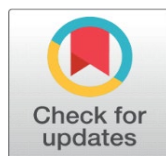


A RESEARCH PAPER ON “UNIFIED PAYMENTS INTERFACE: EMERGENCE, GROWTH AND WHERE IT IS HEADED”

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ABSTRACT

The world is moving at a fast pace. Every day, great discoveries and inventions are being done to make living easier and more transparent. In the year 2016, the government of India also made a step forward in moving towards a transparent and advanced mechanism of making transactions by launching a Unified Payments Interface- UPI. This research covered the origination of the digital payments mechanism and how it paved the way forward for the emergence of the Unified Payments Interface. With the help of charts and bars, the graphical representation of the performance of UPI since its establishment is also shown, and how much it affects the economy along with the scopes that should be looked forward to in the future.

In a country with a 1.43 billion population, it requires an excellent level of digital and financial literacy of the country's people to implement such innovative payment modes. This is a major challenge that UPI still has to overcome, but this cannot cover the huge success journey it has made so far.

Keywords: Unified Payment Interface, Digital Payment, Financial Literacy, National Payments Corporation of India.

1. INTRODUCTION

With innovation comes evolution. Where a few years back people used keypad phones just for the sake of making conversation with their family, friends, acquaintances, later adapted themselves to working on touch screen phones. In a similar approach, for centuries, physical payment at the point of sale was typically required to complete a purchase. There always prevailed the traditional method of payment system using hard money or, in early days barter items. But with time, we were able to push past their conventional means of using hard cash and adapt to a digitalized mechanism. The payment system in India changed and in a very revolutionary manner. The economy has made a significant advancement towards the innovative payment mode. The idea of making the economy go cashless and cardless was made happen with the introduction of the Unified Payment Interface system or UPI System.

By enabling several savings accounts into a single smartphone application (of any collaborating bank), the Unified Payments Interface (UPI) technology brings altogether varied banking operations, seamless fund navigation, and payments from merchants under the same roof. It also facilitates "Peer to Peer" collection inquiries, which are flexible enough to be scheduled and funded based on need and availability. NPCI performed a trial launch with 21 participating

banks while considering the previously listed conditions. On the 11th of April 2016, Dr. Raghuram G. Rajan, the Reserve Bank of India Governor of Mumbai, introduced the pilot program. Financial institutions started submitting their UPI-compatible applications to the Google Play market on the 25th of August 2016.

2. WHAT MAKES IT SPECIAL?

- Real-time money transactions through mobile devices
- Multiple bank accounts can be accessed with a single mobile application, available 24/7/365.
- Single Click 2 Factor Authentication: This functionality complies with legal requirements while providing a seamless single click payment experience.
- Pull & Push eliminates the need for customers to input personal information such as their card number, account number, IFSC, etc., allowing their virtual address to provide incremental protection.
- QR Code
- The simplest method to avoid dealing with Cash on Delivery, use an ATM, or having to give the exact amount.
- Payment to merchants using a single application or in-app purchases.
- Payments for utility bills, phone-based payments, and QR code-based payments (Scan and Pay).
- Adjustable Payments, Gatherings, and Contributions.
- Making a complaint through a mobile app directly.

The following parties are involved in UPI: payers, payees, remitters, beneficiary banks, NPCI, bank account holders, and merchants.

The following major topics are examined in this study paper:

- The creation of UPI and its technological foundation.
- The growth trajectory of the RBI and its effects on the Indian economy.
- The difficulties and opportunities facing UPI, particularly its international expansion.

