# Digital Revolution: Analyzing the Growth of Payment Systems in India

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#### **Abstract**

India's digital payment system has undergone remarkable growth, driven by a combination of government initiatives and technological advancements. The push towards a digital economy, spearheaded by initiatives such as Digital India, demonetization, and Pradhan Mantri Jan Dhan Yojana, which has accelerated the adoption of digital payments across the country. This study aims to identify the factors driving this expansion such as financial inclusion measures, increased internet access, and the penetration of smart phones. It also focuses on the composition of the digital payment system, which includes RTGS, Credit transfer, Debit transfer and direct debit, Card payments and PPI. Furthermore, the research examines the role of digital payments in India's total payment system, demonstrating its growing domination over traditional cash-based transactions. The paper reveals the importance of technological advancements and consumer behavior changes in facilitating this transition. It also examines the difficulties presented by cybersecurity risks and the requirement for stronger security measures to preserve the trust of customers in online transactions. The findings shows there has been significant movement towards a digital economy, with an increasing percentage of total transaction values derived from digital payments.

Keywords: Digital Payment System, Cashless Economy, DigitalIndia, UPI and PPI.

#### Introduction

Digital economy an initiative promoted by government of India, has led to the significant growth of India's digital payment system over last few years. The term "digital payment system" describes a method of completing transactions entirely via the internet without the need for actual currency (Khaitan & Joshi, 2024). Digital payments cover a wide range of transactions such as online banking, peer-to-peer transfers, contactless card payments, smartphone wallets, and cryptocurrency exchanges. The government and commercial sector in India have made the transition to digital payments an absolute priority, revolutionizing the way individuals and institution transfer money. A combination of government policies designed to encourage financial inclusion and transparency, as well as technological advancements, such as the widespread availability of smartphones and internet access in both urban and rural areas of India and UPI, which has become global champion in digital transactions, as over 70% of total digital transactions are currently performed through it, as indicated by data from RBI and NPCI, has facilitated this transition(Growth of Various Modes of Digital Payment, 2024). The adoption of digital payments has been significantly influenced by initiatives such as Demonetization (2016), the Digital India Initiative launch, and the Pradhan Mantri Jan Dhan Yojana. Besides these major initiatives digital payment provides several benefits such as convenience, seamless, secure, and instant transfer which plays a vital role in rising adoption of digital payment. Consequently, India has become one of the most prominent countries in the world for the use of digital payments because of its benefits, technological improvements and encouraging government regulations (Bishoyi, 2024).

## History of Digital Payments in India

The history of digital payments in India is a journey of rapid evolution for making the transactions, shaped by technological advancements, government initiatives, and changing consumer behaviour(Soni, 2024). India's economy has evolved gradually from being mostly dependent on cash to a thriving digital payments environment. As technology improved, so did the demand for secure, effective, and user-friendly

payment options. From the birth of the internet and the advent of e-commerce to the global trend toward mobile and contactless payments, the digital payment environment has changed rapidly.

## Key Milestones in the Evolution of Digital Payments in India

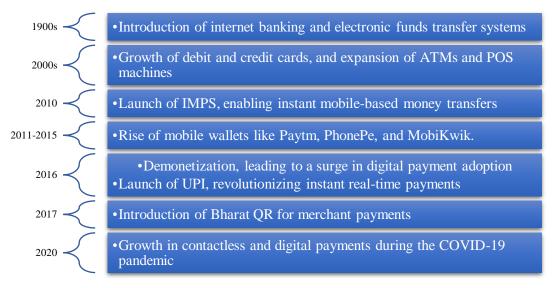


Figure 1.1 (Key Milestones in the Evolution of Digital Payments in India)

## 1. Pre-1990s: Introduction of Early Digital Banking

- The development of electronic fund transfer systems like RTGS (Real Time Gross Settlement) and NEFT (National Electronic Funds Transfer), which enabled interbank money transactions, sowed the seeds for digital payments in India.
- During this time, debit and credit cards were launched, but only urban elites used them to make transactions at point-of-sale (POS) terminals or withdraw cash.

