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Cashless economy: the impact of digital innovation in India

S. Sangeeta Kumari, K. M. Singh* and Nasim Ahmad

Digitalization has brought a revolutionary change in every walk of human life, giving the average person many digital options for payment and settlement. Information communication technology enabled the transformation of our banking system from paper to virtual mode, facilitating speedy and secure fund transfers. Post-demonetization (8 November 2016), the cashless economy got a boost, and about 98% of transactions have become cashless. A cashless policy empowers industries, leading to an increase in employment opportunities and reducing cash-oriented fraud. The Reserve Bank of India-Digital Payments Index was recorded at 349.30 as of March 2022 against 304.06 for September 2021, indicating significant growth, rapid adoption and deepening of digital payment across the nation. During the financial year 2021–22, digital transactions surged to 7195 crores, with the value increasing to Rs 17.44 billion. There is a strong need to make policies for protection against cyber-attacks, encourage digital literacy, and ensure adequate rural penetration of internet connectivity and banking infrastructure, with awareness among rural masses to strengthen organized indigenous markets. This article provides an insight into the cashless economy and the impact of digital innovation on India's financial system.

Keywords: Cashless economy, digital innovation, economic growth, financial transactions, internet connectivity.

THE world is on the verge of a digitally-driven revolution which will dominantly transform the way people live, work, interact and socialize. With 'digitization' and 'digitalization' growing at an unprecedented pace in developed as well as developing nations, the use of Information and Communication Technology (ICT) across various sectors to produce desirable benefits to mankind plays an important role in the digital transformation of the Indian economy. As a stepping stone towards this revolutionary move, in 2015 the Government of India (GoI) launched 'Digital India', a flagship programme to develop a more digitally enhanced ecosystem with a focus on creating and enabling a digital infrastructure for every citizen of the nation as the foundation utility, e-governance and digital services to the reach the end-consumers, and digital empowerment by promoting the goal of 'faceless, paperless and cashless economy'¹. To achieve this, GoI focused on ensuring high-speed internet connectivity, access to mobile phones, opening of bank accounts for every citizen, availability of real-time services via on-line platforms, financial transactions through cashless and digitalized networks, and most importantly,

ensuring digital literacy and availability of digital resources even in the rural parts of the nation.

India has always been a cash-centric economy. However, the revolutionary move on 8 November 2016, with the announcement of 'demonetization', changed the scenario by curbing 86% of the currency in circulation by banning ₹ 500 and ₹ 1000 notes without the adequate supply of new paper currency. Due to the cash crunch, people shifted towards using digital payments. While about 95% of the transactions were done using cash before demonetization, within a month after the process, the number of online transactions witnessed a surge of 271% (ref. 2). A cashless economy is one of the emerging concepts of modern economy laid on the foundation of digitalization. It can be defined as 'a transaction layout that aims at reducing (and not eliminating) total physical currency circulating in the economy while encouraging more digital based transaction that includes direct debit, credit and debit cards, immediate payment service (IMPS), national electronic funds transfer (NEFT) and real time gross settlement (RTGS)'. This technological breakthrough will help decrease tax evasion, curb black money and fake currency, save time in real-time transactions and mitigate risk.

It is imperative to make every individual financially literate to precisely plan his/her financial decisions, as they directly impact a nation's economic growth. Financial literacy means understanding the basic financial concepts,

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and the knowledge and skills required to make efficient financial planning and decisions using the available financial products and resources to get maximum benefit³.

Cashless economy in India

Although the 'cashless economy' is the buzzword of the current economy, the stepping stone for the same was laid by GoI in 1996 by introducing an online banking system in different branches of ICICI bank. Recognizing the benefits and ease of work, in 1999 banks like HDFC, IndusInd and Citi availed online banking facilities. Subsequently, the entire banking system in India adopted net banking services. This new transformation in the banking sector could be marked as the beginning of the digitalization era in India⁴. However, it was limited to big business firms and industries in the metro cities. Various institutions were set up to overcome the challenges and facilitate an easy and smooth payment system under the jurisdiction of GoI.

Clearing Corporation of India Limited

This was established in April 2006 under authorization of the Central Bank of India, Reserve Bank of India (RBI). Clearing Corporation of India Limited (CCIL) acted as a Financial Market Infrastructure (FMI) to provide smooth clearing and settlement of trades in the money market, Government securities, forex and derivative markets.

National Payments Corporation of India

RBI and the Indian Banks' Association (IBA) formed the National Payments Corporation of India (NPCI) in 2008. Since then, it has acted as an umbrella organization for creating a robust payment and settlement infrastructure in India using ICT. NPCI started its journey with ten core promoter banks as its stakeholders, and gradually, this expanded over the years with the involvement of more banks. Since its launch, NPCI has been able to introduce vivid products, namely IMPS, RuPay card scheme, Unified Payments Interface (UPI), Aadhaar Enabled Payments System (AePS), Aadhaar Payments Bridge System (ABPS), National Automated Clearing House (NACH), NETS and BBPS. To meet the global outreach and primarily internationalization of RuPay and UPI, NPCI launched International Payments Limited (NIPL) in RuPay and UPI. Through its continuous efforts and the vision of Digital India, RuPay is now gaining a global identity.

