

# A Trend Analysis of Growth Pattern of Digital Modes of Payments in India

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## **Abstract**

*In the face of corruption, black money and counterfeit currency a digital economy has huge importance, because it keeps record of all transactions done by any person, be it in government or businessmen or consumer. As of now their access to be no alternative of this in the near future and it is worthwhile for one and all to become more aware of the procedures of applying digital modes of payments in there day to day life. Here, in this research an effort is made to analyse trend of growth pattern of digital modes of payments in India. Whole research is based on secondary sources of data taken from various reports of RBI and analysed it by applying CAGR and trend lines with their equation showing predictability of growth of digital modes of payments. CAGR shows overall average annual growth of 38 percent in volume and 9 percent in value. Results of the study show exponential growth in overall digital modes of payment but in case on its indicator's growth were huge and fluctuative in nature. Among all indicator UPI have found growth of 234 per cent which is indicating tremendous acceptability for the same in India.*

**Keywords:** *Digital payments, Growth, RBI, NPCI, Trend Analysis, India.*

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## I. Introduction

In recent years, there has been a notable rise in the adoption of digital payment methods such as cards, EFTs, and mobile banking within India. This recent acceleration is due to the November 8, 2016 demonetization, which caused a shortage of money in circulation. Even with significant growth in the utilization of these methods over the past decade, cash continues to maintain its presence within the Indian economy. Throughout history, there have been a variety of modes of payment, starting from the barter system to digital or electronic payments in the 21<sup>st</sup> century. Digital and electronic payments are the mediums of transaction. Almost all countries in the world are shifting toward digital transactions. In India, the growth of digital payment systems is fuelled by four key factors: a supportive regulatory landscape, the rise of advanced payment service providers, and improvements in customer satisfaction and experience. (Sumathy & Vipin, 2017).

Raj Kumar et al. (2020) defined the following two types of digital payment systems in India: i) Systematically Important Financial Market Infrastructures, which include:

- Real-Time Gross Settlement
- Collateralized Borrowing and Lending Obligation
- Government securities clearing
- Forex clearing

ii) Retail payments, which include:

- Cheque or paper clearing
- Retail Electronic Clearing (Electronic Clearing System, debit, ECS credit, NEFT, IMPS, NACH).
- Card Payments (Credit cards, Debit cards, and Prepaid Payment Instruments).

According to Awasthy et al. (2023), India's payment ecosystem has undergone a transformative revolution in the last two decades. Digital payment's inception can be traced back to a notable event in the United States in 1918, where telegraph assistance facilitated currency transfer. It was first merged in developed economies. In 1972, the Federal Reserve Bank of the United States established an "Automated Clearing House" employing technology as a substitute for traditional check payments (Kabir et al., 2015). According to Raghuraj (2017), a

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check in its different forms was the first instrument of digital fund transfer and transaction through an interbank payment system. The Bank of Hindustan introduced checks in India in 1770. RBI started paper-less clearing services in the mid-1990s, first for credit transfers. The NPCI and Clearing Corporation of India Ltd. are two major authorized organizations permitted by the RBI to offer payment systems.

### **1.1 Meaning of Digital Payments**

Ravish (2017) defined digital modes of payments as, “Electronics consumer transactions made at point of sale (POS) for services and products either through internet banking or mobile banking using a smart phone or card payment are called digital payments”.

“The Payment and Settlement Act” started in 2007 in India has defined digital payments as “any transfer of funds which is initiated by a person by way of instruction, authorization, or order to a bank to debit or credit an account maintained with that bank through electronic means and includes point of sale transfers; automated teller machine transactions; direct deposits or withdrawals of funds; transfers initiated by telephone, internet, and card payment”.

It is clear from above definitions that digital payments are nothing but transactions of money through electronic mediums like mobile phones, POS, credit and debit cards, etc.

