Increasing internet penetration, especially with 3G and 4G, is also accelerating the adoption of digital payment methods.

Another major factor that has increased the usage of digital payments is the widespread adoption of Aadhaar card usage. Many individuals have enrolled with it, which has catalysed the growth of digital payments through Aadhaar-enabled e-KYC. It has been used for authenticating payments to merchants, and transactions via Business Correspondents, and reducing leakages in Government to Person (G2P) payments.

While credit cards were once considered elite, the issuance of both debit and credit cards has increased significantly over the past decade. The conversion of Magstripe cards to EuroPay, Mastercard and Visa (EMV) Chips and PIN-compliant cards has contributed to this growth, facilitating both online and physical card-based transactions.

## Debit and Credit Cards Outstanding



Source: RBI Data

The above graph shows the steady increase over the years in the use of credit and debit cards. The increase in usage from March 2013 to March 2020 shows how much the transactions grew of both types of cards in a mere 7 years. This highlights the widespread adoption and usage of these cards all over India, which also highlights that it is transforming from an elite product to something that is a necessity and is mass consumed.

### B. Third-Party Application Providers (TPAPs)

TPAPs are standalone or additional applications connected to banking applications, providing various financial services. They request access to user bank details through the linked banking app, enhancing flexibility and convenience for consumers. TPAPs exemplify public-private partnerships, showcasing the synergy between banks and non-banks in expanding payment services. This partnership fosters innovation and contributes to the growth of digital payments while ensuring regulatory compliance and customer trust. In the UPI ecosystem, TPAPs primarily facilitate transactions by partnering with banks already on the UPI platform. They develop APIs and act as transaction facilitators, with the operational and financial liability resting on the bank. TPAPs like Google Pay and WhatsApp contribute significantly to UPI transactions. Large TPAPs can adopt a multi-bank model, partnering with multiple banks to act as PSPs. While TPAPs provide customer interfaces, transactions are processed through the underlying PSP bank.

Point of Sale (PoS, a hardware system for processing card payments at retail locations.) Terminals capture payment information electronically at retail locations, encouraging card usage. Cash withdrawals at PoS terminals are possible using debit cards or open-loop prepaid cards, with withdrawal limits varying based on the tier of the centre.

### **C. Quick Response (QR) Code**

A quick response (QR) code is a type of barcode that stores information and can be led by a digital device, such as a cell phone. There are various types of QR codes such as micro QR codes, dynamic QR codes, audio QR codes, frame QR etc.

In India, Bharat QR has emerged as a lightweight, low-cost method to bring merchants into the acceptance network, allowing contactless payments by scanning a QR code from a mobile app. It is the world's first interoperable Quick Response (QR) code acceptance solution developed by the payments industry to expedite India's transition to a less-cash society. It has been developed by the National Payments Corporation of India (NPCI), Mastercard and Visa. The Bharat QR standard promotes interoperability in card payments. QR code-based payments are prevalent in the country and are expected to increase substantially in the future. To streamline the QR code infrastructure, RBI issued instructions in October 2020, mandating the use of only two interoperable QR codes (Bharat QR and UPI QR) and discontinuing proprietary QR codes by March 31, 2022

### **D. Mobile Wallet**

A mobile wallet is a way to carry cash in digital format. You can link your credit card or debit card information in mobile device to mobile wallet application or you can transfer money online to mobile wallet. Instead of using your physical plastic card to make purchases, you can pay with your smartphone, tablet, or smart watch. An individual's account is required to be linked to the digital wallet to load money in it. Most banks have their e-wallets and some private companies. e.g. Paytm, Freecharge, Mobikwik, Oxigen, mRuppee, Airtel Money, Jio Money, SBI Buddy, itz Cash, Citrus Pay, Vodafone M-Pesa, Axis Bank Lime, ICICI Pockets, SpeedPay etc.

### **E. UPI 123PAY**

UPI 123PAY is an instant payment system for feature phone users who can use the Unified Payments Interface (UPI) payment service in a safe and secure manner. Through UPI 123PAY, feature phone users will now be able to undertake a host of transactions based on four technology alternatives. They include calling an IVR (interactive voice response) number, app functionality in feature phones, missed call-based approach and also proximity sound-based payments

### **F. UPI Lite**

UPI LITE is a new payment solution that leverages the trusted NPCI Common Library (CL) application to process low-value transactions that have been set at below ₹500. The solution runs off existing UPI ecosystem protocols for mobile phones to ensure commonality, compliance and system acceptance. UPI LITE experience is intended to be a customer-friendly approach to enabling low-value transactions without utilizing a Remitter bank's core banking systems in real-time while providing adequate risk mitigation.

