

A Study on Digital Payment Systems with Respect to UPI under the Digital India Initiative

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Abstract:

The government of India began the digital India programme in 2015, with the goal of transforming the country into a digitally enabled society and knowledge economy. One of the initiative's primary target areas is development of digital payment technologies to increase financial inclusion, reduce reliance on cash transactions, improve transparency in financial transactions. Among several digital payment systems introduced Unified payments system has emerged as a game changer because of its interoperability, real-time processing, ease of use, resulting in widespread adoption throughout society. UPI has sped the shift to cashless economy by making digital transactions more convenient, secure and efficient.

Despite great development a number of difficulties remain that prevent digital payment systems from reaching their full potential. Concerns about cybersecurity concern, data privacy, digital literacy gaps and infrastructure restrictions re key impediments to wider use. This study analyses UPI and other digital payment preferences developed under the digital India framework, assessing their benefits, limits, and overall influence on the Indian economy. Furthermore, the duty covers legislative proposals and regulatory steps required to improve security, usability and adoption of digital payment systems. The findings show that, while India has achieved tremendous progress in the digital payments. Ongoing innovation, targeted governmental interventions, mass awareness campaigns will be crucial to maintaining the digital financial ecosystem's long term survival and expansion.

Keywords — Financial Inclusion, Cashless Economy, Digital payments, Unified payment interface

I. INTRODUCTION

The Indian government started the Digital India programme in 2015 after realizing the promise of digital transformation. The development and implementation of digital payments system, which seek to lessen reliance on cash transactions, promote financial inclusion, and improve transparency in financial dealings, is a key component of this programme. India's transition to a cashless economy has been largely facilitated by digital payment systems, which make financial transaction quicker, safer and easier.

Numerous digital payment systems have been launched as part of this endeavour, each with special capabilities to meet the needs of various user types. Aadhaar Enabled Payment System (AEPS), National Electronic Toll Collection (NETC), Bharat Interface for Money (BHIM), Unified Payments Interface (UPI), and other mobile wallet services are examples of these systems. When taken as a whole, among these platforms UPI have drastically changed how people, companies, and governmental organizations handle their finances. Despite these developments, there are still a number of obstacles in the way of the shift to a digital

payment ecosystem. Problems like resistance to change, digital illiteracy, cybersecurity risks, and holes in the IT infrastructure continue to exist. Maintaining user confidence and protecting private financial information are still top priorities. Furthermore, ongoing innovation and public awareness initiatives are required to make digital payment systems accessible to all facets of society.

By assessing the features, user uptake, effectiveness, and influence on the Indian financial landscape of the digital payment systems introduced under the Digital India project, this study seeks to give a analysis of these systems. This study aims to highlight the advancements made, pinpoint any shortcomings, and suggest ways to improve the future expansion of digital payments by examining secondary data from government reports

II. LITERATURE REVIEW

1. According to Nitsure (2014), developing countries such as India struggle to implement E-banking due to limited access to information technology. The article addressed issues related to security, rules, regulation, and management. The poor in India face exclusion from the internet and banking systems, raising the likelihood of a digital divide.
2. Rakesh H M and Ramya T J (2014) conducted a study paper named "A Study on Factors Influencing Consumer Adoption of Internet Banking in India" to analyse the elements that impact internet banking adoption. Internet banking services are believed to be reliable, easy to use, and useful. To promote acceptance of these services, experts should highlight their benefits and raise customer awareness. This approach can increase interest in internet banking.
3. " According to Sanghita Roy and Dr. Indrajit Sinha (2014), despite tremendous progress in India's e-payment infrastructure, 90% of transactions still take place in cash. A research using the Technology Acceptance

Model highlighted four critical variables for improving the system: innovation, incentives, customer convenience, and a robust legal framework. More efforts are needed to increase E-payment usage in India.

