



Learnings from Real-time Payment Systems

A focus on India and Brazil

November 2024



Contents

INTRODUCTION	03
OVERVIEW OF GLOBAL RTPS	04
CASE IN POINT: INDIAN RTP SYSTEM – UPI	05
CASE IN POINT: BRAZILIAN RTP SYSTEM – PIX	13
KEY CONSIDERATIONS FOR RTP ADOPTION AND EXPANSION IN SOUTH AFRICA	20

Introduction

In today's digital age, real-time payments are gaining a lot of focus and momentum due to their ability to offer instant, secure and efficient transactions, benefiting businesses, consumers and economies worldwide. South Africa has the same focus, and in March 2023, the payment industry launched a new real-time payment system named PayShap. However, the transaction volumes are still relatively low (seventy-six million transactions by September 2024) compared with real-time payments in other countries. Due to this and other challenges, the South Africa Reserve Bank (SARB) officially launched the Payments Ecosystem Modernisation programme in 2024, with one pillar focusing on maximising the usage of a local real-time payment system based on learnings from other markets.

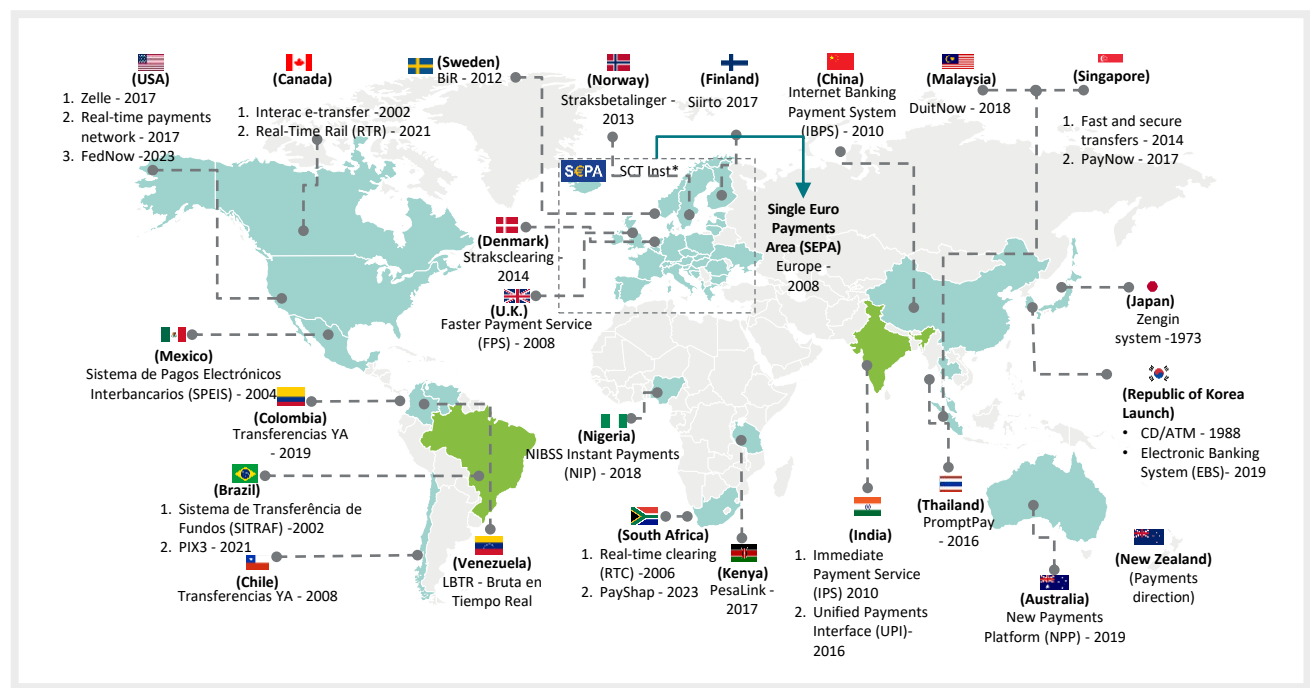
Two global success stories of real-time payment systems include UPI in India and PIX in Brazil. Launched in large economies, both have become the most preferred payment methods in their respective countries.

In India, the Unified Payments Interface (UPI) has become a game-changer by enabling seamless person-to-person and person-to-merchant transactions directly from bank accounts via mobile phones. Since its launch in 2016, UPI has experienced exponential growth, processing billions of monthly transactions. Its success is attributed to its interoperability across banks and Payment Service Providers (PSPs), robust security features and, most importantly, its user-friendly interface that has made digital payments accessible. It has not only simplified payments but has also promoted financial inclusion by reaching unbanked and underbanked populations.