### **G. Fintech**

FinTech refers to financial technology innovations that enhance financial services by increasing efficiency, reducing costs, and diversifying products. FinTech firms in India collaborate with traditional financial institutions through business-to-business (B2B) models, acting as ecosystem enablers. FinTech innovations are categorised into areas like payments, lending, market provisioning, investment management, and data analytics.

The Unified Payments Interface (UPI) platform is a classic example of FinTech innovation in the payments space. UPI revolutionised mobile payments by enabling application-based electronic payments through smartphones using registered virtual addresses. Over 40 non-bank third-party applications are live on the UPI platform, facilitating seamless transactions.

### **H. AI in Digital Payments**

AI in the payments industry combines artificial intelligence (AI) with AP best practices to standardize and automate payment systems. The AI makes sure the right procedures are followed while streamlining operations for its human partners. As a result, bookkeeping and accounting processes become more efficient and more accurate.

One form of AI uses computing power to recognize text in images. Known as optical character recognition OCR, it's used in invoice processing to read invoices and other financial documents, entering the relevant information into financial systems for human review. By adding machine learning, the computer can get better at recognizing this same information in future invoices in transaction data, such as price, customer data, shipping and billing addresses, potential cost savings in payment terms and more. This human-AI process partnership improves accuracy and minimizes the need for manual data entry, saving teams hours of valuable time.

Because AI can scan human text, it can also detect duplicate invoice numbers and recognize the presence of multiple bills within multi-page invoices. This reduces the chance of human error and helps protect against fraudulent transactions.



AI fraud detection is a technology-based approach that employs machine learning to identify fraudulent activities within large datasets. It involves training algorithms to recognize patterns and anomalies that signal possible fraud. By continuously learning from new data, these machine learning models become increasingly adept over time, improving their predictive accuracy and enabling them to adapt to evolving fraudulent tactics. This proactive defense mechanism equips businesses with a powerful tool for maintaining transaction integrity and security.

Artificial Intelligence can also capture digital footprints related to their customers and this can help payment gateways reach out to new customers. AI-based systems can match payments with the customer's historical data to predict their payment behaviour.

### **I. Domestic, Regional and International Coordination**

RBI aims to improve coordination among various inter-regulatory bodies to streamline regulation and enhance customer comfort.

RBI focuses on enhancing the global outreach of Indian payment systems like UPI and RuPay through international collaborations and contributions to standard setting. NPCI established a wholly-owned subsidiary, NPCI International Payments Limited, to expand the reach of UPI and RuPay globally. UPI soft-launched in Singapore and advanced stages of roll-out in South Korea and UAE, which demonstrates global interest in Indian payment systems.

RBI actively participates in the Committee on Payments and Market Infrastructures (CPMI) under BIS to strengthen global regulation, policy, and practices in payment systems. RBI contributes to CPMI's assessments, surveys, and consultation papers, and attends periodic meetings to share developments and contribute to working groups. In addition, RBI engages in international fora like BRICS, SAARC Payments Council (SPC), SWIFT Oversight Forum (SOF), and LEI Regulatory Oversight Committee to collaborate on payment infrastructure development, oversight, and standardisation.

### **A. REGULATIONS FOR SMOOTH FUNCTIONING**

#### **Access Criteria for Payment System**

Non-bank entities seeking to establish payment systems must apply for authorization under the Payment and Settlement System Act 2007.

Applications are scrutinised based on various parameters including the need for the proposed payment system, technical standards, security procedures, and financial status of the applicant. Other factors considered include consumer interests, monetary policies, risk management framework, and any other relevant criteria.

Different payment systems have specific eligibility criteria regarding financials, experience, and regulatory compliance. Criteria include minimum net-worth requirements, domain experience, and adherence to specific regulations and guidelines.

RBI has introduced a PoA ( a legal document that grants someone else the authority to act on your behalf in certain matters such as banking, real estate, and others) and PM framework(Project Management) to assess the efficiency and performance of payment systems. PoA assesses the relevance of a payment system over time, while PM evaluates performance based on parameters like business efficiency and contribution to the payments ecosystem.

