International Journal of Gender, Science and Technology
ISSN: 2040-0748
UGC Care Group I Journal.
Vol-14 Issue-01 Mar 2025

Blockchain-Powered KYC Framework for Banking Credit Distribution

[1]KAMMALAPALLI THARUN KUMAR, [2]R HENDRA KUMAR

[1]PG Scholar, Dept. of CSE, KMM Institute of Technology And Science, Tirupati, AP, India.

[2]Associate Professor, Dept. of CSE, KMM Institute of Technology And Science, Tirupati,AP, India.

Abstract: In the financial industry, banks' adoption of the Know Your Customer (KYC) approach improves these businesses' operational effectiveness. The information obtained from the customer throughout the KYC process may be used to prevent potential money laundering, fraud, and other illegal endeavours. Most financial organisations have their own KYC processes in place. A centralised system also makes it possible for several financial institutions to work together and carry out operations. In addition to these two situations, a blockchain-based system may also be used to carry out KYC procedures. The decentralised network of the blockchain will be extremely transparent, allowing all pertinent parties to validate and verify consumer data in real-time. Furthermore, the blockchain's encryption and immutability guarantee that customer data is safe and unchangeable, eliminating the possibility of data breaches. By doing away with needless paperwork and document submissions, blockchain-based KYC may further enhance the customer experience. This paper proposes a blockchain-based KYC system to gather limit, risk, and collateral information from consumers when banks give them loans. Financial institutions may read and write financial data on the blockchain network thanks to the Ethereum-based method. This KYC approach creates an open, flexible, and quick framework between financial institutions. Solutions for the Sybil attack, one of the most serious issues in these networks, are also covered.

INDEX TERMS: Blockchain, KYC, Financial Institutions, Ethereum, Credit Distribution, Decentralized Network, Data Security, Immutability, Sybil Attack, Customer Verification.

1. INTRODUCTION

The Know Your Customer (KYC) process is a fundamental requirement in the banking and financial sector, ensuring that institutions verify the identities of their customers to prevent fraud, money laundering, and other illicit activities. Traditionally, financial institutions implement their own independent KYC procedures, often leading to inefficiencies such as redundant document submissions, lengthy verification processes, and increased operational costs. Additionally, centralized KYC systems pose risks related to data breaches and unauthorized access, raising concerns about data security and privacy.

Blockchain technology offers a transformative approach to KYC processes by leveraging its decentralized, immutable, and transparent nature. A blockchain-based KYC model enables real-time

validation and verification of customer data among multiple financial institutions, eliminating duplication and improving efficiency. The cryptographic security features of blockchain ensure that sensitive customer information remains secure while enabling seamless data sharing across authorized entities. This decentralized approach reduces operational costs, enhances regulatory compliance, and improves customer experience by eliminating redundant paperwork.

This paper proposes a blockchain-powered KYC framework designed to facilitate secure and efficient credit allocation in banking. Built on the Ethereum blockchain, the proposed system enables financial institutions to store, verify, and share credit allocation data in a transparent and tamper-proof manner. By leveraging smart contracts, the model ensures automated validation, reducing processing time and operational inefficiencies. Additionally, the system addresses key challenges, such as Sybil attacks, ensuring a secure and trustworthy credit distribution environment.

2. LITERATURE SURVEY

2.1 Blockchain characteristics and consensus in modern business processes:

https://www.sciencedirect.com/science/article/abs/pii/S2452414X18300815

ABSTRACT: Blockchain technology has garnered a lot of interest as a successful means of introducing new business procedures. For it to accomplish certain application-related features, it must be coupled with other Business Process Management (BPM) components. The efforts to incorporate this technology into BPM are still in their infancy. It is necessary to identify the features of both blockchain and business processes in order to integrate them effectively. A significant obstacle to business process activities, particularly those that are time-sensitive, is the inconsistency of confirmation settlement that mostly depends on the use of consensus protocol. Furthermore, validators—nodes in a Blockchain system that carry out consensus operations—can inject bias and are thus unreliable. In addition to defining blockchain, this article explores its features and how they relate to corporate operations. Next, in order to address the issues of consensus bias and temporal inconsistency, we propose a business process architecture for the Blockchain age. Blockchain's persistency, validity, auditability, and disintermediacy are all provided by the architecture. Additionally, the design offers flexibility by letting business partners choose which nodes to use for consensus, which reduces bias.