Brazil launched its real-time payment system, PIX, in 2020, and it has rapidly become popular due to its ability to process instant payments 24/7, including weekends and holidays. Additionally, PIX transactions are free for individuals and instantaneous for businesses, offering an alternative to traditional banking methods and reducing dependence on cash. This blend of speed, convenience and cost-effectiveness is transforming the payment system in Brazil.

In this newsletter, we will explore the success stories of UPI in India and PIX in Brazil. We will analyse the factors contributing to their adoption, examine the regulatory frameworks that supported their implementation and discuss the technological innovations driving their growth. Furthermore, we will provide actionable insights and lessons that can be applied in South Africa to enhance the payment infrastructure and promote financial inclusion.

OVERVIEW OF GLOBAL RTPS



*Netherlands, Spain, Belgium, Portugal and some other countries also use SCT Inst and mostly launched between 2017 - 2019

266.2 B

Global real-time Payment transactions in 2023

(YoY growth of 42.2%)¹

Major RTPs contributing to global real-time payment transaction volume ²		
RTPs	Volume of txn. (in B)	% of global txn. volume
India	129.3 B	48%
Brazil	37.4 B	14%
Thailand	20.4 B	7%
China	17.2 B	6%
South Korea	9.1 B	3%

India’s UPI and Brazil’s PIX are the two most successful RTP systems globally, with respect to customer adoption, transaction growth and diversified product offerings.

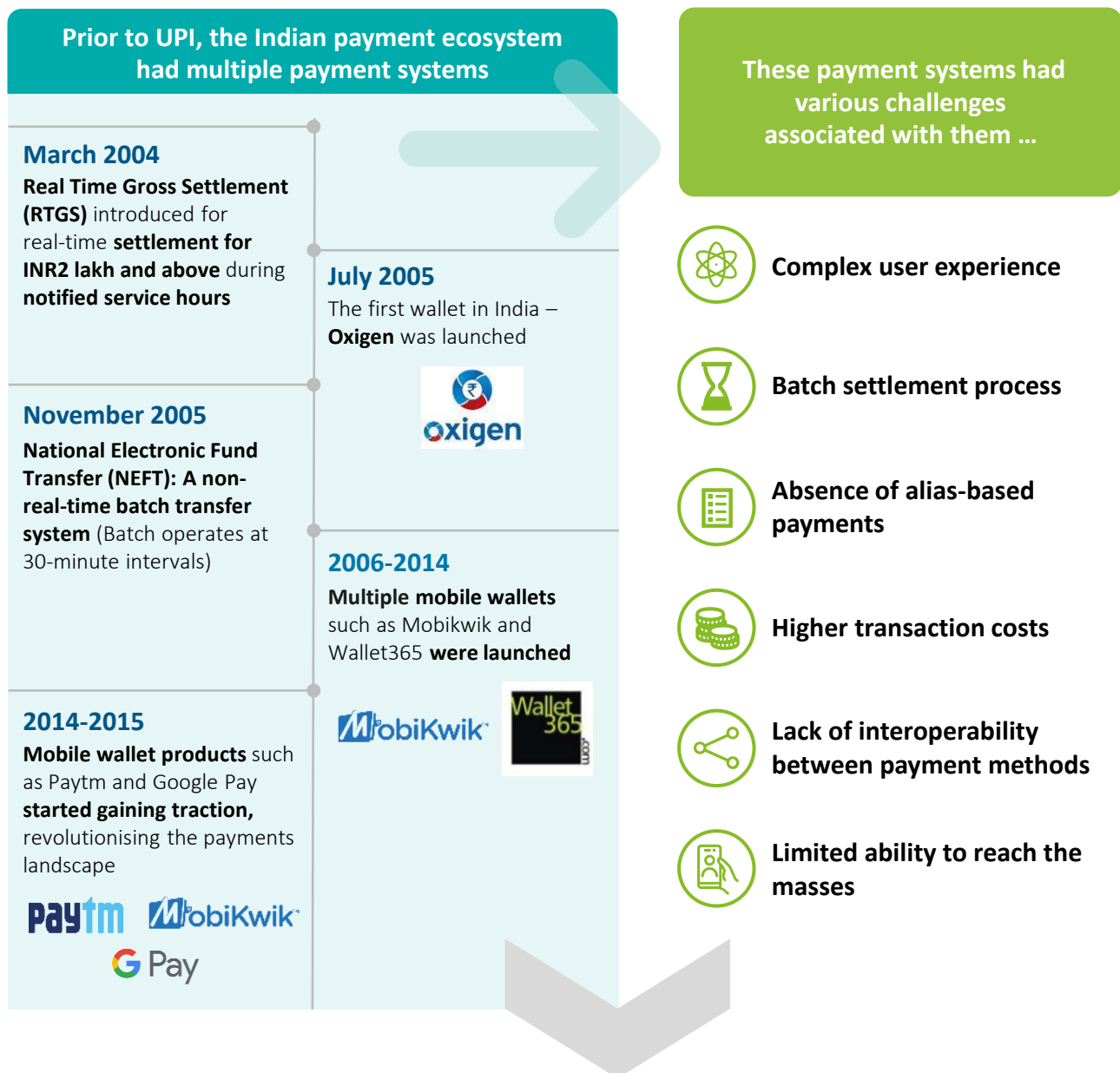
¹ Growth in real-time payment transactions
² RTPs contributing to global real-time payment transaction volume

