

Chapter 13

Blockchain for Financial Technology: Challenges and Opportunities for India



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Abstract The chapter explores the challenges and opportunities of Blockchain-based Financial Technology applications from the Indian perspective. Blockchain has a recent hype worldwide and India responds to it making itself open to both the challenges and opportunities. India has niche societal characteristics, which makes its Blockchain confrontation unique than the other countries exposed to this technology. This chapter contributes to the understanding of these niche characteristics to identify the unique challenges and opportunities of implementing the Blockchain technology from the Indian perspective.

Keywords Blockchain · Fintech · Challenge · Opportunity · India

13.1 Introduction

Blockchain is one of the fastest-growing trends in the last few years (Crosby et al. 2016). This technology has brought many opportunities for the globalization of finance through facilitating Financial Technology (FinTech) applications (Imansyah 2018). It has given us options to transform a plethora of traditional applications and serve our day-to-day needs in a radically more efficient and effective way (Sharma 2018). Blockchain has become a global trend, and India should embrace the opportunity it brings. India, one of the world's fastest-growing economies, considers the applicability of Blockchain seriously, along with its opportunity and relevant challenges.

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Blockchain is a digital, immutable, transparent, and distributed ledger system that chronologically records transactions in almost real-time (Coindesk 2016). The introduction and record of transactions in a ledger is subject to the approval of all the participants (called nodes) of the Blockchain network (Chepurnoy et al. 2016). Furthermore, Blockchain records are immutable and transparently viewable and accessible by all participants, which provides a persistent way of security and control of the data records by preventing their manipulation and errors (FinTech Futures 2017). As such, Blockchain is a shared network through which ‘values’ in the form of high-quality data and records are exchanged over the internet between participants stationed in any part of the world (Christidis and Devetsikiotis 2016) without an intermediary (Morini 2016). Because Blockchain is immutable, no changes can be made once a transaction is recorded into it, which ensures data integrity and security and reduces opportunities for fraud.

Blockchain can be defined as a digitally distributed ledger (Zheng et al. 2017), where transactions are recorded in a ledger in an automatic sequential order (Coindesk 2016). Every transaction recorded is time-stamped, i.e., against the time of transaction occurring or entry, which becomes permanent in the history and viewable and trackable by all participants (NRI 2015; Lee and Chuen 2015). As a result, Blockchain becomes an unalterable technology, which ensures its security. Blockchain can offer much more benefits than the current technology in use. The key advantages offered by Blockchain technology includes—decentralization, transparency, traceability, data security, and a high degree of data encryption (Singh 2018).

The motivation for the chapter stems from the recent confrontation among Indian regulators and the Supreme Court regarding the implementation of the Blockchain technology through the mainstream banking channel. The chapter contributes by outlining the challenges posed for implementing this technology in the Indian context and steps taken in order to mitigate these challenges. This chapter also outlines the opportunities ahead subject to a successful implementation of the technology in the financial services industry. Policymakers, regulators, and stakeholders should consider these challenges and opportunities in FinTech implementations based on this technology.

The rest of the chapter is structured as follows. The second section presents the Indian Blockchain context; the third section investigates the challenges regarding this new technology for India; the fourth section explains the mitigation steps taken against the challenges that exist. The fifth section discusses the opportunities offered for the Indian economy and other stakeholders given the Blockchain technology appropriately implemented, while the final section concludes.

13.2 Indian Blockchain Context

The relevant Indian context needs to be understood first in order to explain the challenges and opportunities of Blockchain technology in India. The latest Blockchain news is about all the severe challenges that are hidden with the adoption of the technology in the existing systems. Indeed this is a revolutionary shift in the field of operations, which has become quite efficient with the encryption-based technique (Bakshi 2018). As the world changes—so do the work culture and opportunities in the market (Akins et al. 2013). The one who changes and modifies with time survives the transformation. The same applies to the application of Blockchain technology within the Indian market, which is going through a breakthrough revolution. Even though it has been evolving since the 1990s but it came into the spotlight with the cryptocurrency craze. The entire crypto operation is based on a Blockchain-based platform. The popularity of Bitcoin has helped in spreading awareness of this technology. Blockchain news then spread like fire in the market and is now picked up by major multi-national corporations. The best feature of Blockchain is that it applies to a majority of domains, particularly in FinTech, and not just limited to cryptocurrency trade (Bakshi 2018).

