

EVALUATING THE ROLE OF PUBLIC POLICY IN THE GROWTH AND ADOPTION OF DIGITAL PAYMENT SYSTEMS IN INDIA

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Abstract—The digital payment system in India has experienced a rapid increase in the past decade, largely because of government policies and technological advancements. Policy initiatives taken by the Government of India and Reserve Bank of India (RBI) have boosted the growth of digital payment systems by enhancing digital payment infrastructure, enabling regulatory framework, creating institutional and technological ecosystems. At the same time, the Digital payment system is reducing the transaction costs, providing faster transactions, increasing convenience and accessibility. In this context, the present study examines the role of government initiatives and policies in facilitating the use of digital payment systems in India, particularly in RTGS (Credit Transfers), AePS (Fund Transfers), IMPS, UPI, and Mobile Payments (mobile app-based).

This study has three objectives: first, to examine the growth trends of digital payment systems in India. Second, to analyse the role of public policy interventions and government initiatives. Third, to identify key challenges and policy gaps affecting the sustainable growth of digital payments. The study is based on secondary data and primary data. Secondary data is collected from the published sources such as Reserve Bank of India, National Payments Corporation of India, NITI Aayog and Periodic Labour Force Survey (PLFS). Primary data were collected from 100 respondents through a structured Google Forms questionnaire to understand users' perspectives on digital payment systems. A descriptive statistics method was employed to analyse the trend volume and transactions of selected digital payment systems.

The study discusses the significant government initiatives to enhance the digital payment infrastructure and facilitate financial inclusion. The results show a significant rise in retail digital payments, particularly through UPI and mobile-based systems. This indicates that policies focusing on interoperability, low transaction costs, and ease of use have been successful. This study also found that, infrastructure and connectivity constraints and cybersecurity and fraud risks are the major challenges policy gaps which are affecting growth of digital payment systems. The paper concludes that government support and effective regulatory policies have been instrumental in accelerating the adoption of a digital payment system.

Index Terms—Digital Payments, Public Policy Interventions, Digital Financial Infrastructure, Payment Systems in India

I. Introduction

Public policy is a purposeful set of rules, regulations, actions and principles taken by government authorities to achieve socio economic welfare. Over the past decade, India's payments landscape has undergone a profound transformation, driven by rapid technological advancements, proactive public policy interventions, and a concerted push toward a less-cash, digitally inclusive economy. One of the biggest shifts in the nation's economic history has occurred as a result of this transition, which moved financial

transactions from conventional paper-based methods to real-time, interoperable digital systems. Public policy frameworks intended to improve financial inclusion, modernize payment infrastructure, and spur innovation in the digital financial ecosystem have played a crucial role in this revolution.

India's central banking authority, the Reserve Bank of India (RBI), alongside institutional platforms such as the National Payments Corporation of India (NPCI), has played a pivotal role in expanding the digital payments ecosystem. The use of a number of electronic payment methods, including the revolutionary Unified Payments Interface (UPI), Real-Time Gross Settlement (RTGS) for high-value transfers, and Immediate Payment Service (IMPS) for instant interbank transfers, has grown exponentially over the past five years in both urban and rural areas of the economy. Peer-to-peer (P2P) and person-to-merchant (P2M) transactions can now be completed with unprecedented speed, security, and convenience thanks to UPI, which has become the dominant force in retail payments. Hanumantharayappa and Keshava (2025) highlighted that government-led policies, development programmes, community participation, and digital innovation have contributed significantly to reducing poverty in India, particularly among rural and marginalised populations. Their study reported that extreme poverty declined from 16.2% in 2011–12 to 2.35% in 2022–23, while moderate poverty fell from 27.12% to 5.25% (Hanumantharayappa & Keshava, 2025).

This growth reflects not only technological adoption but also deliberate policy strategies aimed at fostering interoperability, competition, and scalability within the digital payments ecosystem. Public policy measures such as the Digital India program, financial inclusion strategies under the Pradhan Mantri Jan Dhan Yojana (PMJDY), and collaborative governance between RBI, NPCI, and commercial banks have laid the foundation for high-volume, cost-efficient, and widely accessible digital payments. These interventions have catalysed the shift from cash and card-based transactions to instant, interoperable, and mobile-centric payment methods. Keshava and Gupta (2018) explain that digital empowerment facilitates inclusive growth by integrating information and data through digital platforms, while initiatives such as Digital India and NABARD's E-Shakti contribute to financial inclusion by digitising Self-Help Groups (SHGs) and strengthening their linkages with financial institutions. Today, India accounts for nearly half of the world's real-time digital payments by volume, an achievement that underscores the cumulative impact of coherent policy frameworks, robust infrastructure, and widespread adoption of digital financial services.

II. Review of Literature

Government-led digitalisation efforts have been the dominant lens through which recent studies examine India's shift toward digital payments. Anita & Kumar (2025) trace this through the country's flagship programmes such as Digital India, Pradhan Mantri Jan Dhan Yojana (PMJDY), UPI, BHIM, the Aadhaar Enabled Payment System (AePS), and PM SVANidhi. The author concludes that it extended digital adoption beyond mainstream banking populations into the informal sector.

Krishnan & Shaji (2022) provide a quantitative complement to this picture, applying linear trend models to the volume and value of digital payments before and after Digital India's 2015 launch. Their findings reveal that there is a significant post-implementation upsurge, reflected in a 45% CAGR in transaction volume and 7% in value, reinforcing the view that government-driven digitalisation initiatives can causally advance financial-sector development. Notably, the temporary dip during the 2020 pandemic disruption was followed by a rapid recovery, underscoring the underlying resilience of the digital payment ecosystem once policy infrastructure is in place.