3. LITERATURE REVIEW

- **(Bappaditya Mukhopadhyay, 2016)** examined India's cashless payment system. He created a theoretical model of payment decisions that is typically used by buyers and sellers. He discovered that the advantages of doing transactions without cash outweighed the desire to avoid paying taxes.
- **(Rahul Gochhwal, 2017)** has investigated the development of payment systems via the Unified Payment Interface and discovered that UPI is the most sophisticated payment mechanism globally, offering instant settlement and low transaction costs because no third parties are involved in the transaction process. UPI has allowed for interoperability across various bank payment systems and has allowed banks to communicate with one another.
- **(Suma Vally and Hema Divya, 2018)** examined the uptake of digital payments by Indian consumers. The findings showed that the use of technology, particularly artificial intelligence for digital payments, has enhanced the performance of the fintech and banking sectors and can lead to the goal of a cashless society.
- **(Rouibah, 2015)** shown that the main barriers to digital payments were low security, low trust, failure fear, high costs, and low familiarity. In India, the vast majority of people still utilize cash as their primary means of payment. Also, the acceptance of e-payments was impacted by the internet's security features, banking options, privacy, and service quality. This demonstrates that people's knowledge of the digitalized system is still lacking.
- **(Singh, 2017)** indicated that there was a substantial discrepancy between consumer education and the uptake of digital payments. The adoption of digital payment among customers was positively and significantly impacted by their impression of it. Nevertheless, a very small percentage of people have really used this method.
- **(Roshna Thomas & Dr Abhijeet Chatterjee, 2017)** believes that UPI will act as a catalyst to accelerate digitization. He discovered the benefits, challenges, and opportunities associated with UPI payments through his research. He claims that the country's financial inclusion, where the majority of the agricultural population lacks access to the banking industry, and mobile services, where the services offered by service providers are still out of reach for many, present the biggest obstacles to the adoption of UPI.
- **(Devadutta Indoria, 2021)** claimed that although more people were becoming familiar with the Internet in 1994, the establishment of security protocols (such as HTTP and DSL) that allowed for continuous and rapid access to the Internet took place over the course of four years. In 2000, the term "ecommerce" underwent a change in meaning. E-commerce was originally defined as the process of purchasing goods and services over the Internet using safe connections and electronic payment methods.

- **(Dr. A. Shaji George, 2023)** observed that in India, a new payment method called the Unified Payments Interface (UPI) enables speedy and secure money transfers. People can pay their bills, receive payments, and make payments all on one site. UPI has completely changed the way individuals in India make payments by streamlining and speeding up the process. Numerous advantages are also offered by the UPI system, including cost-effectiveness, simplicity, safety, and more. However, there are certain issues with the implementation of UPI, including security flaws and consumers' lack of system knowledge. In spite of these obstacles, UPI has a huge chance to revolutionize the Indian digital payment market. It may present new chances for companies to effectively approach clients.
- **(Vidani, 2024)** stated that Redefining financial transactions and promoting financial inclusion, the Unified Payments Interface (UPI) has become a revolutionary force in India's digital payments space. The distinguishing feature of UPI is its smooth, safe, and compatible platform that allows for instantaneous money transfers across various bank accounts. Beyond only transactions, UPI has significantly reduced reliance on cash, promoted transparency, and accelerated economic growth. As a result, the digital barrier between rural and urban areas has been bridged and financial literacy has decreased, thereby empowering small enterprises and micro-entrepreneurs. The advent of UPI has caused a paradigm shift in the banking industry, pushing companies to adopt digital-first strategies, personalize their products, and simplify their branch networks.

4. RESEARCH METHODOLOGY

This study adopts a **descriptive and exploratory research design** to analyze the emergence, growth, and future direction of the Unified Payments Interface (UPI). The research examines both qualitative and quantitative aspects of UPI.

The research is broken down into three main sections:

- Emergence of UPI: Historical and contextual analysis.
- Growth of UPI: Quantitative analysis of adoption, transaction volume, and economic impact.
- Future of UPI: Exploratory study into potential trends, challenges, and opportunities for global expansion.

1. DATA COLLECTION METHOD: Secondary Data

• REPORTS AND PUBLICATIONS:

- Analysis of data from NPCI's annual reports, Reserve Bank of India (RBI) reports, and government publications related to digital payments and financial inclusion.
- Examination of white papers and research studies from consulting firms like McKinsey, Deloitte, and PwC on the growth of UPI and its future trends.

• TRANSACTION DATA:

- Collection and analysis of UPI transaction volumes and leading Apps (sourced from NPCI and RBI databases).

• ACADEMIC JOURNALS:

- Review of existing literature on digital payment systems, financial inclusion, and technological innovations in fintech to provide a theoretical grounding for the study.

• News ARTICLES & Case Studies:

- Case studies of countries showing interest in adopting UPI-like systems, and media reports on UPI's role in financial inclusion and its integration with global payment networks.

OBJECTIVES:

- 1) To understand the emergence of the UPI mechanism in India.
- 2) To study the growth of UPI in the economy.
- 3) To project the future trends of UPI based on the data available.

