

Digital Payments in India: An Analysis



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Abstract: With the liberalisation of the Indian banking sector in 2014, the digital payment ecosystem has undergone a steady transformation which can be attributed to the usage of new technologies like Automated Teller Machines (ATM) and Magnetic Ink Character Recognition (MICR). Digital payment systems offer convenience and security while transacting. In 2010, a variety of payment products (stored value cards, wallets, and recharge vouchers) and service providers were introduced. The launching of Digital India in 2015, gave a further boost to the digitalization process. Initiatives have been taken to improve the payment infrastructure to make technology accessible and cost-effective. This study examines the growth of digital payments in India, growth in different modes of payment in India as well as growth in Indian Payment Infrastructures. For this study, data has been compiled from RBI Bulletin, RBI Annual Reports, RBI Reports and authentic websites. The analysis of Payment and Settlement System Statistics revealed exponential growth in the usage of various modes of digital payment. RBI has constructed Digital Payment Index (DPI) with a base period of March 2018 and a DPI score of 100. The high DPI scores released by RBI revealed the widespread use and deepening of digital payments in India. This has been made possible by the Government of India's and the RBI's consistent efforts to improve Payment Infrastructure. The study found that India is experiencing robust growth in the digital payments arena.

Keywords: Digital Payment, Digital Payment Infrastructure, Electronic Money, Retail Payment, Cashless Economy

I. INTRODUCTION

1.1 Electronic Money

As per the Merriam-Webster dictionary, *money* may be defined as a medium of exchange, a measure of value and a means of payment. It may be an officially stamped metal currency or denomination of coin or paper money [16]. The concept of money has immensely changed due to technological disruptions. From barter systems to coins, to paper notes to electronic money (e-money) to cryptocurrency which is being propagated by some as the future currency.

The European Central Bank (ECB) defines e-money in the following words. "E-money can be defined as the amount of money value represented by a claim issued on a prepaid basis, stored in an electronic medium (card or computer) and accepted as a means of payment by undertakings other than the issuer". It has been observed around the world, particularly in developed economies, that there has been a gradual shift from the use of paper-based payment modes to electronic-based payment modes.

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The fundamental characteristics of these new instruments are mostly similar to the old, paper-based instruments. E-money is one such new product that has emerged on the Indian horizon (Report of the Working Group on Electronic Money, July 11, 2002). According to the report, there are two general categories into which e-money can be divided: (a) pre-paid stored value cards, also known as "electronic purses," which have a microprocessor chip built into the plastic card; and (b) pre-paid software-based products, which use computer networks like the internet also referred to as "digital cash" or "network money". Specialized software that is installed on a personal computer is used by software-based products [6].

E-money in India consists of PPIs issued as Wallets and Cards. E-money could help an economy like India, where there are a lot of cash transactions [23], by reducing costs associated with managing, storing, shipping, and insuring currency as well as printing and minting smaller value notes and coins. E-money usage would improve the operational efficiency of the financial sector and will lead to the expansion of banking services to rural and urban underserved areas. It would also facilitate the e-governance initiatives of the governments. Widespread usage of e-money by all the stakeholders, issuers, merchants and consumers would depend on its ease of usage, cost-effectiveness, security, privacy and availability of supportive infrastructure. An emphasis was placed on innovation, financial inclusion, cyber security, customer protection, and competitiveness under the Payment Systems Vision 2019-21[11].

1.2 Digital India

On 1st July 2015, the Government of India launched 'Digital India', the digital transformation initiative with the objective of transforming India into a *digitally empowered society and knowledge economy*. In this context, it may be noted that the seed of 'Digital India' was planted much earlier, on May 18, 2006, with the approval of the National e-Governance Plan (NeGP), which was an amalgamation of initiatives brought about by multiple government ministries [19]. NeGP to begin with comprised twenty seven Mission Mode Projects (MMPs) and eight components. Later in 2011, four projects namely, Health, Education, Public Distribution System and Posts were added to make the list of twenty-seven MMPs to thirty-one MMPs. So as to achieve the objectives of NeGP, these MMPs may further be augmented [20].

Under the aegis of the Digital India program, nine pillars of growth and three key vision areas were identified so as to transform the public service ecosystem by adopting information technology [17].

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The pillars of growth identified are: (a) Broadband Highways (b) Universal Access to Mobile Connectivity (c) Public Internet Access Programme (d) e-Governance: Reforming Government through Technology (e) e-Kranti - Electronic Delivery of Services (f) Information for All (g) Electronics Manufacturing (h) IT for Jobs (i) Early Harvest Programmes. Each of these areas is a complex programme in itself and cuts across multiple Ministries and Departments. The key vision areas are (a) Digital Infrastructure as a Core Utility for Every Citizen (b) Governance and Services on Demand (c) Digital Empowerment of Citizens.

Collectively, the nine pillars and the three key vision areas identified will facilitate smoothening the digitalization process both in the area of e-governance and financial services.