## 2. 1990s: Growth of Internet Banking

- The Indian banking system started to digitize in 1991 when the country's economy was liberalized. Large banks interconnected their branches digitally by introducing core banking systems (CBS).
- The electronic banking era began in India in the late 1990s when internet banking was launched and customers could perform transactions online.

## 3. Early 2000s: Rise of Card Payments and Online Banking

- The expansion of internet access led to the increasing popularity of online banking, which enabled users to check balances, transfer funds, and make payments without visiting bank branches.
- In 1995, the Reserve Bank of India (RBI) implemented the Electronic Clearing System (ECS), which enabled the payment of large sums of money, such as salaries and utility expenses.
- The prevalence of debit and credit cards increased, and POS terminals were deployed in many retail establishments.
- The National Financial Switch (NFS) and other interbank ATM sharing networks expanded ATM networks, thereby facilitating a broader access to cash.

## 4. 2010-2015: Emergence of Mobile Payments and Wallets

- The early 2010s witnessed the emergence of mobile wallets, including Paytm and MobiKwik, which offer users a straightforward method of digitally storing money and making payments for services such as mobile recharges, utility bills, and online purchasing.
- The Immediate Payment Service (IMPS) was introduced by the NPCI in 2010, which enables real-time money transfers 24/7 through mobile phones, thereby expanding the scope of digital transactions.
- The Aadhaar-enabled Payment System (AePS) was established in 2009 with the introduction of Aadhaar, India's biometric identification system. This system enables financial services to be accessed by rural and remote populations through biometric authentication.

## **5. 2016: Demonetization – A Turning Point**

- The Indian government demonetized ₹500 and ₹1,000 currency notes in November 2016, which accounted for 86% of the cash in circulation. Millions of individuals were compelled to implement digital payment methods almost immediately as a result of this sudden cash crisis.
- The use of mobile wallets, UPI, and card payments experienced a record-high increase. MobiKwik, PhonePe, and Paytm capitalized on this opportunity, resulting in a significant rise in their user base.

## 6. 2016: Launch of UPI – A Game Changer

- The digital payments landscape was revolutionized by the advent of the Unified Payments Interface (UPI) by NPCI in 2016. UPI enabled the transmission of money in real time using a mobile phone, eliminating the necessity for bank account information. It was widely accepted as a form of digital payment due to its simplicity, low cost, and convenience.
- Millions of users were able to access UPI through platforms such as Google Pay, PhonePe, and Paytm.
  UPI served as the foundation of India's digital payment system, processing billions of transactions each month.

## 7. 2017-2020: Rapid Growth and Innovation

- The growth of digital payments continued to expand at an accelerated rate in the years following of demonetization. Traditional digital methods, such as mobile wallets and debit/credit cards, were overtaken by UPI transactions, which attained new heights.
- The Bharat Interface for Money (BHIM) app was introduced by the Indian government to facilitate digital payments for individuals and enterprises and to promote UPI.
- Merchants were able to collect payments using a standardized QR code, which reduced the necessity for POS devices, following the introduction of Bharat QR in 2017.
- The Goods and Services Tax (GST) implementation in 2017 served as an additional incentive for businesses to implement digital payments in order to ensure compliance and transparency.
- Financial inclusion was facilitated by Aadhaar-based services, such as AePS, which enabled millions of rural users to access banking services through biometric authentication.

## 8. 2020 Onwards: Digital Payments During the COVID-19 Pandemic

- The COVID-19 pandemic in 2020 has expedited the transition to digital and contactless payments. Consumers and businesses prioritized digital transactions over currency management due to the implementation of social distancing measures.
- During this period, UPI experienced rapid development, establishing itself as the primary payment method for e-commerce, utility expenses, and peer-to-peer transactions.
- In urban areas, contactless card payments, mobile wallets, and NFC-enabled solutions became increasingly popular for offline payments. The digital payments ecosystem was further expanded by the government's continued promotion of digital transactions through initiatives such as Digital India and PM Jan Dhan Yojana (PMJDY).