CASE IN POINT: INDIAN RTP SYSTEM – UPI

Making payments in India fast, secure, simple and convenient to drive a cashless economy



UPI was launched in 2016 to address customer experience challenges and to provide a simple, user-friendly and real-time payment infrastructure



... however, these challenges led Indian regulators and banks to launch payment rails to address key challenges



2016

National Payments Corporation of India (NPCI), along with a consortium of 21 banks, came together to launch UPI³

³ Launch of UPI

Since its launch, UPI has witnessed exponential growth and is now the preferred payment method for low-value transactions.

Launch of UPI to address customer pain points and needs

Key features of UPI

24*7 availability	2-factor authentication
Real-time payments	Standardised APIs
Uses virtual payment address	Interoperable

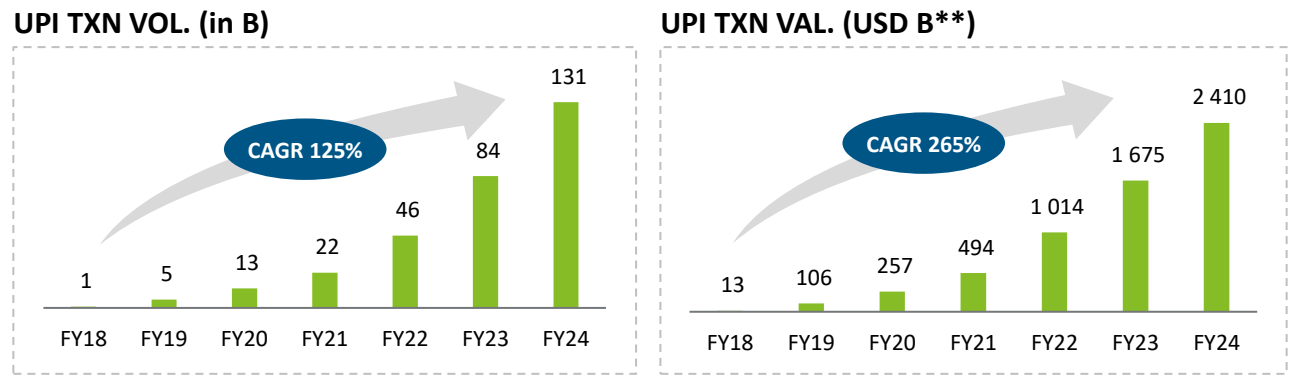
Pain points addressed by UPI

Instant funds transfer	Ease of use
Alias based payments	Enhanced security
Ability to reach masses	Lower costs (0 MDR*)

Use cases

Retail payments
Business payments
Government payments

UPI payments have seen exponential growth both in terms of volume and value of the transactions⁴



	2016	Change	2023	
Digital payment maturity (RBI-DPI Index ^{***}) ⁵	100	3.9x	395.6	Signifies the extent of payment digitisation
Growth in digital payment transactions ⁵	10 B	11.4x	114 B	Signifies the meteoric rise of digital payment transactions
Merchant acquisition (Acceptance touchpoints) ⁵	2.5 M POS	106x	256 M QR	Growth in P2M txn. due to no MDR and lite infra
Reduction in rate of currency coin circulation ⁵	107 B	1.2x	124 B	Dip in growth rate from 8.2% in FY16 to 1.4% in FY22
Reduction in rate of investment towards ATM ⁵	2 lakh	1.1x	2.2 lakh	Cost savings due to reduction in ATMs- 0.6% in FY22

Note*: MDR (Merchant Discounting Rate) is a fee that a merchant pays to a bank or payment service provider for processing a credit or debit card transaction. This fee is typically a small percentage of the transaction amount and covers the cost of using the payment infrastructure, including payment gateways, acquiring banks, and sometimes payment processors.

Note:** The RBI-DPI (Reserve Bank of India-Digital Payments Index) is an index introduced by the Reserve Bank of India (RBI) to measure the extent of payment digitisation across the country. This index helps track the growth of digital payments and reflects how well the financial system is adopting digital transactions over time.