1.2.1 Seven Years of Digital India

Over the years, Digital India evolved into a revolution and a mass movement that touched the lives of the majority of Indians. This can be evidenced by the fact that by the end of December 2021, 99.7% of the adult population of India had been issued an Aadhaar card [21]. On July 1, 2022, the programme has been in existence for seven years. Technology has made it easier for Indians to get improved agriculture, health care, and education services while also promoting transparency and accountability. Today, the vision of mobile governance-offering services using mobile devices and securing access to online services for all is a reality. Implementing initiatives like Aadhar, UPI, and Digi locker ensures paperless, faceless and cashless governance, laying the groundwork for a powerful, strong and safe 'Digital India' [18]. This accomplishment has been made possible by the growth of digital infrastructure, digital services, and digital inclusion, which have all contributed to making India a more digitally enabled country.

During the seven years, 2015-2022 there have been many positive outcomes due to the introduction of numerous innovative systems. There has been a notable shift from paper-based payment to electronic modes of payment, a substantial increase in customer centric-initiatives, transaction turnover, and international recognition, to name a few. In 2016, the demonetisation of high-denomination currency notes also gave impetus to digital usage for making payments.

COVID-19, the global pandemic further accelerated the adoption of digital payments. India used digital payment methods more frequently (75%) than China (63%) or Italy (49%) during the lockdown, compared to the global average of 45% [1]. So, it is important to understand and analyse the progress of the digital payment ecosystem in the country.

II. REVIEW OF LITERATURE

V. Achutamba et al. (2022)[3] studied the effect of Covid-19 on digital payments in India. The study is based on primary data. It was found that COVID-19 led to a substantial change in the payment mechanism from traditional modes to digital modes of payment. Even though there are a few problems and people find it difficult to trust digital payments but still they will switch to digitalized payments once certain measures have been taken by the Government.

Decreased usage of cash during COVID-19, has automatically taken us a step forward towards digitalization. B. Angamuthu (2020) studied the growth of digital payments in India during the period 2012-2013 to 2018-2019. Both the number and value of transactions of seven different parameters were studied, namely, Real Time Gross Settlement (RTGS) customer transactions, Cheque Truncation System (CTS), Debit and Credit Card, Immediate Payment Service (IMPS), M-Wallet and Prepaid Payment Instruments (PPI) Cards were analysed. It was found that during the period under consideration, digital payment transactions have grown multi-fold both in number and value. On comparing various categories of digital payments, IMPS and M-Wallet services were found to have the highest growth rate. Thus, these mediums are the game changers in the digital payments system. Payment transactions using digital modes are convenient and less expensive, due to which digital payments and online payment platforms are being used increasingly. The economy is rapidly transitioning to a cashless world.

Abhipsa Pal et al. (2020) [2] studied the role of mobile payment technology in sustainable and human-centric development, with evidence from the post-demonetization period in India. The theories of Schumacher and Sen, form the basis of the framework used for studying mobile payment technologies. Secondary data from a countrywide survey conducted by the government and the United States Agency for International Development (USAID) has been used in the study. It has also used primary data collected from 41 in-depth interviews with consumers and business owners. In spite of the fact that payment applications have used the QR-code method to connect with local sellers, it was determined that small-scale vendors still need to be more fully included since they compete with e-commerce companies that provide significant markdowns. Service Centre that offer cash-to-wallet transfers must be extended in rural locations so that technology can truly serve the unbanked and the underprivileged.

Ravikumar et al. (2020) [4] studied digital payments in developed and emerging economies with special reference to India. Digital payments have exhibited growth in all types of businesses both, small and large. The study found that India is consistently growing towards being a cashless economy, but still, a lot needs to be accomplished.

Ravikumar et al. (2019) studied the effect of digital payments on economic growth in terms of real Gross Domestic Product (GDP). They concluded that large digital payments and retail electronic payments do not have any direct effect on economic growth. These payments may indirectly affect economic growth through lower cost, convenient and speedy economic transactions.

III. OBJECTIVES OF THE STUDY

The paper is designed keeping in mind the following objectives:

- To study the growth of digital payments in India

- To study growth in different digital modes of payment in India
- To study growth in different Payment Infrastructures

IV. RESEARCH METHODOLOGY

The study examines the growth of digital payments in India. Secondary data has been compiled from research articles, RBI Bulletin, RBI Annual Reports, RBI Reports and authentic websites. It is a descriptive and analytical study. For analysis, data on Payment System Indicators has been compiled from the RBI Bulletin, RBI Annual Reports and RBI Reports [7], [8], [9], [10], [12], [13] and [14]. The growth of digital payments has been studied for a period of twelve years, from 2010-11 to 2021-22. The growth in different digital modes of payment in India has been studied for a period of five years, from 2017-18 to 2021-22. The growth in different Payment Infrastructures has been studied for a period of two years, 2020-21 and 2021-22.

V. LIMITATIONS

This study is only secondary data-based. A primary study can be done to understand the usage of digital payments by conducting a survey. This would also help in studying digital payments as a function of different demographic and socio-economic factors.

6. Digital Payments in India: An Analysis

Presently digital modes of payment can be broadly classified into two segments, Financial Market Infrastructures (FMIs) and Retail payments.

