

# The Use of the Blockchain Technology in the Banking Industry and Its Impact on the Financial System

**Ardhendu Sekhar Nanda**

Vice President Treasury Data services

Independent Researcher

OrcID: 0009-0005-2323-6424

Email: ardhendu.nanda[at]gmail.com

**Abstract:** *The banking world has increasingly started to use Blockchain technology as it provides an unprecedented level of security, efficiency and transparency. The paper delves into the complex influence of Blockchain technology on the financial system and reviews the use cases within the financial sector-settlement systems, cross-border payments, fraud deterrence, etc. The paper outlines basic concepts about blockchain, identifies the various components and processes that define and reinforce blockchain and explains some of the instrumental aspects which have helped propagate blockchain technology. This paper concludes with the implications for the future development of this technology in bank sectors and the implications for future research.*

**Keywords:** Blockchain technology, banking, financial system, cross-border payments, fraud deterrence

## 1. Introduction

At its core, blockchain is a public, distributed digital ledger that keeps transaction records on many computers simultaneously. It is secure because each new block of transactions is linked to the previous one in such a way, to make its alteration impractical, is transparent because every node in the network sees all the transactions and is immutable because, once entered, the record of the transaction cannot be altered. This chain is made up of blocks with each block containing a list of transactions and once a block is chained it cannot be changed, without altering all the next blocks and the network consensus. This built-in security is especially appealing to the banking industry. [1] [2]

The banking industry is being revolutionized by blockchain technology, which promises a transformative impact on the traditional system. Blockchain seems to have a profound impact on the industry since technological innovation ensures enhanced security, efficiency and trustworthiness in traditional systems. Blockchain and its implications for banking are presented in this chapter. Below are some of the uses of Blockchain in Banking.

### 1) Enhanced security and protection of data

Blockchain provides a secure and tamper-proof solution by utilizing cryptographic algorithms and a decentralized consensus mechanism. The record of transactions is maintained securely which becomes immutable, reducing the risks of fraud, impersonation and unauthorized access forever [3]. By creating a distrusted ledger, blockchain substitutes the traditional database systems ubiquitously vulnerable to single points of failure and hacking [4]. In addition to cryptographic security, blockchain's consensus mechanisms such as PoW (*Proof of Work is a consensus mechanism where participants, known as miners, compete to solve complex mathematical problems*) and PoS (*Proof*

*of Stake is a consensus mechanism where participants, known as validators, are chosen to add new blocks based on the number of coins they hold and are willing to "stake" as collateral*) ensure the integrity of transaction validation [5]. The mechanism ensures that all interacting parties comply with the adjustments attached to the ledger that were problematic for detrimental communication change and made it nearly improbable to manipulate ancient events.

### 2) Efficient and transparent

Blockchain technology makes banking operation more efficient and transparent by eliminating intermediaries that slow down transactions and the embedding of intermediaries, which wastes time. The technology allows for the verification and settlement of transactions in real-time, thereby reducing operation costs [6]. On the other hand, blockchain is transparent, enabling all relevant auditors and regulators, as well as any other parties to have direct access to transaction history, which can be followed efficiently.

An example in which this happens is the case of cross-border border transactions, which are settled by blockchain within a few seconds or minutes. This is in contrast to traditional banking, where the rate of transaction settlements is delayed with communication and additional security measures transacted over other institutions-Most will take up to 2 days. [7]

### 3) Trust and customer confidence

All relevant transactions undertaken by blockchain are recorded and stored on servers, on which the ledger is available to all relevant parties, which is accessible through a network. All transactions are also copied multiple times, meaning that any records are accessible and sources of computing power to get soft copies within a few minutes.

Volume 11 Issue 3, March 2022

[www.ijsr.net](http://www.ijsr.net)

Licensed Under Creative Commons Attribution CC BY

This time efficiency of blockchain ultimately leads to a greater customer experience [8].