## **Review of Literature**

**Bhindi. K, (2019).** The research paper titled "Growth of Digital Payment System in India" focuses on the impact of technology improvements, increased smartphone usage, and large Fintech investments in the rapid expansion of digital payment systems in India and its benefits. The research employed descriptive research design and used One Factor ANOVA Test with Post-hoc Analysis to analyse the volume of digital transactions across various payment methods. The secondary data related to the transaction values for these digital payment systems were collected over particular months in order to examine use patterns and discrepancies. The data demonstrate a significant variation in the turnover of digital transactions conducted using various mechanisms of payment, with NEFT being the most popular among digital payment methods. The report reveals that, while UPI transactions are on the rise, NEFT remains the favoured method because to its security, transparency, and speedy fund transfer capabilities, reflecting the general development of electronic transactions driven by technical improvements and growing internet usage.

Nigam. A, & et. al (2021). The article titled "Development of Financial Technology through E-Payment System in India" focuses on the history of financial technology in India, with an emphasis on the rise of the e-payment system since 2010, which has been driven by advancements such as IMPS. It also examines the influence of these improvements on consumer behaviour and the entire payment ecosystem, using data from RBI publications. The researcher used descriptive research design to compare the paradigm shift in the payment system throughout the five-year period from 2015 to 2020. The secondary data sources had been used notably annual reports from the Reserve Bank of India (RBI) and NASSCOM. The study found significant growth in payment and settlement systems, with a 44.1% rise in transaction volume between 2019 and 2020, indicating a substantial shift toward digital payments, which accounted for 97% of non-cash retail transactions. However, the COVID-19 epidemic caused a significant drop in digital transactions during the shutdown which affect overall economic activity.

Jeerath, B. (2022). The study titled "Digital Payment in India: An Analysis", explores deeply into India's digital payment ecosystem, including development, infrastructure demands, and economic implications. This is a descriptive and analytical research. Data on Payment System Indicators were obtained from the RBI Bulletin, RBI Annual Reports, and RBI Reports during a twelve-year period, from 2010-11 to 2021-22. The study revealed that according to Payment and Settlement System Statistics, the use of multiple methods of digital payment is increasing at an exponential rate. Retail digital payments account for more than 99% of all payments. An analysis of the average usage of various digital modes of payment over the last five years (2017-18 to 2021-22) revealed that credit transfers (AePS, APBS, ECS, IMPS, NACH, NEFT, and UPI) have the highest number of transactions, while RTGS has the highest value share. Over a five-year period (2017-18 to 2021-22), UPI and NETC had significant growth in terms of transaction volume and CAGR. UPI, BHIM Adhaar, and NETC had triple-digit rise in transaction values. The study suggests to accelerate the growth of digital payments, existing measures in payment infrastructure, consumer awareness, and regulations need to be strengthened further.

Mishra. A, & Tripathi, D, (2022). The research paper titled "Growth of Digital Payment System in India: A Trend Analysis", examines the trend patterns of digital payment systems in India, focusing on the impact of demonetization and the COVID-19 epidemic. The research technique used in this study is descriptive in natureand data is taken from secondary sources, including the Reserve Bank of India (RBI) database, several government websites, and current literature studies for the period od 2016-17 to 2021-22. The study's findings show a significant increase in digital payment systems in India, notably in products offered by the National Payments Corporation of India (NPCI), such as UPI, IMPS, NACH, BHIM, AEPS, and BBPS. According to the study, most of these payment methods' usage and transaction volumes increased significantly between 2016-17 and 2021-22. However, the USSD payment method's growth trajectory slowed slightly throughout the same time period. Overall, the report suggests that the combined impacts of demonetization and the COVID-19 epidemic have accelerated the uptake of digital payments, putting India on track to become a paperless economy.