4. According to Balazs Vinnai, general manager, Digital Channels, Misys (April 25, 2016), banks must adopt new digital channels as part of an integrated strategy to transition from first to second generation digital banking. This involves shifting digital from a supporting role to a primary sales and communication channel. Banks must embrace digital banking to stay competitive and relevant, despite the difficulty of reengineering systems around customers.

III. OBJECTIVES

1. To examine the patterns of UPI adoption and growth under the Digital India Initiative.
2. To evaluate how well the main digital payment systems—such as UPI, mobile wallets, credit/debit cards, and Aadhaar-enabled payments—perform in terms of user experience, security, and transaction speed.
3. To determine the difficulties that customers and service providers encounter when putting digital payment systems into place and utilizing them.

IV. RESEARCH METHODOLOGY

Research design:

As part of the Digital India Initiative, this study analyses and assesses digital payment systems using a descriptive research design.

Data collection:

Secondary Data: To guarantee a thorough and precise analysis, this study draws on a wide range of secondary data sources. Important sources consist of:

Government Publications and Reports: Information from the National Payments Corporation of India (NPCI), Reserve Bank of India (RBI), and Ministry of Electronics and Information Technology Industry Reports: Analysis of white papers from the technology and finance sectors, as well as reports

from research organizations and consulting businesses.

Academic Literature: Conference proceedings and peer-reviewed journals that concentrate on the Digital India Initiative, financial inclusion, and digital payment systems.

Official Databases: Statistics from government websites including RBI's Payment System Indicator

Media and News Articles: Reputable articles covering recent events from technology-focused media outlets and reputable business periodicals.

V. EVOLUTION OF DIGITAL PAYMENT SYSTEM

The National Payments Corporation of India (NPCI) established UPI in 2016, and its growth has been nothing short of amazing, fundamentally changing the way transactions are handled in India. August 2023, India had a stunning 10 billion UPI transactions. This high result indicates the widespread appeal and rapid adoption of UPI as a payment method.

This new payment infrastructure enables users to seamlessly connect several bank accounts to a single mobile application, allowing for real-time peer-to-peer transactions with just a few smartphones taps. UPI acts as a bridge between over 300 banks, allowing for seamless financial transactions via third-party application providers (TPAPs) like as Google Pay, Amazon Pay, PhonePe, and Paytm, all of which have collaborated with banking institutions. The simplicity and accessibility of UPI have accelerated its widespread adoption, effectively bridging the urban-rural divide

Empowering Financial Inclusion:

UPI's strength is its ability to empower even the most marginalised members of society. Various digital payment systems has brought millions of unbanked and underbanked people into the formal banking system by allowing them to make simple transactions. This inclusion has opened up access to financial services such as savings accounts, loans, and insurance, allowing people to construct a more secure financial future. Small companies, street sellers, and rural communities have also profited

greatly from UPI, which provides a quick, cost-effective, and secure digital payment infrastructure.

The Fourth G20 worldwide Partnership for Financial Inclusion (GPFI) Meeting, held in September 2023, demonstrates the growing understanding of the critical relevance of financial inclusion on a worldwide scale. With over 50 attendees representing G20 member countries, special invitees, and international organisations, the event demonstrates the commitment to promoting equitable financial policies. The topics, which include Digital Financial Inclusion and SME Finance, emphasise the importance of financial inclusion in promoting economic growth and stability. The associated symposiums look at how Digital Public Infrastructure (DPI) can energise MSMEs, empower consumers with digital and financial literacy, and protect consumers.

Catalyst for economic growth:

Digital payment system is not only a financial inclusion tool, but also a driver of economic development. It has reduced reliance on cash transactions, thereby fostering economic openness and accountability. With a staggering amount of 9.41 billion transactions as of May 2023, UPI has cemented its position as a critical pillar in India's digital financial environment. Its widespread acceptance has resulted in a slew of benefits that are revolutionising how people conduct financial transactions. The availability of transaction data via UPI has fuelled the expansion of fintech companies and startups, promoting innovation and creating job possibilities in the financial sector.