- (1) FMIs include - Real Time Gross Settlement (RTGS) credit transfers both, Customer transactions as well as Inter-bank transactions.
- (2) Retail payments include:
 - (a) Credit transfers namely, Aadhaar-enabled Payment System (AePS), Aadhaar Payment Bridge System (APBS), Electronic Clearing Service (ECS) Credit, Immediate Payment Service (IMPS), National Automated Clearing House (NACH) Credit, National Electronic Fund Transfer (NEFT), Unified Payment Interface (UPI),
 - (b) Debit transfers namely, BHIM Aadhaar Pay, Electronic Clearing Service (ECS) Debit, National Automated Clearing House (NACH) Debit, National Electronic Toll Collection (NETC) linked to bank account,
 - (c) Card Payments including, Credit Card payments (Card, Point of Sale (PoS) based and others) and Debit Card payments (Card, Point of Sale (PoS) based and others),
 - (d) Prepaid Payment Instruments (PPI) like Wallets, Cards, PoS-based and others.
 - (e) Paper-based Payments are largely through Cheque Truncation System (CTS) managed by the National Payment Corporation of India (NPCI).

6.1 Growth in Digital Payments in India

Over the years, digital payments have grown exponentially in popularity as well as usage as can be observed in the twelve years, 2010-11 to 2021-22 (Refer to Table 1). Digital payments have increased from 96 crore transactions valued at 498 lakh crore handled in 2010-11 to 7195 crore transactions valued at 1744 lakh crore in 2021-22. In terms of volume and value, this represents a Compounded Annual

Growth Rate (CAGR) of 43.09 per cent and 10.96 per cent respectively.

The impact of numerous initiatives under the Digital India programme is exhibited by the high CAGR of 45.82 per cent in volume and 9.84 per cent in value calculated for the last five-year time period (2014-15 to 2021-22). 2014-15 has been taken as the starting year as the Digital India programme started in the year 2015.

Table 1: Digital Payments in India

Year	Volume (Crore)	Value (Lakh Crore)
2010-11	96	498
2011-12	125	561
2012-13	169	711
2013-14	245	785
2014-15	352	823
2015-16	595	920
2016-17	978	1122
2017-18	1472	1371
2018-19	2340	1638
2019-20	3435	1623
2020-21	4374	1414
2021-22	7195	1744

Source: Compiled from RBI Data

It is noteworthy that despite the strong expansion in digital payments, cash transactions have increased by 68 per cent after the government announced demonetisation in November 2016, suggesting that it is still the preferred method of payment in the nation. The amount of cash in circulation (C-i-C) in the economy increased by 9.2 per cent as on March 18, 2022, reaching an all-time high (Rs. 31 lakh crore) as compared to Rs. 28.5 lakh crore during the same period the previous year [23].

This increase in C-i-C can be attributed to a substantial increase in cash withdrawals using ATMs, especially in rural areas, since the distribution of numerous government beneficiary programs was done through Jan Dhan accounts. It can also be due to the ease of nationwide COVID-19 restrictions. Additionally, a lot of businesses, particularly those in the e-commerce sector, still use cash for day-to-day transactions [23].

6.2 Growth of Digital Payments in India in the Last Five Years (2017-18 to 2021-22)

Digital payments have exhibited robust growth in the five-year period (2017-18 to 2021-22) under consideration. In the year 2021-22 out of the total payments, digital payments accounted for 99.04 per cent in volume and 96.33 per cent in value (Refer to table 2). It can be observed that in the five-year period 2017-18 to 2021-22, the total digital payments increased by 393.16 per cent in volume and 27.32 per cent in value. This represents a CAGR of 37.59 per cent increase in volume and a 4.95 per cent increase in value. As can be seen in column 5 of table 2, digital payments sustained a double-digit year-on-year (y-o-y) growth in volume. In terms of value digital payments showed a mixed y-o-y growth (column 9, table 2). In 2018-19 there was an increase of 19.61 per cent, while 2019-20 and 2020-21 showed contradictory growth of 1.15 and 12.66 per cent,



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followed by a 23.30 per cent positive y-o-y growth in 2021-22.

The decline in the y-o-y number and value of transactions in 2019-20 and 2020-21 can be attributed to COVID-19-related

subdued business and economic activity. Digital payments grew substantially in the year 2021-22, which is reflected in more than 64 per cent and 23 per cent y-o-y growth in volume and value, respectively.

Table 2: Payment System Indicators

Payment System Indicators April-March (Annual Turnover)								
Volume (Lakh)					Value (Rs. Lakh Crore)			
1	2	3	4	5	6	7	8	9
Year	Total Payments	Total Digital Payments	Percentage of Total Digital Payments in Total Payments	Year On Year Growth in Digital Payments	Total Payments	Total Digital Payments	Percentage of Total Digital Payments in Total Payments	Year On Year Growth in Digital Payments
2017-18	157,615	145,902	92.57		1,451.80	1,369.87	94.36	
2018-19	245,577	234,339	95.42	60.61	1,720.98	1,638.52	95.21	19.61
2019-20	350,440	340,026	97.03	45.10	1,697.94	1,619.69	95.39	-1.15
2020-21	444,149	437,445	98.49	28.65	1,470.86	1,414.59	96.17	-12.66
2021-22	726,530	719,531	99.04	64.48	1,810.65	1,744.14	96.33	23.30

