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## Covid era and online payment systems in India

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**Abstract:** Research article presents the online payment systems in India and the impact of Covid on Indian economy, role of financial technologies in facilitating financial transaction for citizens and institutions, and initiatives taken by Reserve Bank of India in the form of creating new digitally embedded organization so that reliance on banking systems is eased and industries (e.g., MSME), entrepreneurs, and citizens can get credit without much of manual paper work. In addition, the research article analyzed changes in consumer behavior as a result of the pandemic and digital technology in daily life. For the discussion and results, secondary data is collected from various sources, including websites, portals, annual reports, blogs and write-ups, and so on. The research approach used in this study is exploratory and descriptive, which analyze the various online payment or financial technologies adopted and used by different financial companies, including Indian banks. Finding of the study reveals the expansion of technological infrastructure and the adaptation to new developments in India. In addition, researchers have also explored the process of the issuance of new licenses to new categories of financial organizations, i.e., establishment of payment banks, trade receivables discounting systems (TReDs), peer-to-peer platforms, regulatory frameworks for account

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aggregators (AA) and NBFC-AA, establishment of wholly digital loan firms (NBFCs), etc.

**Keywords:** Online Payment, Covid Era, P2P Platform, Digital Payments, Online Transaction, RBI.

## Post Covid era i onlajn sistemi plaćanja u Indiji

**Apstrakt:** U članku su predstavljeni sistemi onlajn plaćanja u Indiji i uticaj Covid-a na indijsku ekonomiju, ulogu finansijskih tehnologija u olakšavanju finansijskih transakcija za građane i institucije, kao i inicijative koje je preduzela Rezervna banka Indije u pravcu stvaranja nove digitalno bazirane organizacije kako bi oslanjanje na bankarske sisteme bilo olakšano i kako bi industrijski subjekti (npr. MMSP), preduzetnici i građani mogu da dobiju kredit bez mnogo ručnog rada sa papirima. Pored toga, analizirane su promene u ponašanju potrošača kao rezultat pandemije i digitalne tehnologije u svakodnevnom životu. Za diskusiju i rezultate, sekundarni podaci su prikupljeni iz različitih izvora, uključujući veb-sajtove, portale, godišnje izveštaje, blogove i zapise, itd. Istraživački pristup koji se koristi u ovoj studiji je istraživački i deskriptivan, njime se analiziraju različite tehnologije onlajn plaćanja ili finansijske tehnologije koje su usvojile i koriste različite finansijske kompanije, uključujući indijske banke. Nalazi studije otkrivaju širenje tehnološke infrastrukture i prilagođavanje novim pravcima razvoja u Indiji. Pored toga, istraživači su istraživali i proces izdavanja novih licenci novim kategorijama finansijskih organizacija, odnosno osnivanje platnih banaka, sistema za diskontovanje potraživanja (TReD), peer-to-peer platforme, regulatorne okvire za agregatore računa (AA) i NBFC-AA, osnivanje potpuno digitalnih kreditnih firmi (NBFC) itd.

**Gljučne reči:** Onlajn plaćanje, Covid Era, P2P platforma, digitalna plaćanja, onlajn transakcije, RBI.

## 1. Introduction

Covid-19 cases were first reported in December, 2019 in Wuhan, China and just after spread globally. On 30<sup>th</sup> January, 2020, India identified its first case of Covid-19 in the State of Kerala. Subsequently, on March 24, 2020, the Government of India decided to have lockdown in the country for a period of 21 days (Business News, 2021). Lockdown in turn resulted in to movement of urban workforce from urban centers to far off native places, loss of jobs, and shortage of essential items but help in containing the disease and also in creating the healthcare infrastructure to face it. It helped health professional and agencies to equip them self to fight against the disease. Covid impacted all

aspect of human life across the globes as well as in India. It had created big shock for the civil aviation, tourism, manufacturing, education, banking sector, health sector, and democratic institutions. However, it proves to be a big boom for online retailers, pharmaceutical companies, provider of online banking/financial services, and provider of online learning tools but at substantial risk. To mention, E-commerce industry will grow 84% to \$111 billion in India by 2024 as an impact of coronavirus pandemic. To add further, 41 countries witnessed growth of digital commerce during 2021 pandemic (BS Reporter, 2021). The Reserve Bank of India (RBI), the Indian banking regulator, has contributed to the growing popularity of online banking systems and services by establishing, developing, or approving new categories of organizations and products based on the application of ICT with the aim of fulfilling the stated central government goals of inclusive growth across all sections of societies. (Saraswati & Singh, 2023). It is frequently reported by policy makers that environment financial services driven with financial technologies is one of the important factors for driving growth of business in the post Covid era. Keeping its importance in mind, Reserve Bank of India developed a Digital Payments Index (RBI-DPI) in 2018 to monitor growth of digital payment. RBI-DPI for September 2023 stood at 418.77 as compared to 100 during March 2018 (Press Release, 2022; Piyush (2023; Kawale, 2024). This is also evident from the growth of startups in the domain of financial technologies in India. As on May 2021, India has world's second biggest fintech hub with ~2,565 startups in comparison to 737 in 2014. The India's Fintech hub includes payments techs, lending techs, wealth techs, personal finance techs, insurance techs, regulatory techs and others (Ashwini, 2021). PGA Labs reported that 15 FinTech startups of India are set to join the Unicorn club during 2022 (Kapoor, 2022). As per a report by PwC, more than 50 Indian startups could join the unicorn club by the end of 2022 including Fintech Startups (Business Desk, 2022).

Researchers, in this paper focus on the aspects of increased adoption of online payments during the pandemic, growing interest of contactless and online payment methods such as digital wallets, payment apps and QR codes etc., shift in payment preferences, financial inclusions, the use of blockchain technology is gaining attention as a secure, transparent solution for online payments, new regulatory frameworks to protect consumers, prevent money laundering, and foster innovation in the digital economy. The novelty of research in this area lies in understanding the long-term implications of the rapid shift to online payments, innovations in payment technology, enhanced security measures, and the need for inclusivity in the financial system.

Keeping pace with development in Fintech domain this research paper presents various facets of digital payment domain. Research papers consist of

7 sections starting with a section 1 of introduction. It is followed with section 2 of review of literature. The next section 3 presents research methodology which also includes objectives of the present research. The status of Covid-19 in India compared with world in section 4. Next section 5 presents non-financial measure to combat Covid -19. Section 6 presents the results and discussion and the last section 7 embodies conclusion of this study along with limitations and future scope of study.

### **3. 2. Literature review**

This section presents review of recent studies from the literature on the subject with emphasis of Indian environment. These studies are related to impact of banking and financial sector due to Covid-19. Singh & Bodla (2020) studied the impact of Covid-19 and lockdown on India's banking sector. They study various measures taken by RBI such as (i) grace-period of 3 months for loans to all banks, (ii) advising small private banks to reduce lending to the companies those facing weak finance and poor liquidity, (iii) imparted \$ 6.5 billion additional cash to give loans to small lenders and borrowers Bagewadi & Dhingra (2020) analyzed the impact of Covid-19 on the banking sector and difference in consumer behaviour towards the banking sector pre and post Covid-19 pandemic. They concluded that citizens were not aware of e-payment system and preferred to buying thing from local store in pre Covid-19 era in cash whereas post Covid-19 pandemic citizens switched their bank account towards online banking and payment services. A very few percentages of citizens prefer to go to bank after Covid-19 pandemic because of online services.

