UNIFIED PAYMENTS INTERFACE (UPI): A DIGITAL TRANSFORMATION IN INDIA

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Abstract: Unified Payments Interface (UPI) in India as a unified payment solution to automate and standardize the country's various payment platforms. The National Payments Corporation of India (NPCI) developed UPI as an architecture framework with standard Application Programming Interface (API) specifications to create interoperability and improve the customer experience. UPI allows users to easily and securely transfer funds between bank accounts and make merchant payments using various identifiers. This study aims to analyse the UPI payment system in India and its potential future in the digital payment ecosystem. The objectives of this study are to examine the various applications of UPI, to investigate the adoption and usage rates of UPI in India, and to explore the future of UPI in digital payments. Data was collected through primary and secondary sources, including online surveys and literature reviews. This research paper reveals that UPI has become a popular payment option in India, with increasing adoption and usage rates. The future of UPI in India looks promising, with continued growth, innovation, and increased adoption expected. This study provides valuable insights into the potential of UPI in the digital payment ecosystem and its role in India's vision of a cashless economy.

Index Terms -**UPI, Digital Payments, Growth, Cashless economy.**

I. INTRODUCTION

India used various payment systems to transfer money between banks prior to 2016, including RTGS, IMPS, and NEFT. Due to the complexity of these systems and the growing burden of paperwork, there was a need for a unified payment solution that could automate and standardize India's payment platforms. In response, the National Payments Corporation of India (NPCI) developed the Unified Payments Interface (UPI) in 2016. UPI is an architecture framework with a set of standard Application Programming Interface (API) specifications that aim to simplify and provide a single interface across all NPCI systems, creating interoperability and a better customer experience. The pilot program was launched on April 11, 2016, in Mumbai by Dr. Raghuram G. Rajan, Governor, RBI, with 21-member banks. Subsequently, a growing number of banks began uploading their UPI-enabled apps to the Google Play store from August 25, 2016.

UPI is now one of the most preferred payment solutions in India, with over a billion transactions every month. It is a user-friendly, real-time payment solution that facilitates inter-bank transactions and enables greater digital payments adoption in the country. Its core function is to support easy and secure money transfers between bank accounts. UPI allows users to add multiple bank accounts into a single mobile application, making fund transfers and merchant payments seamless from one place. Additionally, UPI enables 'peer to peer' and 'peer to merchant' collection requests that can be scheduled and paid as requested. Payments can be made using a UPI ID, UPI Number, Account number, and an Indian Financial System Code (IFSC). Payment security is ensured as per applicable RBI guidelines using a 1-click 2-factor authentication, where the second factor of authentication is the UPI PIN. UPI is also available through the Unstructured Supplementary Services Data (USSD) channel to cater to users of feature phones.

II. OBJECTIVES

- To study the UPI payment system and its applications.
- To investigate the adoption and usage rates of UPI in India.
- To explore the potential future of UPI in digital payments.

III. HYPOTHESES

- H_01: India has shown no interest in adopting the Unified Payments Interface (UPI) technology as a payment system.

- H_02: There is no significant role of UPI for the vision of cashless economy of India.

IV. RESEARCH METHODOLOGY

- **Research Design:**
  - The research has been conducted using a descriptive research design, which aimed to describe the current situation and trends related to the UPI payment system.

- **Data Collection:**
  - Secondary data has been collected from various sources such as research papers, journals, reports, and online databases such as Google Scholar, ScienceDirect, and RBI's official website.
  - The data has been collected related to the penetration of UPI in India and around the globe, its transaction volume, and its future prospects in the digital payments industry.

- **Data Analysis:**
  - The collected data has been analysed using statistical methods and content analysis.
  - The data has been analysed both graphically and theoretically to present our objectives.
  - Content analysis conducted to extract relevant information and themes from the collected data.

- **Limitations:**
  - The research is based on secondary data, and the accuracy and reliability of the data are dependent on the sources and methods used to collect them.
  - The study may not capture the latest developments in the UPI payment system, and the findings may not be generalizable to other countries or regions.
  - The research may be limited by the availability and accessibility of relevant data.