Source: Compiled from RBI Reports and Calculated by the author

6.2.1 Reserve Bank of India Digital Payment Index (RBI-DPI)

RBI has constructed RBI-DPI with a base period of March 2018 and a DPI score of 100. This initiative was announced in the statement on Developmental and Regulatory Policies, which was included in the sixth Bi-Monthly Monetary Policy Statement for 2019-20. RBI has been periodically publishing a composite "Digital Payments Index" (DPI). The DPI is intended to correctly depict the deepening and penetration of various modalities of digital payment. It is based on various parameters to adequately represent the level of digitisation in the nation [11]. The five DPI parameters are: payment enablers, demand side factors of payment infrastructure, payment performance, supply-side factors of payment Infrastructure and consumer centricity.

Table 3: RBI - DPI

Year	RBI - DPI	Y-O-Y Growth
March 2018 (Base Year)	100	
March 2019	153.47	53.47
March 2020	207.84	35.43
March 2021	270.59	30.19
March 2022	349.3	29.09

Source: Compiled from RBI Press Release [24]

Table 3 presents annual DPI scores with March 2018 as the base period. It can be observed that the DPI has exhibited a high double-digit y-o-y growth. The CAGR for the five-year period is 28.42 per cent.

6.3 Digital Modes of Payment in India

To understand the usage of various modes of digital payment in India, Table 4 presents average figures for the five-year period (2017-18 to 2021-22) in terms of both, the number and value of transactions. In terms of the number of transactions, it can be seen that the share of Credit transfers is the largest (68.15 per cent), followed by Card payments (16.05 per cent), PPIs (13.32 per cent), Debit transfers (2.07 per cent) and RTGS (0.41 per cent). While in terms of value, RTGS exhibits the highest share (79.34 per cent) as this includes bulk credit transfers both, customer transactions as well as inter-bank transactions. Next is Credit transfers (19.2 per cent) followed by Card payments, Debit transfers and PPIs. In terms of the number of digital payment transactions, of all the modes of digital payments, UPI is the most popular mode (46.4 per cent). Debit card usage is more than twice as common as credit card usage based on the volume of transactions. Though on the basis of value, there is a nominal difference of 0.04 per cent. NEFT alone accounts for 15 per cent of digital payments in terms of value.

Table 4: Digital Modes of Payment in India

Payment System Indicators - April-March (Annual Turnover)					
		Volume		Value	
		Average (Lakh) (2017-18 to 2021-22)	Per cent Share	Average (Rs. Lakh Crore) (2017-18 to 2021-22)	Per cent Share
1	Large Value Credit Transfers-RTGS	1557.4	0.41	1235.63	79.34
	Retail Segment				
2	Credit Transfers	255868	68.15	299.39	19.22
2.1	Adhaar Enabled Payment System (AePS) (Fund Transfers)	9.6	0.00	0.01	0.00
2.2	Aadhaar Payment Bridge System (APBS)	14286	3.81	0.97	0.06
2.3	Electronic Clearing Service (ECS) Credit	26.6	0.01	0.06	0.00

2.4	Immediate Payment Service (IMPS)	26565.4	7.08	23.86	1.53
2.5	National Automated Clearing House (NACH) Credit	12469.4	3.32	9.57	0.61
2.6	National Electronics Fund Transfer (NEFT)	28286.6	7.53	233.64	15.00
2.7	Unified Payments Interface (UPI)	174224.2	46.40	31.28	2.01
3	Debit Transfers and Direct Debits	7775.2	2.07	7.13	0.46
3.1	BHIM Aadhaar Pay	113.6	0.03	0.02	0.00
3.2	Electronic Clearing Service (ECS) Debit	5	0.00	0.004	0.00
3.3	National Automated Clearing House (NACH) Debit	7262.6	1.93	7.10	0.46
3.4	National Electronic Toll Collection (NETC) (Linked to Bank Account)	394.2	0.10	0.01	0.00
4	Card Payments	60242.4	16.05	13.09	0.84
4.1	Credit Cards	18698.2	4.98	6.79	0.44
4.2	Debit Cards	41544.2	11.07	6.30	0.40
5	Prepaid Payment Instruments (PPIs)	50005.8	13.32	2.13	0.14
	Total Digital Payments (1+2+3+4+5)	375448.6	100	1557.36	100.00

Source: Author’s Calculation using data compiled from RBI Reports

6.4 Growth in Different Digital Modes of Payment in India

Digital payments in India comprise large-value credit transfers and retail segment transfers. Table 5 presents the y-o-y growth in terms of volume and table 6 presents the y-o-y growth in terms of value in the different modes of digital payments for the five-year period (2017-18 to 2021-22) as well as the CAGR for the same period.