⁴ Volume and value of UPI transactions
 ⁵ Impact of UPI on financial inclusion

***Conversion Rate: 1 USD = INR83

Despite its exceptional operational performance and continuous availability, there were some initial teething issues observed with UPI

Adoption and awareness

- **UPI's penetration into the real-time payment ecosystem** was gradual, as the ecosystem itself was still evolving
- **Lack of awareness** of UPI with respect to products, usage, benefits and safe practices in remote areas
- **Adoption of UPI required** incentivising and educating customers and merchants and integrating UPI into their POS systems, which led to limited merchant acceptance

Product differentiation

- Targeted at **low ticket size** transactions via restriction on transaction limits, offering **limited use cases (recurring payments, credit facilities, autopay and even merchant payments)**
- Initially, few banks/PSPs supported the UPI functionality

Customer support and grievance

- Users often encountered **delays and difficulties in resolving transaction issues** and receiving support in the initial days
- **Being a new model in the market**, users often encountered delays and difficulties in resolving transaction issues and receiving support
- **A robust grievance redressal mechanism** was not present to effectively handle customer complaints

Illustrative, not exhaustive



To address challenges and drive product innovations, the government, payment operator and ecosystem players implemented various interventions.

Initiatives by the payment system operators



Product diversification for growing customer needs

1

UPI AutoPay

Enable recurring e-mandates for bill payments, mutual funds, etc.



Credit cards on UPI

Enable customers to link their credit cards with UPI



UPI 123Pay

UPI feature for phones without an internet connection



Bilateral linkages

Agreements with RTPs from other countries to enable cross-border UPI payments



Merchant verification

- **Invoice in the box:** Invoice sent to the customer before making the payment
- **Signed intent and QR code:** Authenticity can be checked while scanning QR



Real-time fraud monitoring to deter frauds in UPI ecosystem

2

Implement a real-time Fraud Risk Monitoring and Management (FRM) solution for detecting and preventing fraud. Key features and functionalities include:

- **24X7 fraud monitoring solution** provided to all member banks as a value-added service
- Real-time feed with the capability to **alert and decline transactions** based on predefined rules
- **Scoring methodology** based on **AI and ML**, wherein every transaction is given a model score
- Secured **web-based access** to member banks



Unified Dispute

3

Automated and single-channel redressal to enable speedy **dispute resolution** via **API calls**. Key features include:

- **Transparent tracking** allowing customers to witness real-time progress of raised complaints and pending transactions (via the "Check status" option in the UPI app)
- **Automated workflow** reducing manual intervention
- **Standardised processes** for dispute resolution
- **Faster refunds** due to reliance on an API-based system instead of the traditional filed-based



Real-time fraud monitoring to deter frauds in UPI ecosystem

4

- Launched **"UPI Chalega,"** a **UPI awareness campaign** in association with the payment ecosystem players to promote **secure UPI adoption**
- Launched **"UPI Safety Shield"** to **protect customer interests** and create awareness about digital payments among users



Initiatives by the government and RBI



भारतीय रिज़र्व बैंक
RESERVE BANK OF INDIA

Conducive regulatory guidelines and support

- 1
 - **Regulatory guidelines for interoperability:** RBI issued interoperability guidelines for PPI* (Prepaid Payment Instruments such as prepaid cards and wallets) issuers to ensure compliance with onboarding, KYC, settlement, authentication, etc.
 - **Guidelines for harmonisation of Turn Around Time (TAT) and customer compensation for failed transactions:** TAT has been mandated by RBI for ecosystem participants to strive for quicker resolution of failed transactions
 - **Online dispute resolution:** Per RBI guidelines, ecosystem participants shall provide customers with a facility to lodge disputes and grievances through the same mobile app used for making payments
 - **Third-Party App Providers (TPAPs):** Guidelines for TPAPs to ensure they comply with regulatory requirements, including data privacy, security standards and interoperability
 - **Data security:** UPI service providers must comply with data security standards and guidelines to protect users' information and transaction data. This includes adhering to the IT Act and data localisation norms
 - **KYC compliance:** Users must undergo Know Your Customer (KYC) verification to ensure their identity and prevent fraud. Banks and PSPs must adhere to RBI's KYC norms
 - **Test environments to test UPI-based products:** The RBI has introduced regulatory sandbox environments, allowing fintech companies to test innovative UPI-based products and services under a controlled regulatory framework

Awareness campaigns to spread product knowledge

- 2
 - RBI launched **"Digital Payment Apnao, Aauron ko bhi Sikhao"** to increase the adoption of digital payments. RBI appealed to all stakeholders to teach others about digital payments.
 - RBI launched **"Digital Payment, Surakshit Payment"** to create awareness around the safety and security of digital payments.

Note*: According to RBI, PPIs allow the purchase of goods and services, financial services and remittance facilities. PPIs can be issued as cards or wallets and can be used against the value stored within them.