Badak, S. & et. al. (2023). The research paper titled "Mobile Computing, Communications and Mobile Networks", examines India's rapid digital payment revolution, shifting consumer behaviour, and the socioeconomic consequences of digital payment adoption, particularly among rural and unbanked regions. The paper also discusses concerns such as hackers disrupting UPI transactions, which have resulted in financial instability and confidence issues in the digital payment system. The researcher used descriptive research design and collected data from secondary sources such as articles, books, and research reports. The study uses tabular and graphical data to demonstrate the rise of digital payments over time, offering a visual depiction of trends and statistics. The study shows a massive growth in digital transactions in India in both volume and value of transaction in comparison to year 2016 to 2023. The study identified demonetization and the COVID-19 outbreak as pivotal moments that shifted consumer behaviour, resulting in increasing acceptance and use of digital payments. Government measures, such as the Digital India program and the opening of new bank accounts, have played an important role in fostering financial inclusion and literacy. The paper also highlights difficulties, such as hacker distractions in UPI transactions, which have prompted concerns about security.

### **Objectives of the study**

- 1. To identify the factors affecting the growth of digital payment system.
- 2. To study the composition of digital payment system in India.
- 3. To analyze the share of digital payment in total payment system in India.

## **Research Methodology**

This study is descriptive in nature, secondary data has been extracted from annual report of Reserve Bank of India, government websites and existing literature. A period of 7 years has been taken into account from financial year 2017-18 to 2023-24, and data in terms of value and volume regarding RTGS, credit transfers, debit transfers and direct debit, card payments, PPI, total digital payments and overall total payments has been studied, to know about the composition and growth of digital payment system in India.

## Factors affecting the growth of Digital Payment System in India

- 1. Government Initiatives and Policies: The government of India has been key in the advancement of digital payments by implementing a variety of initiatives, including Digital India, demonetization, and tax incentives for digital transactions. The adoption of digital payments has been improved by the introduction of real-time payment systems such as Bharat QR and UPI (Unified Payments Interface), which have made them more user-friendly and accessible.
- **2. Technological Developments:** The rapid increase of digital payments has been greatly influenced by the rapid advancements in mobile technology, internet penetration, and smartphone usage. The broad availability of 4G and now 5G services in India has facilitated the access of internet banking, e-wallets, and mobile-based payment systems such as UPI and IMPS to even rural citizens.
- **3.** The growth of E-commerce: The e-commerce sector has been a significant factor in the development of digital payments in India. Digital wallets and payment gateways have experienced significant growth in status due to the seamless online purchasing experiences provided by platforms such as Amazon, Flipkart, and Myntra. The sector's expansion is facilitated by the convenience and security that cashless payments provide.
- **4. Financial Inclusion:** India's emphasis on financial inclusion, particularly through initiatives such as the Pradhan Mantri Jan Dhan Yojana (PMJDY), has been instrumental in the advancement of digital payments. These individuals received access to digital banking and payment platforms for the first time as a result of the creation of millions of new bank accounts, particularly for the underbanked and rural population.
- **5. Increased Consumer Awareness**: The trust of consumers in digital payment systems has increased as more individuals become acquainted with these systems. Additionally, the security and convenience of digital payments have been emphasized in awareness campaigns conducted by government and financial institutions, which have facilitated their adoption.
- **6. Multiple Payment Options:** The growing number of digital payment options, including mobile wallets (Paytm, Google Pay, PhonePe), card payments (debit and credit cards), and innovative solutions like UPI, has provided consumers and merchants with flexibility. This variety enables users to select the most expedient payment method for their requirements, thereby promoting widespread adoption.
- **7. Enhanced Cybersecurity Measures:** In response to the increasing apprehension regarding data breaches and digital fraud, the government and financial institutions have instituted enhanced cybersecurity protocols, including biometric verification, two-factor authentication, and one-time passwords (OTPs). Consumer confidence in digital transactions has been significantly increased by the implementation of improved security features.
- **8. Partnerships and Collaborations:** An ecosystem that is conducive to digital payments has been established through collaborations between financial institutions, telecommunications companies, and technology firms. The seamless integration of services has been facilitated by partnerships between banks and digital payment platforms, resulting in a broader reach and adoption.