Banking heavily relies on trust, which is reflected in customer relationships and loyalty. The customers must trust that their transaction is secure, and that the data is private and unassailable. Unfortunately, some form of traditional bank processes cannot be verified if the banks dictate how the processes are handled. With blockchain, however, the customer is the one who can verify the processes, making it easier to trust the banking institutions with money. [9]

#### 4) Settlement and clearing system

Blockchain enables real-time settlement and clearance of transactions, significantly reducing the immense costs associated with manual processing and intermediaries such as clearinghouses. Traditional transaction settlements can take up to four days, while blockchain technology streamlines this process, making it nearly instantaneous [10]. This innovation not only lowers costs but also enhances efficiency and reliability in financial operations. Various applications of blockchain in the financial sector, which will be discussed in the following sections, further illustrate its transformative potential.

#### 5) Cross-Border Payments

Blockchain facilitates cross-border payments with the elimination of third-party investors, and hence speeds up payments for settlement. This reduces the fees associated to the payments, because it eliminates the involvement of numerous middlemen which results in cost-efficiency due to direct settlement. Ripple, for example, uses blockchains in its payment protocol to facilitate cross-border payments that are quick and secure [3]. Blockchain technology has, therefore, demonstrated an untapped potential for banks and other institutions to make greater profits from international transactions using blockchain. [7]

#### 6) Fraud Prevention and Security

Blockchain assures the integrity and traceability of all transactions which increases security measures against fraudulent activities. The challenge in traditional banking platforms is that they must create safeguard databases to prevent any fraudulent transactions. These transactions can be hard to accomplish due to unauthorized entry and hacking. The fact that there is no central storage for any data concerning any transactions conducted on blockchain makes it near impossible for any party to alter the transaction history [8]. Consumers can now get their own permission-based, encrypted identity accounts which support the bank's compliance requirements. [10]

#### 7) Asset Tokenization

Blockchain technology allows for the subdivision and later trading of practically any form of physical asset. Traditional forms of asset management, such as real estate and stocks, require intensive administration and are often illiquid. Blockchain makes this possible due to the ease of

subdividing ownership into small components and allowing greater liquidity to be sold.

Asset tokenization could allow as many investors as possible, including unaccredited ones, to be extended to the new investment opportunities [6]. This process involves converting the ownership rights of an asset into a token-form by means of a blockchain ledger. Tokenizing assets typically means to fractionalize large and expensive assets by breaking them up into smaller parts. Hence, tokenization opens the possibility of diversifying the ownership of illiquid and high-value assets, which in turn makes investment more accessible at a lower cost [7]. Besides, with assets being tokenized, there is an increase in liquidity, effectiveness, and trading of innumerable investment opportunities.

#### 8) Loans and Credits

Blockchain platforms incorporate 'smart contracts', which function both automatically and autonomously. A contract is referred to as smart once the terms are directly written into the code. Execution and enforcement become automatic upon receiving the coded parameters without the need for intermediaries [6]. On the one hand, the use of a smart contract facilitates the process of both approval and disbursement of credits by eliminating third parties, increasing the timeliness of the process, and reducing operational costs [7]. On the other hand, traditional loans are supported by time-consuming, complex agreement mechanisms affecting the amendment and modification processes, as well as slow rate payoffs. Taking all these steps into consideration, smart contracts may ease the complication and difficulty of loans being approved, shorten operational expenses, and guarantee the successful and timely receipt of money. [10]

#### 9) Customer KYC

Simple procedures facilitate the preliminary identification of customers on a blockchain ledger because of which the procedure itself becomes much simpler and efficient. The storage and usage of customer identification data can be utilized as regulated blockchain applications. The average time it takes for a bank to onboard a client is about a week and even longer, whereas the time may be reduced to seconds when using a blockchain system [4]. Normally, from 40% to 50% of customers submitted material is duplicated in nature. Thus, between customer and institution, information is symmetric whereby the same data may be presented by both parties. [5]

#### 10) Digital identity management.

In this context, blockchain will serve as a secure platform for managing digital identities by ensuring users' privacy as well as control over their personal data. Generally, in traditional systems, identity management requires using centralized databases that are not only vulnerable to breaches but also present serious threats of unauthorized access [3]. In contrast, blockchain is a decentralized technology that allows individuals to manage their digital identities and only share required data with service

providers. At the same time, this approach can significantly reduce the risk of identity theft and unauthorized access. As a result, digital identity solutions can provide better access to financial services, streamline regulatory compliance, and improve customer confidence. [6]