Muzawar (2020) evaluated the mobile banking services and found the impact of COVID-19 on mobile banking services. He revealed that in a sample of 100 respondents, most of the respondents i.e. 93% were using mobile banking services and found that Google pay, Paytm and Phone pay applications were mostly used by the mobile banking customers Nair (2021) analysed the benefits of mobile banking services and mobile banking applications during this pandemic. They concluded that all segment of citizens used mobile banking applications. The use of online banking applications has extremely increased for satisfying the need of daily life. Various factors like ease of use, cost and time saving, increases the span of usage of mobile applications. Mobile banking services helped to keep social distance and to protect the lives of people by staying safe at their homes. Girish & Manu (2020) evaluated the role of mobile banking applications. They found out that mobile banking application plays a major role in decreasing social spread of corona by having all the required banking services at fingertips. It was recognized that consumers in India and many other countries of the world still use the traditional banking system and are lesser concerned about mobile banking. They also found that mobile banking users also have increased during the lockdown period. Singh &

Adhikari (2020) studied the social distancing measures implemented by the Government, lockdown effects on pandemic, impact of Covid on citizens of different age groups etc. It was found that mortality rate improved particularly in senior people. Druga (2021) surveyed the change in behaviour of Romanian consumer's changes in behaviour in respects of the usage of e-banking services, during pre and post Covid era. He found a positive change in the attitude of users towards e-banking services which is evident from the fact that only 3.8% respondents were not using the e-banking services before the pandemic whereas this percentage reduced to 1.5% after the Covid-19 pandemic. Verma & Tanwar (2021) noticed that e-banking plays a significant part in the safety of citizens during and after the Covid-19 era. Banks have equipped their consumers with e-banking facilities, which increase the degree of consumer loyalty. They recommended that awareness on e-banking should be promoted through newspapers, TV, internet ads and other media regularly. E-banking awareness campaign should be arranged by expert banking officials in the colleges, societies and organizations.

Garg (2020) measured the perception of people towards investment in banking sector and stock market and scope of e-banking during and after Covid-19 pandemic. Study showed that people perceive banking as reliable option and stock market as very volatile and risky. Consequently, investors now shift their investment in banking sector. It was further revealed that there is a more scope of e-banking during and post Covid era. Rajarajeswari & Princy (2021) focused on the relationship between e-banking services and expectation of the customers in pandemic. They found that most of the customers felt that internet banking is convenient, there are many internet banking services for them to use without having locational restrictions. 50% of the customers felt that it is secured to pay money through internet banking. Most of the customers also believe that their private information was safe with their banks. It was concluded that customers are satisfied from e-banking services compared to traditional banking during the period of lockdown. It can be seen that most of the studies reported in the literature are based on primary data collected using questionnaire as a research tool. However, during the last decade large amount of secondary data is accumulated about growth of application of financial technologies in many ways such as number of technologies supported banking transactions, addition of technology-based service providers, technology developers, technology usage, technology-based organizations etc. there is a gap in the literature of research based on secondary data. This paper is an attempt to fill this gap.

### 3. Research methodology

#### 3.1. The context

Technology has a significant impact on our day-to-day life and banking sector operations such as online transactions, digital payments etc. are not an exception. Since the advent & implementation of central banking systems/ core banking solutions, banking sector has embraced the technological advances in terms of its internet banking, mobile banking, payment banks, P2P platforms, online apps for digital transactions to bring in efficiency, transparency, and better customer services. Further to it, banks are introducing technologies such as biometrics, machine learning, deep learning, big data analytics, artificial intelligence, and Internet of Things (IoT) for enhancing trust, better security of customer money, speedy transactions, making cashless transaction as “the thing” in future and also to harness of the benefits of these technologies in the form of reduction in the cost of running their businesses. In the nutshell, banking organization across the world is committed to use technology to provide better experience to their customers and customer of peer banks. Banking has evolved from the scenario of long queues in bank branches to banking through digital devices be it laptop, desktop or smart mobile phones. There is a need to study the new scenario. This research and its research methodology are based on facts of new scenario.

#### 3.2. Objective and research questions

Large numbers of research papers are available in the literature related to application of information technology such as core banking solution, internet banking, mobile banking etc. However, not much research is reported in the literature related to new form of organizations, policy initiatives, and services emerged along with emerging financial technologies such as mobile apps, UPI, AI, IoT, Big Data, analytics, etc., in Indian banking sector. This paper is an attempt to study the present status of online transactions in Indian banking industry and emergence of new online payment banks/ systems, government interventions such as P2P platforms, digital loan companies, TReDS platform, Account Aggregator- NBFCs, highly digital and cash-lite society etc., by making banking operations cheaper for banks and enhanced security, less cost, more services options, more products, and better experience for the customers specifically in post Covid era. With the present level of usage of online payment technologies, this research paper attempted to answer the following research questions.

**Research Question 1:** What is present status of online payments by the Indian banks and emergence of digital financial organization in the form of Startups?

**Research Question 2:** What are the initiatives taken by Government of India and Reserve Bank of India with regards to new digital products and services?

**Research Question 3:** What are the emerging technologies adopted by Indian banks and members of ecosystem of the Financial Sector?

**Research Question 4:** What is the level of awareness of new digital financial product & services and types of new organizations during Covid Era?

**Research Question 5:** What are the perceived benefits of these emerging technologies during Covid Era?

**Research Question 6:** What is level of acceptance of new digital product & services among Indian consumers?

**Research Question 7:** Was it easy for the Government to push its agenda of digitization and combat bureaucratic hurdles and in turn corruption in extending benefits to the citizens?

### **3.3. Research approach: Data & Analysis**

The research approach followed in the paper is exploratory cum descriptive. Exploratory cum descriptive study combines both exploratory and descriptive research approaches. This approach begins with an exploratory phase in which the researcher attempts to get a preliminary understand of a topic or issue, followed by a descriptive phase in which the researcher provides a more structured and detailed examination of the phenomena. Reason for using exploratory cum descriptive research method is to explore how the pandemic has changed payment preferences, what challenges have emerged, and what new technologies are being adopted. In addition, it provides the flexibility to explore financial inclusions while allowing for structured, detailed investigation once key problems or issues have been identified. This would result in a detailed profile of online payment systems post-COVID. It is an attempt to analyze the different online payment or financial technologies implemented and used by different financial companies includes Indian banks with a view to answer above research questions. The focus has been only on Indian private banks, public sector banks and new form of emerging financial organizations. The research is based on secondary data. Secondary data is collected from sources which are in public domain such as website of the banks and technology provider companies, press releases by banks including reserve bank of India & news websites, literature available in research journals, blogs by experts, research agencies report, policy document of Government agencies etc. In all data was collected from more than 80 sources. Data is then analyzed to answer research questions as listed in earlier sections. Analysis is mainly in the form of content analysis and trend analysis. This data is used to understand the dynamics of usage of online payment technologies in the operating environment of Indian banks and financial institutions with a view to suggest future direction of research and also to answer research questions.

## 4. Covid-19- India v/s world and its impact of financial sector

### 4.1 Impact in general

This section presents statistics relating to impact (infected and deaths of persons) of Covid-19 in India and other part of the world. It is evident from the statistics given in table 1 that as on April 31, 2023 a total of 44,949,671 persons are affected by the disease in India out of 1.3+ billion persons. India has witnessed 531,547 deaths. But, India per million deaths stood as 375 in comparison to figure of 868 deaths per million (World).