V. REVIEW OF LITERARTURE

- **Amit Kumar Pandey and Vipul Jain (2021)** analyses the impact of UPI on digital financial inclusion in India. The study finds that UPI has made digital payments more accessible and convenient for a wide range of consumers, which has contributed to the growth of digital financial services in India.

- **Ankit Kumar and Santosh Kumar (2020)** analyses the impact of UPI on financial inclusion in India. The authors find that UPI has led to an increase in the use of digital financial services and has contributed to financial inclusion in India.

- **Boston Consulting Group (BCG) (2016)** highlights the transformative impact of UPI on digital transformation in India. The report states that UPI has transformed the payments landscape in India and has enabled millions of Indians to access digital financial services, which has contributed to the growth of the digital economy.

- **Nayan Ambali and Mahesh Jaisingh (2021)** examines the impact of UPI on the Indian banking system and financial inclusion. The authors find that UPI has led to an increase in the adoption of digital payments, which has contributed to financial inclusion in India.

- **Nishant Goyal and Rajesh Yadav (2021)** examines the impact of UPI on digital financial inclusion and the cashless economy in India. The authors find that UPI has enabled millions of Indians to access digital financial services, which has contributed to the growth of the digital economy in India.

- **Richa Chaturvedi and Sangeeta Sharma (2021)** analyses the role of UPI in promoting financial inclusion in rural India. The authors find that UPI has facilitated financial transactions for people living in remote areas, which has contributed to the growth of digital financial services in rural India.

- **Tarun Jain and Anuja Tandon (2017)** analyses the impact of UPI on digital payments adoption in India. The study finds that UPI has made digital payments more accessible and convenient for a wide range of consumers and has contributed to the growth of digital financial services in India.

- **World Bank (2016)** highlights the role of UPI in promoting financial inclusion in India. The report states that UPI has facilitated financial transactions for millions of previously unbanked Indians and has contributed to the growth of digital financial services in India.

VI. HOW UPI IS DISTINCTIVE?

- UPI enables instant money transfers via mobile devices 24/7, 365 days a year.

- A single mobile application can access multiple bank accounts.

- Single-click 2-factor authentication provides strong security and aligns with regulatory guidelines.

- Virtual customer addresses for pull and push payments increase security by eliminating the need to enter sensitive details such as card numbers or account numbers.

- QR codes are supported for easy payments.

- UPI is an ideal solution for those who want to avoid the hassle of cash on delivery, running to an ATM, or making exact change.

- Merchant payments and in-app payments can be made using a single application.

- Utility bill payments and over-the-counter payments supported.

- Donations, collections, and disbursements are scalable with UPI.

- Complaints can be raised directly from the mobile app.

VII. STAKEHOLDERS IN UPI

Since its launch with 21 banks in 2016, the UPI ecosystem has witnessed significant growth and now has 381 banks as participants, facilitating billions of digital transactions every month. The National Payments Corporation of India (NPCI), which oversees the UPI, states that the digital payments ecosystem in India consists of the following stakeholders:

- Payer PSP (Payment Service Providers)