2.2 Blockchain technology: Is it hype or real in the construction industry?:

https://www.sciencedirect.com/science/article/abs/pii/S2452414X20300017

ABSTRACT: Numerous technologies aimed at the business and financial sectors have emerged since the turn of the twenty-first century. These include FinTechs like blockchain, the Internet of Things, and big data. A distributed database type called blockchain is used to duplicate, exchange, and synchronise data that is dispersed over several places, nations, or companies. The primary characteristic of blockchain technology is the absence of a single administrator or centralised data storage system. The decentralised network is peer-to-peer and is governed

by consensus methods. Blockchain technology has gained popularity across a wide range of industries due to its many advantages and applications, but is this also the case in the construction sector? Given the construction industry's resistance to change and its lag in digitalisation, it is critical to examine the potential influence of blockchain technology as a disruptive technology.

The construction industry has long been ranked as the second least adopting of information technology, despite the fact that there is a substantial research gap and the potential for testing blockchain in this sector. This raises the question of whether blockchain technology is just a passing fad or whether there is indeed a chance for it to be used in the building industry. Through a use case study and a thorough literature research, the article seeks to objectively analyse the application potential of blockchains in the construction industry in order to determine whether or not it is just hype. The investigation showed that blockchain does have a legitimate chance in the construction sector because of its rapidly expanding applications, the associated investments, and the numerous start-up companies that are advancing Industry 4.0.

2.3 A Review on Blockchain Applications in Fintech Ecosystem

https://ieeexplore.ieee.org/document/10054910

ABSTRACT: In the 1990s, the word "fintech" began to gain popularity. Because of the internet's broad use and the speed at which technology is developing, fintech has grown to be a distinct industry, particularly after 2004. Numerous advancements in ATMs, credit and debit cards, mobile transactions, internet banking, and digital banking infrastructure and transactions have been made under the Fintech framework. Since the 2008 rise of Bitcoin, we have heard the phrase "blockchain" a lot, and fintech and blockchain technology have crossed paths. The distributed ledger nature of the blockchain allowed for decentralisation, which allowed for the transfer of Bitcoin without the need for middlemen. The rise of cryptocurrency assets like Ethereum after Bitcoin made it possible for these transactions to be programmed as an infrastructure. In addition to financial transactions, programmable blockchain infrastructures are now being utilised in industries including insurance, healthcare, supply chains, and education. Applications pertaining to these domains are the subject of several scholarly investigations. There isn't a review that covers them all in one go for finance, though. Blockchain applications across the finance sector were examined and compiled into a single research for this study. Specifically, the business in which it was utilised and the market volume were stated. Furthermore, potential blockchain uses for the future were also discussed.

2.4 A Review of Blockchain Approaches for KYC

https://ieeexplore.ieee.org/document/10299643

Banks' conventional Know Your Customer (KYC) process is seen to be expensive and unreliable. Therefore, the future prospects of financial organisations depend on the acceptance of innovative technology. Blockchain is one such technology that has become widely accepted because to its reputation for dependability and security in a variety of domains. By storing and tracking data, this research seeks to understand how the application of

blockchain technology might alter the current banking operations, namely the KYC document verification procedure. An efficient KYC system is currently essential, and it should be combined with a reliable and safe technology like Blockchain that can resist fraud and overcome issues with scalability and privacy. The essay examines earlier pertinent research that shows how the use of Blockchain technology reduces the need for middlemen, which lowers the risk of malicious activity and mistakes that can happen when there are several manual operations involved.