## **II. Literature Review**

**Das and Agarwal (2010)** declared that the government incurs costs when accepting cash as a form of payment and objective of the study was to find out the role of a variety of providers of card-based systems. It found that the electronic payment mechanism will be helpful to reduce the cost of currency management, provide safety for debit card usage at the point of sale, and also check for tax evasion, fraud etc.. **Awasthy S. et al. (2023)** described that India's payment ecosystem has seen significant changes in the last two decades with a rise in both cash and digital payments. The increase was found due to COVID-19 pandemic but do not lead permanent shift in transactions. Various policy measures for the promotion of digital payments were found to increase smooth interaction and data exchange in the payment ecosystem. **Akinola (2012)** stated that the present society is slowly moving toward a cashless economy and is using e-wallets, ATM cards, e-payments, and mobile apps for their daily payments. The advantages of a cashless economy were found as lowering cash-related robbery and increasing financial profit. Data mining tools were used even though these tools are generally used for higher-value transactions that are not related to a single person. **Achor and Robert (2013)** examined how economic policy changed from a cash-based to a digital economy. The Nigerian central bank provided justifications for the policy's approval, highlighting its potential to reduce, among other things, robberies involving cash, corruption, and other fraudulent activities. An appropriate questionnaire was employed in conjunction with both primary and secondary sources of data. The study's findings demonstrated that most investors backed the program because of its benefits and opposed it because of non-payment fraud, an increase in the number of illiterate individuals, and a lack of infrastructure.

A study was conducted **Rana (2017)** in which it was stated that the internet and mobile usages has increased last decade which lead exponential growth in digital payments. The study was based on primary data and analysed through ANOVA which found positive and significant impact of consumer perception on adoption of digital payments. **Jerath, S. (2022)** conducted an analytical study which provides a comprehensive overview of the evolution of the digital payment ecosystem in the country. The research aimed to analyse enlargement of digital payments in India by studying payment infrastructure, found exponential growth in the same. Data was taken from RBI and the construction of the Digital Payment Index (DPI) by RBI to measure the extensive use of digital expenses in India. **Kumar et al. (2020)**, in their study on digital payments, highlighted the significant growth and impact of electronic transactions in both emerging and developed economies. Research indicates that digital payment systems including contactless payments, online banking, and mobile wallets are being adopted at a very quick pace. Digital India and other similar efforts have been significant in advancing cashless transactions and financial inclusion in emerging economies such as India.

The trend towards digital payments is expected to continue to reshape the global financial landscape, offering new opportunities for businesses, consumers, and governments to enhance efficiency and convenience in financial transactions.

## **III. Methodology**

It is an analytical and descriptive study that analyses and describes the trend of growth in different modes of payment. Mode of Payments taken for analysis was RTGS, Credit, debit transfers, prepaid payment instruments, Card transfers along with their sub parts. Data was analysed through CAGR, and trend analysis which include different trend equations such as exponential trend equations, polynomial trend equations, and linear trend equations as per the data's features that show the best fit of model, which also defined behaviour of data. All tests were applied through MS Excel.

### 3.1 Research Gap

There are a few researches that focus on to analyse growth of digital modes of payment after demonetization and COVID-19 in India. In this paper, the focus is on checking the average annual growth and trend of growth in digital modes of payment by analysing data from RBI, NPCI, and any other government-authorized relevant sites. An Average annual growth of indicators of digital modes of payment instruments were not found, so here an attempt is made to fill that gap.

### 3.2 Objectives

1. To analyse the overall growth trend in digital modes of payments in India.
2. To study average annual growth in indicators of digital modes of payments.

## IV. Analysis/results and discussions

### 4.1 Growth of Digital Payment Indicators in Volume

Growth of digital indicator in volume means how transactions through digital modes are increasing in numbers. Table 1 shows the growth of digital modes of payments in volume, which depicts the continuous growth in all modes of payments from 2016–17 to 2022–23. CAGR was used to check the average annual growth of the same. It is clear from Table 1 that total digital payments have an average annual growth of 38 per cent. Among indicators highest per annual growth 57 per cent were found in credit transfers, followed by PPI with 21 per cent and RTGS with 12 per cent. This increase was found due to infrastructure development, the provision of internet connectivity, etc. It is also evident from Table 1 that there is a reduction in debit transactions by an average of 4 per cent annually due to the availability of various digital modes like online banking, UPI, POS, apps; almost all banks are using their own apps for different types of transactions for their consumers.