EMERGENCE OF UPI

UPI was developed by NPCI to address the need for a unified, real-time payment solution that would integrate multiple bank accounts, streamline payments, and provide a seamless transaction experience for users. Launched in April 2016, UPI was intended to simplify and accelerate digital transactions for both individuals and businesses. Its development was supported by the Reserve Bank of India (RBI) and the Government of India, as part of a broader initiative to reduce the reliance on cash and promote digital financial services.

Key Drivers of UPI's Emergence:

1. Financial Inclusion
2. Need for a Seamless Payment System

3. Technological Advancements
4. Government Initiatives for a Cashless Economy
5. Demonetization of 2016
6. Simplified User Experience
7. Interoperability Across Banks
8. Security and Innovation

Early Adoption and Growth:

- Initially launched with 21 banks, UPI saw a steady rise in adoption due to its simplicity, interoperability, and backing by both the government and private players. Banks, fintech firms, and startups quickly integrated UPI into their offerings, making it easier for users to adopt digital payments.
- By **2017**, UPI began seeing significant transaction growth, spurred by partnerships with global companies like **Google** and **Facebook**, who recognized its potential and integrated it into their platforms (e.g., Google Pay).

GROWTH OF UPI

Since its launch in April 2016, the Unified Payments Interface (UPI) has experienced explosive growth, transforming India's digital payments landscape. From modest beginnings, UPI has become one of the most significant financial innovations, fundamentally changing how individuals and businesses transact. Its growth has been fueled by several key factors, including technological advancements, government initiatives, and a shift towards digital payments.

Key Phases in UPI's Growth:

2. INITIAL ADOPTION (2016-2017):

- **Launch and Initial Usage:** Just 21 banks offered UPI services when the National Payments Corporation of India (NPCI) launched it in 2016, indicating a low level of uptake. With just 100,000 transactions monthly, the adoption rate was very slow in the early going.
- **Catalyst of Demonetization:** The demonetization drive in November 2016 acted as a critical turning point. As the Indian economy faced a cash crunch, people turned to digital payments, including UPI. The transaction volume began to rise exponentially as UPI provided a secure, simple, and real-time platform for money transfers.

3. ACCELERATED GROWTH (2017-2019):

- **Expansion of UPI-Enabled Banks:** By 2017, more banks joined the UPI network, expanding its reach. UPI's ability to work across different banks, offering interoperability and seamless transactions, contributed to its rapid adoption.
- **Entry of Major Players:** Global tech companies and domestic fintech players began integrating UPI into their platforms. The launch of **Google Pay (formerly Tez)** in 2017, followed by **PhonePe** and **Paytm**, further accelerated the adoption of UPI. These apps simplified UPI usage for a broader audience and enhanced the user experience.
- **Transaction Growth:** By the end of 2017, UPI transactions had surged to over **100 million transactions per month**. The growth continued into 2018, with UPI gaining traction among merchants and businesses, thanks to its ease of integration and cost-effectiveness.
- **Introduction of UPI 2.0 (2018):** NPCI introduced UPI 2.0, an upgraded version with new features such as:
 - Linking overdraft accounts.
 - Pre-authorized transactions for recurring payments.
 - Invoice verification before payment. These updates increased UPI's functionality and made it more attractive for businesses and users, resulting in broader adoption.