Table 5: Y-O-Y Growth and CAGR in the Different Modes of Digital Payments (Volume)

		Y-O-Y Growth in Volume					CAGR 2017-18 to 2021-22
		2017-18	2018-19	2019-20	2020-21	2021-22	
PAYMENT SYSTEMS							
1	Large Value Credit Transfers-RTGS		9.81	10.32	5.64	30.53	10.81
	Retail Segment						
2	Credit Transfers		101.98	73.72	54.08	81.72	57.93
2.1	Adhaar Enabled Payment System (AePS) (Fund Transfers)		83.33	-9.09	10.00	-9.09	10.76
2.2	Aadhaar Payment Bridge System (APBS)		15.81	11.41	-14.18	-14.44	-1.07
2.3	Electronic Clearing Service (ECS) Credit		-11.48	-66.67	-100.00	0.00	0
2.4	Immediate Payment Service (IMPS)		73.59	47.14	27.11	42.22	35.79
2.5	National Automated Clearing House (NACH) Credit		28.30	23.05	48.33	13.76	21.65
2.6	National Electronics Fund Transfer (NEFT)		19.14	18.35	12.69	30.65	15.73
2.7	Unified Payments Interface (UPI)		489.11	132.19	78.38	105.80	118.86
3	Debit Transfers and Direct Debits		68.48	-5.56	73.50	16.88	26.41
3.1	BHIM Aadhaar Pay		240.00	33.82	76.92	41.61	62.7
3.2	Electronic Clearing Service (ECS) Debit		-40.00	-88.89	-100.00	0.00	0
3.3	National Automated Clearing House (NACH) Debit		68.51	-7.26	65.11	11.84	23.61
3.4	National Electronic Toll Collection (NETC) (Linked to Bank Account)		-60.00	1450.00	598.92	85.69	140.51
4	Card Payments		30.08	17.18	-20.17	6.92	5.41
4.1	Credit Cards		25.43	23.53	-18.98	26.97	9.77
4.2	Debit Cards		32.03	14.65	-20.68	-1.89	3.33
5	Prepaid Payment Instruments (PPIs)		33.19	16.80	-7.56	32.30	13.73
6	Paper Based Instruments		-4.00	-7.33	-35.63	4.40	-9.78
	Total Retail Payments (2+3+4+5+6)		56.17	42.88	26.83	63.70	35.88
	Total Payments (1+2+3+4+5+6)		55.81	42.70	26.74	63.58	35.74
	Total Digital Payments (1+2+3+4+5)		60.61	45.10	28.65	64.48	37.59

Source: Author’s Calculation using data compiled from RBI Reports

Referring to table 5, it can be observed that in the case of the RTGS-the large-value credit transfers there was an increase in the number of transactions in the five-year period (y-o-y growth rate). While in terms of the value of RTGS transactions there was a significant decline in 2019-20 and 2020-21 which can be attributed to the decline in business activity due to COVID-19 (table 6). After the gradual removal of COVID-19-related restrictions, business activity gained momentum and RTGS transactions in terms of value showed double-digit growth of more than 21 per cent.

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Table 6: Y-O-Y Growth and CAGR in the Different Modes of Digital Payments (Value)

Payment System Indicators - Annual Turnover (April-March)							
		Y-O-Y Growth in Value					CAGR
		2017-18	2018-19	2019-20	2020-21	2021-22	2017-18 to 2021-22
	PAYMENT SYSTEMS						
1	Large Value Credit Transfers-RTGS		16.26	-3.34	-19.49	21.84	1.96
	Retail Segment						
2	Credit Transfers		38.72	9.42	17.32	27.52	17.82
2.1	Adhaar Enabled Payment System (AePS) (Fund Transfers)		66.67	0.00	100.00	0.00	27.23
2.2	Aadhaar Payment Bridge System (APBS)		59.26	15.12	12.12	19.82	19.75
2.3	Electronic Clearing Service (ECS) Credit		18.18	-61.54	-100.00	0.00	0
2.4	Immediate Payment Service (IMPS)		78.25	47.04	25.79	41.82	36.14
2.5	National Automated Clearing House (NACH) Credit		41.54	40.90	17.36	4.93	19.68
2.6	National Electronics Fund Transfer (NEFT)		32.35	0.67	9.52	14.30	10.77
2.7	Unified Payments Interface (UPI)		697.27	143.10	92.50	105.07	138.09
3	Debit Transfers and Direct Debits		64.41	-7.62	42.90	19.86	21.07
3.1	BHIM Aadhaar Pay		900.00	0.00	200.00	100.00	126.09
3.2	Electronic Clearing Service (ECS) Debit		0.00	-100.00	0.00	0.00	0
3.3	National Automated Clearing House (NACH) Debit		64.32	-7.65	42.72	19.61	20.97
3.4	National Electronic Toll Collection (NETC) (Linked to Bank Account)		-48.72	900.00	400.00	100.00	119.78
4	Card Payments		30.25	19.88	-9.97	31.73	13.12
4.1	Credit Cards		31.37	21.23	-13.82	54.29	16.19
4.2	Debit Cards		28.91	18.72	-6.11	10.44	9.68
5	Prepaid Payment Instruments (PPIs)		50.00	1.41	-8.33	48.48	15.67
6	Paper Based Instruments		0.65	-5.11	-28.09	18.18	-4.09
	Total Retail Payments (2+3+4+5+6)		27.90	6.12	7.37	26.32	12.98
	Total Payments (1+2+3+4+5+6)		18.54	-1.34	-13.37	23.10	4.52
	Total Digital Payments (1+2+3+4+5)		19.61	-1.15	-12.6629	23.30	4.95