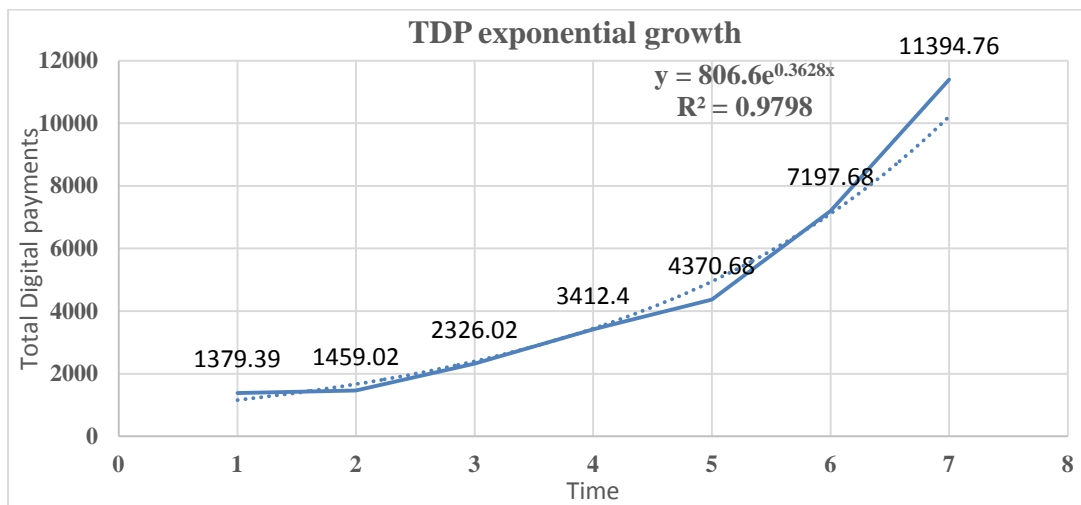
<b>Table1 Growth of Digital Payment Indicators in Volume</b>											
Indicators	Year (value in Crore)							CAGR	X	SD	CV
	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23				
<b>RTGS</b>	10.78	12.44	13.66	15.07	15.92	20.78	24.26	12%	16.13	4.78	29.65
<b>Credit Transfers</b>	421.41	587.93	1184.81	2065.06	3178.68	5779.35	9836.95	57%	3293.46	3428.65	104.11
<b>Debit Transfers</b>	205.82	37.88	49.14	89.57	104.57	121.89	153.43	-4%	106.85	59.56	55.74
<b>Card Payments</b>	348.64	474.86	617.69	723.84	577.87	617.83	633.45	9%	598.65	77.72	12.98
<b>PPPI</b>	196.37	345.91	460.72	533.18	493.66	657.83	746.67	21%	490.62	184.28	37.56
<b>TDP</b>	1183.02	1459.02	2326.02	3412.4	4370.68	7197.68	11394.8	38%	4505.71	3645.24	80.90

*Note:* RTGS= Real Time Gross Settlement; PPPI= Pre- Paid Payment Instruments; TDS= Total Digital Transactions; CAGR=Compounded Annual Growth Rate; %=percentage; X= mean; SD=standard Deviation; CV= Coefficient of variance.

*Source:* Compilation of RBI's Reports from financial year 2017 to 2023

Figure 1 shows an exponential trend of growth in total digital modes of payments in last seven years, exponential equation showing value power of  $e^{0.362}$  which means the average growth of digital payment modes over the years will be 36.2 percent. It also shows a slow increase in 2017-18 which was the result of the demonetization in November 2016. This demonetization has laid the foundation for digital payments in India. Demonetization creates a shortage of currency in circulation, which forces people to adopt digital modes of payment for their daily transactions. As it is evident from figure 1, this growth of digital payments went exponentially after 2019–20, which was due to the pandemic world faced between 2019–20 and 2022. COVID-19 locked people in their houses and they weren't able to go out to buy their daily needs stuff, so this situation led them to adopt a payment system, digital payments became the best option for the transactions at that time, comfortability of digital modes of payment influence the people to use it continuously.

Figure 1 Result from Exponential Trend Model



Source: Table 1

Also, it is evident from the figure that the R square of the model found 0.979, showing a perfect fit of the same in this data, indicating that forecasting for future growth will be accurate.