2.5 A Blockchain based Solution to Know Your Customer (KYC) Dilemma

https://ieeexplore.ieee.org/document/9118042

ABSTRACT: Doing Know Your Customer (KYC) is a requirement for each financial firm. Nonetheless, the procedure still involves an astounding amount of manual interaction. Since computer programs are frequently managed centrally and data is frequently kept centrally, they are not impenetrable, leaving them open to weaknesses and attacks. There isn't a single application that allows several organisations to exchange KYC data without fear of retraction from any of the participating organisations. In order to make the lives of end users easier, our blockchain-based application seeks to provide financial institutions this platform as a service as an electronic KYC solution.

3. METHODOLOGY

a) Proposed Work:

According to this study, the financial industry has a strong chance to store and share credit allocation data in a transparent and safe manner by implementing blockchain technology. All parties participating in the credit distribution process, including banks, borrowers, and other pertinent parties, benefit from the confidence and transparency this distributed ledger technology promotes. Furthermore, the efficiency of credit allocation processes may be greatly improved by blockchain technology. Banks may reduce the time and expenses involved with traditional, manual processes by using this technology to expedite the verification and validation of borrower information for credit allocation data.

b) System Architecture:

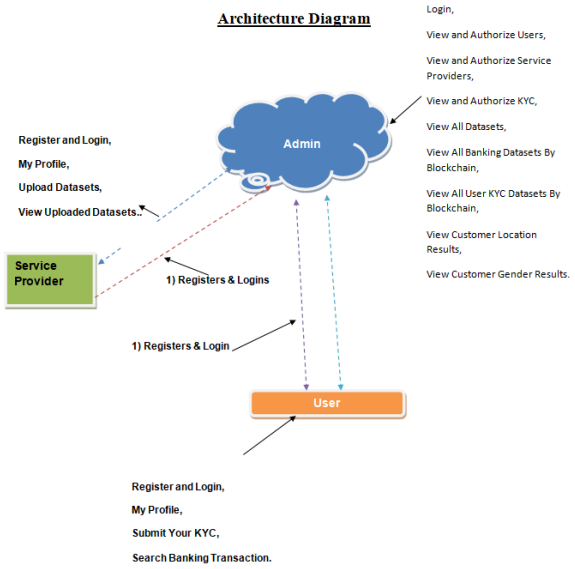

Fig 1 Proposed system

The proposed blockchain-based KYC model for credit allocation in banking is built on a decentralized architecture that ensures secure, transparent, and efficient data management. The system operates on an Ethereum-based blockchain network, where financial institutions act as nodes, enabling real-time validation and verification of customer data. Smart contracts automate key processes such as identity

verification, credit risk assessment, and loan approvals, ensuring transparency and reducing manual intervention.

The architecture consists of multiple components, including a distributed ledger for storing KYC data, cryptographic techniques for secure authentication, and access control mechanisms to ensure that only authorized entities can read or update the data. Customers submit their identity and financial details, which are verified and recorded on the blockchain. Banks can access this data without requiring repeated document submissions, streamlining the credit allocation process. Additionally, the system incorporates Sybil attack prevention mechanisms to safeguard against fraudulent identities, ensuring the integrity of the network. By eliminating central intermediaries, this architecture enhances trust, reduces costs, and accelerates credit processing in the banking sector.

c) Modules:

i. Service Provider

In this module, the service provider uploads their encrypted data in the Cloud server. For the security purpose the data owner encrypts the data file and then store in the server. The Data owner can have capable of manipulating the encrypted data file and performs the following operations

Register and Login, My Profile, Upload Datasets, View Uploaded Datasets.

ii. Admin

The Admin manages which is to provide data storage service for the Data Owners. Data owners encrypt their data files and store them in the Server for sharing with data consumers. To access the shared data files, data consumers download encrypted data files of their interest from the Server and then Server will decrypt them. The server will generate the aggregate key if the end user requests for file authorization to access and performs the following operations such as Login, View and Authorize Users, View and Authorize Service Providers, View and Authorize KYC, View All Datasets, View All Banking Datasets By Blockchain, View All User KYC Datasets By Blockchain, View Customer Location Results, View Customer Gender Results.

iii. User

In this module, the user can only access the data file with the secret key. The user can search the file for a specified keyword. The data which matches for a particular keyword will be indexed in the cloud server and then response to the end user and can do the following operations like Register and Login, My Profile, Submit Your KYC, Search Banking Transaction.