Table 1: Statistics of pandemic of India vs world

Period	Deaths per Million		Deaths of Citizens		No of Citizen impacted		Source
	Worl	Indi	World	India	World	India	
Mar-20	6	0	23,335	17	5,09,164	724	[1]
Jul-20	68	14	5,28,000	19,289	1,11,30,026	6,74,313	[2], [3], [4]
Sep-20	128	68	9,91,224	94,503	3,27,30,204	59,92,532	[5]
Dec-20	216	105	16,80,794	1,45,477	7,51,29,306	1,00,31,223	[6]
Mar-21	368	124	27,69,696	1,60,983	12,63,72,442	1,18,46,096	[8]
Jun-21	497	287	39,54,147	3,96,761	18,04,92,131	3,02,78,986	[7], [8]
Sep-21	607	322	47,41,330	4,47,230	23,14,16,660	3,36,78,703	[8], [9]
Dec-21	624	346	52,15,745	4,81,080	27,87,14,484	3,48,38,804	[10], [8]
Feb-22	748	363	58,29,566	5,08,665	41,08,48,671	4,26,31,421	[11]
Jun-22	798	371	63,84,802	5,26,485	55,43,08,047	4,34,88,519	[12], [14], [13], [15]
Sep-22	821	373	65,74,078	5,30,024	62,31,99,408	4,45,91,112	[12], [14], [13], [15]
Dec-22	842	374	67,20,803	5,30,705	66,52,84,467	4,46,79,413	[12], [14], [13], [15]
Apr-23	868	375	68,71,958	5,31,547	68,75,25,457	4,49,49,671	[12], [14], [13], [15]

Sources: [1]: WHO report (2020 a) , [2] Soni; [3] PTI(2020), [4] WHO report (2020 b) , [5] WHO report (2020 c) ; [6] WHO report (2021 a) , [7] WHO report (2021 b), [8] www.statista.com , [9] WHO report



(2021 c) [10] WHO report (2021 d), [11] WHO report (2021 e) [12] <https://www.worldometers.info/coronavirus/>, [13] <https://www.worldometers.info/coronavirus/country/india/>, [14] <https://ourworldindata.org/grapher/total-covid-cases-deaths-per-million>, [15] <https://www.globaleconomy.com/India/Covid-deaths-per-million/>

Covid-19 impacted all sector of economy in India which is evident from its macro parameters which are given in table 2.

Table 2: Growth Rate (%) of GDP in India during and after Covid-19 Era

Quarters↓ / Years→	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24
Quarter 1	7.5	5.1	-23.4	21.6	12.8	8.2
Quarter 2	6.5	4.3	-5.7	9.1	5.5	8.1
Quarter 3	6.2	3.3	1.6	5.2	4.3	8.4
Quarter 4	5.7	2.9	3.4	4.0	6.2	-

Source: Ministry of Statistics & Programme Implementation, Government of India, [Modhak (2021)], <https://www.mospi.gov.in/dataviz-quarterly-gdp-growth-rates>

## 4.2. Impact on financial infrastructure & services

The impact of Covid-19 on financial Institutions & infrastructure is analysed in this section. The detail of area of impact/ effect on various segments is compiled in table 3. Additional impacts are listed in the following:

- (i) The cash deposit and withdrawal: The growth in Currency-in-Circulation (CiC) has decreased to 7.9 per cent (\$ 26.08 billion) in November 2021 as compared to 22.2 per cent (over \$ 60.944 billion) growth in the November 2020. After demonetisation in 2016, CiC has increased progressively each year, with the CiC to GDP ratio having now surged to 14.5 per cent in 2020-21 from 8.7 per cent in 2016-17. (Verma & Mathew (2021))
- (ii) ATM Withdrawals: The withdrawals from ATM have decreased to \$ 34.007 billion in December 2021 as compared to \$ 35.348 billion in December 2019, before the Covid era (RBI report, 2020 a). Usage of debit cards at Point of Sales (PoS) transactions is expected to be at least 44% of total debit card transactions (at PoS + ATM). The value of transaction is 15.2 per cent in 2018-19 (5.2 per cent in 2014-15) which was expected to be increased 22% by end 2021. (RBI Reports, 2019)
- (iii) Online Fund Transfer: Transactions under the RTGS system expanded by 10.3 per cent, with their value at \$ 15,986.836 billion on December 2021, however, dipping by 3.3 per cent from the December 2020 (RBI annual report (2020b)). Transactions in the National Electronic Funds Transfer (NEFT) system rose by 18.3 per cent during the year 2020. Transaction of UPI also increased to \$ 1025.809 billion in the year 2021-2022 that is more than ten times of from \$ 106.884 billion in the year 2018-19. Similarly,

IMPS increased to \$ 508.395 billion in the year 2021-2022 from \$193.826 billion in the year 2018-19. (RBI Annual report (2020c), RBI Annual Report (2022))

- (iv) EMI Repayment: On 27 March, 2020, the RBI has declared a loan moratorium on paying loan instalments from March 1 to May 31, 2020 to borrowers help in the period of pandemic. Later on this was extended to August 31, 2020. Financial corporations and NBFCs were ordered to credit the difference between compound interest and simple interest on loans up to \$ 0.244 million by November 30, 2020. SBI was selected as the central organisation for handling claim payments. SBI disclosed to the government that they received combined lending institution claims of \$ 0.786 billion. The moratorium on loans from national banks, private banks, Non- Banking Financial Companies (NBFCs), and Micro Finance Institutions (MFIs) will be urged to be extended until December 31, 2020 by the Reserve Bank of India and the Bankers' Committee. (RBI News, 2022). In addition, all other additional facilities such as service requests, cheque-book reissue, requests for a new debit card, mobile number registration, report of lost debit/credit card, etc. can be done online via net banking.

Table 3: Areas affected in the context of digital banking due to the Covid-19

Changes	Affect	Impact on digital banking	Source
Higher Digital customer experience	More customers enrolment to the digital	Provide customer-based and effortless banking experiences.	Shaji (2020)
Customer service to customer engagement	Encourage digital banking to reimbursement	Personalization capabilities corresponding for e-commerce platforms	Shaji (2020)
Change in Technology	Fast and accessible technologies e.g. AI and cloud platforms.	Pushing the technology infrastructure enormously.	Shaji (2020)
Paper to Plastic money to virtual money	Boost up online payments/ plastic card transactions.	Increase in fees for wallet transactions.	Pwc.in (2020)
Change in PoS and ATM technology	Transactions at ATMs will decrease, PoS at stores selling essential items increased	No need of more cash for ATMs along with PoS decline.	Pwc.in (2020)
Customer empowerment via technology for use and ownership	Digital payments may be more affordable and less corrupt.	Increase in use of financial products, trust in financial service provider, and a rigid & effective consumer protection system.	World bank (2022)

Opening of new accounts is a major activity of banking sector for depositing their surplus and regular need based financial transactions. The reason of opening of new account during Covid are listed in table 4.

Table 4: Reasons to open a new account during the crisis of lockdown

Author	Reason	Source
Dixon	To get more support, earn a cash bonus, get more federal insurance coverage, earn a higher savings yield, new banks have emerged	Dixon (2020)
Kaveh	The post office cash delivery service	Kaveh (2020)
The Economic Times	Reduce timing of branches and maintain social distance	The Economic Times (2020)
Albahary	End-to-end digital account opening, reduces the cost, acquisition at points of friction, either with human or AI advisor interventions, live text chat, click-to-call, video chat, or digital appointment booking	Albahary (2020)

## 5. Measures to combat COVID-19

Government of India has taken many measures to combat Covid-19. The main measures include (i) lockdowns, (ii) issuing guidelines to the citizens while coming out for seeking services and buying household needs, (iii) allowing work from home, (iv) conducting online classes and exams for schools and universities, (v) developing and vaccinating citizens in the phased manners, (vi) allowing new financial products and services to reduce the impact of Covid-19.

### 5.1. Phased and need base Lockdowns

Government of India in consultation with state government had imposed lockdown in various phases. Initial four phases were complete lockdowns. However, next phases were partial lock down. As per the situation many a time's lockdowns were limited to containment zones. The details of the lockdowns are summarised in table 5.

