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Harnessing Blockchain for Sustainable Banking Transformation

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Abstract

The 21st century has witnessed significant advancements in technology, with blockchain emerging as a revolutionary innovation impacting various sectors of the economy. Blockchain is a decentralized and tamper-resistant data structure that ensures security and transparency through encryption and digital signatures. Its inherent design prevents unauthorized modifications, making it a reliable solution for secure transactions. First popularized by its association with cryptocurrency, particularly Bitcoin, blockchain has shown immense potential in addressing challenges in the banking sector, such as unethical fund transfers, data breaches, and ledger manipulation. By eliminating intermediaries, blockchain enhances transaction security, efficiency, and transparency. This review-based study explores the applications and opportunities of blockchain technology in creating a secure banking environment. It analyzes the working mechanisms of blockchain and highlights its role in mitigating unethical practices, ultimately demonstrating its capacity to transform the banking system and contribute to a secure economy.

Keywords: Block Chain, Banking, Security, Unethical Practices, Distributed Ledger.

1. INTRODUCTION:

Blockchain technology has rapidly gained attention as a transformative innovation across industries. It is now an integral part of discussions about technological advancements. Blockchain, described as a "digital ledger that stores data securely in a shared, public database through immutable blocks," has proven particularly impactful in the financial sector (Thulya, 2020). Its ability to enhance efficiency and security makes it a key solution for challenges in banking. Blockchain gained prominence as the backbone of cryptocurrency, particularly Bitcoin, with 2017 marking its "jump-out-of-the-cake moment" (Thulya, 2020). By 2018, its applications had expanded across industries, from gaming to banking, showcasing its versatility (Harshitha, Shashidhar, & Roopa, 2021). Today, blockchain is recognized as a promising tool for addressing challenges in finance, healthcare, education, and governance. While some argue that "blockchain and banking may not be entirely compatible," others see it as a critical tool for building secure and transparent systems (Harshitha, Shashidhar, & Roopa, 2021). Financial giants like "Merrill Lynch, J.P. Morgan, HSBC, and the Bank of America" have adopted blockchain-based transactions, leveraging its decentralized and

immutable structure to enhance operations (Thulya, 2020). Blockchain offers revolutionary possibilities for record-keeping, providing transparency, cost reduction, and efficiency. As Mallesha and Haripriya (2019) note, "blockchain significantly reduces processing time and eliminates the need for intermediaries." Its cryptographic infrastructure ensures trust and enables real-time access to transaction information (Mallesha & Haripriya, 2019).

In light of increasing data breaches and cyberattacks in banking, blockchain's secure infrastructure provides a timely solution to safeguard sensitive data and improve operational processes.

This research explores blockchain's application in banking, highlighting its potential to enhance security and efficiency. The findings aim to help policymakers and government officials understand its role in modernizing financial systems.

2. CONCEPT OF BLOCK CHAIN:

"A Block Chain is a shared distributed database or ledger between computer network nodes. A Block Chain serves as an electronic database for storing data in digital form. The most well-known use of Block Chain technology is for preserving a secure and decentralised record of transactions in cryptocurrency systems like Bitcoin. The innovation with a Block Chain is that it guarantees the fidelity and security of a record of data and generates trust without the need for a trusted third party" ***(Chowdhury, Suchana, Alam, & Khan, 2021).***

3. OBJECTIVES OF STUDY:

1) To study the concept and working mechanism of Block Chain.
2) To study the importance of Block Chain in the banking sectors.
3) To assess the people's approach regarding the functioning of the present banking system.

4. STATEMENT OF RESEARCH PROBLEM:

Important fundament sectors in the Indian economy mainly include Banking, Health, Education, Industry, Communication and Agriculture. Only if this sector progresses, the economy can be sustainable and prosperous. For this, efforts are always going on at the institutional and government level. We have seen that the banking sectors have always been in trouble due unethical fund transfer, data hacking, inefficient performance, ledger maintenance etc.,. Due to this reasons, many banks in India have gone bankrupt. For example, Nirav Modi had scammed around 6 thousand 500 crores in Punjab Bank. ***(Thulya, P., 2020).*** Moreover, we have seen and read in recent times that many banks have been privatized and many banks have been merged. For example, in recent times, the government announced the merger of many Public sector banks such as Oriental Bank of Commerce (OBC) and United Bank of India into Punjab National Bank (PNB), Syndicate Bank into Canara Bank, Andhra Bank and Corporation Bank into Union Bank of India, and Allahabad Bank into Indian Bank. Vijaya Bank and Dena Bank merged into Bank of Baroda.

