

# FUTURE READY BANKING WITH SMART CONTRACTS - CBDC AND IMPACT ON THE INDIAN ECONOMY

Bibhu Dash<sup>1</sup>, Meraj F. Ansari<sup>1</sup>, Pawankumar Sharma<sup>1</sup> and Swati Swayam siddha<sup>2</sup>

<sup>1</sup>School of Computer and Information Sciences, KY USA

<sup>2</sup>School of Electronics Engineering, KIIT University, India

## ABSTRACT

*India is significantly diverse in culture and how it promotes business transactions. Though we are very acquainted with cash, cards, and online mode of payment, the Indian rural economy still believes in the barter system. At this juncture, India is evolving as a tech power house, and its economy is thriving to embrace cryptocurrency as a medium of exchange. After the Indian finance minister declared the same last February that India is working towards building its legal tender called Central Bank-backed Digital Currency (CBDC), this paper is making an impact in explaining our strengths, weakness, market readiness, and necessity to adopt a digital rupee when India's economy is highly regarded as a cash-oriented economy. Is our country ready to accept the new technological shift in smart banking in the form of a digital rupee? The paper highlights the socioeconomic and technical challenges our planners need to understand before changing the Central banks' monetary policies. The deployment of fifth-generation (5G) cellular network technology has sparked renewed interest in the potential of blockchain to automate different cellular network use cases. 5G is projected to open up new market prospects for small and large businesses. The article highlights the unique instrument of the digital rupee to enhance peer-to-peer transactions with the evolution of 5G mobile technology.*

## KEYWORDS

*Smart Banking, Smart Contracts, Blockchain, digital rupee, Central Bank Digital Currency (CBDC), FinTech, peer-to-peer transactions, security, socioeconomic impact, monetary policy*

## 1. INTRODUCTION

With rapid technological advancement, the banking industry develops fast with digital products to meet customer demands. The century-old traditional banking is dying, and the new peer-to-peer transfer digital currency era is at its peak. Like any other tech-savvy nation, India is also racing ahead to make a digital currency of its own and provide the young generation with the best effective banking solutions at their fingertips. Digital currency is the best innovation in the last decade to make world banking secure, transparent, and faster [1, 2, 23]. Indian economy is said to be fast-growing and considered a bright spot among other global emerging markets. In the global environment, India has multiple strengths of a larger youth population, growing middle-class people, increased literacy level, and improved technical knowledge among the workforce, favorably addressing any proactive change in the present setup. Historically, India has been a cash transaction-oriented economy in almost all business activities. But in a country like India, where 90% of the transactions are in cash, people adopted card or digital modes of payments in a short period after demonetization [1]. The above point illustrates that the Indian financial system is inherently robust and well-adjusted, and our banking system is also well structured to meet any

future financial endeavour [3]. The Indian economy in the future is going to follow a mixed financial model of centralized, decentralized, and token-based FinTech models.

Cryptocurrency is one of the remarkable financial forms that emerged in the past few years. It can be defined as any medium of exchange, apart from real-world money, which can be used in many financial transactions, whether virtual or real. Cryptocurrencies represent valuable and intangible objects that can be used electronically or virtually in different applications and networks, such as social networks, online social games, virtual worlds, and peer networks [1]. Since Satoshi Nakamoto introduced cryptocurrency, it has developed tremendously due to improved technology and advanced usage methods. This technology is well utilized in India, with various companies incorporating technology in their daily transactions, with start-ups taking the spotlight in technological utility. Three primary industries that have taken digital currency into their day-to-day operations are insurance, banking, and financial services.

Additionally, the Indian public sector started utilizing this technology in various activities such as registering land titles, farm insurance, and health records management. Vietnam and China are the only countries those rank ahead of India in adopting and researching digital currency. The declaration of the Indian government in their last budget session to build a digital rupee by the end of 2023, which will be used as a legal tender, is a significant move forward to establish India as a digital economy [4].