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- Beneficiary Bank

- NPCI

- Bank Account Holders

- Merchants
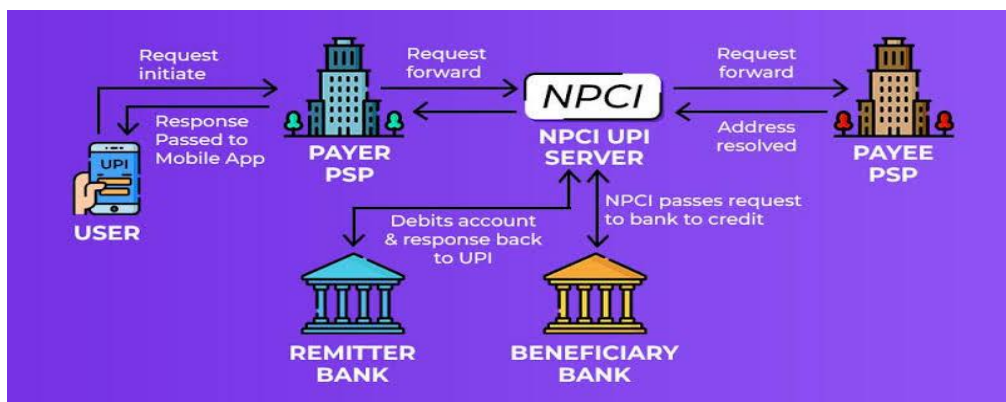
Source: NPCI

To put it into context, apps that are used to make UPI transactions, such as PhonePe or Google Pay, are called third-party app providers (TPAPs) in the value chain. Banks are called payment service providers (PSPs) in the value chain, while they also double up as remitters and beneficiaries in most transactions. TPAPs can't directly access the UPI network and need PSPs to connect with the UPI network and enable transactions

VIII. TYPES OF TRANSACTIONS SUPPORTED BY UPI

- **Financial Transactions**

UPI supports the following financial transactions:

  - **Pay Request:** A payment process in which the customer initiating the transaction transfers funds to the intended recipient is known as a 'push' payment. The payment address may include a mobile number and MMID, an account number with IFSC, or a Virtual ID.

  - **Collect Request:** This type of transaction involves the customer 'pulling' funds from the remitter using a Virtual ID.

- **Non-Financial Transactions**

UPI supports the following types of non-financial transactions on any PSP app.

- Registration for mobile banking
- One Time Password (OTP) generation
- Set/change PIN
- Transaction status
- check Raising disputes/queries

To register for mobile banking, it is mandatory that the mobile number intended for registration is already linked with the issuing bank for SMS or mobile alerts. The UPI platform is accessible through popular operating systems like Android and iOS, and members have developed apps for Android 4.2.2 and iOS 8.1 versions and newer.

IX. BUSINESS USES OF UPI

UPI has numerous business uses that have made it a popular payment system in India. Some of these business uses are:

- **Online and In-Store Payments**: UPI allows businesses to accept online and in-store payments from customers. With UPI, businesses can offer customers a quick and hassle-free payment option, which can improve customer experience and increase customer loyalty.

- **Cash on Delivery:** UPI has made cash on delivery payments easier and more efficient. Businesses can provide customers with a UPI QR code, which can be scanned to initiate a payment. This eliminates the need for customers to carry cash for making a payment.

- **Bill Payments:** UPI can be used for utility bill payments, such as electricity, water, and gas bills. Businesses can use UPI to collect payments from customers, which can reduce the cost of collecting payments and improve cash flow.

- **Fund Transfers:** UPI can be used for fund transfers between businesses, such as for vendor payments or employee salaries. UPI transfers are instant and can be done 24/7, which makes it a convenient option for businesses.

- **Donations and Contributions:** UPI can be used for accepting donations and contributions from customers. Many charitable organizations in India have adopted UPI for accepting donations, as it is a convenient and cost-effective way to collect donations.

- **Subscription payments:** Businesses can use UPI to easily manage recurring payments for subscriptions and memberships, allowing customers to authorize payments through a simple and secure process.

- **E-commerce:** UPI can also be integrated into e-commerce platforms to provide customers with a fast and convenient payment option, leading to increased conversion rates and customer satisfaction.

- **Payroll:** Employers can use UPI to quickly and securely transfer salaries and other payments to their employees' bank accounts, eliminating the need for cash or check payments.

- **Invoicing:** UPI can also be used for invoice payments, allowing businesses to easily track and manage payments from their customers.

- **Point-of-sale transactions:** Businesses can accept UPI payments at their physical locations using QR codes or other UPI-enabled payment methods, providing customers with a fast and secure way to pay for goods and services.