India's serious inclination toward the Blockchain-based FinTech applications can be understood from the proactive stances undertaken by the Reserve Bank of India (RBI)¹—the nation's central bank. Since 2017, RBI has conducted at least seven studies about Blockchain and its Distributed Ledger Technology's (DLT) implementation for a decentralized and cashless financial system (Priyaranjan et al. 2020). Despite the RBIs time taken to study the situation before incorporating the Blockchain trading in its banking system, the Supreme Court has allowed Indian banks to get involved in the Blockchain service and related business without any delay (Simms 2020). Several state governments have expressed their decision to embrace this updated and improved technology. For example, the Karnataka government is progressing toward Blockchain-based e-government system and the state hosts the country's Centre of Excellence (CoE) for Blockchain Technology (Choudhury 2020; THBL 2018). Besides, the Telangana government has decided to use Blockchain to digitize land records and other government data management (Sharma 2018).

Figure 13.1 shows the Blockchain use-cases in India developed into the proof of concept (PoC).² These include trade finance, supply chain finance, E-KYC (Electronic—Know Your Customer) document management, cross-border payments, and employee loyalty or rewards.

The usages of PoC in India can be put forward with examples as follows.

¹ RBI is the central bank of India.

² Here, Proof of Concept (PoC) is the evidence from a pilot study, important in order to check the feasibility of deploying a new technology.

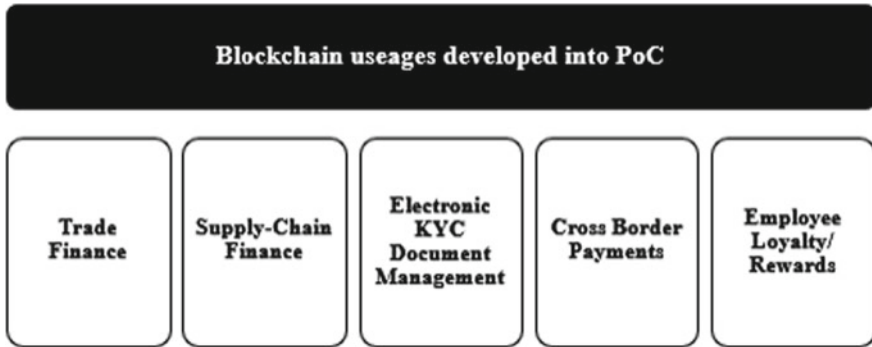


Fig. 13.1 Blockchain experiments by Indian players (*Source* Deloitte 2017)

- **Trade finance:** In October 2016, ICICI Bank—a private sector bank in India—was India’s first and the world’s one of the few financial institutions to execute international trade finance and remittance transactions using Blockchain in partnership with Emirates NBD—a leading bank based in Dubai.
- **Supply chain finance:** In 2016, Indian conglomerate Mahindra Technology in partnership with technology giant IBM initiated a cloud-based application to transform supplier-to-manufacturer trade finance transactions through a permissioned distributed ledger (Manda and Polisetty 2018). The next year, Bajaj Electricals started using Blockchain-based ‘smart contracts’ for facilitating ‘supplier finance’ in collaboration with Yes Bank, IBM, and Cateina Technologies. The adoption has helped the organization slash payment processing time close to real-time from its previous duration of 4–5 days (Manda and Polisetty 2018).
- **Electronic-KYC management:** In 2016, the National Stock Exchange—India’s largest and leading stock market started using Blockchain for verification and management of KYC document in collaboration with some of the leading banks in India. Indian FinTech startup Elemental implemented the process in partnership with ICICI Bank, IDFC Bank, Kotak Mahindra Bank, IndusInd Bank, RBL Bank and HDFC Securities (Higgins 2017; IFC 2017).
- **Cross-border payments:** Stellar India Consultants³ has collaborated with four financial institutions to enable low-cost global money transfers to the Philippines and cross-border payments to and from India, Europe, Kenya, Ghana, and Nigeria. Axis (with Dubai-based RAKBank) and Yes, Kotak and IndusInd (in collaboration with RippleNet)—five of the private sector banks in India are currently testing Blockchain transactions focused mostly on cross-border remittance & trade settlements (VK 2019).
- **Loyalty/Reward programs:** Customer loyalty and reward programs for financial and non-financial institutions are often hectic and involve large and ever-increasing data management and analytics. Blockchain technology could