## 2. SMART BANKING AND THE NEED FOR DIGITAL CURRENCY

The finance industry has been the most regulated industry type for decades. But innovations in the field of Artificial Intelligence (AI), Natural language Processing (NLP), Blockchain, 5G network, and the Internet of Things (IoT) have pushed the finance sector to adopt these technologies to meet growing customer needs. The growing pace of smart banking adoption helped finance industries focus on speed, efficacy, security, and cost reduction. With the evolution of social media and internet banking, the unstructured data volume has increased in Fintech. But that gives banks the control to get data insights and use those for customer self-service analytics. In smart banking, self-service solutions are the new quality measuring tools in the era of big data analytics for quicker and better decision-making [5]. As the internet and smartphone users are constantly increasing globally, banks are getting enormous pressure to operate in a 24\*7 virtual mode to offer their services to their clients. The graph below shows how internet users have constantly increased in the last decade [6].

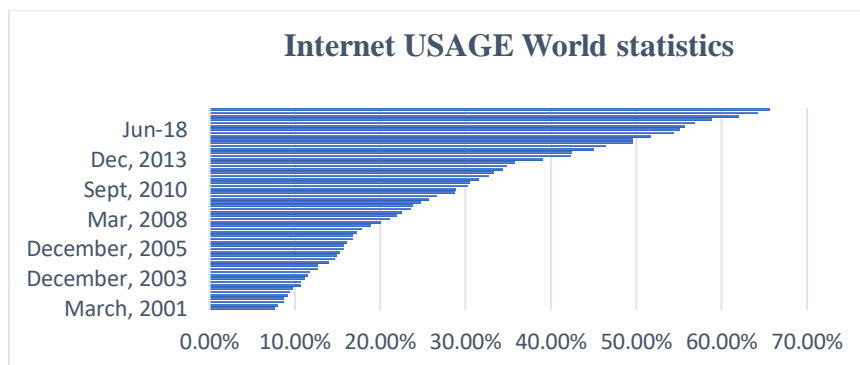


Figure 1. Internet usage trend in the world in the last two decades

Note: From Internet growth statistics 1995 to 2022 - the global village online., Copyright 2022 by Miniwatts Marketing Group.

Blockchain has made an enormous contribution to reshaping modern-day financial and banking institutions. As a centralized and distributed technology, it is a powerful tool in many banking functions. The critical needs of banking, such as trust, transparency, agility, speed, and security, can be addressed using Blockchain technology [6, 7]. So, it's not a luxury but a need for the banking system to accept this technology at this hour. The smart contract for blockchain-based financial and banking systems is critical in setting pre-defined agreements among bank customers. But the innovation in the private cryptocurrency market is putting a lot of pressure on countries and financial institutions to think about a government-approved legal tender in the form of digital currency. Many countries, including India, are seriously considering developing a digital legal tender by the end of 2013 [7]. Digital legal tender scope with its limitations is the main topic of discussion for future banking sustainability, which we address below in detail concerning India.

### **3. BLOCKCHAIN AND CRYPTOCURRENCY**

In simplistic terms, blockchain technology handles blocks uniquely identified, linked transactions like a chain structure. Each block is chained to the previous one by its referenced hash-value, called a digital fingerprint of each block, created by a hashing function [8]. Blockchain systems are transparent distributed ledger technology connected to the nodes responsible for validating a smart contract's governing logic. This technology gives users high confidence because each transaction is unchangeable and allows all parties to have identical records [8].

Cryptocurrency is one of the most significant technological achievements of the modern era, which promotes a peer-to-peer (P2P) transaction system that relies on "Cryptographic proof rather than trust" [4, 9]. Cryptocurrencies are digital assets representing value made possible by cryptography and Blockchain [1]. A unique and unalterable timestamp records each transaction in cryptocurrency, and each party has a copy to avoid authority problems at any given period. Each transaction code is broadcasted to all nodes on the network, and it needs approval from all legitimate parties to get processed. Larry Ren from Reddcoin notes, "The underlying principle of such a strict mechanism is essential for expanding resources when confirming transactions" [2]. In modern blockchain processes, users do not host copies of ledger data among themselves. Instead, they use a cloud service provider (CSP) to maintain active and backup copies of the Blockchain and compute the transactions and blocks as they happen. P2P networking is necessary in these cases to run the Blockchain, and the CSP becomes a third party to track the transaction history [1].