Innovation and Future Prospects

Digital payment systems have proved to be one of the is a significant contributor to India's digital transformation. Its role in facilitating simple, secure, and inclusive transactions has transformed the way Indians undertake financial transactions, empowering millions and accelerating economic growth. As UPI continues to evolve and innovate, its digital power promises to propel India to new heights, leaving an indelible mark on the global digital payment landscape. Furthermore, UPI's reach is growing outside India's boundaries, making

it more accessible to non-resident Indians in a variety of nations. UPI revolutionised India's payment ecosystem, ushering in a new era of digital financial possibilities.

VI. Growth of digital payment system through UPI

Due to a mix of government initiatives, rising e-commerce, and increased internet and smartphone usage, India's digital payments ecosystem has also expanded dramatically in recent years. The introduction of the Bharat Interface for Money (BHIM) app, which streamlines the process of conducting digital transactions, and the Unified Payments Interface (UPI), which permits real-time interbank transactions, are two of the major projects.

Table1: No. of digital transactions

financial year	No. of tansactions (in crores)
FY 017-18	2,071.00
FY 2018-19	3,134.00
FY 2019-20	4,572.00
FY 2020-21	5,554.00
FY 2021-22	8,839.00
FY 2022-23	13,462.00
FY 2023-24	19,737.00

The graph depicts the year-on-year (YoY) increase of digital payments transactions in India, measured in crores, from 2017-18 to 2023-24.

Key Observations:

- a) Stable growth from FY 2017-18 to FY 2020-21.

Digital transactions climbed gradually from 2,071 crores (FY 2017-18) to 5,554 crores (FY 2020-21). This demonstrates early use and expansion of UPI payments.

- b) Accelerated Growth (FY 2021-22–FY 2023-24)

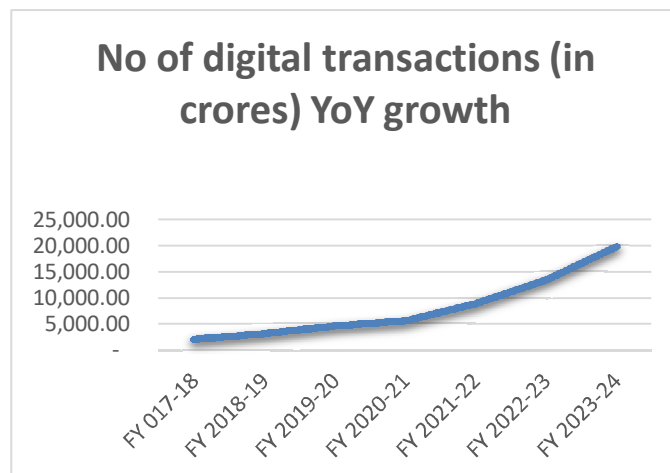
The transactions increased dramatically, from 8,839 crores (FY 2021-22) to 19,737 crores (FY 2023-24). This reflects rapid uptake, digital change, and greater use in both urban and rural settings.

- c) Exponential Trend:

The trendline indicates exponential increase, especially after 2020. Government measures, rising smartphone usage, merchant adoption, and pandemic-driven digital payment habits may all have contributed to the growth in transactions.

- d) Future Implications

If this tendency continues, UPI may become even more dominant in India's digital payment ecosystem. Increased financial inclusion and global UPI adoption have the potential to accelerate growth further.



Graph 1- No. of digital transactions

Table 2: No. of P2P and P2M transactions

financial year	P2M (in crores)	P2P (in crores)
2017-18	10.4	81.1
2018-19	113.1	422.2
2019-20	445.8	806.1
2020-21	929.2	1303.9
2021-22	1940.6	2656.2
2022-23	4260.1	4115
2023-24	7816.8	5299.6

the number of digital transactions in the P2P (Person-to-Person) and P2M (Person-to-Merchant) categories from FY 2017-18 to FY 2023–24.