4. MASS ADOPTION AND SURGE IN TRANSACTIONS (2020-PRESENT):

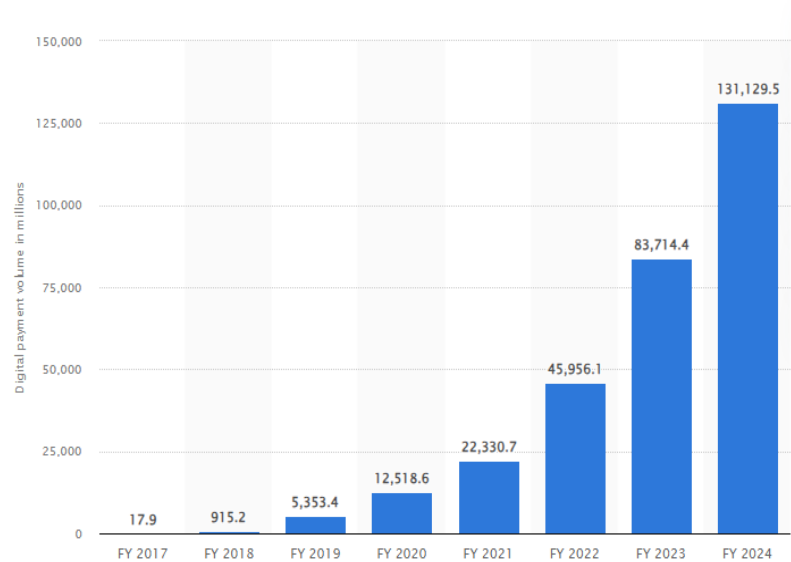
- **COVID-19 Pandemic Impact:** The COVID-19 pandemic acted as another catalyst for UPI's growth. As physical transactions decreased due to lockdowns and social distancing measures, UPI became the preferred mode of payment for both consumers and businesses.
 - UPI transactions surged as people adopted contactless payments for safety reasons.
 - Monthly transactions crossed **2 billion** by October 2020, marking a significant milestone.
- **Government Push for Online Outgoings:** The Indian government's drive for a cashless society through initiatives such as **Digital India** and **Aatmanirbhar Bharat** further fueled UPI's growth. The government's active promotion of digital payments during the pandemic encouraged millions of new users to adopt UPI.
- **Integration into Everyday Life:** UPI's widespread integration across various sectors contributed to its popularity. From small kirana (grocery) stores to e-commerce giants and utility services, UPI became ubiquitous. It evolved into a go-to solution for both personal payments and business transactions, further boosting transaction volumes.

- **International Adoption:** The growth of UPI has caught the attention of global players. NPCI launched **NPCI International Payments Limited (NIPL)** to explore the global potential of UPI. Countries like Singapore and Bhutan have integrated UPI with their own digital payment systems, and discussions are ongoing with several other nations for cross-border UPI usage.
- **Transaction Volume and Value:** UPI reached a significant milestone in **December 2021**, crossing **4.56 billion transactions** in a single month, valued at ₹8.27 trillion (around USD 112 billion). As of **2023**, UPI routinely handles more than **7 billion transactions per month**, making it one of the largest digital payment systems in the world.

5. DIVERSIFICATION AND EXPANSION (2021-PRESENT):

- **New Features and Innovations:**
 - The introduction of **UPI AutoPay** for recurring payments (subscriptions, utility bills, etc.).
 - **UPI Lite** for small-value offline transactions, improving accessibility in regions with limited internet connectivity.
 - **Credit on UPI - which expands the user base by enabling consumers to connect credit cards with UPI.**
- **Merchant Integration:** Merchants across India have increasingly adopted UPI as a primary payment method, driven by lower transaction costs, instant settlements, and simplicity of use. The growth of **QR codes for UPI** as a payment option at stores further boosted its merchant-side adoption.
- **Partnerships with Banks and Fintechs:** The continuous collaboration between banks, fintech firms, and the NPCI led to rapid innovation in UPI, increasing its user base and transaction volumes.

Volume of digital payments made via UPI in India during the fiscal years 2017 and 2024 (in millions)