#### 4.2 Growth of Digital Payment Indicators in Value

Growth of digital payment indicators in value means the price and importance of the same is increasing. Table 2 shows growth of digital payment indicators in value. It shows that total average annual growth of digital modes in value is 9 per cent. Among all indicators average annual growth of credit transfer is highest with 22 per cent; it means every year credit transfers are increasing by 22 per cent.

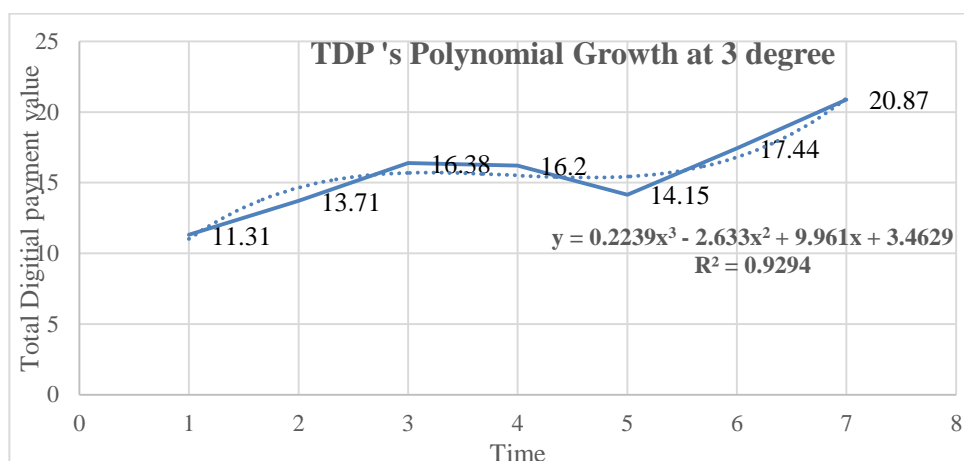
Indicators	Year (value in Crore)							CAGR	X	SD	CV
	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23				
RTGS	9.82	11.68	13.57	13.12	10.56	12.87	14.99	6%	12.37	1.80	14.52
Credit transfer	1.33	1.89	2.61	2.86	3.35	4.27	5.5	22%	3.12	1.42	45.55
Debit Transfers	0.08	0.04	0.06	0.06	0.09	0.1	0.13	7%	0.08	0.03	37.50
Card Payments	0.07	0.09	0.13	0.14	0.13	0.17	0.22	18%	0.14	0.05	36.56
PPPI	0.01	0.01	0.02	0.02	0.02	0.03	0.03	17%	0.02	0.01	40.82
TDP	11.31	13.71	16.38	16.2	14.15	17.44	20.87	9%	15.72	3.06	19.45

Note: RTGS= Real Time Gross Settlement; PPPI= Pre- Paid Payment Instruments; TDS= Total Digital Transactions; %=percentage.

Source: Compilation of RBI’s Reports from financial year 2017 to 2023.

At the same time 2<sup>nd</sup> highest per annual growth found in card payments with 18 per cent followed by PPPI 17 per cent and debit transfers with 7 per cent. This increase is due to rising economic activity which is increasing transaction of large corporate as well as common people.

Figure 2 Results from Polynomial Trend



Source: Table 3

Fig 2 is representing growth pattern of total digital payments modes in polynomial form which is showing fluctuating behaviour of the data. This fluctuation was due to demonetization of 2016 and covid-19 because initial days of the pandemic people was afraid of going out so they preferred to keep cash for their emergence purposes so the increase due to demonetization firstly for some time remain constant then decline for a year but with decaling rate of COVID cases people start using a touch free payment which again increases digital payments.

#### 4.3 Growth of different credit Transfers Indicators in volume

Johbson, et al.(1998) Defined Credit Transfers that, a credit transfer works similarly to a direct cash transfer from payer to payee, but it makes use of bank account technology. When a payer delivers payment instructions to their bank, a credit transfer starts.