Overall growth trend:

Both P2P and P2M transactions have increased significantly over time, demonstrating that UPI is being rapidly adopted for financial transactions

Growth is exponential, particularly after fiscal year 2020-21, indicating growing digital payment acceptance.

P2P (person-to-person) transactions:

Initially, P2P transactions dominated, showing that UPI was primarily used for money transfers between individuals.

P2P transactions increased, although at a slower rate than P2M.

P2M transactions: P2M transactions have increased dramatically in recent years, outpacing P2P growth in absolute numbers. This suggests that more individuals and businesses are utilising UPI for merchant payments rather than merely money transfers. Merchants' adoption of UPI, QR code payments, and integration into enterprises have all contributed to this increase.

Major Risks to Digital Payment Systems:

- **Cybersecurity Risks:** As digital payments increase, so does the risk of fraudulent activities like identity theft, unauthorized access, and transaction manipulation, which can result in financial losses for users and harm the reputation of payment platforms.
- **Data Privacy Concerns:** Payment service providers' collection and storage of personal and financial data raises concerns about data misuse and unauthorized sharing. Ensuring compliance with privacy regulations is essential to protecting consumer information.
- **Cybersecurity Risks:** Cybersecurity breaches, malware, and phishing schemes are among the cyberattacks that hackers can exploit system vulnerabilities to gain access

to sensitive financial information and personal data.

- **System Downtime and Technical Failures:** Disruptions brought on by maintenance, technical issues, or system overloads can affect service availability and transaction reliability, which can erode public confidence in digital payment platforms.
- **User Awareness and Literacy Gaps:** Those who lack digital literacy are more likely to fall victim to scams and misinformation. Many consumers, particularly in rural areas, are not fully aware of safe digital payment practices, making them vulnerable to exploitation.

An Incident of digital payment system breach Case Study: The Data Breach at Indian Bank in 2016

A major financial security breach occurred in India in October 2016 when almost 3.2 million debit cards were compromised. The State Bank of India (SBI), HDFC Bank, ICICI Bank, YES Bank, and Axis Bank were among the major banks that were impacted. Malware that was put into Hitachi Payment Systems' payment gateway network—which handled ATM transactions for multiple banks—was the cause of the incident. SBI proactively blocked and reissued nearly 600,000 debit cards to mitigate potential damage after this malware allowed unauthorized access to sensitive card information, resulting in fraudulent transactions in places like China and the United States, despite the fact that the affected customers were in India. This incident highlighted the vulnerabilities in digital payment infrastructures and the need for strong cybersecurity measures to protect consumer data and preserve trust in digital payment systems.

VII. Conclusion

By encouraging digital payment methods, the Digital India Initiative has drastically changed the financial scene. This study emphasizes how digital payment mechanisms like UPI, mobile wallets, and

Aadhaar-enabled payments are expanding quickly and becoming more widely used.\

Even while these platforms provide improved financial inclusion, ease, and security, issues including cybersecurity threats, gaps in digital literacy, and infrastructure constraints still exist.

According to a comparison analysis, mobile wallets serve particular user segments for daily transactions, whereas UPI stands out for its speed, ease of use, and broad adoption. For online and offline payments, credit and debit cards are still necessary, and Aadhaar-enabled systems offer a link for people living in rural areas.

To sustain this momentum, it is essential to strengthen cybersecurity, improve digital literacy, expand infrastructure, and ensure regulatory adaptability. Addressing these areas will enhance the efficiency security, and accessibility of digital payment systems, ultimately fostering a more inclusive and cashless Indian economy.

Future studies should concentrate on the long-term socioeconomic effects of digital payments, real-time user experiences, and cutting-edge technologies like blockchain. India can achieve the goal of a fully cashless economy and solidify its place as a global leader in digital finance by tackling these issues.

In conclusion, even though the Digital India Initiative's digital payment systems have made impressive strides, more work is needed to improve user trust, security, and accessibility. India can create a more effective and inclusive digital payment ecosystem that promotes economic growth and financial empowerment for all of its residents with consistent investment and cooperative efforts.

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