Adding to the industrial mechanism, the Digital India programme launched in 2015 enhanced the digital transformation by acting as a catalyst and bridging the digital divide. The nine pillars of growth identified by the flagship programme, viz. broadband highways, universal access to mobile connectivity, public interest access programme,

e-Governance, e-Kranti information for all, electronic manufacturing, information technology (IT) jobs and early harvest programmes, transformed the digitalization process in the financial as well as all the major sectors and is still expanding. On 29 February 2016, the Ministry of Finance, GoI introduced guidelines for payment through cards and digital means to improve the ease of conducting digital transactions and reduce the risk associated with them⁵. In addition, RBI released the 'Payment and Settlement System in India: Vision 2018' in June 2016 to develop a roadmap and encourage online payments. With the announcement of demonetization on the eve of 8 November 2016 by GoI, people readily moved towards online payment modes to avoid a cash crunch. Since then, GoI has been taking proactive steps to promote the technologically aided payment system and make India less cash-centric by promoting UPI, launching indigenous platforms like Bharat Interface for Money (BHIM), campaigns like Digi Dhan Abhiyan, Jan Dhan Yojana and Aadhaar Pay. During the COVID-19 pandemic, consumers started opting for digital payments for their daily needs. Thus, UPI transactions in India doubled during the lockdown phase (Figure 1). Recently, there has been a slowdown in growth due to the rise in transaction decline and technical glitches in the banks⁶. New technologies are gaining recognition in the payment ecosystem by focusing on the positive side of this digital wave. India is expected to create up to US\$ 1 trillion of economic value from the digital economy by 2025 (ref. 7).

Role of ICT in a cashless economy

Although digitalization in the banking sector is attributed to a monetary evolution, ICT is a major player in this transformation from traditional to online banking⁸. With the complete support of ICT, India can move towards a cashless economy as it helps create a practical instrumental framework for the financial sector. ICT has improvised the system with RBI by introducing concepts like automated data flow (ADF), cloud computing, information security, data acquisition and Foreign Exchange Transaction Electronic Reporting Systems (FETERS). To enable global integration and stay on par with the international banking system, RBI has also established the Department of Information Technology with a vision to use ICT to create a safe, secure and protected banking ecosystem. GoI's Information Technology Sub Committee (ITSC) also extends its guidance and support to the IT cell of RBI to resolve issues⁹.

Requisites for cashless payment

RBI has always been a pioneer in enabling and promoting digitalization, be it conceptualization, execution or investment in technology to enhance the payment system. Therefore, RBI acts as the owner and regulator of this system. To enable a quick, safe and secure payment system, the

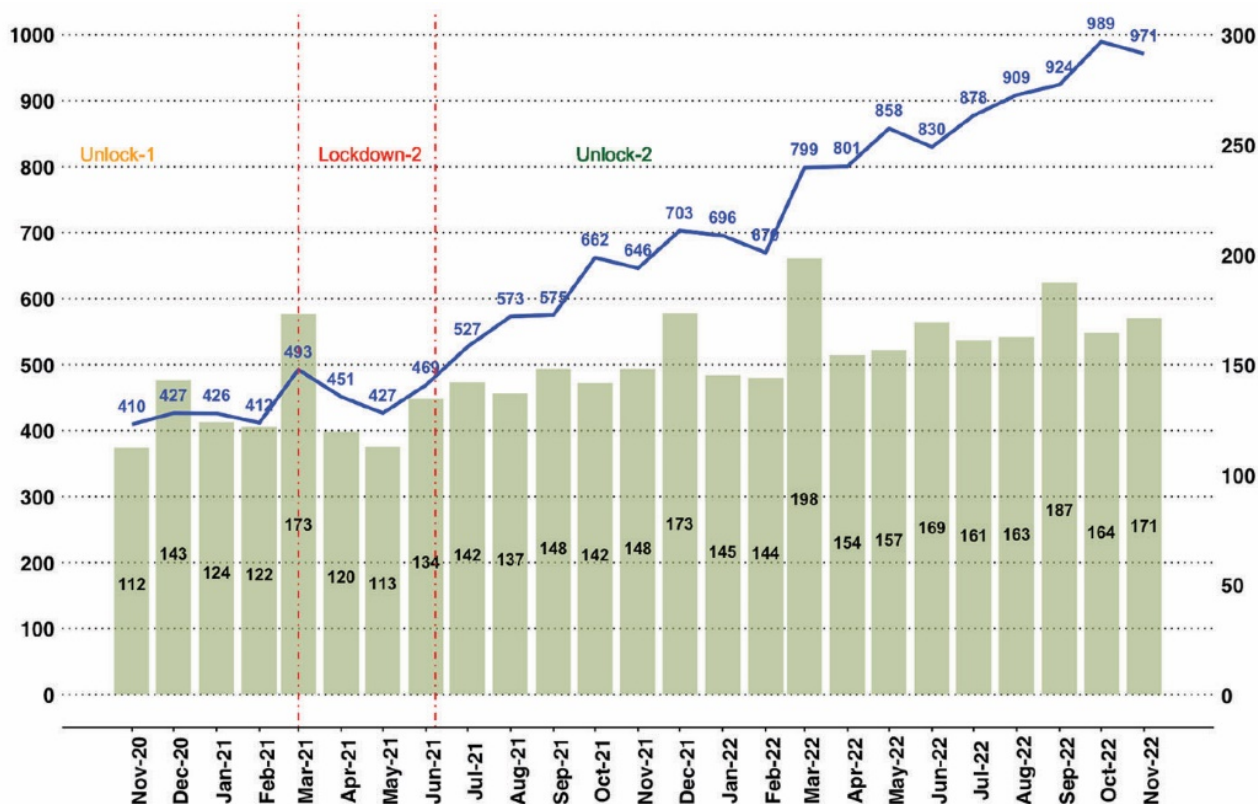


Figure 1. Trend in digital payment transactions (in terms of volume and value). Source: ref. 21. Note: Digital payment volume (Rs in crore) is represented by a line plot and the bar plot represents digital payment value (in Rs lakh crore).

adoption of new technology and innovation, easy access and quality infrastructure plays a major role.