This resilience and the pandemic's role in accelerating it are examined more directly by Sharma & Syed (2024), who compare policy interventions across countries. These policy interventions include regulatory

reforms, transaction-fee reductions, real-time payment promotion, financial incentives, and subsidies, and the study finds that the pandemic converted digital payments from a discretionary convenience into essential financial infrastructure. Their cross-country descriptive analysis suggests that the specific policy lever matters, including fee reductions and expanded usage of real-time systems, while incentives and subsidies drew in consumers and small businesses who might otherwise have remained cash-reliant.

At the level of individual platforms and user behaviour, Tyagi, Jagadale & Anute (2022) shift the focus from policy to adoption dynamics within e-commerce. Their comparative analysis of UPI-based applications such as Google Pay, PhonePe, Paytm, Amazon Pay, and BHIM found generally positive user perceptions driven by convenience and ease of use, but also low awareness of security and fraud-prevention measures, alongside persistent challenges with server reliability and user trust. Market performance diverged by different platforms among these; PhonePe led overall, Google Pay retained strong user preference, Paytm dominated merchant-side adoption, while BHIM and Amazon Pay lost ground. It was observed that policy-driven macro-level infrastructure growth does not uniformly translate into platform-level user trust and retention.

Keshava (2010) provides a systematic discussion of fundamental economic concepts that are relevant to understanding the broader dimensions of economic development. The study covers key issues including economic growth, national income, inflation, poverty, unemployment, and public finance, thereby providing a conceptual foundation for analysing economic conditions. It also emphasizes the significance of government policies and economic institutions in addressing developmental challenges and promoting economic stability. The work is therefore useful as a theoretical reference for examining economic issues and understanding their implications within the context of the Indian economy.

Keshava (2013) examines the socio-economic exclusion experienced by Indian farmers in the process of economic growth and development. The study highlights the disparities faced by the agricultural community and discusses how existing patterns of economic growth may not adequately address the needs of rural and farming populations. It emphasizes the importance of appropriate policy interventions to promote greater economic inclusion, improve farmers' socio-economic conditions, and reduce inequalities. The study provides valuable insights into the need for inclusive agricultural and development policies to ensure that the benefits of economic growth reach marginalized farming communities.

Taken together, these studies establish that public policy has been central to the scale and speed of India's digital payments growth, and that its effects are measurable in transaction volumes, values, and adoption patterns, even amid disruptions such as the pandemic. However, existing research tends to either evaluate policy programmes in aggregate (Anita & Kumar, 2025; Krishnan & Shaji, 2022; Sharma & Syed, 2024) or examine user-level platform perceptions in isolation (Tyagi et al., 2022), with little work connecting specific instruments such as RTGS, AePS, IMPS, UPI, and mobile payments to the on-the-ground perceptions of efficiency, cost savings, security, and satisfaction that determine whether policy gains persist. This gap is what the present study, which combines secondary data on instrument-wise growth with primary survey evidence of user perceptions, seeks to address.

III. Research Gap

An analysis of the literature on public interventions in promoting digital payment system reveals numerous studies conducted in this area, but there is still lack of literature examining, integrated policy performance analysis, there is limited empirical research that systematically links specific public policy interventions with the performance of individual payment systems such as Reserve Bank of India-regulated RTGS, National Payments Corporation of India platforms like UPI, IMPS, and AePS. A comprehensive policy impact evaluation across multiple payment modes remains underexplored.

Furthermore, most of the literature focuses on rapidly increasing payment systems such as UPI and mobile-based systems, but there is little focus on critical evaluation of payment systems which are experiencing declining trends such as AePS.

Hence, to conduct an in-depth analysis and fill the gap, the present study, “Evaluating the Role of Public Policy in the Growth and Adoption of Digital Payment Systems in India,” is undertaken by the researcher.

IV. Objective of the study

1. To analyse the role of public policy interventions and government initiatives in promoting digital payment systems.
2. To examine the growth trends of digital payment systems in India.
3. To identify key challenges and policy gaps affecting the growth of digital payment systems.

V. Research Hypotheses

H₀: There is no significant growth in the adoption and usage of digital payment systems in India during the study period.

VI. Research Methodology

The study is based on both secondary and primary data. The secondary data are collected from the Reserve Bank of India (RBI), the National Payments Corporation of India (NPCI), the Telecom Regulatory Authority of India (TRAI), and IndiaStat. Primary data were collected from 100 respondents through a structured Google Forms questionnaire to understand users' perspectives on digital payment systems. The study follows analytical and descriptive methodology. To analyse data, descriptive statistics, linear Regression, compound annual growth rate analysis and trend analysis are used.

VII. Data Source and Study period

The data are collected from published sources, including RBI, NPCI, and IndiaStat. The study period is from the financial year 2020-21 to 2024-26.

VIII. Empirical Results and Discussion

The empirical results and discussion are presented in two stages. First, the study discusses major government initiatives and public policy interventions to promote digital payment systems in India. Subsequently, the analysis examines secondary data from the Reserve Bank of India over the last five years to assess the growth patterns of key digital payment modes, including RTGS (Credit Transfers), IMPS, UPI, and mobile app-based payments, and to evaluate the impact of these policy measures on the expansion of digital transactions.