Initiatives by the ecosystem participants



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RESERVE BANK OF INDIA

Incentivisation and gamification for ensuring customer stickiness

1. Incentivisation for UPI adoption

- **Cashback:** Users make payments for purchases, bill payments or money transfers, and a **percentage or fixed amount of the transaction value is credited back** to their account as cashback by TPAP apps
- **Discount:** Ecosystem participants offer **discounts on selected merchant** transactions in case of UPI payments



2. Gamification

- UPI apps have certain games, such as **scratching the card and spinning the wheel to increase customer stickiness on the platforms**

One-stop solution for addressing customers growing needs

UPI applications act as one-stop solutions for users' payment needs. **Players such as Bajaj FinServ, Paytm and PhonePe** are the leaders in this segment

- Allow users to **make all types of merchant payments (in-store and online)**, including travel, shopping, entertainment, insurance, stocks, education
- Allow merchants to **accept business payments** on their apps, websites or through links
- Facilitate **cross-border payments**
- Allow users to schedule future payments and **autopay** on the due date
- Provide **loans to the customers based on buying patterns**
- Assist **in tracking expenses**



Grievance redressal to enhance customer experience

PSPs/TPAPs provide a 24*7, robust grievance redressal mechanism for rectifying customer issues

- **Users** of the PSPs/TPAPs app **can raise a complaint** concerning a UPI transaction
- Customers can select the relevant UPI transaction and raise a complaint
- Complaints can be **raised for merchant transactions and fund transfer**
- PSPs/TPAPs shall **communicate the real-time status of the complaint** to the user
- If the grievance remains unresolved, PSPs shall **assist the user in escalating the grievance** to PSP bank and further to NPCI



To improve penetration and offer new use cases, NPCI is expanding UPI to international markets by connecting with global RTP systems

NPCI's current focus areas for UPI expansion



Bilateral linkages with international payment system⁶ Illustrative, not exhaustive

<p>Singapore-PayNow</p>	<p>France-Lyra</p>	<p>Nepal-National Payment Interface</p>	<p>Thailand-PromptPay</p>
<p>Sri Lanka-LankaPay</p>	<p>Malaysia-Merchantrade Asia</p>	<p>RMA-Bhutan</p>	<p>UAE-Neopay</p>

Way forward for UPI

<p>NPCI has rolled out credit line on UPI⁷</p>	<p>7 countries accept UPI and 5 RuPay⁸</p>	<p>1 billion transactions per day using UPI by 2026–27 India⁹</p>
<p>NPCIRBI to expand UPI to 20 countries by 2028–29¹⁰</p> <p>RBI is working on expanding UPI to 20 countries by 2028-29: RBI Annual Report</p> <p>The Reserve Bank of India (RBI) along with NPCI International Payments Ltd (NIPL) will work towards taking UPI to 20 countries by FY29. RBI Annual report says possibilities will be explored for increasing the global footprints of UPI and RuPay.</p>		<p>Japan and West Asia to adopt UPI¹¹</p> <p>Davos 2024: Japanese Monetary Authority to adopt India's digital payment models says Ashwini Vaishnaw</p> <p>The UAE, Bhutan, and Nepal have already adopted the UPI payment system and NPCI International is in talks to extend the UPI services in the US, European countries, and West Asia.</p>