³ Stellar provide its specialized consultancy services in Electrical, Low Voltage, HVAC, and Public Health Engineering.

help minimize errors, maintain full transparency and smooth monetization of loyalty/rewards programs through e-wallets. Deloitte India has launched a Blockchain-based pilot project covering the management of customer rewards and recognition programs (Deloitte 2017).

With these unique features of Indian context, adoption and implementation of Blockchain technology pose distinct challenges as well as opportunities.

13.3 Challenges for Blockchain in India

Challenges are countless as the Blockchain is going through a very early stage of adoption. It might be risky to commit to apply and to predict its applicability for mainstream technology. Many upgradations still need to be implemented to make it safe and secure. Despite the highly promising outlook of the Blockchain technology and its applications, many unanswered questions remain that could make Blockchain a vulnerable venture to pursue. Blockchain is at the same stage where the internet was during the 1990s. The internet faced doubts and hesitation during its days of initial launching similar to what the Blockchain technology experiences today. However, with time, this technology grew, and similarly, the technology is expected to rise in the future (Noyes 2016a).

The fact that Blockchain being over-hyped than usual has created unrealistic expectations from the technology. The lack of regulation and compliance specification are few of the major challenges at the national level against the successful adoption of Blockchain technology. The existing literature identifies a number of challenges in Blockchain adoption at the firm level across the business value chain (not limited to financial technology), classified in several broad categories. For example, technological (e.g., immutability and immaturity of the technology, power consumption, the lack of appropriate platforms), social (e.g., the potential use of multiple identities, privacy concerns), political, and policy (e.g., the lack of national regulations, policies, and commitment), economic (e.g., large initial investment, maintenance cost), intra-organizational (e.g., the lack of management commitment and technology readiness, financial constraints), and inter-organizational (e.g., the lack of participation by business partners, problems and disagreements in collaboration, and information sharing) (Saber et al. 2019; Kosmarski 2020; Pournader et al. 2019; Grover et al. 2019; Dutta et al. 2020; Sternberg et al. 2020).

To date, many people in India remain in darkness about the concepts of digitization, which could make the idea of adopting Blockchain into the mainstream somewhat unrealistic and suffer from a disconnection with reality. To master this technology, one needs to have some specific skills, for example, training in programming languages such as Java, C++, and Python, a deeper understanding about financial services and payment systems, and a detailed knowledge about big data and data analytics (Sharma 2018). This points to the fact that the readiness of the Indian society is still under question for Blockchain technology. As a result, society as a

whole and the government should identify certain implementation challenges before the all embraced implementation of Blockchain technology. The steps that need to be completed to implement this technology are—onboarding end-users, enabling regulations, reshaping the roles of financial institutions and building necessary financial system infrastructure (IANS 2018).

Blockchain shows enormous potential in India's financial services industry, particularly in the banking and insurance sectors. Most of the progress happened so far have been realized through collaboration and partnership between the major FinTech enablers such as financial institutions, FinTech startups and technology companies. In addition, many large non-finance corporations are increasingly inclining to adopting Blockchain for innovating and enhancing the efficiency and effectiveness of their traditional business processes (Nair 2016).