### 5.2. Issuing guidelines to the citizens while coming out homes for seeking services and buying household needs

Government of India & State governments issued guidelines for citizens to contain virus spread. These guidelines include use of mask while going out of houses, maintaining distance at places of visit, offices, hospitals, railway stations, and other places. In addition, government agencies advised citizens

with symptoms of Covid-19 to go for testing of disease. Quarantine for the people returning from abroad, vaccine certificates for attending offices and for travel, quarantine at home for patients with mild symptom of disease etc. Closing of business which may be responsible in many ways for spread of disease such as hotels & restaurant, barber shops, gym etc.

Table 5: Lockdowns in India due to pandemic

Phases	Date of Announcement	Duration of lockdown	Regions of lockdowns	Source
phase I	22 <sup>nd</sup> March 2020	24 March -14 April (21 days)	complete lockdown in all states	Jeffrey and Schultz (2020)
phase II	14 <sup>th</sup> April 2020	15 April – 3 May (40 days)	complete lockdown in all states	Bobins (2020)
phase III	1 <sup>st</sup> May 2020	4 May -17 May (54days)	complete lockdown in all states	Sharma (2020 (a))
phase IV	17 <sup>th</sup> May 2020	18 May – 31 May (68 days)	complete lockdown in all states	Tribune News Service (2020)
Unlocking	30 <sup>th</sup> May 2020	lockdown till 30 June	lockdowns only in containment zones	Sharma (2020 (b))
Phase V	9 May 2021	10 May – 24 May	8 States complete lockdown. 17 States partial lockdown*	Express wed desk (2021)
Phase VI	1 July 2021	1 July – 15 July	Partial lockdown in 19 States**	Pakrasi (2021)
Phase VII	1 August 2021	Till 10 August	12 States complete lockdown***	Nair (2021)
*Complete lockdown in Karnataka, Kerala, Rajasthan, Bihar, Delhi, Madhya Pradesh, Odisha, Chhattisgarh, Mizoram. **Partial lockdown in 19 states few from these are West Bengal, Kerala, Punjab, Odisha, Andhra Pradesh and as such. ***Complete lockdown in Delhi, Kerala, Jharkhand, Assam, Haryana, Rajasthan, Karnataka, Himachal Pradesh, Uttarakhand, Manipur, Meghalaya, Sikkim.				

### 5.3. Allowing work from home

Employees of almost all private and government companies are advised to allow their employees to work from home wherever it is possible. In many cases strength in the offices is reduced to bare minimum

### 5.4. Conducting online classes and exams for schools and universities

Colleges, Universities, and Schools are allowed to conduct online classes and exams. In many cases offline classes and exams are allowed.

### 5.5. Developing and vaccinating citizens in the phased manners

Another important aspect of measures taken by government is developing and vaccinating the citizens in phased manner. Numerous issues faced the vaccination program, including a lack of vaccine, the cost of obtaining vaccines for the State and Central Governments as well as private hospitals, the registration process for vaccinations, the costs imposed by private hospitals, the nation's legal system (Indian healthcare is a state subject), false information, etc. (Singh & Sorout, 2023). The details of vaccinations for different categories of citizens are given in table 6.

Table 6: Phased wise Vaccination of Health workers and citizens.

Phases	Starting Dates	Beneficiaries	Source
Phase 1	16 January, 2021	Health workers,	The Hindu (2021), Singh and Sorout (2023)
Phase 1	1 February, 2021	frontline workers*	Dey (2021), Singh and Sorout (2023)
Phase 2	1 March, 2021	Over the age 60	The New Indian Express (2022), Singh and Sorout (2023)
Phase 2	1 April, 2021	Over the age 45	The New Indian Express (2022)
Phase 3	1 May, 2021	Over the age 18	The New Indian Express (2022)
Phase 3	January 3, 2022	Over the age 15	The New Indian Express (2022)

\*Frontline workers: Police, Paramilitary forces, Sanitation workers and Disaster management volunteers.

### 5.6. New categories of financial products and services created by RBI

RBI has taken many initiatives to ease the flow of money for groups of citizens. It is evident from the data in table 7 that expected digital payment turnover is doubled in 2020-21 in comparison to 2015-16 i.e., 14.80 from 7.14 respectively. If one compares actual and estimates of digital payment, actuals payments are more than estimated. The Covid-19 paid a catalyst in further increasing share of digital payments.

Table 7: Digital payment transaction turnover in terms as percentage of GDP

Year	Expected (%)	Actual (%)	Source
2015-16	7.14	12.1	RBI report (2019), RBI annual (2020b)
2016-17	7.85	8.7	RBI report (2019), RBI annual (2020b)
2017-18	8.42	10.7	RBI report (2019), RBI annual (2020b)
2018-19	10.37	11.2	Pruthi (2019) RBI annual (2020b)
2019-20	12.29	-	Pruthi (2019), RBI report (2019)
2020-21	14.80	-	Pruthi (2019), RBI report (2019),

Similar conclusions can be drawn from the data of Reserve Bank of India – Digital Payments Index (RBI-DPI) index. It has increased more than four times since March 2018.

Table 8: Reserve Bank of India – Digital Payments Index (RBI-DPI)

Period	RBI - DPI Index In ₹ ( in US \$)	Source
March 2018 (Base)	100.00 (1.22)	Press Release (2022)
March 2019	153.47 (1.87)	Press Release (2022)
September 2019	173.49 (2.12)	Press Release (2022)
March 2020	207.84 (2.53)	Press Release (2022)
September 2020	217.74 (2.65)	Press Release (2022)
March 2021	270.59 (3.30)	Press Release (2022)
September 2021	304.06 (3.71)	Press Release (2022)
March 2022	349.30 (4.28)	Rathore (2022)
September 2022	377.46 (4.60)	Piyush (2023)
March 2023	395.57 (4.82)	Kawale (2024)
September 2023	418.77 (5.10)	Kawale (2024)

To measure the level of digitalization of digital/electronic payments across the nation, the Reserve Bank of India has introduced the Digital Payments Index (DPI). There are five basic factors in the RBI-Digital Payments Index (DPI) that will be used to quantify the prevalence and depth of digital payments. These five factors along with weight are Payment Performance (45%), Payment Enablers (25%), Payment Infrastructure for the Supply Side (15%), Payment Infrastructure for the Demand Side (10%), and Consumer Centricity (5%), (Arora, 2021), Piyush (2023)). The newly-constituted RBI's Digital Payments Index (RBI-DPI) is given in table 8 and it stood at ₹ 418.77 (\$ 5.10) in September 2023 (Kawale, 2024).

### 5.6.1 Growth in digital payment transactions

Digital payments have significantly increased in recent years. The total digital payment transactions volume increased from 20,710 million in FY 2017-18 to 134,620 million in FY 2022-23 at a CAGR of 45 per cent. (PIB, 2023). Due to the concerted efforts of the entire government and all interested stakeholders, the number of digital payment transactions has greatly increased, rising from 20.71 billion in FY 2017–18 to 116.6 billion till 11.12.2023 in FY 2023-24. India's most preferred digital payment system is BHIM-UPI. During January 2023 alone the number of transactions with BHIM-UPI app were 80.36 billion worth ₹129800 (\$ 1582.11) billion. (Press Release 2023).

Table 9: Total value of digital payments during 2017-18 to 2022-24

Year	Total number of digital transactions (in millions)	Total value of digital transactions (in billions)	Total value in billion USD (\$) (1\$= 82.0425)
2017-18	20,710	1,962,000	23,914.4
2018-19	31,340	2,482,000	30,252.6
2019-20	45,720	2,953,000	35,993.6
2020-21	55,540	3,000,000	36,566.4
2021-22	88,400	3,021,000	36,822.4
2022-23	1,34,620	3,355,000	24,987.1
2023-24	1,09,880*	2,290,000*	27,912.4

\*Data till 27th November 2023.  
# Note: Digital payment modes considered are BHIM-UPI, IMPS, NACH, AePS, and NETC, debit cards, credit cards, NEFT, RTGS, PPI and others.  
Source: RBI, NPCI and Banks, Press release (2023), [Reserve Bank of India (RBI), National Payments Corporation of India (NPCI) & DIGIDHAN Portal, (PIB, 2023)]

During the fiscal year (FY) 2021–2022, India saw a 33% Year-of-year (YoY) rise in the volume of digital payments. According to the Ministry of Electronics and IT (MeitY), there were 742.2 million digital payment transactions registered during the year 2021-22, raised from 555.4 million transactions in FY 2020–21 (Sarasvati, 2023). It can be inferred from the table 10 that UPI transactions has raised to ₹ 19783.03 (\$ 241.14) billion.