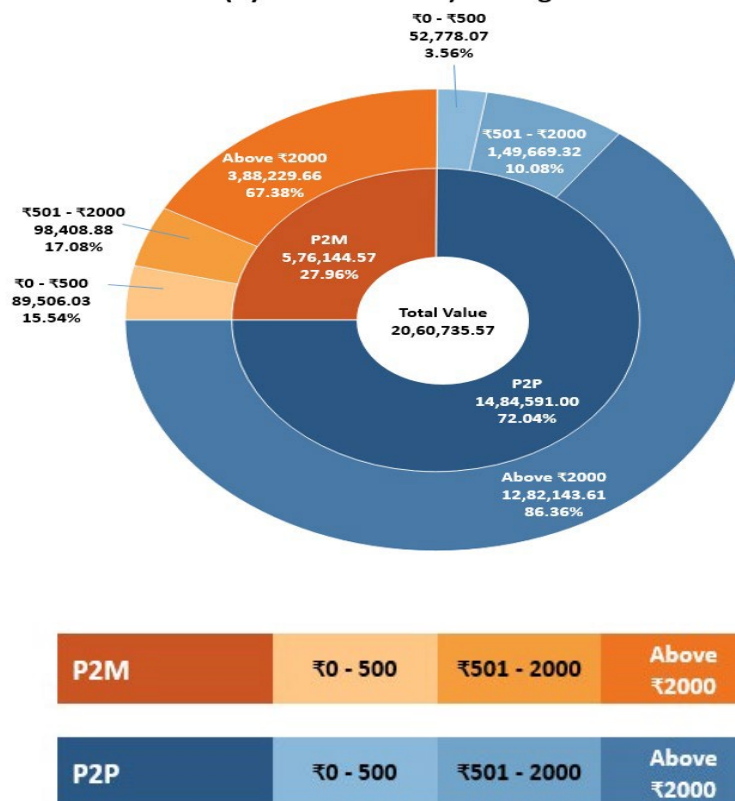


Source:- Statista 2024

In the fiscal year 2024, India, a country in South Asia, processed more than 131 billion digital payments via UPI. Compared to the value of almost 83 billion in the previous fiscal year, this represented a substantial increase. The main causes of the remarkable rise in digital payments in the nation are the increased use of digital technologies and smart service applications.

UPI P2P AND P2M TRANSACTIONS

UPI: Transactions (by Value in Crores) for Aug'24



Source: - NPCI

- P2P - Peer to peer payments, or P2P transactions, are payments made by an individual to another individual.
- P2M: Peer to Merchant Payments are payments made by an individual to a merchant.

The pie graph above illustrates how P2P transaction value is higher in India than P2M transaction value.

SHARE OF ONLINE PAYMENT APPS IN UPI

Paytm was the leading player in the market a few years back. However, since the launch of PhonePe and Google Pay, Paytm went in third place.

The following table shows the share of UPI apps in all UPI transactions.

UPI Apps	Market share
PhonePe	46%
GooglePay	36%
Paytm	13%
Others	5%

Source: - NPCI

5. CHALLENGES FACING UPI

1. OPERATIONAL AND SECURITY CHALLENGES

As UPI continues to grow, it faces operational challenges such as system outages and transaction failures. Moreover, despite its robust security framework, there have been concerns over fraud and phishing attacks targeting UPI users. Enhancing security measures and addressing infrastructure limitations are critical for maintaining user trust.

2. REGULATORY ENVIRONMENT

The regulatory landscape surrounding UPI continues to evolve. Issues related to data privacy, competition among payment providers, and the role of NPCI in managing the system are areas of ongoing debate. Regulatory bodies need to ensure that UPI continues to operate in a fair, secure, and transparent manner.

6. FUTURE PROJECTION OF UPI

Launched with a motto of making a cashless country and promoting a digital lifestyle, UPI has provided the users with an instant way of living life- 'Instant is the new Black'.

UPI has already established itself as a game-changer in the Indian payments ecosystem, and its future growth trajectory looks equally promising. Several key trends, innovations, and expansions are likely to shape the future of UPI, both in India and globally.

1. EXPANSION OF UPI GLOBALLY

One of the key future trends for UPI is its **international expansion**. NPCI has already taken steps to launch UPI in countries like **Singapore, Bhutan, Nepal**, and is in talks with several other nations for cross-border UPI acceptance. Key developments expected include:

- **Cross-Border Transactions:** UPI could enable seamless cross-border transactions, allowing Indian users to send and receive money globally through the same platform. This could be especially beneficial for **remittances**.
- **Partnerships with Foreign Governments and Banks:** As more countries adopt UPI, partnerships with global banks and financial institutions will be crucial for UPI's expansion beyond India.

2. INTRODUCTION OF UPI CREDIT

The integration of **credit with UPI** is already underway, and the future is likely to see more innovations in this space. By allowing users to link credit cards with UPI, the platform is expected to cater to a broader audience, especially those seeking credit-based digital payments. This will include:

- **Credit Card Integration:** Seamless transactions with credit cards through UPI for small and large purchases.
- **Credit on UPI (Buy Now, Pay Later):** The extension of micro-credit facilities using UPI, making short-term credit more accessible for users, particularly in the **Buy Now, Pay Later (BNPL)** space.

3. INCREASED ADOPTION OF UPI LITE AND OFFLINE PAYMENTS

UPI Lite, which enables small-value transactions without requiring an internet connection, will play a significant role in driving UPI adoption in areas with poor connectivity. Future developments include:

- **Offline Payments:** Expansion of UPI Lite to allow offline transactions at a larger scale, especially in rural areas where internet penetration is limited.
- **Integration with Feature Phones:** With initiatives like **UPI123Pay**, UPI will be made accessible to users without smartphones, broadening its reach across all segments of society.