Mobile phones and internet connectivity

The growth of digital infrastructure in terms of the spread of mobile cellular networks, mobile accessibility and internet penetration has significantly improved over the past decades in India. All the financial institutions in the country offer banking services through channels like Unstructured Supplementary Service Data (USSD), internet banking, message services and mobile-based applications. The penetration of 3G, 4G and recently, to some parts, 5G internet networks and smartphone usage, even in remote areas, have facilitated this digital revolution. Reports showed that mobile cellular connections and total internet users had surged to 1.1 billion and 658 million respectively, by the end of April 2022. On average, Indians consume about 10 GB of data every month.

Bank accounts

The availability of bank accounts plays a major role in the evolution of digital payment. This includes deposit accounts in all the commercial banks in India.

Aadhaar

The launch of Aadhaar, a unique identification number for every citizen of India and enabling e-KYC (electronic Know Your Customer) have catalysed digitalization. Authentication of Aadhaar using biometrics is mandatory for making merchant payments or business correspondents.

Banking cards (debit/credit)

Since the financial year 2010–11, there has been a considerable increase in the issue of debit and credit cards. RuPay cards issued for basic savings bank deposits hold a major share of the debit cards issued by the banks. This has facilitated physical and online card-based payments and helped in the growth of a cashless economy.

Cashless payment system

In India, cashless transactions started around the 1980s with the launch of credit cards. With the increased demand, new virtual businesses and mobile applications joined the race to offer instant retail payments. Some of the digital payment methods available to consumers are as mentioned below¹⁰.

Table 1. Total unified payments interface (UPI) transactions (2016–17 to 2021–22)

Year	Volume (million)			Value (Rs billion)		
	Total financial transactions	Total UPI transactions	Percentage share	Total financial transactions	Total UPI transactions	Percentage share
2016–17	7,138.40	17.36	0.25	96,626.07	69.47	0.07
2017–18	9,857.60	915.23	9.28	113,552.76	1,098.32	0.97
2018–19	16,806.25	5,353.40	31.85	136,719.23	8,769.70	6.41
2019–20	35,044.00	12,518.62	35.72	169,794.25	21,317.30	12.55
2020–21	44,414.90	22,330.70	50.28	165,529.97	41,036.54	24.79
2021–22	72,653.00	45,956.10	63.25	181,064.82	84,157.32	46.48

Source: Compiled from NPCI.

Banking cards (debit/credit/prepaid/travel and other cards)

Banking cards were first introduced by RBI as credit cards for easy transactions. Today, various banking cards like debit cards, prepaid cards, credit cards and travel cards are available for the convenience of consumers.

Unstructured Supplementary Service Data

USSD was launched in 2016 for mobile banking services in basic feature mobile phones without internet connectivity. It aims to provide financial inclusion to each common person in the country. Customers can avail of services such as inter-bank account-to-account fund transfer, balance enquiry, mini statement and other services from the transaction menu.

Unified Payments Interface

UPI was launched by the National Payments Corporation of India in 2016. It combines multiple bank accounts into a single mobile application (of the participating bank) to provide several banking features, a virtual address and seamless merchant payments. It also offers ‘peer-to-peer’ payment requests that can be scheduled and paid as needed and convenient. Each participating bank provides its own UPI app for different mobile platforms. Table 1 presents the total Unified Payments Interface (UPI) transactions in terms of volume and value since its launch. The data suggests that UPI transactions have recorded an unprecedented growth from 17.36 million to 45,956.10 million in terms of volume and from Rs 69.47 billion to Rs 84,157.32 billion in terms of value.

Mobile wallet

This falls under the prepaid payment instrument (PPI) category. In this category, Paytm wallets have gained massive acceptance since their launch. A mobile wallet is like an individual wallet, but the cash is stored in digital format by linking individual bank accounts to the digital wallet.

Bank prepaid cards

Prepaid cards are reloadable cards that work on the principle of ‘pay now, use later’, i.e. it allows the user to spend the amount pre-deposited in the card. To some extent, such cards offer better security than regular banking cards.

Point of sale

Point of sale (PoS) is provided by the Merchant Establishment (ME) to carry out merchant payment of goods and services through credit/debit cards and UPI.

Aadhaar-enabled payment system

AePS offers a payment model led by the bank that permits interoperable financial transactions at PoS terminals through the business correspondent of participating banks using unique Aadhaar authentication.

Mobile banking

This is an app-based platform provided by a financial institution to carry out different financial transactions. Each licensed bank provides its mobile banking app after getting the required permission from the RBI.

Micro ATMs

These are portable devices that business correspondents use to carry out their financial transactions, employing card swipe machines. They bring about ease in carrying out day-to-day business without payment hindrance.

Internet banking

This is an electronic payment system provided by financial bodies and banks to carry out financial transactions through their on-line portal or website. It is also known as virtual banking or e-banking. Under this category, there

are different types of financial transactions like NEFT, RTGS, Electronic Clearing System (ECS) and IMPS.

Types of financial transactions

National Electronic Fund Transfer

NEFT is a retail payment system implemented in 2015, owned and operated by RBI. It has emerged as the most popular payment system as it has no ceiling attached to the amount per transaction and provides a safe, secure and affordable payment system around the clock. Since 2019, RBI has waived the NEFT processing charge, which was earlier collected from the member banks.

Real-Time Gross Settlement

RTGS was launched in 2004 and is considered India's large-value payment system (LVPS). This is also owned and operated by RBI. As the name suggests, the transactions are carried out in real-time in the books of the Reserve Bank of India (RBI). To facilitate global integration and more comprehensive payment flexibility, RTGS is available round the clock. To promote financial transactions using RTGS, RBI has also waived the processing charge and time-varying charge that were earlier applicable.