Several Indian corporations and enterprises have already piloted Blockchain's real-life applications in the areas of international trade finance, international payments, bills discounting, supply chain finance, loyalty program management, and digital identity conversion and verification (Jaag and Bach 2016). Similarly, many Indian financial institutions such as banks and at least a stock exchange are playing a pioneering role in adopting Blockchain into their regular products, services, and processes. The main aim for most of these early adopters is to explore Blockchain's potential as an alternative to achieve a greater efficiency, effectiveness, and coverage through innovation in products, services, and processes. However, the journey of these experiments remains full of challenges, which exposes the serious difficulties lying ahead in the way of adopting Blockchain across the board. Some of the key challenges include the lack of knowledge and awareness among the stakeholders, the 'too fast to keep pace with' nature Blockchain's technological evolution and the challenges associated with operational and cultural integration across organizations and stakeholder groups.

While the use of Blockchain technology gains momentum at the industry level, the Reserve Bank of India (RBI)—main financial services regulatory authority in India closely monitors the developments (Foroglou and Tsilidou 2015). The technology research arm of RBI—the Institute for Development and Research in Banking Technology (IDRBT)⁴ took the initiative to understand the applicability of Blockchain to the Indian Banking and Financial Industry in mid-2016. The Institute conducted a workshop where stakeholders from all spheres, such as the academics, bankers, regulators, and technology partners participated in contributing to an in-depth understanding of the technology, opportunities and challenges, finally the implementation impact on the society. Participants in the working group include experts from all major banks and related bodies in the country (FinTech Futures 2017). The workshop participants contributed to the development of a White Paper, which covers the fundamentals of the Blockchain technology and the critical issues surrounding it, detailed studies on its applications globally, and the potential areas for its adoption

⁴ Institute for Development and Research in Banking Technology was established by the Reserve Bank of India for its technology related activities. Available at <https://www.idrbt.ac.in/conferences.html>.

in India's financial services industry. The document also outlines several key benefits of adopting Blockchain, such as cost and time efficiency and greater transparency. Furthermore, the IDRBT has drafted a PoC on the applicability of Blockchain in trade finance particularly through active contributions from National Payment Corporation of India, banks, FinTech start-ups, and technology firms (FinTech Futures 2017).

Deloitte—an IDRBT working group member, presented a study analysis at the IDRBT conference in Hyderabad in 2017. This study was conducted based on a questionnaire survey on and interviews of India's early adopters of Blockchain, which presents a detailed understanding about the potential challenges to the technology's adoption from the perspectives of both a customer and a technology service provider (Axon 2015). The study suggests that the journey toward Blockchain adoption can be clearly divided into three major phases as depicted in Fig. 13.2, where the challenges skew toward the pre-PoC stage. Based on the observations, the most critical challenges met by businesses at the PoC levels pertains to six major activities—building awareness, identification of business case and partners for PoC, selection of Blockchain platforms or service providers, partner onboarding, the development of a congenial environment, and security and integration-related difficulties (Biryukov et al. 2014).

Figure 13.2 presents the stages of Blockchain implementation in order to mitigate these challenges while performing the PoC.

The proposed pre-PoC stage can take three to four months approximately to intra-organization awareness about Blockchain technology by firms intending to adopt it, identify a clear and systematic business process and the relevant stakeholders for