Table 10: UPI transactions in India

Date & Year	No. of transactions (Million)	Volume in ₹ (Billions)	Volume in billion US\$ (1\$= 82.0425)	Source
2019-20	12,520	21,320	259.87	PTI (2020)
2020-21 (April- July)	6,310	6,310	76.91	PTI (2020)
July, 2019	822.30	1,463.87	17.85	PTI (2020)
April 01, 2020	1000	1,511.41	18.42	Joseph (2021)
March 31, 2021	2,732	5,048.86	61.54	Joseph (2021)
August 31, 2021	3,556	6,391.17	77.90	Npci.org.in
November 2021	4,187	7,684.36	93.67	Npci.org.in
March, 2022	5,400	9,605.81	117.08	Sarasvati 2023
December, 2022	7,820	12,820.55	156.27	Sarasvati 2023
March, 2023	8,650	14,049.51	171.25	Sarasvati 2023
December, 2023	12,020.2	18,229.50	222.20	<a href="https://www.rbi.org.in/Scripts/Statistics.aspx">https://www.rbi.org.in/Scripts/Statistics.aspx</a>
March, 2024	13,440.0	19,783.53	241.14	<a href="https://www.rbi.org.in/Scripts/Statistics.aspx">https://www.rbi.org.in/Scripts/Statistics.aspx</a>

In addition, the FinTech market in India was valued at ₹ 1.9 (\$ 0.0232) trillion in 2019 and is expected to reach ₹ 6.2 (\$ 0.0756) trillion by 2025 across diversified fields like digital payments, digital lending, peer to peer (P2P) lending, crowd funding, block chain technology, distributed ledgers technology, big data, RegTech and SupTech, (RBI (2021a)). The new licences are given to new categories of financial institutions. Major categories include setting up payment banks, Trade Receivables Discounting System (TReDs), P2P Platforms, regulatory framework for Account Aggregators (AA) & NBFC-AA, setting up purely digital loan companies (NBFCs) etc. (RBI, 2019). Taxonomy of digital lending is given in the figure 1. Nair (2021) mentioned the two innovative customer-centric initiatives include the RBI Retail Direct Scheme and the Reserve Bank - Integrated Ombudsman Scheme. Select other initiatives are analyzed for their present status.

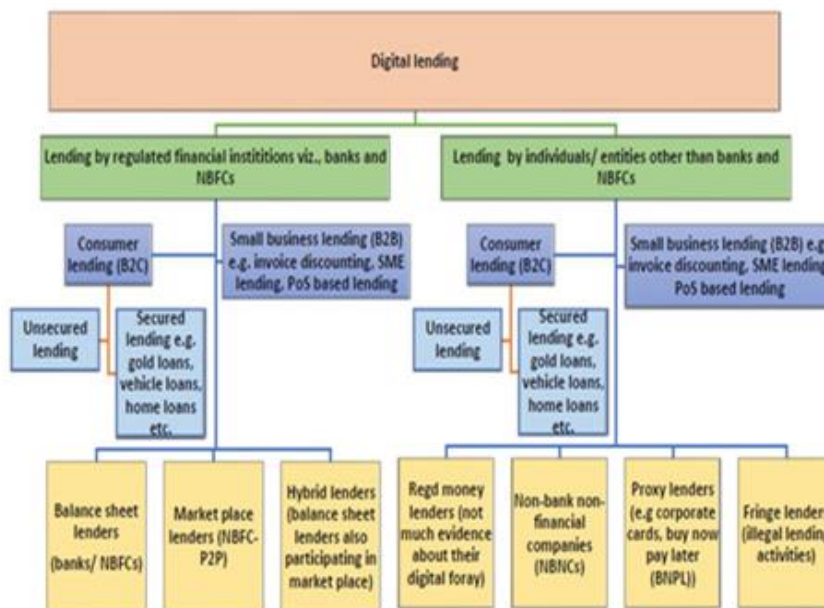


Fig 1: Taxonomy of Digital Lending

(Source:

<https://www.rbi.org.in/Scripts/PublicationReportDetails.aspx?UrlPage=&ID=1189#S22> )



### 5.6.2. Online payment banks

RBI initiated/ created on online payments banks with a view to achieve objectives of digital India initiative and encourage affordable, secure, reliable, and easy to use fast payment systems with wider reach among Indian citizens. Key features of online payment banks are given in the table 11 and table 12.

Table 11: Online Payment Banks

Name of the Banks	Website	Date of incorporation	Reach (No. of states)	Reach (No. of Districts)	Source
Airtel Payment Bank	<a href="http://www.airtel.in/bank/">www.airtel.in/bank/</a>	January 2017	29 states	All	Kulkarni (2021)
Indian Post Payment Bank	<a href="http://ippbonline.com">ippbonline.com</a>	1 <sup>st</sup> September 2018	29 states	All	Kulkarni (2021)
Fino Payment Bank	<a href="http://www.finobank.com">www.finobank.com</a>	4 <sup>th</sup> April, 2017	28 states	499	Kulkarni (2021)
Paytm Payment Bank	<a href="http://paytm.com/bank/">paytm.com/bank/</a>	November 2017	29 states	All	Kulkarni (2021)
Jio Payments Bank	<a href="http://www.jiopaymentsbank.com">www.jiopaymentsbank.com</a>	3 <sup>rd</sup> April, 2018	29 states	All	Kulkarni (2021)
NSDL Payments Bank	<a href="http://nsdlbank.com">nsdlbank.com</a>	29 <sup>th</sup> October, 2018	29 states	All	Kulkarni (2021)

Table 12: Online Payment Banks

Name of the Banks	No. of Customers	Deposits Limits in millions )	Interest Rates (% in P.A.)	Operative account	Otherservices	Source
Airtel Payment Bank	> 155 million <sup>(103)</sup>	0.5	3	Saving a/c	Insurance cover ₹ 0.1 million	Kulkarni (2021), Grover (2023)
Indian Post Payment Bank	> 40 million	0.1	2	Saving a/c & current a/c	Door step banking facility upto ₹ 0.01 million, QR Code Payments	Aggrawal (2018), The EconomicTimes (2022)
Fino Payment Bank	> 100 million	0.78	6.25	Saving a/c & current a/c	Domestic remittance	Kulkarni (2021)
Paytm Payment Bank	> 64 million	0.2	2.5	Saving a/c	Free insurance upto ₹ 0.2 million (In case of death/ permanent disability)	Kulkarni (2021)
Jio Payments Bank	> 380 million	0.1	3.5	Saving a/c & current a/c	No need to maintain a minimum balance	Dhar (2018)
NSDL Payments Bank	> 20 million	0.1	2.5	Saving a/c & current a/c	NSDL jiffy mobile app	(nsdlbank.com)

### 5.6.3. Peer to Peer (P2P) Platforms

The peer-to-peer lending system allows citizens to invest their money and lend money to people who don't have access to regular banking systems. The fundamental tenet of this system is to provide advantages to both investors and debtors. All peer-to-peer lending platforms are governed by the Reserve Bank of India, which enables borrowers to borrow money at reasonable interest rates while also enabling savers to earn a good interest on their savings. P2P lending is also known as “social lending” or “crowd lending.” Peer-to-peer (P2P) lending enables individuals to obtain loans directly from other individuals, cutting out the financial institution as the middleman. RBI has given license to many companies. A select list with their features is given in table 13 and table 14.