Crypto and Blockchain have been around for a long time, but in the last couple of years, executives around the globe have been thinking of accepting and adding those into the mainstream of the business. Now, cryptocurrencies are considered alternatives for payments and new assets for time and cost savings for an enterprise's digital future. But still, executives are in doubt, and some view differently to accept it into the global finance streams. The detailed challenges are highlighted below from a PWC study conducted in 2018-19 and published in Business Insider magazine [3]. The regulatory, compliance, trust, and intellectual property concerns are the biggest worries of the modern-day executives of blockchain adaptation.

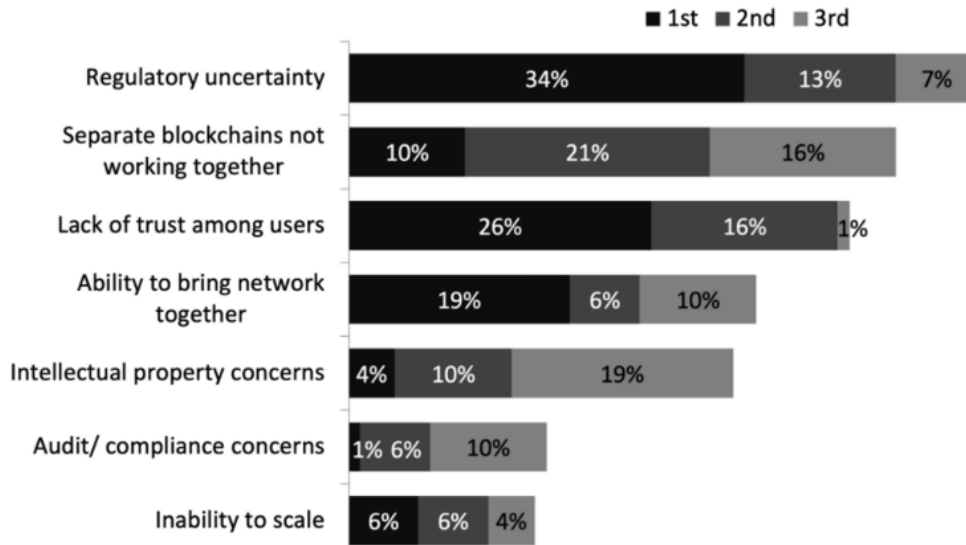


Figure 2. Global Finance Executives' View of Blockchain Adaptation and Challenges

Note: Adapted from “How the laws & regulations affecting blockchain technology and cryptocurrencies, like Bitcoin, can impact its adoption.” Business Insider., by S., Dolan., 2021, Copyright 2021 by www.businessinsider.in.

#### 4. COVID-19 PANDEMIC AND THE CRYPTOMARKET

The current COVID-19 pandemic has significantly accelerated crypto usage in all areas. The digitization wave is a catalyst for how people do financial transactions nowadays. The number of private cryptocurrencies and people investing in those assets increased multifield in recent years. The parallel economy created by private crypto investors forced many governments to step towards digitization and develop their digital currency. As a result of the COVID-19 lockdown, most consumers opted for digital transactions, further accelerating digital currency growth [1]. This change places a blockchain among the contributors to sustainable development since it is connected to almost all development objectives. The high digital transactions during this pandemic have forced many governments worldwide to think more about the future and adaptability of crypto as approved legal tender. Blockchain can also be utilized by individuals and the government across various sectors. In a populous country like India, Blockchain presents another benefit by providing transparency, development, security, and transaction efficiencies among vulnerable communities.