Government initiatives promoting the digital payment system in India:

To promote different digital payment systems, the government of India has undertaken many initiatives. This study focuses on important government programs that are effectively promoting government initiatives.

1. Pradhan Mantri Jan Dhan Yojana (PMJDY)

The Pradhan Mantri Jan Dhan Yojana (PMJDY), implemented in 2014, aims to achieve financial inclusion through universal access to banking services, particularly for the ‘unbanked,’ thereby enabling digital

payments and the implementation of Direct Benefit Transfers.

Table1 presents the progress of the Pradhan Mantri Jan-Dhan Yojana (PMJDY) across different categories of banks as of 22 July 2026. It highlights the number of beneficiaries, deposits, and RuPay Debit Card issuances, reflecting the government's efforts to promote financial inclusion and expand access to digital payment systems.

Table 1: Pradhan Mantri Jan - Dhan Yojana: Beneficiaries: Number of RuPay Debit Cards issued to beneficiaries

Pradhan Mantri Jan - Dhan Yojana						
(All figures in Crore)						
Beneficiaries as on 22/07/2026						
Bank Name / Type	Number of Beneficiaries at rural/semi urban centre bank branches	Number of Beneficiaries at urban/metro centre bank branches	No. of Rural-Urban Female Beneficiaries	Number of Total Beneficiaries	Deposits in Accounts(In Crore)	Number of RuPay Debit Cards issued to beneficiaries
Public Sector Banks	35.29	10.12	25.01	45.41	241216.39	35.15
Regional Rural Banks	9.38	1.68	6.46	11.06	60662.35	4.08
Private Sector Banks	0.92	1.26	1.23	2.19	9411.95	1.78
Rural Cooperative Banks	0.19	0	0.1	0.19	0.01	0
Grand Total	45.77	13.07	32.79	58.84	311290.71	41.01

Source: Pradhan Mantri Jan-Dhan Yojana (PMJDY), *Progress Report: Beneficiaries as on 22 July 2026*, Department of Financial Services, Ministry of Finance, Government of India. Retrieved from [PMJDY Official Website](#)

The table shows that a total of 41.01 crore RuPay Debit Cards have been issued to PMJDY beneficiaries, with Public Sector Banks accounting for the largest share (35.15 crore), followed by Regional Rural Banks (4.08 crore) and Private Sector Banks (1.78 crore), while Rural Cooperative Banks have issued a negligible number. The widespread distribution of RuPay Debit Cards has enabled millions of newly banked individuals to access digital payment services such as ATM withdrawals, Point-of-Sale (PoS) transactions,

and online payments, thereby supporting the adoption of a cashless economy. These findings demonstrate that PMJDY, through the issuance of RuPay Debit Cards, has played a significant role in strengthening financial inclusion and advancing the growth of India's digital payment ecosystem in line with the country's public policy objectives.

Though the financial inclusion program PMJDY has been successful in opening bank accounts for millions of people, the number of bank accounts that initially had zero balance was quite high. Also, financial illiteracy among the rural population has limited the use of bank accounts for digital payments.

2. Digital India Programme:

The Digital India program, launched by the Government on July 1, 2015, envisions transforming India into a knowledge-based economy and a digitally empowered society by ensuring digital services, accessibility, inclusion, and empowerment. The ability to transfer money or complete important tasks with a single click is a testament to the Prime Minister of India's vision.

The Digital India initiative was created to help promote a digitally enabled Indian society via building out the digital infrastructure needed for people to be able to use it for payments. With respect to these objectives, the Digital India proposal helps improve overall digital infrastructure in India, although large disparities between rural and urban areas persist in internet access and digital skills. In rural areas, issues with inconsistent internet connection, limited access to internet-capable devices (mobile telephones, etc.), and a lack of digital skills contribute towards the ultimately low potential used with respect to digital payments overall.

3. Unified Payments Interface (UPI):

The Unified Payments Interface (UPI), launched in 2016 by the National Payments Corporation of India with regulatory support from the RBI. In India, UPI is an innovative payment system that allows people to send money using their phones. The system offers:

- i. Seamless transactions from your bank account to another bank account.
- ii. Instant payments. And
- iii. Low transaction costs compared to traditional payment methods such as checks and credit cards.

UPI will help the economy shift toward cashless payments by making regular citizens and businesses more comfortable using their mobile phones for daily transactions.

Although the UPI has transformed digital payment methods in stores and facilitated instant cashless payments that are inexpensive, it also experiences challenges with online banking fraud, failed transactions, excessive use of only a handful of dominant private digital payment apps, and no dependable means of generating revenue for payment service providers due to free-of-charge payment transactions.

4. BHIM (Bharat Interface for Money) application:

Developed by the Reserve Bank of India, Ministry of Finance, Ministry of Consumer Affairs, and Consumer Club, the Bharat Interface for Money (BHIM) Application was launched in 2016 as a free, easy-to-use mobile application designed to facilitate transactions through the Unified Payments Interface (UPI). BHIM is primarily targeted at novice digital users and small merchants, making it simple and secure for them to conduct UPI-based transactions.

BHIM has a great deal of room for improvement as compared to its private competitors. BHIM, although a government-sponsored digital payment application, has been unable to compete with Google Pay and Phone Pay in the expanding market by providing adequate promotional strategies and value-added features, and by

addressing low user engagement levels. Altogether, these factors have put BHIM behind in market share currently and place it at a severe disadvantage in this booming ecosystem of digital payment solutions.