5. RESEARCH METHODOLOGY

Research Methodology

This study employs an analytical research approach to examine the significance of blockchain technology in the banking sector. Both primary and secondary data sources

have been utilized to ensure a comprehensive analysis. For primary data collection, a purposive sampling method was adopted, selecting 50 respondents who are well-educated and possess knowledge about blockchain technology. To analyze the collected data, appropriate statistical software, including Excel and SPSS, was used for data processing and interpretation. The researcher employed relevant statistical tools to ensure robust analysis, and the Chi-square test was utilized for hypothesis testing. The study focuses on the banking sector as a case to demonstrate the importance and potential of blockchain technology. Respondents' opinions were analyzed to provide insights into the role of blockchain in addressing challenges and enhancing efficiency within the banking industry.

6. WORKING MECHANISM OF BLOCK CHAIN

A computerised idea for storing data is called a block chain. The Block Chain's operational mechanism is depicted in the following figures.

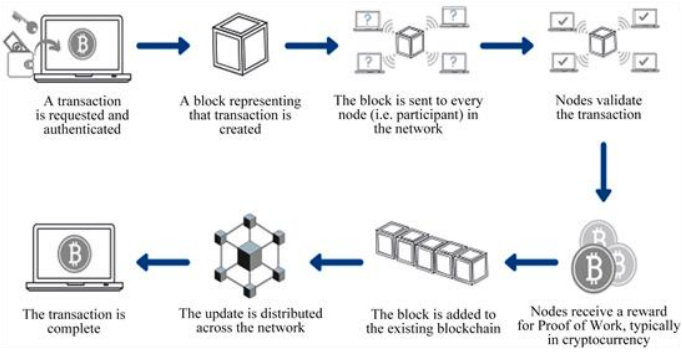

Figure 1: Block Chain Working Mechanism

These squares are often referred to as "information squares" because they deliver data in discrete blocks. Once these blocks are connected, they become immutable, meaning no changes can be made after they are linked. This characteristic makes the technology revolutionary, as it allows people to securely maintain records of various types, such as bank balances, financial transactions, properties, identities, medical records, and more. The reliability of this technology lies in the assurance that no one can alter or tamper with these records. For instance, if someone purchases a property and stores the related documents on a blockchain, they can always verify their ownership. The records stored on the blockchain are secure from any form of distortion or manipulation. This is why blockchain is regarded as a groundbreaking innovation, enabling people to store data safely. It is crucial to understand how blockchain operates, particularly in the context of banking.

Every transaction on a blockchain must undergo several key steps. Figure 1 illustrates the process by which blockchain functions. When a transaction requires authentication, a block containing the transaction details is created. This newly generated block is then shared across all participants, or nodes, within the blockchain network. The nodes then verify the transaction, as depicted in Figure 3.

If the information in the newly created block is incorrect or has been altered, it will not align with the blocks in other nodes of the blockchain. In such cases, the

transaction will not be recorded, and the validation process will fail, as shown in Figure 2.

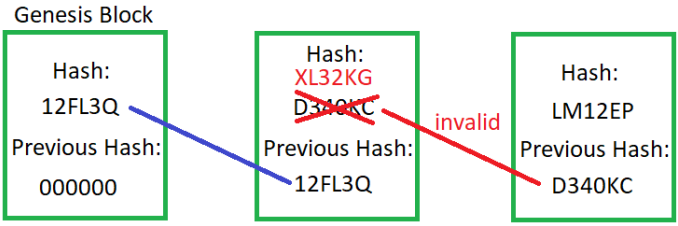

Figure 2: Unethical transaction

If validation is passed, then the transaction is complete. And the updates will be distributed to all the nodes in that particular Block Chain network.

7. PROOF OF WORK

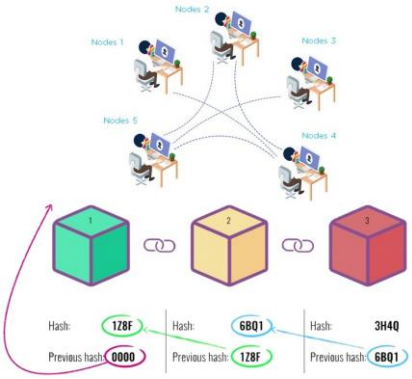

Figure 3: Proof of work in Block Chain.

As seen in Figure 3, a transaction needs to be authorised before it can be put to a block in the chain once the users have agreed upon it. The choice to include a transaction in a public block chain is made by consensus. This means that in order for a transaction to be valid, the majority of "nodes" (or computers) in the network must concur. Rewards are offered to encourage the users of the network's machines to verify transactions. This procedure is referred to as "proof of work."