Fear sentiment, uncertainty, and organizational asset price dynamics were impacted heavily during this stock market pandemic. Similarly, unregulated and ill-informed crypto assets fluctuated heavily during this pandemic [10]. A study by Susana et al. [11] revealed that compared to the pre-pandemic period, the upswing and downswing of the crypto market are more frequent during this COVID-19 pandemic era. It created many public nuances and built a parallel financial layer globally, threatening the global economy. This market condition forces many countries to make crypto transactions taxable or ban the total black-crypto market by introducing digital currencies to beat crypto. Countries like China, Venezuela, and eastern Caribbean nations are the front runners in declaring and building cryptocurrencies equivalent to their national currency [12]. In a recent development, India, following in the same footsteps as other countries and seeing the global crypto trend, has recently announced building her digital rupee by 2022-23 [2].

## **5. DIGITAL RUPEE AND THE INDIAN ECONOMY**

As the 6<sup>th</sup> largest economy, blockchain adaptation presents India with global strategic positioning to obtain solutions to its business environment, security, jobs, and capital problems. As a result, the government is keen to facilitate the background to ensure that innovation in this area occurs without disruption. However, administering Blockchain is expensive, with a demand for high-end resources to facilitate the complete processing of data. The various nodes in the Blockchain perform the same tasks as their data copies. Many banks in India, such as the State Bank of India, Kotak Mahindra Bank, ICICI Bank, Axis Bank, and Yes Bank, approve Blockchain. All these banks project a high growth potential with immense growth progress into the future [2, 13]. These banks started using blockchain in their international financing transactions [4]. There is an exciting step forward by the Institute for Development and Research in Banking Technology (IDRBT), the technology and research arm of RBI, as it is working on a technology model using a blockchain platform to facilitate Indian banks' banking needs. This move comes when blockchain technology prototypes are fast-moving from experimentation to deployment in many financial institutions [4]. As the digital market is gaining more popularity across the world economy, there are many benefits that the Indian government will avail of by adopting the digital rupee using blockchain technology, which is explained in detail below.

### **5.1. Transparency**

Cryptocurrency enhances transparency, where every transaction can be traced back to the central node. Also, Blockchain, the technology on which the digital rupee is based, is immutable. This means that transaction histories are permanent and unalterable and can help significantly bring down fraud and corruption as the data cannot be altered by any means [7]. Digital rupee payments will reduce the settlement risk in the financial system. Interbank settlement will not be required as the system will transact the digital currencies instead of bank balances, just like the cash is handed over. Similarly, forex transactions would be able to pay its American exporter in real-time in digital dollars [12]. Digital currencies in India will promote real-time and cost-effective globalization of payment systems.

### **5.2. Employment Growth**

The crypto industry currently employs about 50,000 individuals, and as per a report, the industry is poised to see massive employment opportunities globally, pegged at over 800,000 by 2030 [12]. India already has a strong talent pool of finance professionals and IT experts. Additionally, the talent is available at cost-effective rates. With the rise of the cryptocurrency market, India is becoming a central hub and global destination for the cryptocurrency market [7, 14].

### **5.3. Boost the FinTech Sector and Taxation**

As mentioned earlier, India already has a strong base of IT professionals. The collaboration of IT and the financial sector can bring endless business openings and overseas cash influx opportunities. Additionally, with the Indian government getting strong regulatory measures to implement new Goods and Services Tax (GST) and create laws for an official digital currency, it will attract substantial foreign investments [7]. Digital rupee and crypto acceptance will boost the FinTech sector and move the Indian economy forward. A shift from cash to digital transactions will lead to better tax compliance. The government will record a noticeable rise in tax to GDP ratio in the future [15].

#### **5.4. Enhanced Digital Payments**

Cryptocurrency transactions are both time and cost-effective. The transactions are carried out between the sender and receiver without needing a third party, making the transactions easy and instant [5, 16]. Furthermore, the transaction charge levied by intermediaries like banks and payment gateways is exterminated. It helps reduce the transaction cost, helping save money on each transaction. Thus, implementing a digital rupee will not only support India's financial inclusion goal, but crypto transactions can significantly enhance digital payments, bringing down the time and cost of each indenture [16].