5. Demonetization

The policy of demonetization instituted in 2016 is viewed as a major policy intervention for the reduction of informal cash-based transactions as well as for the promotion of electronic payment mechanisms, therefore supporting an accelerated transition from cash to digital by encouraging households and businesses to use e-transactions more frequently.

While demonetisation did lead to an accelerated shift towards the use of digital payments in the short term, the extent to which this has resulted in lasting reductions in cash usage post-demonetisation is still contested. Several studies have shown that after an initial spike in their use after demonetisation, consumers returned to using cash at pre-demonetisation levels, and that the continued use of digital payments is likely to be driven more by structural factors (such as consumer trust, financial literacy and availability of infrastructure) than by demonetisation itself.

6. Zero Merchant Discount Rate (MDR)

Introduced in 2020, the Zero Merchant Discount Rate (MDR Policy), which applies to UPI and RuPay transactions, is intended to help achieve greater acceptance of digital payments by allowing merchants to avoid all costs associated with digital payment transactions. This policy will primarily benefit micro and small businesses, while also supporting the development of a digital payments infrastructure across the country.

Digital Payment System Progress in India

The study examines growth trends of digital payment systems like RTGS - Credit Transfers, AePS (Fund Transfers), IMPS, UPI, Mobile Payments (mobile app based). The study is based on the data from the Reserve Bank of India report.

1. RTGS - Credit Transfers:

Real Time Gross Settlement (RTGS), is a money transfer system. Where, a customer can transfer money in real time from one bank to another bank. The minimum limit of money transfer is 2 lacks and there is no maximum limit. This transfer method helps people to have a smooth money transfer without time lags. Following is the table showing a transaction of money via RTGS.

Table: 2.1 Trend in RTGS: Transactions in India (Volume and Value), 2020–21 to 2024–25

Year	Volume (lakh)	Value (₹ crore)
2020-21	1591.92	105599849
2021-22	2078.39	128657516
2022-23	2425.62	149946286
2023-24	2700.16	170886670
2024-25	3024.55	201387682

Source: Reserve Bank of India (RBI), Payment System Indicators Database.

To assess the pace of accumulation over the study period, Table 2.2 presents the cumulative volume and value of RTGS transactions along with year-on-year growth rates.

Table 2.2: Cumulative Volume and Value of RTGS Transactions.

Year	Volume (lakh)	Cumulative Volume	YoY Growth %	Value (₹ crore)	Cumulative Value	YoY Growth %
2020–21	1591.92	1591.92	—	105,599,849	105,599,849	—
2021–22	2078.39	3670.31	30.56%	128,657,516	234,257,365	21.83%
2022–23	2425.62	6095.93	16.70%	149,946,286	384,203,651	16.55%
2023–24	2700.16	8796.09	11.32%	170,886,670	555,090,321	13.96%
2024–25	3024.55	11,820.64	12.01%	201,387,682	756,478,003	17.85%

Source: Reserve Bank of India (RBI), Payment System Indicators Database. Author's calculations.

Note: Cumulative volume/value is the running total from 2020–21 through the given year. YoY growth = $[(\text{Current Year} - \text{Previous Year}) / \text{Previous Year}] \times 100$. CAGR over the period = 17.4% (volume) and 17.5%(value).

Over the five-year period, cumulative RTGS volume reached 11,820.64 lakh transactions, though YoY growth decelerated steadily from 30.56% in 2021–22 to 12.01% in 2024–25, suggesting the segment is maturing even as absolute activity continues to rise.

Table: 2.3 Linear Regression Results Showing the Trend in RTGS Credit Transfers in India (2020–21 to 2024–25)

Predictor	Estimate	SE	t	p
Intercept	-702713	45016.3	-15.6	<.001
Year	349	22.3	15.7	<.001

This table shows the results of a simple linear regression analysis where the dependent variable is RTGS - Credit Transfers and the independent variable is year. Estimate = 349; a positive coefficient (349) means RTGS credit transfers increase over time. SE = 22.3; since 22.3 is very small relative to 349, the estimate is reliable. $t = 15.7$, $p < 0.001$. A high t-value (15.7) yields $p < 0.001$, indicating the result is statistically significant at the 1% level.

The regression results indicate a positive and statistically significant relationship between time and RTGS credit transfers in India. The coefficient of the Year variable is positive and significant at the 1 per cent level, implying that RTGS credit transfer values have increased consistently over the study period. On average, RTGS credit transfers increased by approximately ₹349 crore per year, reflecting a strong upward trend in the adoption of high-value digital payment systems. The findings highlight the growing importance of RTGS in India's digital payment infrastructure.

Percentage growth rate of RTGS value:

$$\text{Growth} = \frac{201387682 - 105599849}{105599849} \times 100$$

$$= 90.70$$

The RTGS value growth rate in percentage has increased by 90 percent, showing a rapid increase in RTGS usage.

2. AePS (Fund Transfers):

Aadhaar Enabled Payment System (AePS), is digital payment system, where banking activities such as cash withdrawal, money transfer, and balance enquiry can be done using Aadhaar number and biometric authentication. Here, Micro-ATM or banking correspondents will do this banking activity. These digital payment systems play a crucial role in rural areas, because this transfer method does not require, mobile network or cards. The following table explains AePS fund transfers.