Electronic Clearing System

ECS was introduced by RBI in the early 1990s to handle bulk and repetitive periodic utility payments like salaries, dividend payments and the interest of different institutions for over 25 years. Later, with NPCI, the umbrella organization to carry out robust payments and settlements, ECS was smoothly shifted to the NACH by 31 January 2020. NACH is a centralized system that operates both NACH credit and NACH debit by consolidating multiple ECS systems across India into one system. NACH credit deals with credit transfers like salary, pension, distribution of subsidies, dividend payment, etc. NACH debit collects utility payments and periodic installments towards loans and mutual funds investments.

Immediate Payment System

IMPS is a multi-channel payment system that offers real-time, 24*7 fast money transfer between the remitter and the beneficiary. India is the fourth country to adopt this payment system after South Korea, the UK and South Africa. Earlier, when it was launched, both parties needed to be registered for mobile banking. Later, it was upgraded to avoid hindrance to its growth by enabling other options like a bank account number linked with an Aadhaar number and IFSC code.

Major instruments promoting cashless economy in India

RuPay

RuPay is India's first global card payment system initiated by NPCI in 2012. The name is derived from two words, viz. 'Rupee' and 'Payment', indicating that it is the country's indigenous card payment system. It provides wider acceptance, a secure network and protection against anti-phishing. It is also one of the major instruments that promote the vision of a cashless economy by offering e-payments. RuPay offers scheme cards, classic and platinum cards that offer user benefits like international acceptance, health and wellness coverage, and merchant offers. More than 1100 banks issue RuPay cards across the country. With the innovation flow, RuPay virtual cards, RuPay global cards, RuPay contactless cards and Bharat e-commerce payment gateways have also been initiated. RuPay contactless card facilitates off-line wallet payment service across all utilities with the vision of 'one nation, one card'. According to an RBI report¹¹, by the end of January 2022, over 651 million RuPay debit cards were dominating the market, with a share of more than 65% of the total debit cards issued. However, the RuPay credit card holds a share of less than 3% (ref. 11).

UPI

This is India's first unified payment gateway for real-time on-line payment transactions, which was launched by the NPCI in 2016. It works on a well-built architecture framework with standard application programming interface (API) specifications¹². UPI brings multiple bank accounts into a single mobile application, allowing seamless money transfer and merchant payment from a single platform. It also offers features like 'peer-to-peer' and 'peer-to-merchant' pay requests. The pilot programme was initially launched with 21 member banks on 11 April 2016. With the success of the pilot programme, almost all the banks started introducing UPI-enabled apps. UPI's payment security, according to the guidelines laid down by RBI, uses two-factor authentication, where the device fingerprint works as the first factor, and UPI PIN is the second. UPI is one of the most preferred modes of payment, with over a billion monthly transactions. By the third quarter of 2022, UPI clocked over 19.65 billion transactions in volume and INR 32.5 trillion in value. The total number of UPI quick response stood at 216.43 million, registering an increase of 81% compared to September 2021. Tables 2 and 3 present the top five UPI remitter and beneficiary banks based on the transactions volume. As of March 2022, the top three UPI apps accounted for 94.8% of total UPI transactions and 93% of UPI transactions value¹³.

JAM infrastructure

This refers to the GoI’s initiative to link Jan Dhan accounts opened under the Pradhan Mantri Jan Dhan Yojana (PMJDY) scheme, Aadhaar card and mobile numbers to ensure access to government subsidies, financial services and insurance. Since its launch, the JAM infrastructure has served as the bedrock of many Government monetary initiatives by reaching out to citizens in the utmost corners of the nation. Under the JAM infrastructure, a total of 19.72 crore bank accounts were opened, and 16.8 crore RuPay cards were issued under the Jan Dhan Yojana scheme. Second, Aadhaar linkage helped in getting accounts verified through e-KYC. Lastly, mobile phones were used to provide information about subsidies, deposits and Government benefit schemes in regional languages as well. Thus, the JAM infrastructure was a catalyst in implementing a cashless economy.

Growth of India’s cashless ecosystem

Over the past decades, digital payment has witnessed exponential usage and growth in social acceptance as portrayed in Figure 2. Studies have shown that there has been a

Table 2. Top five UPI remitter banks (November 2022)

UPI remitter banks	Total volume (million)
State Bank of India	1951.85
HDFC Bank Limited	649.64
Bank of Baroda	475.43
Union Bank of India	447.27
ICICI Bank	396.06

Source: NPCI.

Table 3. Top five UPI beneficiary banks (November 2022)

UPI beneficiary banks	Total volume (million)
Paytm Payments Bank	1617.99
Yes Bank Limited	1261.66
State Bank of India	877.76
Axis Bank Limited	541.43
ICICI Bank	493.34

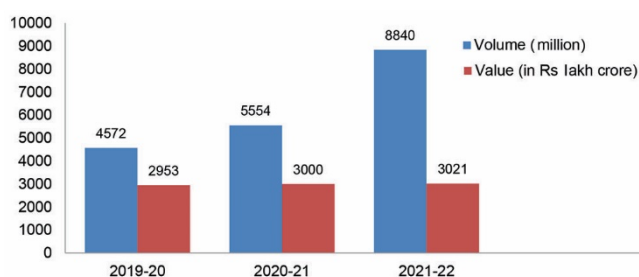


Figure 2. Total digital transaction in India in terms of volume and value. Source: Reserve Bank of India (RBI).

surge in the number of users adopting mobile banking and internet banking by 99% and 18% respectively, between March 2019 and September 2021. Table 4 presents the digital payment transactions in terms of volume and value for the financial years 2010–11 to 2021–22. The data reports that during the financial year 2010–11, India’s digital transactions were 96 crores, valued at Rs 4.98 billion. During the financial year 2021–22, the same surged to 7195 crores, with the value increasing to Rs 17.44 billion.