#### **5.5. Achieve the Goal of Atmanirbhar Bharat**

India has consistently positioned itself among the largest recipient of remittances. The digital rupee will solve those problems because remittances involve a high fee and a long waiting time for processing [10]. With the government proposing the creation of a single, officially recognized cryptocurrency, the dependence on third-party, private, and foreign-based cryptocurrency will be eliminated. Popular cryptocurrencies like Bitcoin, Ethereum, Dogecoin, and others are foreign-based. The official cryptocurrency will be developed entirely in the country and must depend on other cryptocurrencies for inter-transnationality based on the core blockchain architecture. Investors, trades, and other individuals will have a single digital rupee for their needs and help the government fulfill its goal of 'Atmanirbhar Bharat' in cryptocurrency [2, 17].

#### **5.6. End of the Fake Currency Problem**

As per the Indian Statistical Institute (ISI), the movement of fake currency in the Indian economy is Rs.400 Crore at every point in time. It was also stated that the Rs.70 Crore counterfeit currency is also being inserted annually into the Indian economy, making it an economic security risk [18]. The digital rupee will also put an end to it as technologies will discard fake notes. It will eliminate the prospects of fraud and hidden customer charges as businesses will be in charge and monitor advertisements from the start while observing their expenditure [19]. Blockchain allows customers to select their share data, just like companies do.

#### **5.7. Saving on Printing and Supplying Cash Notes**

As per the data provided by the Indian currency notes press, the standard cost of printing ₹10, ₹50, and ₹500 notes are ₹0.86, ₹1.24, and ₹2.71, respectively, in the year 2018-19 [3]. Also, the above study highlights that the cost of the supply chain of cash notes to different parts of the country is a few crores of rupees annually. So, if the digital rupee is introduced, this extra cost of printing and delivery can be saved, which is considerable in the long run.

### **6. DIGITAL RUPEE AND ITS CHALLENGES IN INDIA**

#### **6.1. Technological challenges**

Digital Rupee's technical ecosystem is vulnerable to cyber-attacks in the same way that present payment systems. Furthermore, the rise in digital payment-related scams may expand to digital rupees in areas with lower financial literacy levels in the country. As a result, institutions dealing with the digital rupee must ensure strong cybersecurity standards while focusing on financial literacy. The economy's ability to absorb the digital rupee partly depends on technological readiness and digital literacy. The development of a census-taking digital currency system relies on the advancement of high-speed internet and telecommunication networks and adequate

technical support for storing and transacting in digital rupee with the public. The proposed 5G countrywide implementation will catalyze the digital rupee strategy execution and speed delivery [20]. Lower levels of technology adoption and cryptocurrency unfamiliarity in underdeveloped areas in India may restrict the reach of the digital rupee and exacerbate existing inequities in access to financial goods and services [21].

## 6.2. Socioeconomic Challenges

Some economists believe the Indian digital rupee needs intensive thought and less implementation. The Indian government's claim that this digital rupee will boost its digital economy by adopting this Central Bank Digital Currency (CBDC) by replacing paper notes needs more socioeconomic analysis considering the diversity of Indian culture. The digital rupee without ATMs will be operated from smartphones without any limits. It will give more purchasing power to the consumers, which will be a direct liability to the Reserve Bank of India (RBI), like cash transactions [15]. As per the analysis of Mukherjee [12] from Bloomberg, the digital rupee will restrict cash flow to banks, impacting weaker banks to maintain sticky, low-cost deposit accounts. The above study also highlights that the less-liquid balance sheets will make the banks vulnerable and create financial instability.