X. BHIM (BHARAT INTERFACE FOR MONEY) APP

BHIM (Bharat Interface for Money) is a mobile payment app developed by the National Payments Corporation of India (NPCI) in 2016, as part of the government's digital payment initiative. BHIM is built on the Unified Payments Interface (UPI) platform, enabling users to make instant bank-to-bank transfers and payments using their mobile phones. The app is designed to be user-friendly, with a simple interface and straightforward navigation. It supports multiple languages, making it accessible to users across the country.

To use BHIM, users need to link their bank account to the app and create a UPI ID. They can then make payments using various identifiers such as the UPI ID, mobile number, account number, or QR code. The app also offers features such as requesting money, checking transaction history, and generating QR codes for merchants to receive payments. BHIM is a secure and reliable payment app that uses a 4-digit passcode or fingerprint authentication to authorize transactions. It has been integrated with more than 100 banks, making it widely available to users across India. The app has received positive reviews for its ease of use, reliability, and security.

XI. UPI LITE

A significant proportion of digital payment transactions in the future will be of low-value, below Rs. 200. To address this trend, a new customer-friendly solution called UPI Lite has been introduced. It utilizes existing protocols to enable these low-value transactions without overburdening core banking systems in real-time. UPI Lite allows issuing banks to assign a refillable "on-device stored value" for their existing UPI app users who opt for this solution. Customers can use this stored value for offline transactions below Rs. 200 and replenish it as necessary from their UPI linked bank account. As per current guidelines, a balance limit of Rs. 2,000 is available for the stored value.

- For transactions and on-device store value refills, UPI PIN is required.

- For UPI Lite services, customer opt-in consent is required.

- Key features:
    - Balance available on home screen
    - Top-up when prompted
    - 1FA transactions (device biometric / pattern validation for transaction authentication to be provided)
    - Disable UPI Lite services (Residual balances are credited back to the customer.

XII. UPI FOR ASBA (IPO)

ASBA (Application Supported by Blocked Amount) is a process that allows investors to apply for Initial Public Offerings (IPOs) through their bank accounts. By integrating UPI with ASBA, investors can now easily make payments for IPO applications using their UPI ID and mobile phone. This method is quick, secure and eliminates the need for submitting physical cheques or transferring funds through net banking. The UPI ASBA method has also helped in reducing the time taken for IPO application processing, making it faster and more efficient for investors. With this new process, investors can apply for IPOs with ease and convenience, which has led to an increase in the participation of retail investors in the Indian capital market.

XIII. UPI PENETRATION IN INDIA

The total volume of payments made through UPI has reached 7829.49 million, while digital payments have increased from 0.38 crores in FY16 to 1,282,055.01 crores as of FY22. This trend is expected to continue as online purchasing and digital adoption increase, and it is projected to constitute 30 percent of Indian consumption. Since its inception in 2016, it took four years for the monthly value of UPI transactions to exceed Rs 3 lakh crore, which occurred in September 2020. However, in just one year, it more than doubled to Rs 7 lakh crore. In just six years, UPI has captured 16 percent of all retail payments, and in the process, it has taken away market share from other payment forms. For example, the market share of NEFT (National Electronic Funds Transfer) has declined from 60 percent five years ago to 54 percent now[1].
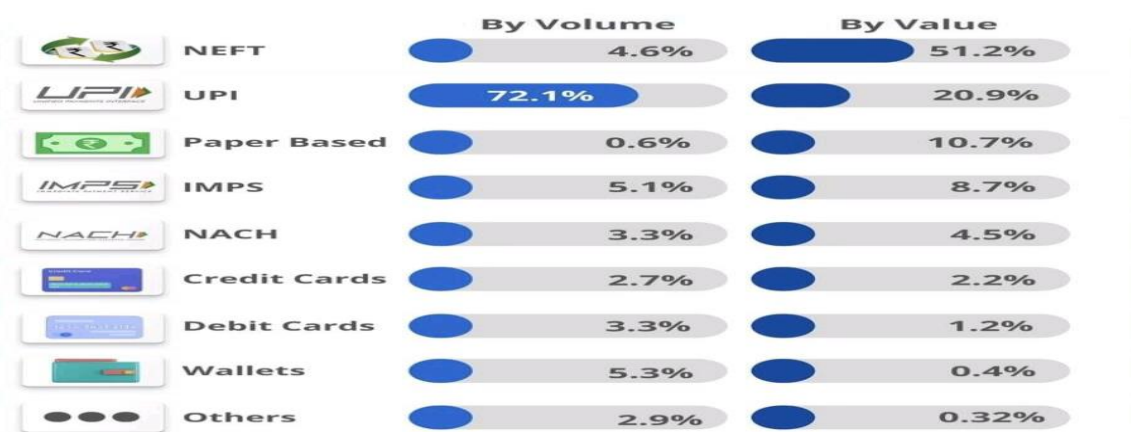