During the financial year 2010–11, the payment system was dominated by paper currency. However, with the more in digital awareness, literacy and infrastructure landscape, the share of payments through paper currency declined, and the number of electronic payments increased considerably. Figure 3 present a comparison of retail transaction methods in terms of volume share during 2010–11 and 2021–22.

Despite the digital expansion, cash remains the preferred transaction method, as indicated by the decrease in average value per digital transaction. The amount of cash in the economy can be attributed to the increase in cash withdrawals under different initiatives and beneficiary schemes by GoI in rural areas. Also, most business firms still prefer cash payment for their day-to-day transactions¹⁴.

By September 2022, 23.06 billion transactions in volume and INR 38.32 trillion in value were processed through debit and credit cards, PPIs like mobile wallets and prepaid cards, and UPIs. The UPI transactions included peer-to-peer (P2P) and peer-to-merchant (P2M) transactions. UPI P2M emerged as the preferred payment mode, with a market share of 34% in volume and 17% in value. According to the Economist Intelligence Unit Report 2021, UPI made India stand out as a global leader in the real-time payment market, followed by China and South Korea. Seeing the success of UPI, many countries like Brazil, Bahrain, Saudi Arabia, Singapore, the United States and the European Union are now trying to adopt it in their market as well¹⁵.

Table 4. Digital payment transactions in terms of volume and value (FY 2010–11 to 2021–22)

Year	Transaction volume (Rs crore)	Transaction value (Rs 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
Compound annual growth rate	43.09	10.96

Source: RBI.

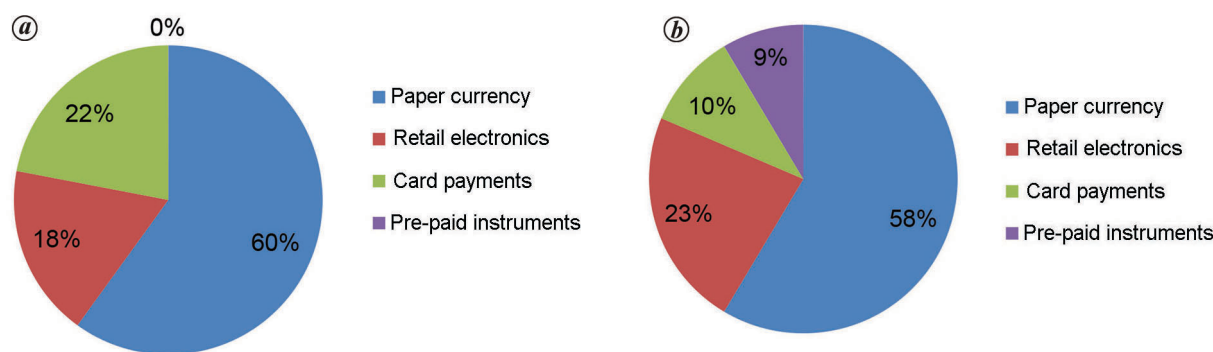


Figure 3. Comparison of retail transaction methods in terms of volume in (a) 2010–11 and (b) 2021–22. Source: National Payments Corporation of India (NPCI).

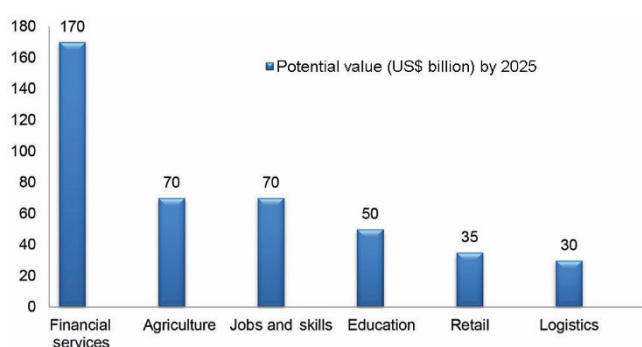


Figure 4. Sector-wise growth in India by 2025 due to digital transformation. Source: ref. 10.

One of the biggest moves by GoI in 2022 was the launch of the Central Bank Digital Currency based on blockchain technology. According to the Finance Minister, Nirmala Sitharaman, ‘Digital currency will help to create an efficient and inexpensive currency management system’. India’s digitization efforts have also been applauded by the chief economist of the International Monetary Fund (IMF), Pierre-Olivier Gourinch, who mentioned, ‘Digitisation is helping along several dimensions. One is financial inclusion because many people in countries like India are unbanked. Furthermore, having access to digital wallets is a way in which they can enter into transactions that are not just cash transactions. Digitalization will be a game changer for India as it has allowed the Indian Government to do things that would have been difficult to do otherwise’¹⁶.

Impact of cashless economy on India’s economic growth

Cashless transactions are considered a major force in economic development and significantly benefit both emerging and developed economies. According to a report by economic analysts, the Digital India initiative could boost our GDP by around US\$ 1 trillion by 2025. Past studies suggest that cashless payments increase operational efficiency

while decreasing operational costs, resulting in better revenue and business growth. When the economy has an effective payment system, macroeconomic indicators will show positive effects such as GDP growth, employment generation, labour productivity, growth in several businesses and revenue leakages for the Government. There is also an increase in the efficiency of financial markets and the financial system as a whole, which enhances consumer confidence and enables trade in goods and services. According to a McKinsey report¹⁷, the digital economy is expected to generate between 60 and 65 million jobs by 2025. Figure 4 presents the potential value (in billion \$) of major sectors of the digital economy as per the McKinsey global institute analysis.