8. STRUCTURE OF BLOCK CHAIN

Figure 4: Structure of block

9. DATA ANALYSIS AND ENTERPRETATION

Table No.1: Status of Bank Sector in Economy

Cross Tabulation Does the country's bank sector work properly? * Problems of bank sectors					
		Problems and Challenges of Bank Sector			Total
		Bank system work properly	Bankrupt, Data hacking & Unethical fund transfer	Trans. Difficulty, Low efficiency of workers & Unsafely	
Does the country's bank sector work properly?	Yes	12	5	6	23
	No	3	16	8	27
Total		15	21	14	50

Source: Field Visit, 2022.

The cross-tabulation of public opinion regarding the bank sector of India and significant issues in bank sector is displayed in Table No. 1. Here the researcher has cross-tabulated the answers to the two questions. Those questions were: 1) Does the country's bank sector work properly? and 2) What are the problems of bank sectors?. Here the researcher has tried to understand the attitude of the people towards the functioning of banks. Similar to this, an effort has been undertaken to identify the main issues facing this bank sector by discussing with respondents. Out of 50 respondents, 23 believe that the bank sector is operating effectively, while 27 believe contrary. This sector experience a variety of issues as a result, prominent among them Bankrupt, Data hacking & Unethical fund transfer. Although 23 respondents expressed their opinion in favour of the bank sector, eleven of them reported that despite this sector functioning properly. There are still additional problems there, such as transaction difficulty, low efficiency of workers and unsafely in addition to the previously mentioned problems. ***In conclusion, there are some major issues and challenges are facing by the bank sector such as bankruptcy, data hacking, unethical fund transfer, bank transaction difficulty, low efficiency of workers, and unsafely.***

Table No.2: Problems and Challenges of Bank Sector.

Sr. No	Name of the Problem and Challenges	Never	Rarely	Sometimes	Often	Always	Total
1	Bankruptcy	1	3	5	12	29	50
2	Data hacking	2	3	4	13	28	50
3	Unethical fund transfer	4	4	5	16	21	50
4	Bank transaction difficulty	8	7	12	14	9	50
5	Low efficiency of workers	11	8	14	8	9	50
6	Unsafely	14	13	11	6	6	50

Source: Field Visit, 2022.

The researcher has conducted a thorough analysis of the issues and challenges are facing in the bank sector of the Indian economy, which is shown in above table number 2. It was found that the issues listed in the table above are primarily present in the banking system. However, the researcher has examined the level to which these issues' seriousness is felt in this sector using the Likert scale method. According to most of respondents, this sector is where 'always' and 'often' seen bankruptcy, data hacking, unethical fund transfer. Similarly, the majority of respondents claim that Bank transaction difficulty, Low efficiency of workers, and unsafely transaction are 'often' and 'sometimes' found in the bank system. For instance, some time bank work not gets

finished on deadline. Similar to this, Bankruptcy exists in majority of banks, such as the private and cooperative banks. People with higher levels of education believe that by using block chain in this system, these issues can be mitigated.

10. HYPOTHESIS TESTING

H_0-There is no significant role of block chain in removing present problems of bank system.
H_1-There is significant role of block chain in removing present problems of bank system.

Case Processing Summary						
	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Will block chain work effectively in bank system of India * What changes can take place in the bank system due to the use of block chain?	50	100.0%	0	.0%	50	100.0%

The researcher seeks to determine through the proposed hypothesis whether or not the use of block chain can help resolve the major issues in the bank sector. The researcher chose 50 respondents for this study and posed several block chain usage questions to them. The primary questions are whether block chains will function well in the bank sector of the Indian economy and what kind of changes may be expected there once block chains are used.

Cross Tabulation						
		Impacts of block chain on bank sector				Total
		Bankruptcy and Unethical bank practices	Data hacking, Unethical fund transfer can be reduced	Bank transaction difficulty may be reduced. Work efficiency of workers will improved, Transaction safety will increase	Nothing will change.	
Will block chain work effectively in bank sector of economy?	Yes	16	9	7	0	32
	No	0	1	0	17	17
Total		**16**	**10**	**7**	**17**	**50**

The researcher has provided an overview of two questions related to the significance of using block chain technology in bank sector in the above table. It demonstrates that 32 of the 50 respondents think block chain can benefit the bank system of Indian economy. The remaining 17 individuals claim that block chain cannot be utilised successfully in the Indian bank system. In conclusion, the majority of respondents believed that block chain could be employed effectively. It can solve issues in the bank system, such as those already present with bankruptcy, unethical bank practices, data hacking, unethical fund transfer, bank transaction difficulty, low efficiency of workers, and unsafely etc.