Table: 3.1 Trend in AePS (Fund Transfers): Transactions in India (Volume and Value), 2020–21 to 2024–25

Year	Volume (lakh)	Value (₹ crore)
2020-21	11.31	623
2021-22	9.76	575
2022-23	5.90	356
2023-24	3.92	261
2024-25	3.64	190

Source: Reserve Bank of India (RBI), Payment System Indicators Database.

Table: 3.2 shows the cumulative pattern for AePS fund transfers, a segment that behaves differently from the other digital payment modes in this study.

Table 3.2: Cumulative Trend in AePS (Fund Transfers) in India, 2020–21 to 2024–25

Year	Volume (lakh)	Cumulative Volume	YoY Growth %	Value (₹ crore)	Cumulative Value	YoY Growth %
2020–21	11.31	11.31	—	623	623	—
2021–22	9.76	21.07	-13.71%	575	1198	-7.70%

2022–23	5.9	26.97	-39.55%	356	1554	-38.09%
2023–24	3.92	30.89	-33.56%	261	1815	-26.69%
2024–25	3.64	34.53	-7.14%	190	2005	-27.20%

Source: Reserve Bank of India (RBI), Payment System Indicators Database. Author's calculations.

Note: Cumulative volume/value is the running total from 2020–21 through the given year. YoY growth = $[(\text{Current Year} - \text{Previous Year}) / \text{Previous Year}] \times 100$. CAGR over the period = -24.7% (volume) and -25.7% (value).

Unlike the other four payment systems examined, AePS fund transfers show a consistent year-on-year decline, with cumulative volume growing only marginally to 34.53 lakh transactions by 2024–25, a pattern likely reflecting substitution toward UPI and mobile-based channels, and worth flagging as a policy gap in Objective 3.

Table 3.3 Time Trend Regression Results for AePS (Fund Transfers) in India (2020–21 to 2024–25)

Predictor	Estimate	SE	t	p
Intercept	4289.50	668.207	6.42	.008
Year	-2.12	0.330	-6.41	.008

This table shows the results of time trend regression for Aadhaar Enabled Payment System AePS (Fund Transfers) in India (2020 - 21 to 2024 -25). Estimate 4289.50 is the intercept of the regression line. Estimate = - 2.12 Year is the effect of time (Year) on AePS fund transfers. The negative sign means declining. Each year, the value of AePS fund transfers decreases by ₹2.12 crore on average. SE = 668.207 indicates variability in the intercept estimate, and 0.330 is very small compared to 2.12; the estimate is highly reliable. A high absolute t-value indicates the test is statistically significant, with a p-value of 0.008 at the 1% significance level.

The data indicate a consistent decline in AePS fund transfers over time. The negative coefficient sign suggests that AePS fund transfer values have decreased by approximately ₹2.12 crore per year on average during the study period. This result confirms that the observed decline in AePS usage for fund transfers is systematic and not due to random fluctuations.

3. IMPS:

IMPS (Immediate Payment Service) is an instant electronic money transfer. This system allows transactions any time, 24X7, even during holidays. IMPS uses different methods, such as a mobile number, an MMID (Mobile Money Identifier), a bank account number with an IFSC code, or an Aadhaar number. In IMPS, people can transfer money between Rs 1 and 5 lakh. The following table shows an IMPS transaction during the study period.

Table: 4.1 Trend in IMPS: Transactions in India (Volume and Value), 2020–21 to 2024–25

Year	Volume (lakh)	Value (₹ crore)
2020-21	32783.47	2941500
2021-22	46625.25	4171037
2022-23	56532.64	5585441
2023-24	60053.35	6495652
2024-25	56249.68	7139110

Source: Reserve Bank of India (RBI), Payment System Indicators Database.

Table 4.2 presents the cumulative volume and value trends for IMPS, showing a notable shift in its final year.

Table: 4.2 Cumulative Trend in IMPS Transactions in India, 2020–21 to 2024–25

Year	Volume (lakh)	Cumulative Volume	YoY Growth %	Value (₹ crore)	Cumulative Value	YoY Growth %
2020–21	32,783.47	32,783.47	—	2,941,500	2,941,500	—
2021–22	46,625.25	79,408.72	42.22%	4,171,037	7,112,537	41.81%
2022–23	56,532.64	135,941.36	21.25%	5,585,441	12,697,978	33.91%
2023–24	60,053.35	195,994.71	6.23%	6,495,652	19,193,630	16.30%
2024–25	56,249.68	252,244.39	-6.33%	7,139,110	26,332,740	9.91%

Reserve Bank of India (RBI), Payment System Indicators Database. Author's calculations.

Note: Cumulative volume/value is the running total from 2020–21 through the given year. YoY growth = $[(\text{Current Year} - \text{Previous Year}) / \text{Previous Year}] \times 100$. CAGR over the period = 14.5% (volume) and 24.8% (value).

Notably, IMPS volume declined by 6.33% in 2024–25 — the only contraction in the series even as cumulative value kept rising, indicating a rising average transaction size and a possible shift of smaller-value transfers toward UPI.

Table:4.3 Descriptive Statistics of Immediate Payment Service - IMPS Transactions

				95% Confidence Interval		SD	Minimum	Maximum
	N	Mean	SE	Lower	Upper			
IMPS	5	50449	4948	36712	64186	11063	32783	60053

Note. The CI of the mean assumes sample means follow a t-distribution with N - 1 degrees of freedom

The results show that the mean IMPS transaction volume during the study period is 50,449 lakh transactions, indicating a high level of usage of IMPS as a real-time retail payment system. The standard deviation (11,063 lakh) suggests a moderate degree of variation in transaction volumes across years, reflecting fluctuations in usage intensity over the study period.