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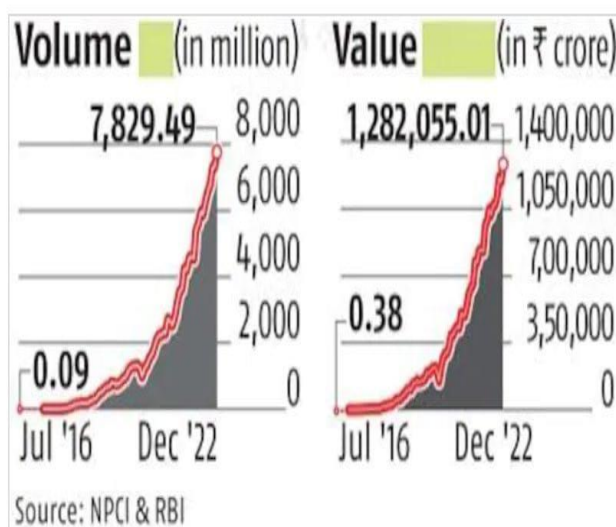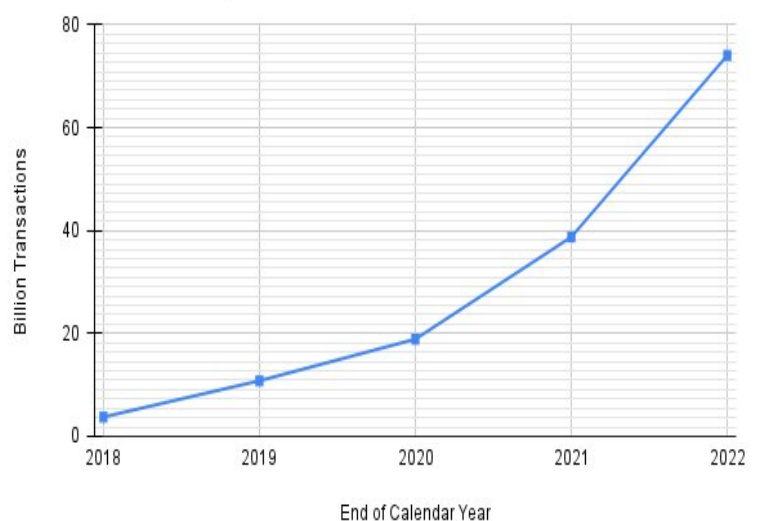
Currently, it is difficult to come across a pani puri vendor, barber or cigarette seller without a QR code for UPI payments. Millions of merchants have adopted UPI for their payment needs, making it a juggernaut in its own right. According to consulting firm BCG, more than 30 million merchants are now using QR codes, which is significantly higher than the number of point-of-sale (POS) machines for swiping credit and debit cards, which stands at just 6 million despite their decades-long presence. UPI has gained such momentum that it's like a train that has left the station. In 2022, India's digital payments framework, UPI, witnessed tremendous growth in terms of both the number of transactions and their total value. As per the National Payments Corporation of India (NPCI), at the end of the calendar year 2022, the total value of UPI transactions stood at INR 125.95 Lakh Cr, which is a year-on-year increase of 1.75 times.