Table 13: Features of P2P Platforms

Name of the P2P platform	Interest rate (%in P.A.)	Loan amount (₹ in millions)	Repayment tenure (months)	Registration fee (INR for borrower)	Website	Source
Lendbox	> 12	0.025–0.5	6-24	₹ 500	<a href="https://www.lendbox.in">https://www.lendbox.in</a>	Bhakta (2019)
i2ifunding	> 12	< 1	3-36	₹ 118	<a href="http://www.i2ifunding.com">www.i2ifunding.com</a>	Bhakta (2019)
Faircent	> 9.99	0.010–0.5	6-36	₹ 500	<a href="http://www.faircent.com">www.faircent.com</a>	Bhakta (2019)
OMLP2P	> 10.99	0.025-1	3-36	₹100	<a href="http://www.omlp2p.com">www.omlp2p.com</a>	Bhakta (2019)
iLend	> 15	0.025–0.5	6-36	₹ 500	<a href="http://www.iLend.in">www.iLend.in</a>	Bhakta (2019)
Lenden club	> 6.5	0.025–0.5	3-24	₹750	<a href="http://www.lendendub.com">www.lendendub.com</a>	Bhakta (2019)
Finzy	>10.99	<0.5	6-36	Nil	<a href="http://www.finzy.com">www.finzy.com</a>	Arya (2018)
PaisaDukan	12-30	0.5-1	3-36	₹ 500 + GST	<a href="http://www.paisadukan.com">www.paisadukan.com</a>	Arya (2018) <a href="http://www.paisadukan.com">www.paisadukan.com</a>
Rupee circle	18-36	<0.5	<36	₹ 500	<a href="http://www.rupeecircle.com">www.rupeecircle.com</a>	Arya (2018) <a href="http://www.rupeecircle.com">www.rupeecircle.com</a>
Rupaiya exchange	15-24	0.01-1	1-24	Nil	<a href="http://www.rupaiyaxchange.com">www.rupaiyaxchange.com</a>	Bhakta (2019)
Finance peer	Nil	entire year fees to the School on Day 1	3-12	Nil	<a href="http://www.financepeer.com">www.financepeer.com</a>	Finance peer, Punamiya (2021)
India Money Mart	12-25	0.01	3-36	₹ 1000+18% GST (1180)	<a href="http://www.indiamoneymart.com">www.indiamoneymart.com</a>	Bhakta (2019)
Anytime loan	<36	<1	<1	₹ 750	<a href="http://www.anytimeloan.in">www.anytimeloan.in</a>	Anytime loan

Table 14: Features of P2P Platform

Name of the P2P platform	Date	Amount raised in million.\$	Headquarter	Founders	Source
Lendbox	Nov. 2015	0.84	Delhi NCR	Bhuvan Rustagi, Ekmeet Singh and Jatin Malwal	Bhakta (2019)
i2ifunding	2015	0.44	Delhi NCR	Abhinav Johary, Manisha Bansal, Neha Aggarwal, Raghavendra Pratap Singh, and Vaibhav Pandey	Bhakta (2019)
Faircent	2017	9.32	Delhi NCR	Nitin Gupta, Rajat Gandhi and Vinay Mathews	Bhakta (2019)
OMLP2P	Aug. 2017	Self-funded	Mumbai	Pramod Kumar Akhrama	Bhakta (2019)
Hend	2015	0.5	Hyderabad	Mukesh Kothari, Niti Gupta and Shankar VVSSB,	Arya (2018)
Lendenclub	2015	6.1	Mumbai	Bhavin Patel and Dipesh Karki	Bhakta (2019) Arya (2018)
Finzy	2016	2.3	Bengaluru	Abhinandan Sangam, Amit More and Vishwas dixit	Bhakta (2019) Arya (2018)
PaisaDukan	Nov. 2017	8.75	Mumbai	Rajiv Ranjan	Bhakta (2019) Arya (2018)
Rupee circle	Jun. 2016	0.9	Mumbai	By itself	Bhakta (2019)
Monexo	2014	1	Chennai	M Sundar, Mukesh Bubna and Sonal Bengani	Bhakta (2019) Arya (2018)
Rupaiya exchange	2015	0.2	Delhi	Rohan Hazrati,	Arya (2018)
Finance peer	2017		Mumbai	Rohit Gajbhiye	Arya (2018)
Cashkumar	2014	0.74	Bengaluru	Dhiren Makhija, Kannan Kandappan and Yogesh Joshi	Bhakta (2019) Arya (2018)
India Money Mart	2016	Self-funded	Mumbai	Mahendra Agrawal	Bhakta (2019)
Loan Baba	2015	3.2	Mumbai	Sanket Hasabnis and Satchit Hasabnis	Arya (2018)
WazirX	2018	4.4	Mumbai	Nischal Shetty	Gilchrist (2021)
Liquiloans	Mar. 2016	1.6	Mumbai	Achal Mittal and Guatam Adukia	Bhakta (2019)
Microgram	2010	0.56	Bengaluru	Rangan Varadan	Bhakta (2019)
Anytime loan	2014	4.5	Hyderabad	Keerthi Jain	Bhakta (2019)
Peerland	Feb. 2016	0.7	Hyderabad	Sanjay Darbha	Bhakta (2019)

#### 5.6.4. Loans (Physical / Digital) Mode

Based on data received from a representative sample of banks and NBFCs (representing 75 per cent and 10 per cent of total assets of banks and NBFCs respectively as on March 31, 2020), it is observed that lending through digital mode relative to physical mode is still at a nascent stage in case of banks (₹1,120 (\$ 13.65) billion via digital mode vis-à-vis ₹ 53,080 (\$ 646.98) billion via physical mode) whereas for NBFCs, higher proportion of lending (₹ 230 (\$ 2.80) billion via digital mode vis-à-vis ₹1,930 (\$ 23.52) billion via physical mode) is happening through digital mode (RBI, 2021b).

Table 15: Top 10 digital loan companies

Name of companies	Founder	Founding year	Revenue in US \$ million	Website	Source
Lendingkart	Harshvardhan Lunia and Mukul Sachan	2014	6.3	<a href="http://www.lendingkart.com">www.lendingkart.com</a>	Srivastava (2022)
Pinelabs	Lokvir Kapoor, Tarun Upadhyya and Rahul Garg	1998	9.4	<a href="http://www.pinelabs.com">www.pinelabs.com</a>	Srivastava (2022)
Mobikwik	Bipin Preet Singh and Upasana Taku	2009	5.09	<a href="http://www.mobikwik.com">www.mobikwik.com</a>	Srivastava (2022)
Shiksha Finance	Jacob Abraham	2016	2.2	<a href="http://www.shikshafinance.com">www.shikshafinance.com</a>	Srivastava (2022)
Money Tap	Bala Parthasarathy	2015	6.7	<a href="http://www.moneytap.com">www.moneytap.com</a>	Srivastava (2022)
Paytm	Vijay Shekhar Sharma	2010	44.09	<a href="http://www.paytm.com">www.paytm.com</a>	Srivastava (2022)
Bill Desk	Ajay Murthy, Karthik Ganapathy and M.N. Srinivasu	2000	16.6	<a href="http://www.billdesk.com">www.billdesk.com</a>	Srivastava (2022)
Policy Bazaar	Yashish Dahiya, Alok Bansal and Avanish Nirjar	2008	70	<a href="http://www.policybazaar.com">www.policybazaar.com</a>	Srivastava (2022)
Capital Float	Gaurav Hinduja, Sashank Rishyasinga	2013	19.4	<a href="http://www.capitalfloat.com">www.capitalfloat.com</a>	Srivastava (2022)
Faircent	Rajat Gandhi	2017	9.2	<a href="http://www.faircent.com">www.faircent.com</a>	Bhakti (2019)