Table 3 is evident of increase of credit transfers of digital payments in last 7 years from 2016-17-2022-23, indicating overall average annual growth of credit payments 57 per cent. Among all credit transfers UPI is increasing average annually by 234 per cent which itself is a greatest

Credit Transfer Instruments	Year (Value in Crore)							CAGR
	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	
AEPS	0	0.06	0.11	0.1	0.11	0.1	0.06	0%
APBS	0	129.86	149.49	167.47	143.73	125.73	178.98	5%
ECS(Cr)	1.01	0.61	0.54	0.18	0	0	0	-100%
IMPS	50.67	100.98	175.29	257.92	327.83	466.25	565.33	41%
NACH(Cr)	205.73	70.31	88.34	111	164.65	187.58	192.67	-1%
NEFT	162.21	194.64	231.89	274.45	309.28	404.07	528.47	18%
UPI	1.79	91.52	539.15	1251.86	2233.07	4595.61	8371.44	234%
<b>Total Credit Transfers</b>	421.41	587.98	1184.81	2062.98	3178.67	5779.34	9836.95	57%

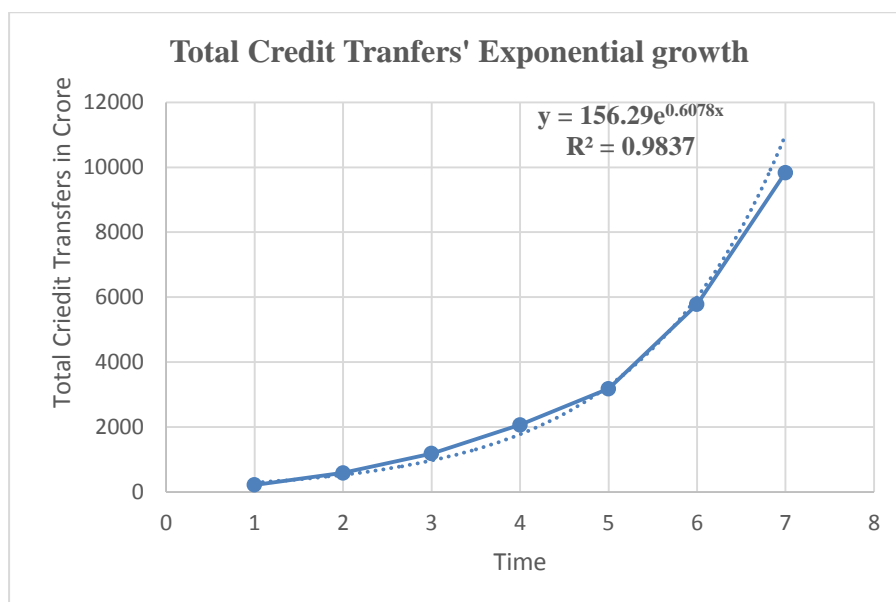
**Note:** CAGR for AEPS, APBS and NACH has been calculated from 2017-18 onward. AEPS (fund transfer)=Aadhar Enable Payment System; APBS=Aadhar Payments Bridge System;ECS=ElectronicClearingService;IMPS=Immediate Payment Service; NACH=National Payments Corporation of India; NEFT=National ElectronicFundsTransfer; UPI= Unified Payment Interface, %=percentage.

**Source:** Compilation of RBI's Reports from financial year 2017 to 2023.

achievement for government, RBI and NPCI who are working for the promotion of digital payments through various schemes like Payment infrastructure development etc. This immense increase in UPI is due to availability or affordability of smart phone and internet connection because all instruments of UPI payments

like googlepay, phonePe, various banks app etc. work through internet in mobile. Table 3 also shows that 100 percent average annual decline in ECS(cr) followed by NACH (cr) with decline of 1 percent which is result of availability of various other option for digital payments which are more convenient.

Figure 3 Results from Exponential Trend



Source: Table 3

Figure 3 is showing exponential growth of credit transfer with 0.983 r<sup>2</sup> showing best fit of model, forecasting average 60.7 per cent growth of credit transfers.