HOW INDIA PAYS

	By Volume	By Value
NEFT	4.6%	51.2%
UPI	72.1%	20.9%
Paper Based	0.6%	10.7%
IMPS	5.1%	8.7%
NACH	3.3%	4.5%
Credit Cards	2.7%	2.2%
Debit Cards	3.3%	1.2%
Wallets	5.3%	0.4%
Others	2.9%	0.32%

InvestyWise
@investywise

(%) Retail Payments Share for Aug 2022
Source: rbi.org.in

UPI has been slowly chipping away at the market share of NEFT, which is currently the leading retail electronic payment segment in India operated by the Reserve Bank of India (RBI). With the introduction of UPI 2.0 a year ago, customers can now enable recurring e-mandates for a wide range of payments, including electricity bills and insurance premiums, which has contributed to the decline in NEFT payments that operate with a half-hour delay. However, NEFT, net banking, and cards are still widely used by enterprises, high net-worth individuals (HNIs), and others for large-value transactions, though even that is expected to change in the future. UPI's popularity has been growing due to its sheer convenience and ability to break down barriers.

XIV. FUTURE OF UPI

UPI is expected to continue its steady growth in near future, fueled by the widespread adoption of digital payments across the country. This is evident from the decreasing average ticket size of transactions, indicating that UPI payments are becoming more prevalent across India. While 2022 was a year of significant growth for UPI, there was a slowdown in transaction value in the second half, indicating a level of maturity in the ecosystem as more users adopt the technology. Nevertheless, UPI is expected to consolidate its position as the leading digital payment technology globally, with the integration of credit cards and expansion into international markets. According to a recent BCG report, India's digital payments market, which includes retail payments, business-to-business payments by MSMEs, and government payments, is expected to more than triple from the current $3 trillion (Rs 226 lakh crore) to $10 trillion (nearly Rs 800 lakh crore) by 2026.[2] Dilip Asbe, MD & CEO of NPCI that created the UPI technology has stated that "a billion transactions per day" is possible. UPI currently logs 220 million transactions per day, with a 4x increase as the next goal. Newer use cases such as credit card-UPI linkages, international remittances and penetration into smaller geographies are poised to drive the next wave of exponential growth. "Our competition is with cash. There is still a lot of it in circulation that we need to get rid of, not only in India, but globally.[3]

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Newer technologies like blockchain and the central bank digital currency (CBDC) pose a challenge to UPI. Blockchain solutions for cross-border remittances are still a work in progress. In addition, CBDC is fast gaining adoption with 80-plus countries, including India. In fact, there are close to half a dozen countries already live with CBDC. Overall, the future of UPI in India looks bright. With continued growth, increased adoption, innovation, and international expansion, UPI is likely to become even more popular in the years to come.

XV. CONCLUSION

The study of UPI and its applications has shown that UPI has revolutionized the digital payment industry in India. It offers a seamless and secure payment experience, making it a popular payment option for individuals and businesses alike. The adoption and usage rates of UPI have been increasing rapidly, with UPI transactions growing at an unprecedented rate. This indicates a high level of acceptance and trust among users, highlighting the potential of UPI in the digital payment industry. Contrary to H_01, India has shown significant interest in adopting UPI technology as a payment system, with UPI becoming a popular payment option in India.

Additionally, the study has shown that UPI is playing a significant role in India's vision of a cashless economy. So H_02 is rejected. UPI has become the backbone of the digital payment ecosystem in India and is driving the shift towards a cashless economy. With the government's push towards a digital economy and the increasing popularity of UPI, India is poised to become a leader in the digital payment space. Looking towards the future, UPI is expected to continue its growth trajectory, with increased adoption, innovation, and international expansion. This will further drive the shift towards a cashless economy in India and could serve as an inspiration for other countries looking to transform their payment systems. In conclusion, UPI is a disruptive and innovative technology that has already transformed the digital payment landscape in India, and its potential for the future is vast.

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