4. EXPERIMENTAL RESULTS

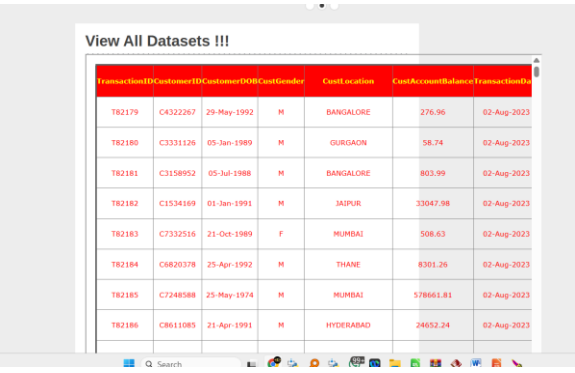

Fig 1:View Datasets

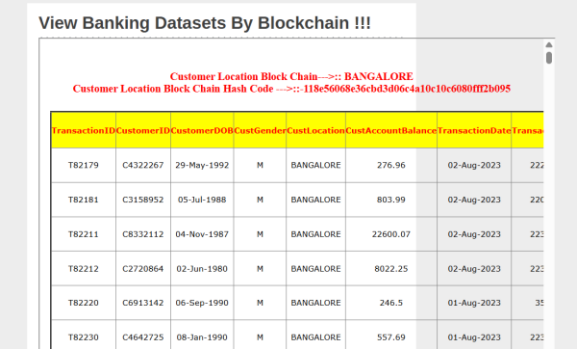

Fig 2: Customer Location Block Chain--->:: BANGALORE

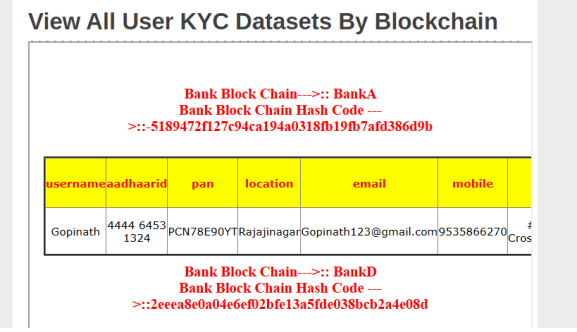

Fig 3: View All User KYC Datasets By Blockchain

5. CONCLUSION

Based on the Blockchain-based KYC paradigm, this research shows how bank clients who have been given loans may share their loan allocation information. A solidity-language smart contract on the Ethereum network enables interbank data sharing. The prepared smart contract's deployment to the Ethereum network is discussed, along with how to write and read data across this network. Additionally, because it is built on a private blockchain network and uses the PoS consensus process, it offers a secure environment against Sybil assaults. The private Ethereum network and PoS consensus mechanism were taken into consideration when designing the blockchain-based KYC approach. Blockchain technology thus provides a revolutionary remedy for the drawbacks of conventional KYC in banking. Real-time risk assessment is made possible, data security is strengthened, and onboarding is streamlined with a shared, unchangeable ledger. Although there are still regulatory obstacles to overcome, there is no denying the possibility of improved productivity, teamwork, and risk management in a safe and open environment. Blockchain has the ability to completely transform KYC and usher in a new age of safe and effective consumer identification in banking as it develops and rules change.