### 11) Smart contracts.

Smart contracts will be incorporated by several banking systems to reduce the need for intermediaries in contract execution. Specifically, in traditional financial services, the process of contract execution usually involves multiple parties, which contributes to extensive paperwork and may involve a variety of hidden fees if disputes occur. In contrast, when the conditions are met, smart contracts are automatically executed and enforced. Therefore, the reliance on third parties will be greatly reduced, along with administrative costs, to ensure on-time contract execution. In the banking industry, such programs are being tested in such processes as loan approval, trade finance, and insurance claims. [9]

### Real-World Examples and Use Cases:

#### 1) J. P Morgan's Quorum

J. P. Morgan has recently launched the Quorum - the company's blockchain technology, built as a secure, standardized, and efficient management system for financial transactions. In other words, this Ethereum (*digital currency*) based platform is designed to facilitate various interbank processes, including transfers and settlements, to cut costs and enhance transparency [7]. Since blockchain implies the use of a standardized decentralized ledger technology, adding Quorum to the system enables real-time transaction settlement and clearance as well as stem reliance on third parties. [8]

#### 2) The Swedish Central Bank's e-Krona Project

The Swedish Central Bank's e-Krona project has implemented a blockchain-based digital currency for an effortless and real-time transaction as well as to retain the stability and reliability of the financial system. The central codesign partners involved in the e-Krona project have built a blockchain-based payment token that provides features like privacy. Hence, the e-Krona project uses the blockchain technology to establish the digital version of the Swedish krona and to provide efficient, reliable and safe payment solutions [9]. Finally, the e-Krona project has some key implications in the study of blockchain applications since it proves the efficiency of blockchains in central banking and digital currency. [10]

#### 3) Cross-Border Payments with Ripple

Ripple provides a blockchain-based payment protocol that facilitates the process of a cross-border payment. As such, the Ripple protocol has revolutionized overseas payments to make them faster and secure and efficient as well. The multi-hop feature provided by the Ripple network has eliminated the hustle that is witnessed when making overseas payments since the payments made through

Ripple do not require correspondent banks. As such, the Ripple payments go directly to the recipient from the sender and eliminate the issues associated with foreign currencies [5]. Finally, the Ripple blockchain is an effective solution to cross-border payments and offers a secure and transparent platform that enhances efficiency. [7]

#### 4) Case Study: Santander's One Pay FX

Santander is one of the largest financial institutions worldwide and they have just announced One Pay FX, a completely secure and transparent blockchain-based cross-border payment service, which is set to redefine the international money transfer system [6]. Utilizing Ripple's blockchain technology, Santander enables its customers to make faster, cheaper, more transparent and more secure cross-border transactions, with foreign exchange soon available for retail customers [8]. It shortens transaction delays from several days to a few seconds and cuts down fees by removing multiple intermediaries. One Pay FX also improves transparency for customers, as they receive real-time updates and have visibility into fees and exchange rates upfront. Santander demonstrates its ambition to use new technologies to provide better banking services and adapt to the changing needs of the market, through this action.

#### 5) Fraud Prevention with Cambridge Blockchain

The Cambridge Blockchain is a blockchain solution that provides a platform designed to confirm and validate customer identities. Eventually, the Cambridge Blockchain offers a decentralized solution that eliminates the risk of identity theft. In addition, the Cambridge Blockchain ensures that the customer data stored in the blockchain cannot be accessed without the consent of the owner or involving external parties. Cambridge Blockchain has also applied blockchain's tamper-proof feature to enhance security and reduce the risk of fraud. Finally, the blockchain-based Cambridge platform has offered an innovative and efficient solution for the validation of customers' identities.

#### 6) HSBC's Use of Blockchain for Trade Finance Payment

Using blockchain technology as its foundation, the financial services technology giant recently integrated the Contour platform-a blockchain-based trade finance solution for businesses and financial institutions-and effectively applied it within the firm. This integration has a tremendous impact on saving costs associated with trade finance payments. One of the many benefits is the significant shortening of the payment processing interval, which could previously stretch for ten days or more.

Because Contour is built on blockchain technology, it offers a level of transparency that has never been available - trade documents submitted to the bank are verified in a matter of minutes, utilizing the nature of blockchain to perform these decentralized and immutable transactions. Real-time verification is available to both buyers and sellers, allowing all the parties to have a look at the

documents which minimizes the risks of getting defrauded and decreases the time for error checking.