The 95 per cent confidence interval for the mean IMPS transaction volume ranges from 36,712 lakh to 64,186 lakh, implying that the true population mean of IMPS transactions lies within this range with a high level of confidence. This highlights the consistency and reliability of IMPS usage over time.

The minimum transaction volume of 32,783 lakh was recorded during the period 2020–21, while the maximum volume of 60,053 lakh occurred in 2023–24, indicating a substantial expansion in IMPS transactions over the years. Although a slight decline is observed in 2024–25, the overall transaction volume remains significantly higher than the initial years. The descriptive statistics test indicates a strong and sustained growth in IMPS transaction volumes, underlining its growing importance in India's digital payment ecosystem.

4. UPI

UPI (Unified Payments Interface), is the most popular and widely used mobile based digital payment system in India. It provides an instant fund transfer for person-to-person payments, merchant payments, bill payments, and online purchases. The following table shows a UPI transaction. The following table shows a trend in UPI during the study period.

Table: 5.1 Trend in UPI: Transactions in India (Volume and Value), 2020–21 to 2024–25

Year	Volume (lakh)	Value (₹ crore)
2020-21	223306.64	4103658
2021-22	459561.30	8415900
2022-23	837143.73	13914932
2023-24	1311294.68	19995086
2024-25	1858660.25	26056955

Source: Reserve Bank of India (RBI), Payment System Indicators Database.

Table 5.2 presents the cumulative growth pattern for UPI, the fastest-growing digital payment mode in this study.

Table 5.2: Cumulative Trend in UPI Transactions in India, 2020–21 to 2024–25

Year	Volume (lakh)	Cumulative Volume	YoY Growth %	Value (₹ crore)	Cumulative Value	YoY Growth %
2020–21	223,306.64	223,306.64	—	4,103,658	4,103,658	—

2021–22	459,561.30	682,867.94	105.80%	8,415,900	12,519,558	105.10%
2022–23	837,143.73	1,520,011.67	82.16%	13,914,932	26,434,490	65.35%
2023–24	1,311,294.68	2,831,306.35	56.65%	19,995,086	46,429,576	43.70%
2024–25	1,858,660.25	4,689,966.60	41.74%	26,056,955	72,486,531	30.32%

Source: Reserve Bank of India (RBI), Payment System Indicators Database. Author's calculations.

Note: Cumulative volume/value is the running total from 2020–21 through the given year. YoY growth = $[(\text{Current Year} - \text{Previous Year}) / \text{Previous Year}] \times 100$. CAGR over the period = 69.8% (volume) and 58.8% (value).

UPI's cumulative volume grew more than twenty-fold over the study period, and although YoY growth has decelerated each year, it remains far higher than any other payment mode examined, reinforcing UPI's position as the primary driver of India's digital payments growth.

Table 5.3: Descriptive Statistics of UPI Transactions (Volume in Lakh) in India (2020–21 to 2024–25)

				95% Confidence Interval		SD	Minimum	Maximum
	N	Mean	SE	Lower	Upper			
UPI	5	937993	294689	119807	1.76e+6	658944	223307	1.86e+6

Note. The CI of the mean assumes sample means follow a t-distribution with N - 1 degrees of freedom

In the statistical test, the mean is 937993, the average UPI transaction value during the study period. The standard error of 294689 indicates that the sample mean differs from the true population mean. SE is larger, indicating higher confidence, and UPI transaction is increasing significantly. The 95 per cent confidence interval for the mean ranges from 119,807 lakh to approximately 1.76 million lakh, indicating that the true population mean of UPI transaction volume is expected to lie within this range with a high level of confidence. Standard Deviation (SD) measures how much the UPI transaction volumes vary from the average (mean) over the years. An SD of 658,944 lakh indicates large variability in UPI transaction volumes.

The Unified Payments Interface (UPI) transaction volume is increasing over time. This increase reflects a shift in Indian consumers' preference. The majority of Indians prefer real-time mobile payment systems over cash transactions.

Mobile Payments (mobile app based)

Mobile Payments, also known as Mobile Apps, are digital payments. In this payment system, transactions are made using smartphones and mobile apps. Mobile payments are processed by software systems to

transfer money electronically via UPI (Unified Payments Interface) or IMPS (Immediate Payment Service). Users can link their bank account to apps like Google Pay, PhonePe, and Paytm to transfer funds. Users can make mobile payments to send and receive money, pay bills, and buy things online.

Table 6.1: Trend in Mobile Payments (mobile app based): Transactions in India (Volume and Value), 2020–21 to 2024–25

Year	Volume (lakh)	Value (₹ crore)
2020-21	2,58,033.70	92,01,212
2021-22	4,79,607.03	1,45,41,929
2022-23	805338.23	22031628
2023-24	1252599.21	30687088
2024-25	1756976.91	39206221

Source: Reserve Bank of India (RBI), Payment System Indicators Database.