To validate the impact of digital payments on India’s economic growth, the present study analysed the causal relationship between digital payments and economic growth in the country during the period 2013–21 using ordinary least square (OLS) regression. Economic growth was quantified using a proxy – real gross domestic product (GDP), while RTGS, CCIL-operated systems, paper-clearing, electronic retail clearing, card payments and PPIs were the proxies used to quantify digital payments in India. The real GDP information and digital payments data were collected from the RBI database. The formulated multiple regression model is presented below

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \beta_6X_6 + e,$$

where Y is the logarithm of real GDP for India at the time t , X_1 the total value of RTGS for India at time t , X_2 is the total value of CCIL-operating systems for India at time t , X_3 the total value of paper clearing for India at time t , X_4 the total value of electronic retail clearing for India at time t , X_5 the total value of card payments for India at time t , X_6 is the total value of PPIs for India at time t .

The real GDP of India has been considered as a dependent variable, while digital payments are considered as the independent variables in the OLS regression estimates; also, all the values of independent variables are logged values.

Table 5 shows that during the study period, PPI (P -value = 0.05) is the only independent variable that impacts the real GDP significantly, while the other variables have no significant impact on the real GDP at 5% level of significance. As the P -value of F statistic is 0.00, the prediction model under evaluation is significant at the overall level. Similar studies were carried out earlier by Ravikumar *et al.*¹⁸. They concluded that retail payments had a significant short-run impact on the real GDP throughout the study period. Consequently, over the long run, cashless payments may indirectly contribute to economic growth through quick, low-cost and more convenient commercial transactions.

Digital innovation will also help decrease our carbon footprint by reducing fuel consumption, waste management and creating greener workplaces, ultimately contributing to a greener ecosystem. With the emergence of technologies such as artificial intelligence, the Internet of Things (IoT), cloud computing, blockchain and robotics, the Government might capitalize on these new pathways to further fuel India's digital and technological growth. For instance, the ICT sector contributes to efficiently managing and utilizing scarce and non-renewable resources, whereas cloud technology minimizes carbon emissions by strengthening mobility and flexibility. Major changes in the technology space will affect the economic system and contribute to environmental changes¹⁹. Digital platforms can help farmers in terms of know-how (selection of crops, seed variety), context (weather, plant protection, best cultivation practices) and correct market information (market prices, market demand, logistics).

Potential impacts of cashless payment on the economy

Creation of a formal and pure structure of economy: It has been observed that a cashless economy results in the establishment of a proper formal and functional economy in the country. When all the transactions are made clear, clean and taxed, it may lead to the creation of a formal framework for the entire financial system, leading India towards progress.

Maintenance cost: Another significant aspect is maintenance in terms of storage of notes, money distribution

through ATMs at different locations, security of the notes, and counterfeit note-detection systems. It has been reported that GoI spent roughly about 5% of the GDP on maintenance costs. In a nutshell, we can save roughly Rs 500 crores by this means alone.

Assist in reducing the high rate of organized crimes: In an environment where cashless payments are widely used, illicit transactions can be easily traced and tracked. The cashless economy assists the Government in keeping a check on the free flow of cash by limiting the amount of cash flowing through the system to reduce activities such as armed robbery, corruption, kidnapping and money laundering. The presence of a cashless economy will undoubtedly lead to the growth and development of India through the collection of surplus taxes and spending of these taxes for the Welfare scheme's benefit.

Lowering commodity costs: The cashless economy attempts to lower commodity costs by eliminating the black market and with proper tax deposits. All of this leads to the development of a system in which consumers may find a fair commodity market price.

Agriculture sector

By bringing together various technological advancements, digital innovation has revolutionized the face of the agricultural sector. GoI has also supported this sector in every possible way to increase farmers' awareness about emerging technologies and enhance productivity. For instance, on-line bank accounts can offer farmers the income and spending data they need to qualify for lower-interest bank credit. Crop insurance may become more accessible to farmers due to digital land-registry records. Precision agriculture, viz. delivering real-time data to farmers' mobile phones, enables them to optimize fertilizer, insecticide and other inputs, potentially increasing crop yield by 15% or more. Farmers could use different online agricultural marketplaces after harvest to transact with a broader range of potential buyers. One such platform is GoI's electronic National Agriculture Market (eNAM), which can potentially improve farmers' income by 15%. Combining these and other digital technologies in this vibrant sector might help food production keep up with population growth and add US\$ 70 billion to the Indian economy by 2025 (ref. 20).

Digital Payment Index of the Reserve Bank of India

The development of the composite RBI-DPI was initiated by RBI and included in the sixth bi-monthly monetary policy statement for 2019–20. The composite DPI was developed using March 2018 as the base period; it depicts the adoption penetration of digital payment across India²¹. It is calculated based on five parameters, namely (i) payment

Table 5. Ordinary least square regression

Variables	Coefficient	Standard error	Probability
L_RTGS	-0.5737	0.2174	0.1186
L_CCIL_OS	-0.0774	0.0486	0.2525
L_PC	0.5531	0.1650	0.0787
L_CP	0.2151	0.0594	0.0686
L_ERC	0.2054	0.0897	0.1492
L_PPIS	0.0398	0.0097	0.0550
C	5.4699	0.7377	0.0177
R -squared	0.9994	F -Statistic	638.75
Adjusted R -squared	0.9979	Prob (F -statistic)	0.00