# Composition of Digital Payment System in India

#### 1- Volume

Year	RTGS	Credit transfers	Debit transfers and direct debit	Card payments	PPI
2017-18	1,244	58,793	3,788	47,486	34,591
2018-19	1,366	1,18,750	6,382	61,769	46,072
2019-20	1,507	2,06,661	8,957	73,012	53,318
2020-21	1,592	3,17,868	10,457	57,787	49,366
2021-22	2078	5,77,935	12,189	61,783	65,783
2022-23	2426	9,83,621	15,343	63,325	74,667
2023-24	2700	14,86,107	18,250	58,470	78,775

**Table 1.1 (Composition of DPS in terms of volume)** 

## Sources- RBI Annual Report

The above table 1.1 emphasizes the critical elements of the digital payment system from 2017-18 to 2023-24, displaying the transaction volumes (in lakks) for a variety of payment methods, such as RTGS (Real-Time Gross Settlement), Credit Transfers, Debit Transfers & Direct Debits, Card Payments, and PPI (Prepaid Payment Instruments). The rapid digitization of the payment system is visible in the development of all of these methods during this time.

In the 2023-24 financial years, credit transfers dominated the ecosystem, accounting for 83.6% of all transactions. This number increased from 58,793 lakh in 2017-18 to 14, 86,107 lakh. RTGS transactions increased from 1,244 lakh to 2,700 lakh, accounting for 0.16% of the total. Debit transfers and direct debits also experienced growth, contributing 1.1% of the total payments, rising from 3,788 lakh to 18,250 lakh. Card payments reached their highest point at 4.4%, while PPIs (mobile wallets and prepaid instruments), another significant method, accounted for 5.2% of the total. This number increased from 34,591 lakh in 2017-18 to 78,775 lakh in 2023-24. The digital payment system's composition indicates a distinct transition to credit transfers (particularly UPI) as the predominant mode of digital payments, which is indicative of their convenience and user-friendliness. Other components, such as RTGS and Debit Transfers, also experienced consistent growth. However, card payments exhibited more moderate progress as a result of the growing competition from UPI and mobile wallets. The increasing number of fintech solutions served as an incentive for PPIs to expand. In general, this data demonstrates the diversification of digital payment methods, with UPI emerging as a significant driver of growth.



Figure 1.2 (Composition of DPS in terms of volume)

#### 2. Value

Year	RTGS	Credit transfers	Debit transfers and direct debit	Card payments	PPI
2017-18	1167.12	188.14	3.99	9.19	1.42
2018-19	1356.88	260.97	6.56	11.96	2.13
2019-20	1311.56	285.72	8.26	15.35	2.15
2020-21	1056	335.04	8.66	12.92	1.97
2021-22	1286.6	427.3	10.3	17	2.8
2022-23	1499.5	550.1	12.9	21.5	2.9
2023-24	1708.9	675.4	16.9	24.2	2.8

**Table 1.2 (Composition of DPS in terms of value)** 

## Sources- RBI Annual Report

The value composition of digital payments from 2017-18 to 2023-24 displays significant trends across various payment methods. RTGS (Real-Time Gross Settlement) continues to be the largest contributor in terms of value, increasing from ₹1167.12 lakh crore in 2017-18 to ₹1708.9 lakh crore in 2023-24. This is suggestive of its indispensable function in transactions of considerable value. Credit transfers, which encompass UPI and IMPS, have experienced exceptional growth, rising from ₹188.14 lakh crore in 2017-18 to ₹675.4 lakh crore in 2023-24. This growth has recognized it as a significant element of digital payments in terms of both volume and value. Debit transfers and direct debits have also experienced consistent growth, despite the fact that it constitutes a lesser proportion of total payments. Specifically, it has increased From ₹ 3.99 lakh crore to ₹ 16.9 lakh crore during this time.