Source: Author's Calculation using data compiled from RBI Reports

In the retail segment, credit transfers comprising AePS, APBS, ECS, IMPS, NACH, NEFT and UPI, collectively showed a double-digit y-o-y growth over the five years with a CAGR of almost 58 per cent in terms of the number of transactions and 18 per cent in terms of the value of transactions. In this category UPI was the most popular mode growing at a CAGR of 118.86 per cent and 138 per cent in terms of number and value of transactions respectively, followed by IMPS (CAGR of 35.79 per cent in terms of volume and 36.14 per cent in terms of the value of transactions).

Debit transfers and direct debits (BHIM Aadhaar Pay, ECS, NACH and NETC) exhibited positive y-o-y growth in all the years except the year 2019-20. In terms of the number of transactions, NETC was the most popular mode followed by BHIM, while in terms of value BHIM outpaced NETC. CAGR for card payments was more than 5 per cent in terms of the number of transactions and 13 per cent in terms of value and Credit card usage was more than that of debit cards.

High y-o-y growth in PPIs was observed in 2018-19 and 2021-22. Over the five-year period, the CAGR was more than 13 per cent in terms of volume and 15 per cent in terms of the value of transactions.

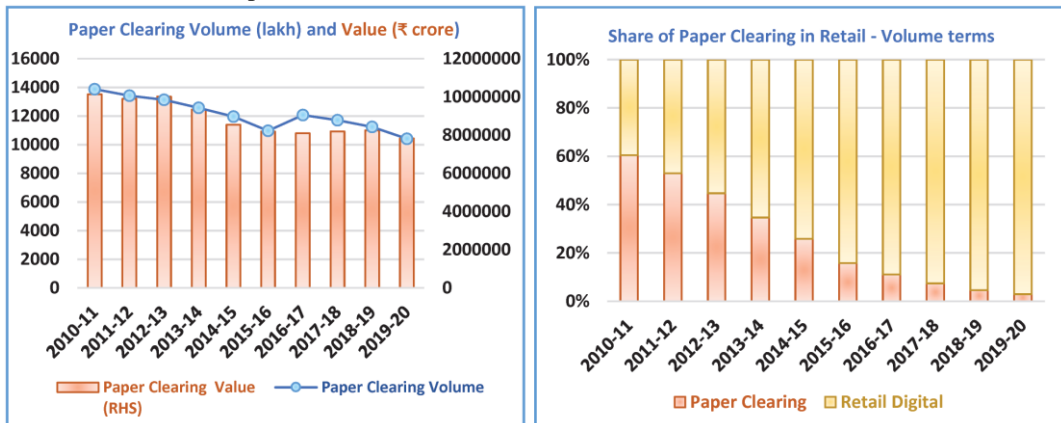


Chart1: Growth and Share of Paper Clearing

Source: Payment and Settlement Systems in India, RBI [11]

Retail Payments using Paper-based Instruments demonstrated a negative CAGR in terms of the number and value of transactions. This is also reflected in chart 1, which shows that over the ten-year period from 2010-11 to 2019-20, the share of Paper Clearing in the total Retail, has decreased both in terms of volume and value.

In general, there was significant y-o-y growth in all modes of digital payments in 2018-19, 2020-21 and 2021-22, in terms of volume and value of transactions. While the year 2019-20 saw a significant decline, this can be attributed to a drop in economic activity at the start of COVID-19.

6.5 Payment System Indicators-Payment Infrastructures

Due to innovative technologies, diverse Digital Payment Infrastructures are available in India. Growth achieved in the Digital Payment indicators in India can also be attributed to such infrastructures. This is supported by data presented in Table 7 for Payment Infrastructures for the months of April 2021 and 2022.

Table 7: Payment System Indicators-Payment Infrastructures

Payment Infrastructures (Lakh)			
System	April 2021	April 2022	Percentage Increase-April '22 and April'21
Payment System Infrastructures	1	2	3
1 Number of Cards (1.1 to 1.2)	9630.55	9956.84	3.39
1.1 Credit Cards	622.60	751.66	20.73
1.2 Debit Cards	9007.95	9205.18	2.19
2 Number of PPIs @ (2.1 to 2.2)	22216.97	27405.90	23.36
2.1 Wallets @	20249.78	24748.38	22.22
2.2 Cards @	1967.19	2657.52	35.09
3 Number of ATMs (3.1 to 3.2)	2.40	2.49	3.75
3.1 Bank-owned ATMs \$	2.14	2.17	1.40
3.2 White Label ATMs \$	0.25	0.32	28.00
4 Number of Micro ATMs @	4.14	8.16	97.10
5 Number of PoS Terminals	45.25	61.26	35.38
6 Bharat QR @	40.28	40.90	1.54
7 UPI QR *	978.19	1807.21	84.75

Source: Data retrieved from RBI Bulletin, June 2022[14]

Percentage: Author’s calculation

Column 3 of Table 7 presents the percentage increase in various types of Payment Infrastructures in one year period from April 2021 to April 2022. It can be observed that during the aforementioned period, the number of Micro ATMs grew by 97 per cent. UPI Quick Response which was included in September 2020 showed robust growth of almost 85 per cent. The number of PoS Terminals increased by 35 per cent. PPIs which were included in November 2019 grew in number by 23 per cent. Though the total number of ATMs only increased by 3.75 per cent, White Label ATMs exhibited a double-digit growth of 28 per cent. Similarly, the total number of Credit and Debit Cards increased by only 3.39 per cent but as compared to April 2021, the number of Credit Cards grew by almost 21 per cent by April 2022.