Table 6. Parameters and sub-parameters of RBI-DPI

Payment enablers	Payment infrastructure			
	Demand-side factors	Supply-side factors	Payment performance	Consumer centricity
Internet	Banking cards	Bank and financial institutions	Digital payment systems: volume and value	Awareness and education
Mobile phones Aadhaar	Prepaid payment instrument (PPI) Registered mobile and internet banking	Business correspondents ATMs	Unique users Paper clearing	Security grievance Complaints
Bank accounts Merchants	FASTag	PoS terminals QR codes	Currency in circulation Cash withdrawal	Cyber fraud System glitches and downtime
Participants		Common service centres		Transaction declines

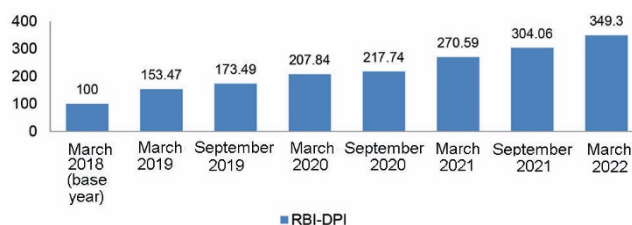


Figure 5. RBI-Digital Payment Index (RBI-DPI). Source: ref. 20.

enablers (weightage of 25%), (ii) demand-side factors of payment infrastructure (weightage of 10%), supply-side factors of payment infrastructure (weightage of 15%), (iii) payment performance (weightage of 45%) and (iv) consumer centricity (weightage of 5%). Table 6 explains the sub-parameters within them. Figure 5 presents the composite RBI-DPI and suggests that the DPI for March 2022 stood at 349.30, recording a CAGR of 28.42% since 2018.

Payment vision 2025 of RBI

To achieve a cashless economy, India has undergone major technological developments to develop one of the most modern payment systems in the world. For the convenience of the commoner, various safety and security measures have been addressed time-to-time to provide a better platform. RBI has played a major role in developing this structured payment ecosystem in India. Increased adoption of this new technology and innovation has helped India to compete in the global payments space, not only in terms of growth in digital payments but also in the availability of safe, secure and efficient payment systems. Over 26 crore digital payment transactions are processed daily by our payment systems, of which UPI processes more than two-thirds.

The current vision document of RBI outlines the rough framework for the payments ecosystem up to December 2025. As we move towards realizing Payments Vision 2025, the action plan for enhancing digital penetration, cyber security and customer centricity should focus on the five pillars of (i) integrity, (ii) inclusion, (iii) innovation, (iv)

institutionalization and (v) internationalization. Adhering to these five pillars will elevate cross-border payments by improvizing constraints like cost, transparency, speed and accessibility. As a less-cash and less-card society unfold, simultaneous expansion in the basket of digital payment options would ensure RBI’s approach to facilitate users with a seamless digital payment experience. This will also strengthen India’s position as the global leader in the digital payments domain²².

Digital penetration in India

Growing internet penetration, affordable data, technological breakthroughs, and the Government’s emphasis on building digital infrastructure ensures faster delivery, better targeting and improved accountability. India’s core digital economy grew 2.4 times faster than the overall economy between 2014 and 2019. The Government’s emphasis on developing digital infrastructure which ensure public availability of digital components for more participatory service delivery systems promotes market-led innovations, enables more affordable and faster on-boarding of services, and facilitates the development of more transparent systems, thus accelerating economic growth through higher financial inclusion, greater formalization, increased efficiencies and enhanced opportunities. As a result of addressing the rural–urban digital divide, India now has over 1.17 billion mobile telecom customers, 600 million smartphone users and 840 million internet connections. Figure 6 depicts the rate of internet penetration in India from 2013 to 2022, indicating an increase from 15.10% in 2013 to 48.70% in 2022.

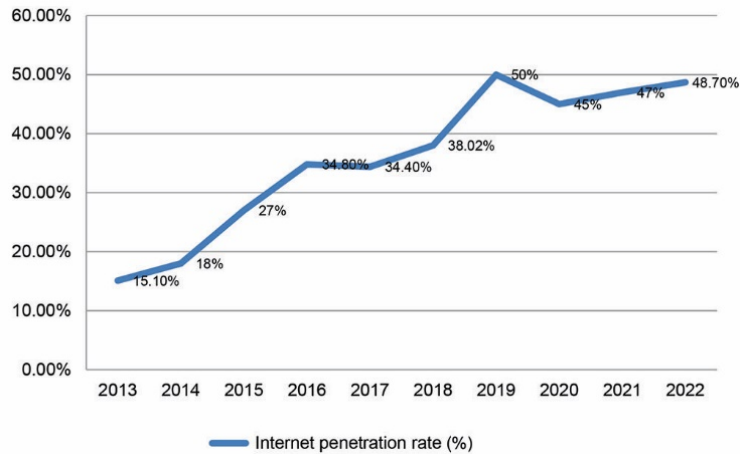


Figure 6. Internet penetration rate (%) in India from 2013 to 2022.

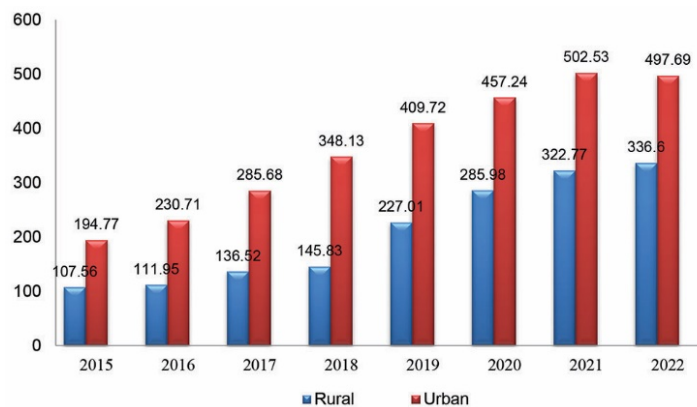


Figure 7. Number of internet connections in rural and urban India from financial year 2015 to 2022.