4. ENHANCED SECURITY FEATURES

As UPI transactions grow, ensuring security will become a top priority. Future projections include the introduction of:

- **Machine learning (ML) and artificial intelligence (AI) in fraud detection:** ML and AI-driven algorithms for real-time fraud prevention and detection that provide a safe platform for users.
- **Biometric Authentication:** Enhanced biometric-based authentication systems, including fingerprint and facial recognition, to improve transaction security and reduce fraud.

5. UPI AS A FINANCIAL INCLUSION TOOL

UPI will continue to be a major driver of financial inclusion in India by:

- **Expanding Digital Banking Services:** UPI could become a gateway for users to access a wide range of financial services, including micro-credit, insurance, and savings products.

- **Promoting Financial Literacy:** Government and fintech companies are likely to collaborate on initiatives to educate users about digital banking and payments, further driving UPI adoption.

6. INTEGRATION WITH BLOCKCHAIN AND DIGITAL CURRENCY

In the future, UPI could be integrated with **blockchain technology** or **digital currencies**, such as India's **Central Bank Digital Currency (CBDC)**. Potential developments include:

- **Instant Cross-Border Payments:** Leveraging blockchain to facilitate instant, low-cost cross-border transactions.
- **UPI and CBDC Integration:** UPI may serve as the front-end interface for digital rupee transactions, allowing seamless integration between traditional banking and digital currency ecosystems.

7. FINDINGS

Back in 2016 when UPI was first launched, it was not well acknowledged by the citizens, and it was difficult to make them understand the importance of this transparent mechanism. But when the economy was hit by demonetization, people started to opt for this option steadily.

1. With the number of transactions increasing each month, more mobile applications started surfacing which supported the UPI system. These applications perform a crucial part in the success graph of UPI.
2. In the year 2020, the country was met with the blow of Covid-19 and the government imposed a nationwide lockdown. ATMs were closed, transportation blocked, only limited shops open for providing necessities. And UPI brought great relief to people because at least they were able to send off money to their families.
3. The pandemic brought a huge escalation in the number of UPI operations in the country.
4. It can be observed that UPI is one of the most chosen modes of making payments in the country and it is assumed that by 2023-25 the transactions made through UPI will cover up to 60-70 per cent of the total digital transactions in the country.
5. Another factor to look forward to is the establishment of UPI on an international platform. NPCI has stated that they plan on launching UPI in different countries which will allow UPI users to scan QR codes and make payment in the respective country's payment terminals.
6. The growth of UPI from its inception in 2016 to becoming a global leader in digital payments is remarkable. It has developed the way outflows are made in the India, providing a seamless, secure, and cost-effective solution for consumers and businesses alike. UPI's rapid transaction growth, government backing, and increasing international interest point toward a promising future as the platform expands globally.

8. CONCLUSION

Generally speaking, it is fascinating to see the development and progress that The Unified Payments Interface (UPI) has made over the years. It has made it possible to access a basic smartphone and use it to send and receive money. Due to India's inadequate infrastructure for receiving payments for merchant transactions, UPI has enabled even the tiniest retailers to begin accepting digital currency without the necessity for a point of sale system. The conservative belief that technology-driven tools and processes would increase complexity and make work harder to understand has been replaced by UPI.

The government instigated payment interface has become the most chosen and advanced payment system in the country. Unlike the mechanism in card networks, there is no involvement of intermediaries, making the transactions to be settled at a low cost. Making life easier for citizens. Although there are many setbacks in the path, being more than half the population still relying on cash to make payments, the lack of proper financial and digital knowledge among the people being the core reason for it. The future of UPI has been anticipated in many forms, analysing the growth percentage it can be very well drawn that the graph would grow in a positive direction.

In India, UPI has the potential to significantly boost financial inclusion and make it possible for everyone to participate in the digital economy.

India's digital economy has benefited greatly from UPI's revolutionary transformation of the nation's digital payment system. UPI has developed from its modest origins in 2016 to become an essential part of India's payment system. Millions of people favor this payment option because of its low costs, ease of use, and compatibility. But in order to guarantee its long-term prosperity, UPI needs to keep developing, tackling problems with operations and strengthening security protocols.

UPI has the ability to significantly change the way that digital payments are made in the future, both in India and globally, as it seeks to grow internationally and integrate with cutting-edge technologies.

CONFLICT OF INTERESTS

None

ACKNOWLEDGMENTS

None

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