Table 6.2: Growth Trend and CAGR Analysis of Mobile App-Based Payments in India (2020-21 to 2024-25)

Year	Volume (lakh)	CAGR	Value (₹ crore)	CAGR
2020-21	258033.7	85.87%	9201212	58.04%
2021-22	479607.03	67.92%	14541929	51.50%
2022-23	805338.23	55.54%	22031628	39.29%
2023-24	1252599.21	40.27%	30687088	27.76%
2024-25	1756976.91	-100.00%	39206221	-100.00%

$$\begin{aligned}
 \text{CAGR of volume} &= (\text{Ending} / \text{Beginning})^{\frac{1}{n}} - 1 \\
 &= (1756976.91 / 258033.7)^{\frac{1}{4}} - 1 \\
 &= 61 \%
 \end{aligned}$$

$$\begin{aligned}
 \text{CAGR of value} &= (\text{Ending} / \text{Beginning})^{\frac{1}{n}} - 1 \\
 &= (39206221 / 9201212)^{\frac{1}{4}} - 1 \\
 &= 43.67\%
 \end{aligned}$$

There is a strong and sustained expansion of mobile app-based payments in India from 2020-21 to 2024-25, in both transaction volume and value. Transaction volume increased sharply from 2,58,033.7 lakh in 2020-21 to 17,56,976.91 lakh in 2024-25, reflecting the rapid diffusion of mobile payment applications among users and merchants. The volume growth rate declined progressively from 85.87% in 2020-21 to

40.27% in 2023-24, indicating a transition from an early high-growth phase to a more mature stage of adoption.

Similarly, transaction value rose consistently from ₹ 92,01,212 crore in 2020-21 to ₹ 3,92,06,221 crore in 2024-25. The growth rate of value moderated over time, declining from 58.04% to 27.76%, suggesting stabilisation in spending growth alongside continued usage expansion. The simultaneous increase in both volume and value indicates deeper integration of mobile payments into routine economic transactions.

For this study, primary data were collected from over 100 responses. The following is a summary of primary data collected.

Table 7: Primary data summary

Variable	Category	n	%
Age Group	18–25	12	12.40%
	25–35	71	73.20%
	26–35	2	2.10%
	35–45 / 36–45	8	8.30%
	46+	4	4.10%
Employment Status	Employed	70	72.20%
	Student	20	20.60%
	Self-employed	7	7.20%
Monthly Income (INR)	Below 10,000	22	22.70%
	10,000–30,000	12	12.40%
	30,000–50,000	42	43.30%
	50,000–1,00,000	19	19.60%
	Above 1,00,000	2	2.10%

Among the respondents around 73 percent belong to 25 - 35 years. Around 70 percent responded to being employed. Around 43 present respondents monthly income is 30,000 to 50,000.

The summary of digital payment use related perception among respondents are as follows.

Table 8: Primary data summary

Dimension	Mean	SD	vs. midpoint (3)
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Transaction efficiency	4.52	0.66	Above
Willingness to recommend	4.46	0.91	Above
Reduced cash dependence	4.35	0.89	Above
Ease of use	4.35	0.78	Above
Time savings	4.26	0.93	Above
Overall satisfaction	4.26	0.78	Above
Perceived security	3.78	0.92	Above
Perceived cost savings	2.52	0.97	Below

The results indicate that respondents perceive digital payment systems predominantly favourably, with transaction efficiency ($M = 4.52$, $SD = 0.66$), willingness to recommend ($M = 4.46$, $SD = 0.91$), and reduced cash dependence ($M = 4.35$, $SD = 0.89$) emerging as the most strongly endorsed dimensions, alongside consistently high ratings for ease of use, time savings, and overall satisfaction, all significantly above the midpoint of 3. Perceived security, while also above the neutral midpoint ($M = 3.78$, $SD = 0.92$), registered comparatively lower agreement and greater variability than the efficiency-related dimensions, suggesting that trust in the safety of digital transactions remains a relatively weaker driver of adoption than functional convenience. Notably, perceived cost savings was the sole dimension to fall below the midpoint ($M = 2.52$, $SD = 0.97$), indicating that users do not widely associate digital payment platforms with tangible economic savings, a finding that points to a potential gap between the operational benefits and the perceived financial value of digital payment adoption.

IX. Hypothesis testing result

The statistical analysis of digital payment data reveals a significant upward trend across major payment systems, including UPI, IMPS, RTGS, and mobile app-based payments. The regression results for RTGS show a statistically significant positive relationship between time and transaction values ($p < 0.001$). Similarly, descriptive statistics and growth trend analysis indicate substantial increases in UPI, IMPS, and mobile payment transactions during the study period. Therefore, the null hypothesis (H_0), which states that there is no significant growth in digital payment systems, is rejected, and the alternative hypothesis (H_1) is accepted.

X. Challenges and policy gaps affecting the growth of digital payment systems

In India, the growth of digital payment systems depends heavily on the availability of telecommunications and internet infrastructure. Access to mobile networks, broadband services, and internet connections enables businesses and individuals to use digital financial services more effectively than before. Despite significant progress, many infrastructure challenges and policy gaps still hinder the growth of

digital payments, particularly in rural areas. Urban and rural areas differ in tele-density, internet access, and broadband availability, which obstruct widespread use of digital payment systems. The following table shows selected telecom and internet connectivity indicators for India (2024-25) based on data from the Telecom Regulatory Authority of India (TRAI). It highlights some of the factors that can influence the growth of digital payment systems.