#### 5.6.5. TReDS platform

The Trade Receivables Discounting System (TReDS) is a plan for establishing and running an institutional mechanism to make it easier for corporate and other buyers, such as government departments and public sector undertakings (PSUs), to finance the trade receivables of MSMEs through multiple financiers

(MSMEx, 2021). Following are the entities that Reserve bank of India has licensed for TReDS platform participation:

Table 16: 3 Entities that RBI has licensed to participate on the TReDS platform

Name of entity	Founding year	Head quarter	Portal for Registration	Source
NSE Strategic Investment Corporation NSICL & SIDBI	March 12, 2016	Mumbai	RXIL	Economictimes.com csladda.com, NSICL & SIDBI (2016)
AXIS Bank	June 29, 2017	Mumbai	Invoicemart	Economictimes.com, csladda.com, Invoice Mart (2019)
Mynd Solutions	April 7, 2017	Gurgaon (Haryana)	M1Exchange	Economictimes.com csladda.com, M1xchange (2017)

#### 5.6.6. Account Aggregator (AA) NBFCs

An NBFC Account Aggregator is a type of financial organization that manages customer accounts. The RBI must grant the Account Aggregator (AA) an NBFC Account Aggregator Licence before it may conduct business in the nation. The NBFC Account Aggregator provides details on various account types held by a customer in numerous NBFCs at once (Gupta, 2020).

Table 17: List of Account Aggregator (AA) NBFCs registered with RBI (As on January 31, 2022)

Sr.no	Name of the company	Founding year	Regional Office	State	Website	Source
1.	Cams Financial Information Services Private Limited (Account Aggregator)	September 26, 2016	Chennai	Tamil Nadu	camsonline.com	RBI, Sahamati.org.in
2.	FinSec AA Solutions Private Limited	November 25, 2016	Hyderabad	Telangana	onemoney.in	RBI, Sahamati.org.in
3.	Perfios Account Aggregation Services Private Limited	October 16, 2017	Bengaluru	Karnataka	perfios.in	RBI, Sahamati.org.in
4.	Cookiejar Technologies Private Limited (NBFC-AA)	September 01, 2016	Mumbai	Maharashtra	cookiejar.co.in	RBI, Sahamati.org.in
5.	NESL ASSETS DATA Limited	June 28, 2018	Mumbai	Maharashtra	nadl.co.in	RBI, Sahamati.org.in

Pahwa (2019) mentioned that the Reserve Bank of India (RBI- Central Bank of Country) has taken initiatives to empower every citizen by creating e-payment opportunities that are safe, secure, convenient, quick and affordable. This initiative proved to be handy during Covid era. RBI devised processes embedded with technologies which are capable to improve customer experience, sanctions payment systems operators and infrastructure, lays in onward looking regulation, and creates a risk-focused supervision system. He also mentioned 12 expected outcomes starting with reduction in the paper-based clearing to healthy competition in the payments space and formation of new Payments System Operators.

Pruthi (2019) mentioned that the aims of RBI is to achieve "a 'highly digital' and 'cash-lite' society through Goal Posts (4Cs, i.e., Competition, Cost effectiveness, Convenience, and Confidence). He also disclosed the point of India joining the global initiatives to combat online extremism. He further mentioned that digital transaction turnover as the percentage of GDP will increase.

Maaik Steinebach stated that the pandemic had led to a big shift in consumer behaviour, because digitalization becomes more integral to everyday life. The rise of virtual banks and the increasing adoption of mobile banking services are indeed exciting developments in the financial landscape (Yiu, 2021).

Swinemar discussed that more data is being used to identify opportunities for users so that more optimal digital solutions can be provided, and that data is also being passed over to sales teams so that digital conversations can be led by them. It's not a replacement for a physical or personal relationship with customers, but it helps inform conversions with customers (Pymnts, 2020).

## 6. Result & discussion

This section presents answer to seven propositions based on secondary data collected and summarizes in earlier sections.

**Research Question/ Proposition 1:** What is present status of online payments by the Indian Banks and emergence of digital financial organization in the form of Startups?

The number of digital payment transactions has significantly increased, from 20.71 billion in FY 2017–18 to 88.4 billion in FY 2021–22, it is due to the coordinated efforts of the government, RBI, banks and all other stakeholders. In January 2023, BHIM UPI, the country's primary mode of payment, processed 803.6 billion digital payments transactions totaling an amount of ₹ 1298 (\$15.82) billion (Press Release (2023)). Previous study provides an analysis of

the emergence of new technologies in the financial industry and their application to financial and investment activities, with organizations well-equipped with the technology required to outperform traditional financial institutions (Barroso and Laborda, 2022). In the meanwhile, between 2015-2020, there was an incredible increase in new fintech start-ups across India, particularly in the digital payments, lending, and wealth industries. In the last three years, India had the second greatest number of new fintech start-ups, after the US (Dayal and Narayanan, 2021).

**Research Question/ Proposition 2:** What are the initiatives taken by Government and Reserve Bank of India in the form of new digital products and services?

The Reserve Bank has since authorised various products and services, viz. financial market infrastructure (enabling securities, triparty repos, forex trades, Rupee / forex derivatives settlements, etc.), retail payments organisation (operating ATM switch, fast payment systems, cheque clearing, automated clearing, Aadhaar-based payments, toll collections, etc.), card payment networks, cross-border inbound money transfer entities, Automated Teller Machine (ATM) networks, white label ATM operators, Prepaid Payment Instrument (PPI) issuers, instant money transfer service provider, Trade Receivables Discounting System (TReDS) operators, Bharat Bill Payment Central Unit (BBPCU), Bharat Bill Payment Operating Units (BBPOUs), etc. Some of these key initiatives taken by the government are as Goods and Services Tax (GST) regime, Jan Dhan Yojana, Availability of the internet, Unified Payments Interface (UPI), Digital India programme, Startup India, Licence for payment banks, Recognition of peer-to-peer (P2P) lenders as non-banking financial companies (NBFCs), Regulatory sandbox by the RBI for FinTechs etc. Fintech, or financial technology, emerged during the 2007–2008 financial crisis and has since revolutionized the financial services industry by bringing new technologies to the market (Chouhan et al. 2021a; Anagnostopoulos 2018). In India, the rapid development of mobile networks in underserved areas and communities over the past ten years has also played a significant role in this development (Chouhan et al. 2021c; Omojolaibi et al. 2019; Li et al. 2021). Payment banks have also emerged as a further alternative to online and mobile banking, helping to increase operational efficiency and lower costs associated with providing services to clients in rural and semiurban areas (Schuetz and Venkatesh 2020; Chouhan et al. 2020).

**Research Question/ Proposition 3:** What are the emerging technologies adopted by Indian banks and member of ecosystem of Financial Sector?

The Indian Financial Sector introduced various technologies such as, Artificial Intelligence, Blockchain, Cloud Computing, Data Science, Machine Learning,

Internet of Things, Big Data Analytics, Money Couch, Paylater, Soft Robotics, Tap n Pay, Smart Vault, ipal, Voice Biometric, etc. The epidemic drives banks to reevaluate their technological plans and boost digital/branchless banking, rethink customer interactions, and change the meaning of financial inclusion. With the start of 2022, the Indian economy is gradually gaining momentum and is anticipated to grow at a 6.5% annual rate in the fiscal years 2022–23 (The times of India (2022)). Different levels of the ecosystem include end users, individuals, governments, and private companies. All of these groups are vital because they define the needs, they have for developing a market, addressing specific problems, and contributing to the advancement of technology through blockchain partnerships (Dang & Nguyen 2021). It is due to the emerging technologies adopted by Indian banks and other members of the financial sector ecosystem. Despite the pandemic's third wave emerged during financial year, economists are still optimistic about the country's economic recovery because of increased FDI flows and India's ranking as one of the world's most desirable investment locations (Parvez, 2022).