⁶ UPI bilateral linkages

⁷ Credit line on UPI

⁸ Acceptance of UPI in 7 countries

⁹ UPI transactions to reach 1 Bn per day by 2026-27 in India

¹⁰ RBI to expand UPI to 20 countries by 2028-29

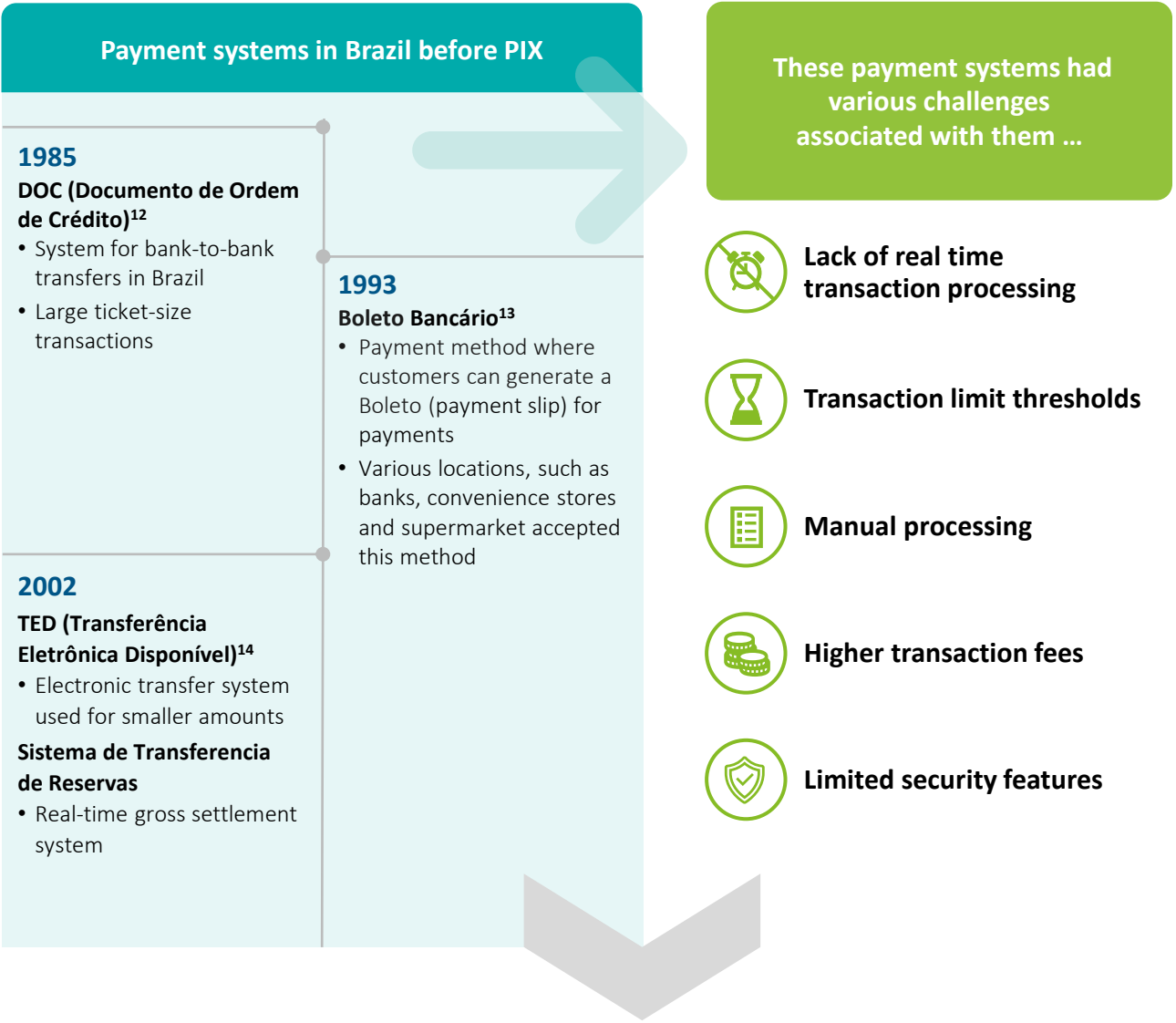
¹¹ Japan and West Asia to adopt UPI

CASE IN POINT: BRAZILIAN RTP SYSTEM – PIX





Various payment methods such as TED, DOC and Boletão were widely used before the launch of PIX in Brazil



... these challenges lead Brazilian regulators to launch real-time payment rails addressing the pain points



2020
Central Bank of Brazil (BCB), along with the Transaction Account Identifiers Directory (DICT) and Instant Payment System (SPI) came together to launch Pix¹⁵

¹² Documento de Ordem de Credito, 1985

¹³ Boleto Bancario, 1993

¹⁴ Transferencia Eletronica Disponivel, 2002

¹⁵ Launch of Pix



PIX was launched to mitigate the pain points and further drive the adoption of digital payments in Brazil

Launch of PIX to address customer pain points and needs

Key features of PIX

24*7 availability

Payments via alias

QR code enabled

Simplified pricing

ISO 20022 compliant

Real-time settlement

Pain points addressed by PIX

Instant funds transfer

Scalable and secure

24*7 availability

Lower pricing

Use cases

Retail payments

Business payments

Government payments

PIX has been growing exponentially driven by multiple use cases

109.8 M

Brazilians have access to PIX (approximately 66 percent of the population)¹⁶

8.5 M

Brazilian businesses/merchants have access to/transact money on PIX¹⁶

80%

Transactions are P2P occurring over PIX platform¹⁶

US\$3.4 T

Value of transactions processed across PIX as of 2023¹⁷

42 B

PIX platform contributed transactions by volume to the overall Brazilian economy as of April 2024¹⁷

800+

Number of PIX participants, banks, fintech players, etc., supporting payments via the PIX platform¹⁸

¹⁶ Growth of Pix
¹⁷ Volume and value of Pix transactions
¹⁸ Number of Pix participants

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15



Despite its exceptional operational performance and continuous availability, there were some initial teething issues observed with PIX.