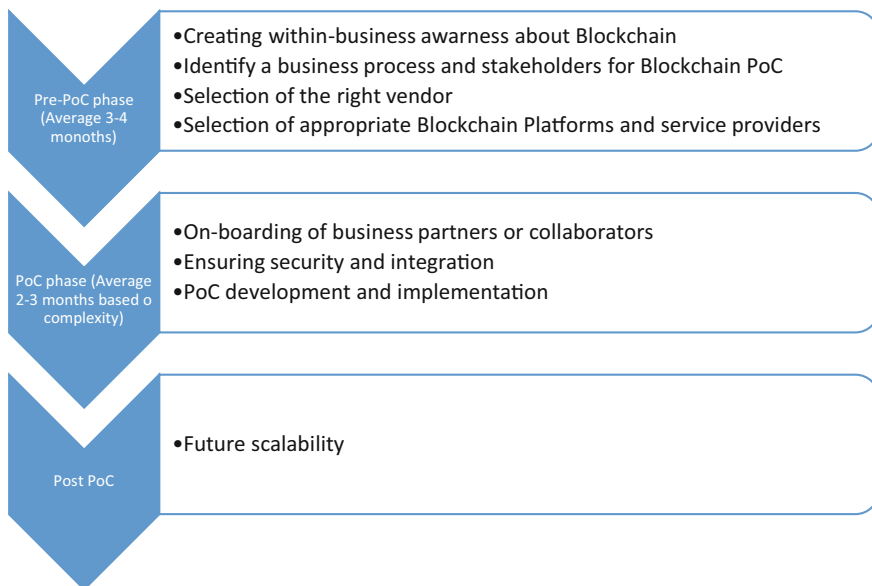


Fig. 13.2 Stages of blockchain implementation (Source Deloitte 2017)

the PoC, selection of both appropriate vendors and suitable platforms. The PoC stage may take a further two to three months on average based on their complexities to onboard business partners, to check security and integration, and finally the PoC development and implementation. Further, the post-PoC stage includes the future scalability according to need at times.

Each of the stages has its importance in Blockchain adoption and implementation. However, at the pre-PoC stage, the biggest challenges during the PoC development include the difficulties and complexities pertaining to the adoption and identification of the Blockchain use-cases. At the same time, the unavailability of uniform standards and complications related to the existing IT landscape works as a fundamental barrier in developing the PoC and its full-scale implementation in the later period. Nevertheless, an appropriate selection and combination of business collaborators, Blockchain platforms, and technology service providers drive the success or failure of a PoC (Deloitte 2017).

Taking all these challenges and survey findings into account RBI put a temporary ban on immediate adoption of Blockchain finance by the Indian banking industry. However, this ban was lifted by the Indian Supreme Court in early March of 2020 (Simms 2020). However, RBI warns this will expose the Indian banking industry to significant risks as they might still not be ready for the accompanying risks involved in the Blockchain transactions (Helms 2020). This might also have a spillover effect in the long run on all other sectors.

Before full stream adoption and application of the technology, the regulators, policymakers, government, and stakeholders need to be appropriately ready for the challenges it poses.

13.4 Mitigation Steps Against the Challenges

Major mitigations steps to counter the challenges in the adoption and implementation of the Blockchain technology faced by business houses are as follows.

Lack of Awareness

Since Blockchain is a relatively new technology, the lack of awareness and knowledge remains a key barrier to Blockchain adoption across the world (Noyes 2016b). For firms that want to adopt Blockchain, the ideal first step for them is to develop an internal team that will learn the technology at depth and breadth covering its technical architecture and mechanisms, impacts, and application areas in the businesses' operations. In addition to in-house training, knowledge-sharing sessions, and employee Hackathons, key employees could also be sent for attending external events such as training, conferences, and industry working groups to develop a comprehensive understanding about the technology (Gogerty and Zitoli 2011; Eyal and Sirer 2014).

Firms should consider the expenses related to Blockchain training and learning as an investment rather than just an operational expenditure.

Identifying the Right Platform, Vendor, and Partner for PoC

Once a use-case is identified and decided, the next big difficulty is to find the appropriate platform, technology service provider, and partner or collaborating firms to run a real pilot test (Meiklejohn et al. 2013). To mitigate these challenges, firms intending to implement Blockchain could develop cross-functional teams within the organization, continue consultations and focused group discussions with the prospective partner or collaborator firms, develop an inter-organizational team with the suitable partner firms, and then outline a comprehensive project charter with specific milestones and key performance metrics.

Integration and Data Security Challenges

It is important to confirm that the technology's actual integration and data security (e.g., customer data encryption) do not result in a threat or risk. During the implementation phase of PoCs, most of the early adopters came up with only a minimum number of viable products to pilot the application of the Blockchain technology. This approach allowed a smoother and carefully-monitored integration of the new technology with the existing one. As an effort to ensure data security, they also developed effective strategies for data purging or masking (i.e., a way of erasing the data blocks created so that no one can access them anymore) (Pilkington 2016). It is necessary to ensure the reliability of the technology.