**Research Question/ Proposition 4:** What is the level of awareness of new financial product & services and types of new organizations during Covid Era? This proposition is answered with secondary data of technology users. The number of users is increasing, it means awareness is increasing. Here number of users is taken a surrogate variable for awareness. To support the proposition the data is given in table 9 and table 10. It is evident from the table 10 that awareness is increasing as number of UPI transactions was increasing. It has increased two times from November 2021 to March 2023. In November 2021 the users were 4187 million. This number is increased to 8650 million in March 2023. Table 9 showed that number of digital payment transactions has increased, rising from 20710 million in FY 2017-18 to 134620 million in FY 2022-23. In the previous studies it was also found that majority of banks have used online banking (rahi and ghani, 2019). However, after the COVID-19 pandemic breakout in 2019, there has been a noticeable rise in the usage of online banking (Islam et al., 2020; Chauhan & Singh, 2024). The new licenses are given to new categories of financial institutions by RBI. Major categories include setting up payment banks, Trade Receivables Discounting System (TReDs), P2P Platforms, regulatory framework for Account Aggregators (AA) & NBFC-AA, etc.

**Research Question/ Proposition 5:** What are the perceived benefits of these emerging technologies during Covid Era?

During Covid Era financial inclusion of emerging technologies found to be beneficial for government, banks, as well as users. Consumers are accepting the easily accessible digital technologies such Artificial Intelligence, Chatbots, Robotics, and cloud platforms. It resulted into acclimatize to changes and



pushing the technological infrastructure. The Covid era has encouraged the adoption and development of various emerging technologies, offering solutions to challenges posed by the pandemic. Digital banking solutions and fintech platforms have enabled customers to access banking services remotely, reducing the need for physical branch visits and minimizing the risk of virus transmission. Contactless payment methods and mobile banking apps have promoted financial transactions without the need for physical cash, enhancing convenience and safety for consumers. Additionally, advancements in artificial intelligence and data analytics have facilitated personalized financial services, enabling banks and fintech companies to better understand customer needs. Overall, these emerging technologies have enhanced the resilience and agility of the banking sector, while also improving the customer experience amidst the challenges of the pandemic. Several international research imply that COVID-19 is a factor influencing the adoption of mobile simple payment services (Immanuel & Dewi, 2020; Daragmeh et al., 2021). Rafdinal and Senalasar (2021) examined the adoption of mobile payment applications during the COVID-19 pandemic and discovered that consumers' opinions were influenced by perceived usefulness and ease of use.

**Research Question/ Proposition 6:** What is level of acceptance of new product & services among Indian Consumers?

Rapid growth was observed in the use of contactless payments (up over 30%), registration and usage of mobile pay applications (up over 80%), and digital opening of new partnerships (up over 70%). The decrease in in-person client meetings coincided with these increases (Oertli, 2020). In May 2022, UPI conducted 5.95 billion transactions worth more than ₹10 trillion, up from 5.58 billion transactions worth ₹9.83 trillion in April 2022. (Panda, 2022). Table 7 shows that digital payment transaction turnover in terms of a percentage of GDP which is approximately doubled in 2021 in comparison to 2016. However, actual percentages are more as compared to expected percentages of GDP. In addition, table 8 represents that RBI-DPI index has increased more than four times since the base year i.e., March 2018. From these tables it can be inferred that Indian Consumers rapidly accepting the new products and services during the covid era.

**Research Question/ Proposition 7:** Was it easy for the Government to push its agenda of digitization and combat bureaucratic hurdles and in turn reduction of corruption in extending benefits to the citizens?

No, it was not easy for the government to push its agenda of digitization during and post covid era. The success of the government's efforts to push digitization and combat bureaucratic hurdles and corruption during and after COVID-19 is depending on several factors, including the existing infrastructure,

technological literacy of the population, regulatory environment, and political will. While digitization offers significant potential to streamline government services, reduce bureaucratic inefficiencies, and combat corruption by increasing transparency. The Indian banking regulator, the Reserve Bank of India (RBI), has increased the popularity of online payment systems and services by creating/developing or approving new categories of organizations and products based on the use of ICT with the goal of achieving the central government's stated goals of inclusive growth across all sections of society (Saraswati & Singh, 2024). It faces hurdles such as resistance to change, concerns about data privacy and security, and inequalities in access to technology. By implementing these measures comprehensively and consistently, governments can significantly reduce corruption in extending benefits to citizens.

## **7. Conclusion and suggestions**

The COVID-19 epidemic has undoubtedly had an indelible impact on many aspects of human life, including economics, cultures, and individual habits. The epidemic has also restricted people's physical movement, making outdoor activities impossible due to the risk of transmitting the fatal virus. As a result, this epidemic has enabled a country in which digital financial transactions can be carried out electronically. Before this pandemic, the process of digital financial inclusion was still in its infancy, despite the government's tireless efforts. People are increasingly turning to contactless and online payment methods to limit physical interactions and adhere to social distance standards, resulting in a considerable increase in digital payment transactions. The adoption of mobile pay applications, contactless payment methods, and the digital launch of new digital businesses all showed indicators of rapid growth. Customers are embracing readily available digital technology like chatbots, robotics, cloud platforms, and artificial intelligence. It results in pushing the technological infrastructure and acclimating to developments. Financial institutions in new categories are granted the new licenses. Payment banks, Trade Receivables Discounting Systems (TReDs), peer-to-peer platforms, regulatory frameworks for Account Aggregators (AA) and NBFC-AA, and fully digital loan businesses (NBFCs) are among the major categories.

Digital financial inclusion offers a secure mechanism for anyone to conduct financial transactions electronically. The most essential aspect influencing the potential of a transition to the digital era is digital literacy and awareness. Sustained investment in financial literacy, digital literacy, and higher education is necessary to realize the goal of Digital India. The COVID-19 pandemic and online payment systems are not able to encourage everyone to use digital platforms. In order to encourage people to use formal financial platforms

connected to digital platforms for financial services, financial intermediaries and service providers should be involved.

### **7.1 Policy implication**

Covid -19 pandemic accelerated the shift toward online payment system globally, including India. As the country navigates post covid recovery, several policy implications surrounding the real-time electronic authorization and online payment system have emerged. Post Covid, India's goal for a digital first economy emphasis the necessity of developing a secure, inclusive and efficient online payment system. Recently, one of the popular online payment systems i.e., Paytm payment bank as penalized by regulators for security purpose (Ramakanth, 2024). Therefore, regulators need to develop strict IT audit of online payment system so that Paytm scenario is not repeated. In addition, two-way verification may be made compulsory for all kind of transactions. Also, regulators may give privilege to biometric verification. Moreover, occasional calls from the banks to the customer for personal data verification e.g., date of birth, nominee name etc. while the transaction. Regulators, must emphasize strong consumer protection laws, grievance redressal mechanisms, and transparency to build trust in online payment systems. Regulators must address infrastructure, literacy, regulatory, and security issues while also promoting innovation and user's trust. The success of these measures will determine India's financial and economic environment in the succeeding years.

### **7.2 Limitations and future scope**

This paper is focused only on secondary data analysis. So, for the further study primary data can be consider for the results analysis. In addition, only institutions perspective is considered for discussion. Customers and users' perspective can be undertaken for the further study. This study includes the secondary data only of 2015-2023 years. More year's data can be taken for the further study.

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