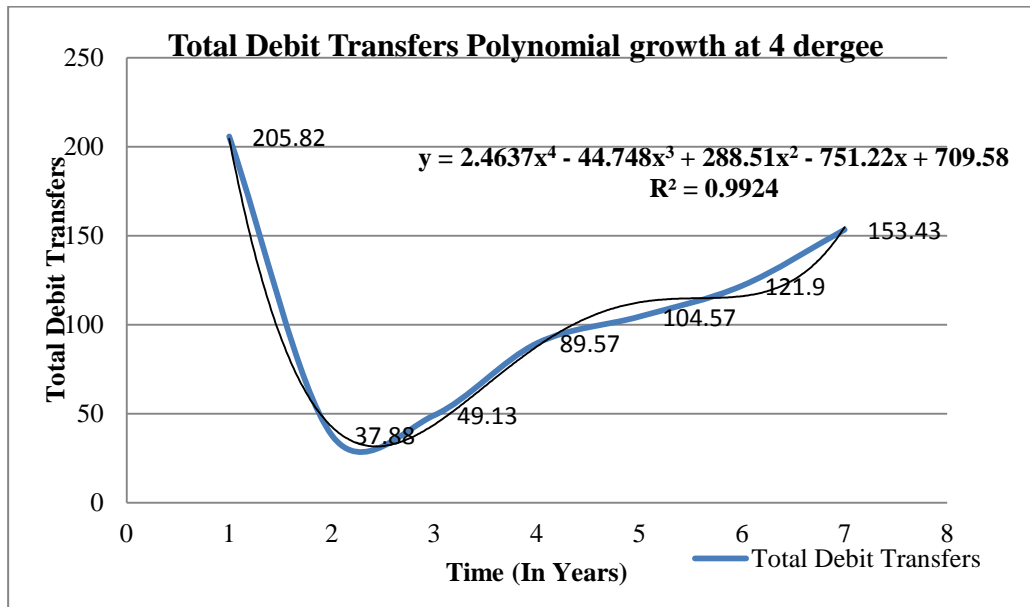
Debit transfers Instrument	(Value in Crore)							
	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	CAGR
BAP	0	0.2	0.68	0.91	1.61	2.28	2.14	48%
ECS(Dr)	0.88	0.15	0.09	0.01	0	0	0	-67%
NACH(Dr)	204.94	37.38	48.3	87.68	96.46	107.55	135.03	-6%
NETC	0	0.15	0.06	0.97	6.5	12.07	16.26	118%
<b>Total Debit Transfers</b>	205.82	37.88	49.13	89.57	104.57	121.9	153.43	-4 %

Note: For BAP, NACH, NETC CAGR is calculated for 6 years from 2017-18 to 2023 and for ECS (Dr) CAGR is calculated for 3 years only. BAP= Bhim Aadhar Pay; ECS=ElectronicClearingService;IMPS=ImmediatePaymentService; NACH=National Payments Corporation of India; NEFT=National ElectronicFundsTransfer; NETC= National Electronic Toll Collection; Dr= Debit; %=percentage.

Source: Compilation of RBI’s Reports from financial year 2017 to 2023.

Table 4 is showing growth of different debit transfers indicators in volume which is decreasing overall 4 per cent or indicator wise NACH (dr) and ECS (DR) by 6 and 67 per cent. Among all BAP and NETC are decreasing, because UPI is taking place of all traditional or old digital payment systems.

Figure 4 Trend of Growth of Total Debit Transfers



Source: Table 4

Figure 4 is showing trend of growth of debit transfers which suddenly decline a lot in between 2016-17 and 2017-18 because that time demonetization of 500 and 1000 currency force people to adopt digital transaction and transactions for other medium decline. And also it shows increase of the same after 2017-18 due to security concern of people regarding digital payments.

#### 4.5 Growth of Card Payments in Volume

Card payments play an important role in digital payment system. It is one of the major indicators of digital payments which include credit or debit payments.