Global data is growing at an exponential rate, making safe storage and effective stakeholder sharing essential. Leading the way in this area is blockchain technology, which makes data exchange safe and transparent. In the upcoming years, this feature is probably going to spur further usage in the financial industry. Regulatory and compliance barriers still exist, though. Financial organisations will have a plethora of use cases once these obstacles are overcome. Using non-fungible tokens (NFTs) to hold Letters of Guarantee (LoGs), a common financial instrument, is one example of this. By using NFTs to tokenise LoGs, the system automatically stops counterfeiting and duplication, allowing institutions to better control related risks. There is great potential for improved security, efficiency, and cooperation through the integration of NFTs into the financial ecosystem.

6. FUTURE SCOPE

The future scope of a blockchain-powered KYC framework in banking credit distribution includes several advancements. Integrating AI and machine

learning can enhance fraud detection and risk assessment through anomaly detection models. Expanding interoperability with global financial systems will enable cross-border banking and regulatory compliance. The adoption of multi-chain frameworks can improve data sharing and efficiency, while improved regulatory compliance will ensure alignment with evolving financial laws. Decentralized identity management using self-sovereign identity (SSI) frameworks will give customers more control over their data. Implementing quantum-resistant security measures will protect against future threats posed by quantum computing. Scalability enhancements, such as Layer 2 solutions or sidechains, can efficiently handle high transaction volumes. Tokenization of KYC data can facilitate secure and seamless data exchange among financial institutions. Real-time customer risk profiling through blockchain analytics will improve creditworthiness assessments. Additionally, the framework's adoption can extend beyond banking to sectors like insurance, investment firms, and fintech, strengthening financial security across industries.

REFERENCES

[1] V. L. Lemieux, ‘‘Trusting records: Is blockchain technology the answer?’’

Records Manage. J., vol. 26, no. 2, pp. 110–139, Jul. 2016.

[2] W. Viriyasitavat and D. Hoonsopon, ‘‘Blockchain characteristics and

consensus in modern business processes,’’ J. Ind. Inf. Integr., vol. 13,

pp. 32–39, Mar. 2019.

[3] S. Nakamoto. (2008). Bitcoin: A Peer-to-Peer Electronic Cash System.

Accessed: Apr. 18, 2023. [Online]. Available: https://bitcoin.org/bitcoin.pdf

[4] S. Perera, S. Nanayakkara, M. N. N. Rodrigo, S. Senaratne, and

R.Weinand, ‘‘Blockchain technology: Is it hype or real in the construction

industry,’’ J. Ind. Inf. Integr., vol. 17, pp. 1–20, Jan. 2020.

[5] B. Karadag, A. Akbulut, and A. H. Zaim, ‘‘A review on blockchain

applications in fintech ecosystem,’’ in Proc. Int. Conf. Adv. Creative

Netw. Intell. Syst. (ICACNIS), Nov. 2022, pp. 1–5, doi: 10.1109/ICACNIS57039.2022.10054910.

[6] Ethereum. (2023). Ethereum Whitepaper. [Online]. Available:

https://ethereum.org/en/whitepaper/

[7] N. Mansoor, K. F. Antora, P. Deb, T. A. Arman, A. A. Manaf, and

M. Zareei, ‘‘A review of blockchain approaches for KYC,’’ IEEE Access,

vol. 11, pp. 121013–121042, 2023.

[8] D. George, A.Wani, and A. Bhatia, ‘‘A blockchain based solution to know

your customer (KYC) dilemma,’’ in Proc. IEEE Int. Conf. Adv. Netw.

Telecommun. Syst. (ANTS), Goa, India, Dec. 2019, pp. 1–6.

[9] D. Roman and G. Stefano, ‘‘Towards a reference architecture for trusted

data marketplaces: The credit scoring perspective,’’ in Proc. 2nd Int. Conf.

Open Big Data (OBD), Aug. 2016, pp. 95–101.

[10] H. Karaylan, Blockchain and its applications for financial technology

solutions. İstanbul, Turkey: Yüksek Öğretim Dergisi, 2019.