6.6 Global Comparison of India’s Digitalisation

In the year 2019, in terms of volume a CAGR of 58.9 per cent and in terms of value a CAGR of 28.4 per cent was achieved in digital payments in India. In the global payments market, India's growth rate is remarkable [5].

In 2020, India had more real-time online transactions than nations like China and the US. The nation completed 25.5 billion real-time payments transactions, followed by China with 15.7 billion, South Korea with 6 billion, Thailand with 5.2 billion, and the UK with 2.8 billion. With 1.2 billion transactions, the US came in ninth place among the top 10 nations [22]. In the year 2021, digital commerce transactions growth in India at the rate of 30 per cent was much more than the average global growth. Indian Startups played a significant role in moulding India’s digitalization. In 2021 India secured the third rank in terms of the number of startups thereby joining the unicorn club, and was next to the US and China [13]. As per RBI Bulletin, March 2022 comparing India to other regions of the world, it is clear that

from 2018 onwards digital commerce transactions value in India has been growing consistently (Refer to Chart 2).

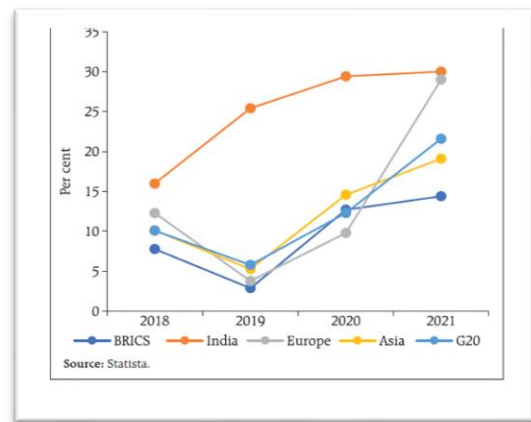


Chart 2: Global Comparison of India’s Digitalisation

Source: RBI Bulletin, March 2022 [13]

VI. CONCLUSION AND SUGGESTIONS

Innovative technologies have brought new paradigms; India is performing well and growing consistently in the digital payments arena. The analysis of Payment and Settlement System Statistics reveals exponential growth in the usage of various modes of digital payment. Retail Digital Payments account for more than 99 per cent of the Total Payments. High DPI scores reflect the widespread use and deepening of digital payments in India.

Analysis of the average usage of various digital modes of payment in the five years (2017-18 to 2021-22) showed that in terms of the number of transactions Credit transfers (AePS, APBS, ECS, IMPS, NACH, NEFT and UPI) exhibit the largest share and in terms of value the share of RTGS is the largest. On studying the y-o-y growth and CAGR of different digital modes of payment for the five years (2017-18 to 2021-22) in terms of the number of transactions, UPI and NETC showed triple-figure growth. In terms of the value of transactions, UPI, BHIM Adhaar and NETC exhibited triple-digit growth. In the global payments market, India's growth rate is impressive. This has been possible due to consistent efforts of the Government of India and the RBI in improving Payment Infrastructures. Even before the global pandemic, the Indian government and regulators focused heavily on increasing the penetration and acceptance of digital modes of payment. In this context, it is important to note that demonetization may have served as an initial catalyst for the rise of digital payments by forcing individuals to use them for the first time, educating them on how they operate and fostering confidence in them. It is the expansion of UPI, which corresponded with increased business formalisation and digital acceptability after the launch of the Goods and Sales Tax (GST) which explains the long-term growth observed from the beginning of 2016 than demonetization [15]. The National Payments Corporation of India (NPCI), a unique institution established by RBI, is at the center of the Indian digital payments ecosystem. NPCI serves as an industry body, a market player (introduced various digital modes of payment like AePS, IMPS, UPI and BHIM), a payment infrastructure platform (responsible for the National Financial Switch), and a quasi-regulator at various times [15]. As per the CEO of UDAI, usage of Aadhaar services has not only led to savings to the tune of ₹2.25 lakh crores through Direct Benefit Transfers (DBT) to the genuine beneficiaries of numerous government schemes but it has also enabled tackling the problem of 'Ghost (fake) beneficiaries' out of the country's system [21]. To maintain the robust growth already attained and to further give impetus to the expansion of digital payments, additional strengthening of extant measures in the areas of Payment Infrastructure, Consumer awareness and Regulations are necessary.