Chi-Square Tests				
N of Valid Cases	Pearson Chi-Square Value	Chi-square table value	df	Asymp. Sig. (2-sided)
50	46.094[a]	7.81	3	.0001

Above table no. 3 revealed data of Chi-Square test results. The researcher observed that the Pearson Chi-Square Value of 46.094 is greater than the Chi-square table value of 7.81 and probability value (P-Value) is (.001) less than 0.05 percent significance level for 3 degrees of freedom. The thumb rule of hypothesis is that when the P-value is less than the 0.05 (P<0.05) percent significant level, we can reject the null hypothesis and accepts the alternative. Vice-versa, Null is accepted. In conclusion, the researcher has accepted the alternative hypothesis and rejects the Null. Because of the P-value is .001, which is less than 0.05 percent significant level for 3 degrees of freedom. Moreover, the Pearson chi-square value is 46.094, greater than the table value of 7.81. This means that, block chain will introduce significant role in bank system of economy for removing existing problems like bankruptcy, data hacking, unethical fund transfer, bank transaction difficulty, low efficiency of workers, and unsafely.

11. SOME IMPORTANT BENEFITS OF BLOCK CHAIN

Research has given following some important and representative benefits of block chain for understanding their need in Indian banking system.

1) **Cost reduction:** For essential economic sectors like banks, the Block Chain has this benefit. The majority of banks and other commercial entities are looking into and experimenting with using block chain. It was discovered that Block Chain might cut the cost of central finance reporting by up to 70% can save operating costs for an organization by 50% as well. It can also cut the cost of compliance by more than half. By employing the Block Chain, bank sector can also reduce the expenses associated with sector-to-sector and business-to-business exchanges (Zachariadis, M., Hileman, G., & Scott, S.v., 2019).
2) **Faster transactions:** Another major benefit of using block chains in banks and other institutions is faster transactions. Exchanges can be made using Block Chain technology in a matter of seconds, which is much faster than the majority of conventional financial techniques. Clients can conduct transactions more quickly because the Block Chain allows essential sectors to avoid agents. Clients and institutions will become more prepared to complete and handle additional exchanges as a result (Javaid, Haleem, Singh, Khan, & Suman, 2021).
3) **Greater security:** By utilising block chains in banks that resemble banking, banks can increase the security of their data and information. Because the block chain allows for the simultaneous security of this data or information in numerous locations. As a result, there will be a fundamental decrease in the ability of anyone to intentionally catch exchange data or divert payments (Yaofei, Qiurui, & Rongfang, 2022).
4) **Better information quality:** With today's Block Chain technology, any type of information may be stored and is also able to be accessed while conforming to predetermined standards and criteria. Contracts are naturally confirmed and approved by the invention known as smart contracts. Data is given the

benefits of the Block Chain at that point by being transferred from private to shared records.

5) **Digital currencies:** By utilizing cutting-edge monetary standards, Block Chain can benefit the bank sector. They are currently prepared to accept electronic money to complete a variety of transactions. With the advent of digital currency, other sectors, such as banks, will really desire to process and settle financial transactions more quickly and safely. Banks will also aspire to employ electronic cash as a form of currency in the future (Rosanna, Maurizio, & Silvia, 2021).
6) **Accountability:** Since accountability is a feature of block chain innovation. Bank sector, may seek to gain an advantage by restricting, encouraging extortion, and abusing organizational resources. Currently, no sector needs to worry about costly errors because exchanges have been carefully designed. Additionally, they won't feel pressured to produce the data. Given that the Block Chain makes it easy to monitor and confirm all transactions, any business or organization will genuinely wish to handle trades precisely and reliably.
7) **Compliance:** Blockchain technology offers consistent advantages to banks and other industries. It enables them to grant controlled access to judges and government officials. Through this access, evaluators and authorities can monitor business activities with full transparency. Financial institutions can now efficiently provide digital data that is easy to interpret, reducing time spent on analysing processes (Evrim, Stanislav, & Joep, 2022).
8) **Reconciliation:** Blockchain technology also aids banks by simplifying the acceptance of a larger volume of transactions. Transactions can be tracked in real time, and errors can be identified and addressed swiftly. This benefits banks by allowing them to detect and rectify mistakes before a transaction is completed. Consequently, they can mitigate risks to the business and protect their customers from potential issues.

12. CONCLUSIONS AND SUGGESTIONS:

After studying the history of the Indian banking system we will notice that many public sector banks have been privatized or the government has decided to merge them. At the same time, we have seen cases of legal action against many private and co-operative banks in India. The main reason for this is the bankruptcy of banks. There are many reasons behind these bankruptcies, mainly lack of proper records of expenditure and income, complicated bank administration, low trustworthiness of customers, unethical money lending, unethical bank money transfer, and cyber security. Overcoming all these problems and challenges, if we want to sustain the banking sector, the only solution is to use block chain in the Indian banking system. Educated customers feel that if we succeed in using block chain in the Indian banking system, we can definitely get rid of these problems. The use of block chain can create dynamism in the banking sector and expand the sector. Block chain use can permanently prevent bank frauds and bring sustainable stability to the economy. This is proven by Bit coin's performance to date.

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