While the challenges remain critical and valid, India shows an effective track so far in mitigating the challenges posed by Blockchain implementation.

13.5 Opportunities in Indian Perspective

This section unveils the opportunities and benefits offered by the Blockchain technology in the niche Indian context.

Blockchain technology has emerged as an accessible technology because of its decentralization feature (Foroglou and Tsilidou 2015), which is most likely to find applications in different aspects of mainstream society (Kosba et al. 2016). Blockchain can be a great platform that enables a range of extra facilities such as tracing the origin of a financial transaction (Sharma 2018). If appropriately implemented, Blockchain features increase the security and reliability of the technology. Blockchain has the potential to streamline land records (Dixon et al. 2012), asset

registries, auto records, voting records (Dennis and Owen 2015), national identity, financial transaction records, and traceability (Peters et al. 2015). All these can eliminate corruption on a large scale and bring the large informal sector into the formal economy (Singh 2018). Blockchain, alongside other innovative technologies including artificial intelligence, machine learning, data analytics, and robotic process automation could improve the efficiency of India's current trade finance system by manifold (Assocham 2018; Omohundro 2014). Besides, according to Deloitte (2017), Blockchain's use for digital identity management and 'know your customer' (KYC) seems highly promising.

Job creation is an inevitable blessing that India might enjoy from the technology. There is an acute shortage of Blockchain developers, and it has been observed that budding engineers are now opting-out from the conventional streams. According to the latest Blockchain news, it is alleged that there will be several high paying jobs in the next decade. Giant technological companies like IBM and Tech Mahindra are conducting seminars and workshops to spread awareness on Blockchain technology (Bakshi 2018).

Neighboring countries like China have Blockchain technology and its application closer to mainstream life. Unable to deny the spill over-expectation and the obvious temptation of the advantages this technology offers, India strives forward to find the use of Blockchain in its mainstream activities. As India takes steps toward digitization; Blockchain will be the next thing the country would be aiming for. There are many sectors, which have significant value for Blockchain addition like infrastructure, education, finance and pharmaceutical (Sapirshtein et al. 2015). In addition to this, it is likely to open new career options for the upcoming generation (Eyal and Siner 2014). Those who become proficient in it will have bright opportunities in the forthcoming years as it might replace the old conventional operational platforms (Bakshi 2018). India striving toward a sustainable democracy, voting is a potential field where the use of Blockchain Technology can potentially have a revolutionary role to ensure transparency (Ayed 2017). Although this is not very feasible right now, in the long run, the nation will find this technology to ensure accountable and secure voting (Sharma 2018).

Despite the major challenges posed by technology, Blockchain offers many benefits to Indian society and stakeholders.

13.6 Conclusion

The Indian economy is likely to be benefitted immensely from the adoption of Blockchain technology. If this new technology is proved to become successful and can be practically implemented in India, it has the potential to bring in a revolutionary change in society. Blockchain can contribute with an opportunity to create a new set of jobs to enable the nation to be independent of the unemployment problem (Sharma 2018). Indian banks and non-bank financial institutions need to prepare well for this new technology to have a more enriched understanding of its potential implications

for finance (e.g., products such as trade and supplier finance) when implemented and integrated into the overall system (Assocham 2018).

However, the risk is there in implementing such an overwhelming and robust technology all out at once without proper research and pilot study. Policymakers need to consider this very carefully; dialogues among the regulatory bodies can bring an appropriate solution in deciding the right moment and extent to implement the Blockchain in the mainstream economy in India. The timely and exact address of challenges should open up the opportunities for India in Blockchain Finance.

This chapter identifies the challenges in implementing the technology that needs to be addressed before implementing such a disruptive technology that can bring us myriad opportunities as well as expose us to a lot of risks. Thus, this chapter advocates for careful consideration of the challenges before implementing Blockchain. Before implementation, the related stakeholders and industries need to be appropriately prepared for the change. A proper application of Blockchain offers radical development in the Indian economy.

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