Table 9: Telecom and Internet Connectivity Indicators in India (Urban–Rural Distribution), 2024–25

Particulars	Wireless	Wireline	Total (Wireless+Wireline)
Total Telephone Subscribers (Million)	1163.76*	37.04	1200.80
Urban Telephone Subscribers (Million)	632.57*	33.54	666.11
Rural Telephone Subscribers (Million)	531.18*	3.50	534.69
Overall Tele-density (%)	82.42%	2.62%	85.04%
Urban Tele-density (%)	124.83%	6.62%	131.45%
Rural Tele-density (%)	58.67%	0.39%	59.06%
Share of Urban Subscribers	54.36%	90.55%	55.47%
Share of Rural Subscribers	45.64%	9.45%	44.53%
No. of Internet Subscribers (Million)	927.70	41.41	969.10
No. of Broadband Subscribers (Million)	902.74*	41.39	944.12
* Wireless includes 5G FWA subscription also.			

Source: Telecom Regulatory Authority of India (TRAI), *Annual Report 2024–25*.

The above table reveals that, in India during 2024 – 25 total telephone subscribers are 1200.80 million. In urban areas, total telephone subscribers number 666.11 million, while in rural areas, they number 534.69 million. The rural tele-density was just 59.06 percent which indicates relatively lower telecommunication access in rural areas. As India is a rural-centric economy with low telephone subscription and density in rural areas, a large portion of the Indian population lacks access to telephone infrastructure. Since many digital payment systems rely on mobile phones and internet connectivity, limited telephone access will adversely affect digital payment usage. Therefore, the lack of telecommunication infrastructure is a major challenge India faces.

The rise of digital payment systems has led to an increase in fraud cases.

Table 10: Digital Payment Fraud Cases and Amount Involved in India (2022–23 to 2024–25)

Year	Number of Digital Payment Fraud Cases	Amount Involved (₹ Crore)
2022–23	6,699	278

2023–24	29,082	1,457
2024–25	13,516	520

Source: Reserve Bank of India, Report on Trend and Progress of Banking in India and RBI Annual Reports

The above table reveals that, in India during 2022-23, a total of 6,699 digital payment fraud cases were registered, in this period 278 crore rupees were involved. In the following year, 2023-24 the number of digital payment fraud cases were 29,082 with 1,457 crore rupees amount involved. In 2024–25, the number of digital payment fraud cases registered are 13,516 and 520 crore rupees are involved. This huge amount of cybersecurity and fraud risks are major challenges within digital payment ecosystems.

XI. Key Findings

Followings are the key findings of the study:

In the study period, it is observed that there is significant growth in the digital payment system.

1. Mobile payment-based digital payment systems have grown rapidly.
2. Relatively conventional modes of digital payment such as Aadhaar Enabled Payment
3. System (AePS) usage has decreased; the main reason for this inverse movement is the emergence of more convenient alternative modes of payment systems such as Mobile payment systems.
4. Government initiatives such as Pradhan Mantri Jan Dhan Yojana (PMJDY), Digital India Programme, Unified Payments Interface (UPI), etc., have positively impacted digital payment systems.
5. It has been observed that the general public has a positive approach to digital payment systems. Mobile payment systems are a popular digital payment system among youth.
6. However, differences in Internet Connectivity density between urban and rural areas and digital fraud are the major challenges that the Indian digital ecosystem is facing.

XII. Policy Implications

The results of this study indicate that public policy interventions have been instrumental in driving the growth of digital payment systems in India, particularly UPI, IMPS, and mobile app-based payments. Policies promoting interoperability, low transaction costs, and user-friendly digital platforms have significantly accelerated retail payment adoption, suggesting the need for continued policy support to sustain this momentum.

The steady growth of RTGS transactions highlights its continued relevance for high-value institutional payments. Policymakers should focus on strengthening RTGS infrastructure through enhanced security, efficiency, and resilience, while maintaining a clear functional distinction between large-value and retail payment systems.

1. Strengthen rural digital infrastructure.
2. Improve cybersecurity frameworks.
3. Maintain interoperability and low transaction costs.
4. Promote financial literacy for digital payments.
5. Strengthen AePs infrastructure for promoting digital payment systems in rural areas.

Public policy interventions play an important role in the growth of digital payment systems in India. The most crucial policy implications are strengthening rural digital infrastructure, improving cybersecurity frameworks, maintaining interoperability, reducing transaction costs, promoting financial literacy for digital payments, and strengthening AePs infrastructure for promoting digital payment systems in rural areas. Though digital payments have expanded rapidly in urban areas, rural areas still face challenges such as low internet connectivity, low tele-density, and limited access to smartphones and other digital devices. More

availability of broadband connectivity, mobile network coverage, and increasing digital infrastructure in rural areas can increase digital payment adoption and ensure more inclusive financial participation.

XIII. Conclusion

This study examines the role of public policy interventions in shaping the growth of digital payment systems in India by analysing secondary data from the Reserve Bank of India on RTGS (Credit Transfers), IMPS, UPI, and mobile app-based payments over the last five years. The empirical results reveal a substantial and sustained increase in digital payment transactions, with UPI and mobile payments emerging as the primary drivers of retail digital transactions, reflecting the effectiveness of policy measures aimed at promoting low-cost, interoperable, and user-friendly payment platforms.

While retail payment systems demonstrate rapid expansion, the relatively stable growth of RTGS transactions indicates its continued importance for high-value and institutional transfers. The findings suggest that differentiated policy approaches are required to address the distinct functional roles of large-value and retail payment systems. Overall, the study concludes that coordinated public policy initiatives, supported by robust regulatory oversight and technological infrastructure, have been central to India's transition toward a digitally driven payment ecosystem. Sustained policy focus on inclusion, infrastructure, and system resilience will be essential to ensure the long-term growth and stability of digital payments in India.

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