HSBC's deployment of the Contour platform illustrates a streamlined and effective use of blockchain technology for operational improvements, increased security, and cost savings.

### Challenges and Future Outlook:

There are several challenges that prevent banks from implementing blockchain technology. First, the technology itself is such that to use it, there is a need for a clear legal framework as blockchain is trying to replace the very institution of intermediation [3]. Blockchain technology is putting pressure on the AML and KYC legislation, and therefore for banks, it is important to ensure the adoption of laws that will allow blockchain technologies to be introduced into their infrastructure. It is also important to understand that although one of the advantages of the blockchain is maximum reliability and openness, the key value of banks today is to preserve the confidential information of their customers, including data about transactions [7]. According to the World Economic Forum, privacy is the biggest challenge for unlocking blockchain's potential. One of the key tasks is to begin to ensure that the blockchain remains secure or develop privacy technologies where data should never be fully revealed or shared but can still prove the validity of transactions. For now, the blockchain technology allows to prove the fact of the transaction and the authenticity of the sender and the transaction but doesn't provide any data in itself [8]. In addition, it is important to invest in new technologies that allow for transaction verification without data. [6]

There is also a need for the development of technologies that focus on solving the scale issue. One of the basic features of blockchain technology is the ability to maintain a single registry across multiple platforms. However, since the banks do not use purely blockchain solutions, it is necessary to provide technological solutions that allow to move to a completely new system. After all, all data must be simultaneously synchronized between the points that are part of the different systems. In turn, these points should interact with each other, and it is possible only when there are proper technologies in place to ensure this exchange of data. As the blockchain develops further, most likely, it will also develop the problem of the speed of payment. In turn, it is likely that methods, like the so-called sharding and layer-two protocols, will be discovered for the blockchain to achieve near-infinite scalability and high amounts of users, and to allow high frequency of uses. Another important area of development of such technologies is ensuring that all the networks can communicate with each other making possible cross-chain infrastructure and bridges, making it possible for the data to flow between all the blockchain. [6]

### Trends guiding the blockchain adoption in the banking sector:

Five of the most significant trends that will guide blockchain's future in the banking sector are digital identity

verification, decentralized finance, integration of AI with Blockchain, Asset Tokenization and Regulatory Sandbox.

1. Digital identity verification will empower blockchain's future in the banking sector. It is a useful tool that can help banks verify customer identities faster and without the need for physical presence. Furthermore, it is more secure, reducing the risk of fraud and increasing compliance with regulations [10]. Individuals will have more control over their identity information, enhancing their privacy.
2. DeFi platforms have the potential to revolutionize the way financial systems work by providing decentralized options and bypassing authority in many cases. DeFi platforms enable the provision of financial services to customers without the need for intermediaries [8]. As DeFi platforms continue to evolve, the traditional banking model may continue to decline.
3. The new technology or trend in the banking industry is AI integration with blockchain. AI integration with blockchain drives innovations in risk assessment application, fraud detection, and compliance monitoring. Blockchain's tamper-proofed nature combined with AI algorithms provides an accurate risk offer, and fast assessment of data. AI can analyze large amount of data to investigate patterns and detect unusual or fraudulent behavior, which meanwhile blockchain's cannot do. Furthermore, when this happens on blockchain immutable ledger, it enables real-time view of the transactions, increase the feature of preventing and detecting the fraudulent behavior. In addition, integrated AI algorithms can also monitor the law compliance of banks and financial institutions. It decreases the workload of the bank and ensures that the bank follows law [7]. Once lingering transfers are made, they can be automatically completed through the AI algorithm.
4. Asset tokenization is another trend in the banking industry that facilitates new investment and increase liquidity. Sources were tokenized through blockchain technology. Through the fractional ownership offered to the investment value of the property and the transaction rate, more markets were made available to investors. The transfer opportunity of the ownership of the token provider has programming specifications. In return, this ensures increased liquidity. Soon this new opportunity will provide investors additional opportunity. As a conclusion, the week is bright for a banking system with blockchain and untapped potentials.
5. Regulatory sandboxes are a relatively recent innovation that provides a framework for testing and creating blockchain solutions for use in the banking industry, creating an opportunity for banks and associated companies to experiment with blockchain technology, allowing them to become more familiar with the process while being regulated [6]. There are many examples of such regulatory sandboxes, including the ones in the United Kingdom, Singapore, and Australia [7]. These sandboxes have been successful in improving the innovations and platform development for banks wishing to use blockchain application.