REFERENCES

1. B., Angamuthu. (2020). Growth of Digital Payments in India. NMIMS Journal Of Economics And Public Policy Volume V, Issue 4, October 2020.
2. Pal, Abhipsa and De', Rahul and Herath, Tejaswini. (2020). The Role of Mobile Payment Technology in Sustainable and Human-Centric Development: Evidence from the Post-Demonetization Period in India. Information Systems Frontiers <https://doi.org/10.1007/s10796-020-09982-7#> Springer Science+Business Media, LLC, part of Springer Nature 2020. [CrossRef]
3. Achutamba, V., Hymavathi, CH.. (2021). Impact of Covid-19 on Digital Payments in India. Journal of Positive School Psychology <http://journalppw.com> 2022, Vol. 6, No. 3, 4394 – 4400.
4. Ravikumar, T., Murugan, N., Suhashini, J., and Rajesh, R.. (2020). Digital Payments Diffusion in Emerging and Developed Economies. International Journal of Innovative Technology and Exploring Engineering (IJITEE) ISSN: 2278-3075, Volume-9 Issue-4, February 2020.
5. Ravikumar, T., Suresha, B., Sriram, M., and Rajesh, R.. (2019). Impact of Digital Payments on Economic Growth: Evidence from India. International Journal of Innovative Technology and Exploring Engineering (IJITEE) ISSN: 2278-3075, Volume-8 Issue-12, October 2019.
6. Reserve Bank of India. (2002). Report of the Working Group on Electronic Money. Accessed at <https://rbidocs.rbi.org.in/rdocs/PublicationReport/Pdfs/30758.pdf>
7. Reserve Bank of India. (2017-18). Annual Report. Accessed at <https://rbidocs.rbi.org.in/rdocs/AnnualReport/PDFs/0ANREPORT201718077745EC9A874DB38C991F580ED14242.PDF>
8. Reserve Bank of India. (2018-19). Annual Report. Accessed at <https://rbidocs.rbi.org.in/rdocs/AnnualReport/PDFs/0ANNUALREPOR20181993CB8CB2D3DEE4EFA8D6F0F6BD624CEDE.PDF>
9. Reserve Bank of India. (2019-20). Annual Report. Accessed at <https://rbidocs.rbi.org.in/rdocs/AnnualReport/PDFs/ORBIAR201920DAG64F97C6E7B48848E6DEA06D531BADF.PDF>
10. Reserve Bank of India. (2020-21). Annual Report. Accessed at https://rbidocs.rbi.org.in/rdocs/AnnualReport/PDFs/ORBIAR202021_F49F9833694E84C16AAD01BE48F53F6A2.PDF
11. RBI. (2021). Payment and Settlement Systems in India - Journey in the Second Decade of the Millenium. Accessed at <https://rbidocs.rbi.org.in/rdocs/Publications/PDFs/PSSBOOKLET93D3AEFDEAF14044BC1BB36662C41A8C.PDF>
12. Reserve Bank of India. (2021-22). Annual Report. Accessed at <https://rbidocs.rbi.org.in/rdocs/AnnualReport/PDFs/ORBIAR2021226AD1119FF6674A13865C988DF70B4E1A.PDF>
13. Reserve Bank of India. (2022). RBI Bulletin Volume LXXVI Number 3. Accessed at <https://rbidocs.rbi.org.in/rdocs/Bulletin/PDFs/RBIBULLETINMARCH202265EF4744715A4DACB9F800114D5E6ADD.PDF>
14. Reserve Bank of India. (2022). RBI Bulletin Volume LXXVI Number 6. Accessed at <https://rbidocs.rbi.org.in/rdocs/Bulletin/PDFs/RBIJUNEBULLETIN2022BC3DC495560D430E9D6E7A0122FF225E.PDF>
15. USAID. (2019). India Digital Financial Inclusion – Journey Map Report. Accessed at https://www.usaid.gov/sites/default/files/documents/15396/mSTAR_IndiaDFI_Report_DRAFT_FINAL.pdf
16. <https://www.merriam-webster.com/>
17. <https://www.digitalindia.gov.in>
18. <https://transformingindia.mygov.in/digital-india/>
19. <https://news.sap.com/india/2021/11/7-years-of-digital-india/>
20. [https://www.meity.gov.in/divisions/national-e-governance-plan#:~:text=The%20Government%20approved%20the%20National,Mission%20Mode%20Projects%20\(MMPs\).](https://www.meity.gov.in/divisions/national-e-governance-plan#:~:text=The%20Government%20approved%20the%20National,Mission%20Mode%20Projects%20(MMPs).)
21. <https://www.hindustantimes.com/india-news/over-100-crore-aadhaar-cards-issued-in-india-so-far-says-uidai-ceo-101639645906181.html>
22. <https://www.financialexpress.com/industry/banking-finance/digital-payments-india-pips-china-us-others-in-2020-leads-global-tally-with-this-many-transactions/2226074/>
23. <https://timesofindia.indiatimes.com/business/india-business/why-cash-circulation-in-economy-hit-all-time-high-in-march-2022-despite-surge-in-digital-payments/articleshow/90562209.cms>
24. https://www.rbi.org.in/scripts/FS_PressRelease.aspx?prid=54100&fn=9

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