The value of card payments (credit and debit) has increased from ₹9.19 lakh crore in 2017-18 to ₹24.2 lakh crorein 2023-24, marking a consistent increase in usage. The value of prepaid payment instruments (PPIs), which encompasses mobile wallets and prepaid cards, has increased from ₹1.42 lakh croreto ₹2.8 lakh crore. This increase is suggestive of its involvement in minor, retail-level transactions. In general, the rapid expansion of credit transfers suggests a transition to more widely-used and accessible digital payment systems, particularly for retail and mid-sized transactions, despite the fact that RTGS continues to be the dominant system in terms of value.

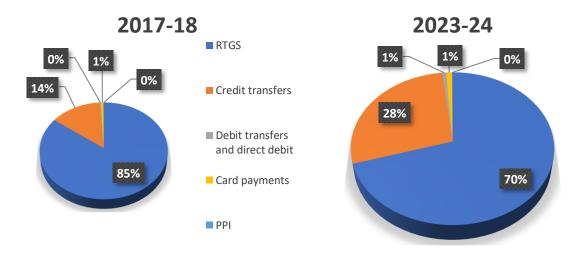


Figure 1.3 (Composition of DPS in terms of value)

## Share of Digital payment in total payment system of India

#### 1- Volume

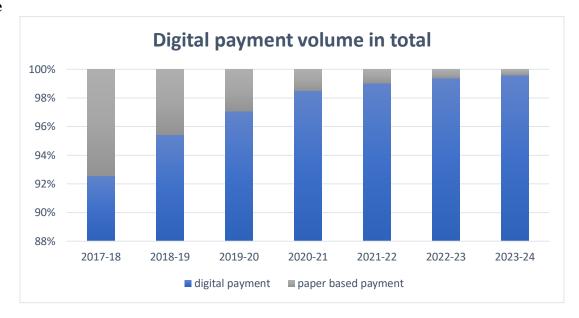


Figure 1.4 (Digital Payment to paper based payment in terms of volume)

This figure 1.4 illustrates the transition from paper-based payments to digital payments by providing data on the total payment volumes in lakhs from 2017-18 to 2023-24. Paper-based payments have consistently declined, while the use of digital payments has increased significantly over the seven-year period.

Digital payments comprised 1,45,902 lakhs in 2017-18, while paper-based payments comprised 11,713 lakhs, accounting for a significant proportion of the total payment volume of 1,57,615 lakhs. Digital payments experienced a more than tenfold increase to 16,44,302 lakhs by 2023-24, while paper-based payments decreased to 6,632 lakhs. In 2023-24, the total payment volume reached 16,50,934 lakhs, despite a modest decrease in paper-based payments. The vast majority of payments are now conducted digitally.

This data demonstrates a distinct trend, over just a few years, digital payments grew from 92.57% of total payment volume in 2017-18 to nearly 99.60% in 2023-24, the transition of consumers and businesses from traditional paper-based transactions has been primarily facilitated by the expansion of digital infrastructure and payment platforms. The gradual decline in paper-based payment volumes suggests a shift toward a digital economy, in which the overwhelming majority of financial transactions are now conducted electronically.

## 2- Value

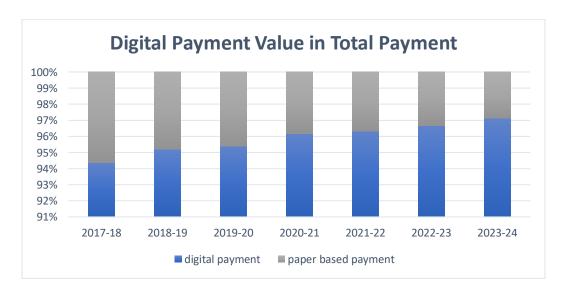


Figure 1.5 (Digital Payment to paper-based payment in terms of value)

The above graph gives an overview of the total payment values (in lakh crore) for digital and paper-based payments from 2017-18 to 2023-24. During this seven-year period, the value of digital payments has experienced a substantial increase, while paper-based payments have remained relatively stable, despite contributing a significantly lower portion of the overall transaction volume.