## 2. Conclusion

In conclusion, the options for introducing blockchain technology in the banking industry seem to signify not a temporary tendency but a significant turn toward the era of security, effectiveness, and transparency that has never been seen in the realm of finance before. The solution helps to upgrade the principles of banking and offer new products that can address the existing issues related to both inefficiency and susceptibility to potential threats. As a result, those organizations that will take an active part in promoting the technology and making considerable investments will become leaders in the new digital epoch and revolutionize the standard for any further financial services.

It appears that the remarkable prospects of blockchain in banking indicate that it does have the power to transform and improve the existing virtues of the financial sector. The best technology that is capable of providing the opportunity to settle transactions immediately, reinforce the prevention of fraud, and make the process of international payments effortless is already changing the aspects of banking and will soon result in the development of new innovative financial products.

## References

- [1] [Nakamoto, S. (2008). Bitcoin: A peer-to-peer electronic cash system. *Consulted*, 1 (2012), 28.
- [2] Tapscott, D., & Tapscott, A. (2016). Blockchain revolution: How the technology behind Bitcoin is changing money, business, and the world. *Penguin*.
- [3] Catalini, C., & Gans, J. S. (2016). Some simple economics of the blockchain. *NBER Working Paper No.22952*. Retrieved from <https://www.nber.org/papers/w22952>.
- [4] Mougayar, W. (2016). The business blockchain: Promise, practice, and the application of the next internet technology. *Wiley*.
- [5] Casey, M. J., & Vigna, P. (2018). The truth machine: The blockchain and the future of everything. *St. Martin's Press*.
- [6] Peters, G. W., & Panayi, E. (2016). Understanding modern banking ledgers through blockchain technologies: Future of transaction processing and smart contracts on the internet of money. In *Banking beyond banks and money* (pp.239-278). Springer, Cham.
- [7] Lee, D. K. C., Guo, L., & Wang, Y. (2018). Cryptocurrency: A new investment opportunity?. *The Journal of Alternative Investments*, 20 (3), 16-40.
- [8] Treleaven, P., Brown, R. G., & Yang, D. (2017). Blockchain technology in finance. *Computer*, 50 (9), 14-17.
- [9] Gomber, P., Kauffman, R. J., Parker, C., & Weber, B. W. (2018). On the fintech revolution: Interpreting the forces of innovation, disruption, and transformation in financial services. *Journal of Management Information Systems*, 35 (1), 220-265.
- [10] Katsiampa, P. (2017). Volatility estimation for Bitcoin: A comparison of GARCH models. *Economics Letters*, 158, 3-6.

## Author Profile



**Ardhendu Sekhar Nanda** is an accomplished Fintech Expert in Treasury management & data services, with two decades of diverse experience across the financial services and technology sectors. As a senior executive for esteemed global firms, he has leveraged his expertise in Treasury management services along with Data modelling, alongside Investment Banking, Wealth Management, Risk Management, and various other domains. In addition to his strategic vision and analytical capabilities, Ardhendu is widely recognized for delivering AI enabled innovative solutions to complex Treasury Management services, Regulatory reporting and leading initiatives to successful outcomes. His profound understanding of technology innovation and its implementation has played a pivotal role in bridging the gap between technological advancements and business goals. With expertise in analytics, design, and strategic vision, he has pioneered and guided product strategy for a comprehensive suite of applications for Treasury Management Services. Ardhendu is recognized for his leadership in mentoring, process optimization, product design, and strategic consulting; all of which have catalyzed positive organizational transformations. Ardhendu possesses an impressive educational background with Bachelor of Engineering in Electrical and instrumentation Engineering and currently pursuing master's degrees Business consulting and data analytics, along with certifications in specialized disciplines; indicating a unique combination of domain expertise, technical acumen, and managerial excellence. His profound insights and comprehensive skill set enable him to contribute significantly to transformative changes within the fintech industry.