Compared to other countries globally, India accounts for 15% of the money supply, which shows cash is not dying in India. While Sweden and the United States are researching meticulously in adopting digital currency, they are still seeking public opinion on whether to issue the digital rupee or not [15, 22]. As transactions will be in digital mode using smartphones, CBDC will be designed so that the central bank can trace all transactions and check money laundering cases. Also, the mindset of the Indian public needs to be changed to adopt the technology-driven currency. Though the crypto market is booming on social media and online, it is still unknown to the general public [23]. According to 2021 figures, just 4.5% of individuals have used Bitcoin or digital currency according to a poll [24]. As rural industries and farming drive the Indian economy, technology needs to be reachable everywhere to facilitate this digital journey. Considering India's vast digital divide (Figure 3), the RBI needs to balance the technology, Blockchain, and otherwise to balance the main goals of speed, scalability, auditing, and security to manage this drive [12, 24]. Proper digital and security training plans must be implemented in all rural areas, districts, and cities to ensure better usability and benefits of these digital rupees.

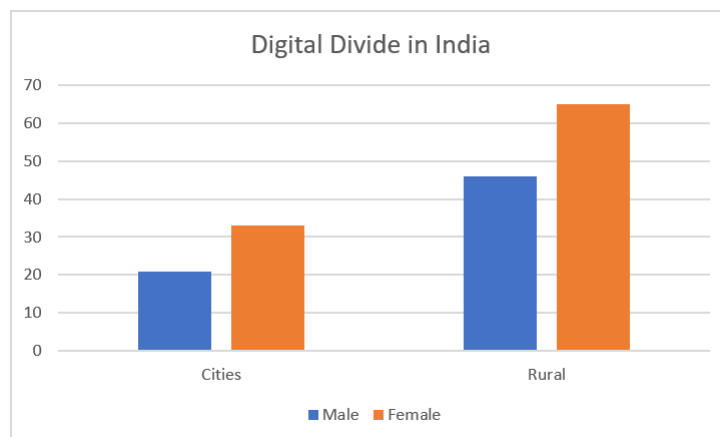


Figure 3. Digital Divide in India

Note: Based on data from India's gendered digital divide: How the absence of digital access leaves women behind., by M., Nikore, &I., Uppadhayay, 2021, Copyright 2021 by Observer Research Foundation.

## 7. DIGITAL RUPEE AND THE INDIAN MONETARY POLICY

Interest in a central bank digital currency has risen in the last few years. But it is crucial to analyze digital policy implementation, transmission, and stability for a future Indian financial structure. CBDCs can potentially affect the behavior of the public and the Indian economy at large. Suppose the demand for CBDCs exceeds supply, and CBDCs are primarily issued via the banking system, as is expected. In that case, additional liquidity may be required to compensate for currency leakage from the finance system.

For this reason, much recent debate has focused on using negative interest-bearing CBDCs for monetary policy efficacy because negative interest rates are ineffective due to the transition to cash [25]. Many advanced western countries have been limited in their capacity to cut interest rates due to the meager inflationary economy [26]. If money can carry a negative interest rate, the monetary transmission to increase digital rupee demand would be more successful. As a result, the case for paying a negative interest rate on CBDC as an unorthodox monetary policy instrument to encourage consumption needs to be authenticated [1, 26]. Interest-bearing CBDCs can impact the attractiveness of fixed deposits held by traditional banking systems, negatively impacting Indian banks' overall lending capacity. But for sure, the Indian FinTech sector will have three future exchange modes: cash, e-card-based online payments, and CBDC-backed digital rupee. The Venn diagram (Figure 4) represents the same.

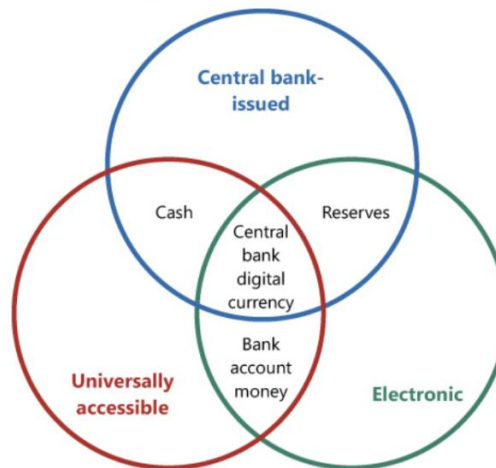


Figure 4. Three modes of prominent exchanges in India

Note: Adapted from Central bank cryptocurrencies., by M., Bech, and R., Garratt, 2017.