Digital payments were valued at ₹1,369.87 lakh crore in 2017-18, while paper-based payments were valued at ₹81.93 lakh crore, resulting in a total payment value of ₹1,451.8 lakh crore. The continuous transition to digital transactions is illustrated by the significant increase in digital payments to ₹2,428.20 lakh crore by 2023-24. In contrast, paper-based payments experienced a marginal increase to ₹72.2 lakh crore by 2023-24, accounting for a lesser proportion of the total payment value.

The surge in digital payments was the primary factor driving the total payment value to ₹2,500.40 lakh crore in 2023-24. This signifies a significant transformation in transaction methods over the years, as digital payments have emerged as the predominant form, and their share of total transaction value has increased from 94.36% in 2017-18 to 97.11% in 2023-24. This is indicative of the growing popularity of mobile wallets, online banking, and other digital platforms. The increase in the value of digital payments indicates a more digitized financial ecosystem, while the value of paper-based transactions has largely peaked, contributing less to the overall economy as technology-driven solutions take precedence.

#### **Conclusion**

The study gives an in-depth analysis of the development and present situation of digital payments in India, emphasizing the dramatic change from conventional paper-based transactions todigital payments. This transition has been driven by several factors such as government initiatives, shifting consumer behaviour, and technical improvements. The payment landscape has changed significantly with the advent of advanced methods of digital payment like the Immediate Payment Service (IMPS), Unified Payments Interface (UPI), and other products from the National Payments Corporation of India (NPCI). According to the research, by 2020, digital payments made up an astounding 97% of non-cash retail transactions, demonstrating a notable shift in customer preferences. The study also emphasises the role of demonetization and Covid-19 pandemic along with government initiatives such as Digital India, financial inclusion and literacy in the expansion of digital payment system. The data shows that paper-based payments significantly decreased and digital payments increased enormously between 2017–18 and 2023–24, rising from 1,45,902 lakhs to an incredible 16,44,302 lakhs. Credit transfers, particularly through UPI, have become the predominant method of digital transactions in terms of both volume and value. Although RTGS remains essential for high-value transactions, mobile wallets, card payments, and prepaid payment instruments (PPIs) have also experienced substantial growth. This trend highlights how consumers and companies are starting to accept digital transactions more and more, which is made possible by the growth of digital infrastructure and payment systems. While the expansion of digital payments is encouraging, the study makes clear that in order to preserve customer trust and guarantee the long-term viability of the digital payment ecosystem, these security problems must be addressed.

## **Findings**

- The study presents an in-depth overview of the development and present condition of digital payments in India, emphasizing the significant transition from conventional paper-based transactions to a primarily digital payment framework. This transformation has been accelerated by several sources, including technical innovations, governmental efforts, and changing consumer behavior.
- The data indicates that from 2017-18 to 2023-24, digital payments scaled from 1,45,902 lakhs to an impressive 16,44,302 lakhs, while paper-based payments saw a significant decrease. This trend highlights the increasing adoption of digital transactions by both consumers and companies, enabled by the enhancement of digital infrastructure and payment systems.
- The paper highlights that the COVID-19 pandemic and the demonetization initiative were critical events that accelerated the adoption of digital payments, as they compelled consumers to pursue safer and more convenient transaction methods.

- The paper indicates that India is progressing towards a paperless economy, with digital payments serving a fundamental role in this evolution.
- The outlook for India's payment system appears optimistic, with the capacity to improve economic efficiency, foster financial inclusion, and establish India as a global leader in digital financial services.

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