This deliberate effort to bridge the gap between rural and urban internet penetration has resulted in positive outcomes. We have added more internet subscribers in rural areas than in urban areas (Figure 7). The 200% increase in rural internet subscriptions between 2015 and 2021, compared to 158% in urban areas, demonstrates the Government's increased emphasis on bringing rural and urban digital connectivity to the same level. This has become possible due to dedicated digital drives across rural areas through ambitious Government schemes such as the flagship Bharat Net Project Scheme, Telecom Development Plan, Aspirational District Scheme, initiatives in North-Eastern Region through Comprehensive Telecom Development Plan (CTDP), Production Linked Incentive (PLI) for telecom and networking products, and initiatives towards areas affected by Left Wing Extremism (LWE). To further develop digital linkages at the grassroots level and improve consumer experience in rural areas similar to urban centres, a project to achieve penetration of a 4G wireless network in uncovered villages across India has been approved. This initiative will provide 4G mobile services in 24,680 uncovered communities in remote and challenging locations,

while 6279 villages will be upgraded to 4G from 2G/3G network.

Capacity building and awareness programmes for promoting a cashless economy

In order to promote a cashless economy, the following steps have been taken by GoI and RBI:

- (i) Creating awareness and educating people about the vision of the Digital India campaign, i.e. 'cashless, faceless and paperless'.
- (ii) The Central Government, with cooperation from the state/Union Territories, is looking to improve the payment acceptance infrastructure to enable citizens to pay by various modes such as Internet banking, mobile banking and mobile applications. It also hosts sessions on the mechanism of digital financial services such as UPI, IMPS, AadhaarPay and PoS machines, as well as awareness programmes on Government policies.

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- (iii) GoI is also advising all financial institutions and payment service providers to undertake awareness campaigns for the promotion of secure payment practices and generate information security awareness through traditional means of publicity as well as emergent means such as social media platforms.
- (iv) In order to ensure the safety and security of digital payments, various steps have been taken by the GoI and RBI. MeitY has integrated Digital Payment Grievances with the Ministry of Consumer Affairs, GoI. The platform is live and receives digital-payment-related grievances from all the major on-board banks and financial service institutions.
- (v) To digitally empower millions of Indians in rural areas and educate them about cashless transactions, MeitY has launched the scheme titled 'Pradhan Mantri Gramin Digital Saksharta Abhiyan' (PMGDISHA). Under this scheme, it has launched another scheme entitled 'Digital Finance for Rural India: Creating Awareness and Access through Common Service Centres' (CSCs). It also carries out newspaper, digital theatre, FM radio and hoarding campaigns to promote digital payments^{23,24}.
- (vi) About 93% of India's rural population is deprived of digital transactions due to the absence of digital payment infrastructure. The Central Government is focusing on expanding digital infrastructure in collaboration with the National Bank for Agriculture and Rural Development (NABARD) by extending financial support to eligible banks for developing two PoS devices each in 1 lakh villages with a population of less than 10,000.
- (vii) The Indian Farmers' Fertilizer Cooperative Limited (IFFCO), the world's largest fertilizer cooperative, has initiated a Pan-India outreach programme to educate farmers about digitalization and Government subsidies through live demonstrations and interactive sessions.

SWOT analysis of the cashless economy

Strengths

- (i) One-stop payment portal.
- (ii) Maintains transparency.
- (iii) Financial inclusion.
- (iv) Higher revenue.
- (v) Curbs black money or illegal transactions.

Weaknesses

- (i) Digital literacy.
- (ii) Lack of digital infrastructure.
- (iii) Transaction limit.
- (iv) Limited availability of PoS terminals.

- (v) Internet penetration rate is low compared to the global median.

Opportunities

- (i) Strong banking network.
- (ii) Leads to the entry of tech giants and the emergence of new business models.
- (iii) According to a report published by Deloitte, the Indian e-commerce market is expected to capture 11.4% of the country's market by 2026.
- (iv) By 2025, India's digital payment industry is projected to grow, leading to more enhanced payment systems.
- (v) Help India to become a global leader in a cashless economy.

Threats

- (i) Cybercrime.
- (ii) Weak grievance redressal system.
- (iii) Economic singularity.
- (iv) Risk of identity theft.
- (v) It can also influence people's 'Propensity to save'.

Conclusion

Cash transactions are decreasing as the world adopts a cashless society. India is also trying to convert their cash economy to a cashless one. The slow pace of India's move towards a cashless economy calls for development, diversification, and global competitiveness by employing new ICT techniques and blockchain technologies. Undoubtedly, the cashless economy comes with unavoidable risks, security concerns and privacy glitches at the initial stage, as new challenges arise simultaneously with the advancement and adoption of new technological development. This seems to dominate our country due to internal and external factors. Irrespective of the Government's efforts, there are still many obstacles to a cashless economy.

The path to a cashless economy is not as simple as it seems, as implementation has many bottlenecks like enhancing the digital payments landscape, digital divide, digital literacy, consumers' changing perception and market confidence. There is a need to strengthen the collaboration between consumers, financial institutions and the Government so that digital expansion can be easily carried out. Digital inclusion plays a major role in bridging the digital divide. GoI should take adequate measures to educate people and improve the security mechanisms for better implementation and progress of the cashless economy. Equality between cash and cashless transactions is probably a long-race game. However, there are ways to get closer to it by establishing an incentive structure for the switch through enhanced enforcement of a cashless economy.

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