[11] H. Byström, ‘‘Blockchains, real-time accounting, and the future of credit

risk modeling,’’ Ledger, vol. 4, pp. 40–47, Apr. 2019.

[12] S. Chakraborty, S. Aich, S. J. Seong, and H. C. Kim, ‘‘A blockchain based

credit analysis framework for efficient financial systems,’’ in Proc. 21st

Int. Conf. Adv. Commun. Technol. (ICACT), PyeongChang, South Korea,

Feb. 2019, pp. 56–60.

[13] S. B. Patel, P. Bhattacharya, S. Tanwar, and N. Kumar, ‘‘KiRTi: A

blockchain-based credit recommender system for financial institutions,’’

IEEE Trans. Netw. Sci. Eng., vol. 8, no. 2, pp. 1044–1054, Apr. 2021.

[14] F. Yang, Y. Qiao, Y. Qi, J. Bo, and X. Wang, ‘‘BACS: Blockchain and

AutoML-based technology for efficient credit scoring classification,’’ Ann.

Oper. Res., pp. 1–21, Jan. 2022, doi: 10.1007/s10479-022-04531-8.

[15] S.Wang, L. Ouyang,Y.Yuan, X. Ni, X. Han, and F.-Y.Wang, ‘‘Blockchainenabled

smart contracts: Architecture, applications, and future trends,’’

IEEE Trans. Syst. Man, Cybern. Syst., vol. 49, no. 11, pp. 2266–2277,

Nov. 2019, doi: 10.1109/TSMC.2019.2895123.

[16] R. Rohitchandran, B. Santhoshkumar, and M. Kumar, ‘‘Bank

records storage system through blockchain,’’ in Proc. Int. Conf.

Inventive Comput. Technol. (ICICT), Apr. 2023, pp. 1178–1181, doi:

10.1109/ICICT57646.2023.10134282.

[17] F. Ali, M. U. Khurram, A. Sensoy, and X. V. Vo, ‘‘Green cryptocurrencies

and portfolio diversification in the era of greener paths,’’

Renew. Sustain. Energy Rev., vol. 191, Mar. 2024, Art. no. 114137, doi:

10.1016/j.rser.2023.114137.

[18] K. E. Wegrzyn and E. Wang. (2021). Foley. Accessed: Mar. 9, 2024.

[Online]. Available: https://bit.ly/3BbLQTF

[19] N. Szabo. (2019). Formalizing and Securing Relationships on Public Networks.

Accessed: Mar. 11, 2024. [Online]. Available: https://ojphi.org/ojs/

index.php/fm/article/view/548/469

[20] M. Laarabi and A. Maach, ‘‘Understanding risk assessment in the context

of fractional ownership using Ethereum smart contract,’’ Adv. Sci., Technol.

Eng. Syst. J., vol. 5, no. 5, pp. 1028–1035, 2020.

[21] V. D. Kolychev and D. V. Solovov, ‘‘Methods and mechanisms of a

subsystem formation of financial monitoring of suspicious operations in

commercial bank,’’ KnE Social Sci., vol. 3, no. 2, p. 279, Feb. 2018.

[22] B. Karadag. (2023). Blockchain Based KYC Model. GitHub Repository.

[Online]. Available: https://github.com/BulutKaradag/Blockchain-based-

KYC-Model

[23] M. Platt and P. McBurney, ‘‘Sybil in the haystack: A comprehensive

review of blockchain consensus mechanisms in search of strong Sybil

attack resistance,’’ Algorithms, vol. 16, no. 1, p. 34, Jan. 2023, doi:

10.3390/a16010034.

[24] S. Hu, L. Hou, G. Chen, J.Weng, and J. Li, ‘‘Reputation-based distributed

knowledge sharing system in blockchain,’’ in Proc. 15th EAI Int. Conf.

Mobile Ubiquitous Syst., Comput., Netw. Services, New York, NY, USA,

Nov. 2018, pp. 476–481.