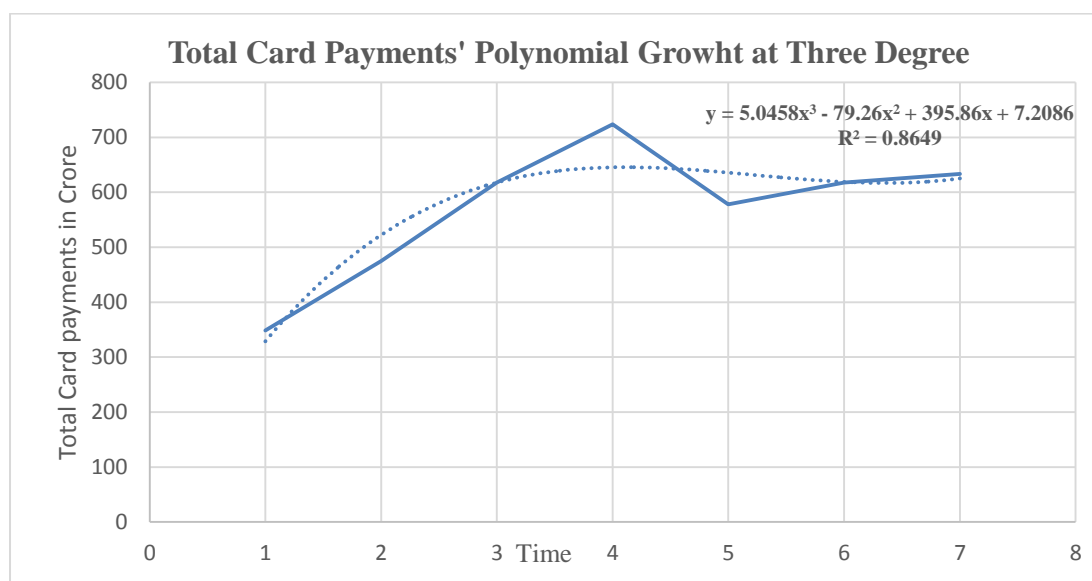
Note: % = Percentage.

indicatorsof Card Payments	Year (value in Crore)							
	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	CAGR
Credit Cards	108.71	140.52	176.26	217.73	176.41	223.99	291.45	15%
Debit cards	239.93	334.34	441.43	506.11	401.46	393.84	341.99	5%
Total Card Payments	348.64	474.86	617.69	723.84	577.87	617.83	633.44	9%

Source: Compilation of RBI's Reports from financial year 2017 to 2023.

Overall card payments are increasing average annually 9 per cent, among the indicators of card payments, credit payments are increasing average annually 15 per cent or debit 9 per cent because both credit and debit cards are used as a medium for transactions through POS, mini-ATMs etc.

Figure 5 Results from Polynomial Trend



Source: Table 5

Figure 5 is showing fluctuated trend of growth of card payments system in India. Polynomial equation fit is showing  $r^2$  0.86 which means our model have better predictability.

### V. Conclusion

After analysing digital modes of payments, it can be concluded that digital payments are increasing in both volume and value. Overall, it is increasing average 38 per cent per year in volume and average 9 per cent per year in value due to adoptability of digital modes of payments in all fields of economy. Among all indicators growth of credit transfer is highest in both value and volume with 22 percent in value and 57 percent in volume and In between indicators of credit UPI is increasing highest with average 234 per cent per year which indicate that UPI achieved a greatest acceptance among people of India due to availability of smart phone, internet connection. Reasons for the increasing trend or average annual income of overall digital modes of payments were found infrastructure development, provision of internet connectivity, availability and accessibility of various modes of payments like online banking, UPI, POS and banks own apps. Exponential growth was found in overall payments modes in volume due to COVID-19 and demonetization. Only debit transfers have found declining phase of transaction average annual 4 percent due to availability of various options of payments. Hence, it can be concluded that trend of overall growth in modes of payments is increasing and trend equation found better or best fit indicting the best forecasting for future growth, which shows India is doing well in promotion of digital modes of payment. Overall digital modes of payments are increasing continuously from 2016-17 to 2022-23 but reasons and concerns for the same has changed over the time for example found by reviewed various reports of RBI that in 2017 people adopt digital modes of payments only because they did not have any other option due to lack of currency in circulation and concern of regulatory body was lack of awareness among people and concern for people was lack of knowledge of technology and its uses. In 2019-20 Covid-19 become reason for adoption of these modes and lack of infrastructure was concern, but by 2023 people are using it due to its comfort ability, accessibility but biggest concern rises are cyber frauds.

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