Adoption and awareness

- Brazil's population was limitedly familiar with digital transactions, which hindered the adoption of PIX. This was later addressed by spreading awareness.
- Significant efforts are required to **shift spending behaviour from cash to digital**.
- **New players** in the NPS (National Payment System) **lacked the expertise to meet PIX's minimum-security requirements** for identity validation and authentication, leading to increased fraud.

Fraud/Cyber security

- **PIX data leakage** compromised financial information. After a system failure in 2021, 3,95,000 PIX keys were exposed.
- **Due to increased incidents of abductions/ransoms** after the launch of PIX, the government had to restrict its usage.
- **Security concerns**, such as authorised push payment fraud, fake supplier scams, session capture and WhatsApp cloning scams, are becoming more prevalent.

Customer support and grievance

- **In the initial days, customer dissatisfaction resulted from the absence of a refund provision in case of erroneous bank transactions (such as fraud or operational failure).**
- **Structured grievance redressal and return mechanisms** were not present to effectively handle customer complaints and speedily issue refunds.

Product differentiation

- Initially, PIX was not equipped with features such as automated recurring and instalment payments and fund reversals.
- There were also limitations with respect to **automated batch payments** due to integration challenges.

Illustrative, not exhaustive





Periodic interventions by the Central Bank of Brazil (BCB) have been pivotal in addressing these issues and fostering innovation for PIX.

Interventions by the payment system operator



Product diversification for growing customer needs

1

Dynamic and static QR code

Ensure the integrity of the information about the payee



Cross-border payments

Allows users to make/receive payments from abroad



One-click sign and pay

Allows users to make payment with a click by automatically filling in saved information



PIX offline

Enables users to send/receive money without internet



Near field communication

Proximity payments via smartphones using NFC technology



2

Fraud risk monitoring and management for safe and secured transactions

- **Regular supervision** of PIX participants and transactions
- **Blocking of suspicious transactions** using **anti-fraud engines**
- **Rejection of unsecured transactions**
- **Alerts** sent to all parties in case of fraudulent transactions
- **Encryption of PIX data** operated by BCB



3

Dispute management framework for enhanced customer experience

- BCB has also issued guidelines with respect to **dispute resolution for PSPs**
 - To Customers can complain to their PSPs for a transaction
 - PSP evaluates the case of fraud and the reimbursement
 - PSP notify the user in case of errors
- Parties can raise a **request on Bank of Brazil's website**
- A **15-day period** is given to the other party by BCB for dispute resolution
- If no agreement is reached, the established **dispute resolution committee** will take the lead
- Established a **special refund mechanism** for reimbursements



4

Conducive regulatory framework to support product adoption

1. Cybersecurity

- **Regular supervision** of PIX participants' data for cybersecurity
- Data supervision based on **CPMI-IOSCO principles for financial market infrastructure**

2. AML/CFT checks

- **All PIX participants are subject to BCB's regulation** on AML/CFT

3. Minimal fee structure

- A **minimal fee** is charged to the receiving participant
- **Interchange fee for cash out** at ATM
- Direct participants charge **fees from sub-members** in contract
- **Users are charged** above a certain limit on the number of transactions
- **Merchant prices** are variable



Interventions by the payment system operator



5

Precautionary blocking to avoid suspected frauds

- Precautionary **blocking of funds received for up to 72 hours** from the credited time in the event of a suspected fraud
- Funds are set **free only after the assurance** of the transaction
- If the fraud is confirmed, the **payee's institution must return the funds to the paying user**



6

Awareness campaigns for better product outreach and knowledge

- BCB started **#campanhacontragolpes**, **#essefilmevocêjáviu** and **#evitegolpes** to educate users against the most common scams involving PIX
- **#Pixparanegócios**: Promote the use of PIX in the business environment, especially with retailers
- **#BCteExplica**: A series of short videos on the BCB's YouTube channel that clarify issues involving PIX
- **Conexão Pix and Circuito Pix**: A series of webinars launched to educate people
- **#Pixparanegócios**: Started to promote the use of PIX by businesses



7

Adoption via customer incentivisation

- **In-store discounts** by retailers in case of making payments via PIX
- **Cashbacks to users** in case of making digital payments using PIX



8

Fostering innovation via new features

1. Seamless integration

- PIX APIs facilitate automated **interaction between the systems** of participating institutions and end users
- Assists in the **identification of receipt of funds**
- PIX allows users to change their participating institution without changing their management system

2. Future dated billing

- Functionality to support generating billing charges with **future due dates**
- **Automatic calculation of any additional amounts** (such as interest, fines, discounts and rebates) as applicable on the actual payment date





PIX is making significant strides by strategically collaborating and driving new product innovations

NPCI's current New product launch areas for UPI expansion

Launching innovative products such as:



Implemented

- **PIX Automatico**¹⁹ – New product feature to enable **recurring payments** via PIX platform
- **PIX Garantindo**²⁰ – Product which enables making **merchant payments in instalments**

In-Progress

- **PIX Credito** – This product is similar to the buy now, pay later model, where an agreed-upon financing rate is set at the time of customer acquisition.
- **PIX International** – Launch of instant payment solution with real-time currency exchange for **cross-border remittances**.