RBI now grants authorizations for payment system operators (PSOs) on a perpetual basis, subject to certain conditions, instead of limited periods of up to five years. This perpetual validity is expected to reduce licensing uncertainties and allow PSOs to focus on their business

A cooling period of one year is introduced for entities whose authorization is revoked, not renewed, or voluntarily surrendered, as well as for rejected applications. During the cooling period, entities are barred from operating any payment system, aiming to discipline such entities and mitigate regulatory concerns.

### **Approach to Regulation**

RBI remains technology agnostic or neutral, enabling the ecosystem to develop and adopt the best technology. Payment system regulation is bank-led but inclusive of non-banks to widen scope, access, and outreach. RBI places discussion papers, concept papers, and draft circulars/guidelines on its website for public comments and feedback. Stakeholder feedback is examined, and appropriate inputs are included in final regulations to align with expectations. Committees, including industry nominees, are formed for specific issues to provide insights from practitioners' perspectives.

Also, speeches by top management of RBI provide indicative guidelines and define regulatory expectations for payment system participants. RBI remains responsive to market expectations and global technology evolutions, signalling an indicative path for ecosystem evolution.

### **VISION**

RBI recently released a document for its vision until December 2025. The core theme the document focuses on is 'E-payments for Everyone, Anywhere, Anytime'. The Payments Vision 2025 aims to elevate India's payment systems, providing users with affordable, accessible, and convenient digital payment options. It seeks to reinforce the Reserve Bank's commitment to facilitating a seamless digital payment experience and maintain India's global leadership in

digital payments. It aims to consolidate efforts in outreach, customer-centricity, cybersecurity, and digital deepening. The vision aligns with G-20's focus on improving cross-border payments by addressing challenges related to cost, speed, access, and transparency. The success of these initiatives will depend on the ecosystem's readiness to accept and support them.

**Integrity:** The document outlines the importance of integrity in digital transactions to bolster consumer confidence. To ensure this, a policy to weave in alternate authentication mechanisms for digital payment transactions will be implemented.

**Inclusion:** Inclusion efforts involve collecting and publishing disaggregated payment data, enhancing policies as needed, raising customer awareness across different geographies and segments, assessing the spatial penetration of digital payment infrastructure, and reviewing the scope of the Payments Infrastructure Development Fund (PIDF) Scheme.

**Innovation:** The document proposes exploring innovations such as a UPI-like system for cards and a framework for Internet of Things (IoT)-based payments to spur further innovation in the digital payments landscape.

**Institutionalization:** Showcasing India's achievements at international fora is considered essential. Increased participation in discussions with global standard-setting bodies, interlinking with fast payment systems in other jurisdictions (especially adjoining corridors), and fostering trade and commerce are highlighted goals.

**Internationalization:** Higher adoption of digital payments is expected to reduce costs associated with cash usage, contribute to GDP, and enhance transparency in transactions. The document emphasizes engagement with global standard-setting bodies to facilitate interlinkages with fast payment systems in other jurisdictions, aiming to improve trade, and commerce, and reduce remittance costs and time.

Further, there are 10 expected outcomes outlined till 2025 in the document which are:

1. Volume of cheque based payments to be less than 0.25% of the total retail payments
2. More than 3x increase in number of digital payment transactions
3. UPI to register average annualised growth of 50% and IMPS/ NEFT at 20%
4. Increase in payment transaction turnover vis-à-vis GDP to 8
5. Increase in debit card transaction to PoS by 20%
6. Debit card usage to surpass credit card in terms of value

7. Increase in PPI transactions by 150%
8. Card acceptance infrastructure to increase by 250 lakh
9. Increase of registered customer base transactions by 50% CAGR
10. Reduction in cash in circulation as a percentage of GDP

## **CONCLUSION**

Overall, the journey of the Payment Systems in India has been an arduous, but fruitful one. The hard work of the RBI has led to the addressing of various issues and challenges along the way, to ultimately address the vision of establishing a safe, secure, sound and efficient system. There has been immense development over the years, from paper-based instruments to finally having digital payment systems. Significant growth in payments has been witnessed, but sustaining this growth and shifting customer behaviour from cash to digital payments remains a challenge. RBI's efforts in introducing measures like Additional Factor Authentication (AFA), digital ombudsman, and customer protection initiatives have been milestones in ensuring a secure payment landscape.

India's development in digital payments has gained international recognition, with successful Indian practices being implemented in developed countries. As the payment ecosystem evolves, RBI remains committed to meeting challenges and utilizing opportunities to achieve the vision of a less-cash society. RBI and Government efforts have led to India becoming a global leader in digitization, having the most advanced technologies and advancements in this sector globally.

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