The Reserve Bank authorities are taking a cautious stand on designing and planning CBDCs and are still studying its risks. Considering the Indian mode of operation and young and middle-class families, the above three modes of transactions need to be balanced well with logical meaning to handle cyber threats and the possibility of counterfeiting [26]. A nuanced and calibrated approach is required to launch India's first digital currency.

## 8. RECOMMENDATION FOR FUTURE WORK

The banking industry's primary worry is fraudulent activities and cyber threats [27]. To maintain the financial industry strong and sustainable, the government should focus more on data and client privacy [28]. This technology can be upgraded with new generation AI and federated



learning. Consequently, these CBDC investigations will give academics, authorities, and economists fresh insights on how to speed up the study and research of digital money in India. Because India and its business model prioritize cash and financial institutions, the FinTech industry needs a detailed plan before implementing it in many parts to achieve its goal of being a \$5 trillion economy by 2030. Before implementing the plan across the country, the implementation model must be thoroughly explored.

## 9. CONCLUSION

Undoubtedly, India is marching toward a more digital economy every day. As the Indian government ventures into the blockchain-backed digital rupee, citizens' trust will increase. This belief is due to peer-to-peer transactions, which eliminate fraud and increase transparency from public auditing. But the technology is still new, and various developments are going on worldwide to find better alternatives for implementing cryptocurrency in countries. There will be gains from the step in India, but that may not happen immediately, and government needs a proper blueprint of digital governance and risk analysis before moving ahead. As India and its business model are more favorable toward cash and banking systems, the FinTech industry needs a perfect plan before implementing it in different parts. The implementation model needs to follow a proof of concept (POC) pilot model in some business segments in a few metros to test its usability and popularity before rolling out the plan countrywide. As India has been struggling for decades to control money laundering, corruption, demonetization, and terrorist funding, the CBDC provides a better opportunity to trace the movement of funds. CBDC will be more attractive and promising than cash to attract young generations to replace notes and coins in the long run. India surely needs more preparation as it will present its financial model as 3Cs, a mixed model economy- Cash, Card, and Crypto.

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## AUTHORS

**Bibbu Dash** is an Architect-Data and Analytics in a Fortune 100 financial organization in Madison, WI. He completed his Ph.D. in Information Technology at the University of the Cumberlands, Kentucky. Also, Bibhu has a Master of Electronics and Communication Engineering and an MBA from Illinois State University, Normal, IL. Bibhu's research interests include AI, Cloud Computing, Big Data, and Blockchain technologies.

**MerajFarheen Ansari** completed her Ph.D. (IT) from the Graduate School of Information Technology, University of the Cumberlands. She also completed her MBA with a Specialization in Management Information Systems from Concordia University, Milwaukee, WI, USA. Her research interests include cybersecurity awareness, eliminating Cyber Threats, & ML. Her current research involves making organizational employees aware of cyber security threats using AI awareness programs. Currently, she is a Security Analyst at Northern Trust Bank, Chicago, IL.

**Pawankumar Sharma** is a Senior Product Manager for Walmart in San Bruno, California. He is pursuing his Ph.D. in Information Technology at the University of the Cumberlands, KY. Pawankumar Sharma completed his Master of Science in Management Information Systems from the University of Nebraska at Omaha in 2015. He also holds another Master of Science in Information Systems Security from the University of the Cumberlands, Kentucky, and graduated in 2020. His research interests are in the areas of Cybersecurity, Artificial Intelligence, Cloud Computing, Neural Networks, Information Systems, Big Data Analytics, Intrusion Detection, and Prevention.

**Swati Swayamsiddha** is an Assistant Professor at the School of Electronics Engineering, KIIT University, Bhubaneswar, India. She has a Ph.D. in Electronics and Communication Engineering, focusing on spectrum distribution and networks. Her research interests are Artificial Intelligence, Neural Networks, IoT, and 5G networks.