PIX allows cross-border payment solutions with Remitly²¹



Fiserv improves the technology used by PIX in Brazil to increase the adoption of P2B payments²²



FastSpring and EBANX partners with PIX payments to enhance payments in Brazil²³



UK-based Volt expands operations in Brazil for real-time payments²⁴



Ria Money Transfer launched its instant payment services in Brazil with the help of PIX²⁴

¹⁹ [Pix Automacio](#)

²⁰ [Pix Grantindo](#)

²¹ [Pix-Remitly partnership](#)

²² [Pix-Fiserv partnership](#)

²³ [Pix-Ebnax partnership](#)

²⁴ [Pix-Volt, Pix-Ria partnership](#)



Key considerations for RTP adoption and expansion in South Africa

India's UPI and Brazil's PIX are especially relevant to South Africa, given the similarities in how our economies are structured, especially a large informal sector and a high-reliance on cash at the outset. Both UPI and PIX have experienced exponential growth, making them both successful models that can serve as a blueprint for South Africa's RTP system. Rapid Payments adoption growth did not come without challenges, and South Africa should learn from the pitfalls experienced by Brazil and India. Here are some key considerations for South Africa:

- 1. User-centric design and industry-wide consistency is critical:** Both UPI and PIX spent considerable effort to ensure a simple, easy to navigate and consistent user experience. UPI's TPAP was designed for diverse users with limited technical knowledge, allowing UPI to penetrate lower tier towns. Brazil's PIX seamlessly integrated with mobile apps of participating banks – offering a single user interface and familiarity. Significant user testing across diverse demographics, and ensuring a consistent experience across all banking apps will be critical.
- 2. Interoperability and Industry collaboration:** The interoperability of UPI has fostered a cohesive and user-friendly digital payment ecosystem in India, leading to the platform's success and popularity. UPI's features, such as cross-app transactions, unified QR codes, support for multiple bank accounts and the ease of switching between different UPI apps, have made it the preferred mode of payment. Industry collaboration was also highlighted by PIX as a key success factor.
- 3. Central dispute resolution and fraud prevention:** UPI provides a unified dispute and issue resolution system that ensures automated and prompt conflict resolution and allows customers to track the progress of their complaints in real time. This along with a live fraud prevention system will be critical to ensure trust in the system is maintained.
- 4. Promote financial inclusion:** UPI promoted financial inclusion through UPI123Pay and UPI Lite. PIX also had great success in the unbanked population in Brazil. Whilst South Africa has high levels of bank penetration, there is still scope to remove cash from the system through a cheap and easy payments mechanism that not only works for P2P payments but also for SME and businesses. Incentives and a wide-scale education programme will be critical.
- 5. Government and regulatory support:** Both UPI and PIX were supported by strong regulation and support from Government. This included subsidized charges, and promotion to the preferred payment method for public institutions. South Africa will need to enable our RTP to be the preferred and favoured method of payment for utilities, municipalities and government departments.

To meet these objectives, South Africa's RTP will require a funding model. Developing a sophisticated interchange methodology that allows SMEs and Business to fund this payment method will be crucial to ensuring success and sustainability, whilst ensuring a low or ideally zero cost to consumers.



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Particulars	Source
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¹⁸ Number of Pix participants	https://www.europeanpaymentscouncil.eu/news-insights/insight/pix-rapid-development-instant-payments-brazil
¹⁹ Pix Automacio	https://latinoamerica21.com/en/pix-and-its-innovations-for-the-payment-sector-in-brazil/
²⁰ Pix Garantindo	https://www.pagbrasil.com/pix/pix-offline-understand-more-about-brazils-instant-payment-upcoming-feature/
²¹ Pix-Remitly partnership	https://blog.remitly.com/money-transfer/complete-guide-brazilian-pix-system/#:~:text=To%20use%20Pix%20with%20Remitly%2C%20you%20just%20need%20to%20ask,enter%20your%20recipient's%20Pix%20key.
²² Pix-Fiserv partnership	https://newsroom.fiserv.com/news-releases/news-release-details/fiserv-enhances-its-pix-hub-technology-offer-brazilian-retailers
²³ Pix-Ebanx partnership	https://fintechmagazine.com/articles/fastspring-ebanx-partner-to-expand-pix-payments-in-brazil
²⁴ Pix-Volt, Pix-Ria partnership	https://www.mordorintelligence.com/industry-reports/brazil-real-time-payments-market



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