INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY RESEARCH & REVIEWS

BLOCK CHAIN MANAGEMENT: AN APPROACH TO LOWER URBAN COOPERATIVE BANKS' NON-PERFORMING ASSETS

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Keywords	Abstract
Blockchain, Architecture of Blockchain , Blockchain in Banking , Blockchain in KYC, Security Aspects in Blockchain , NPA. *JEL - 033, C63, G21, G28, D82, G3.*	Digital technology has emerged as a disruptive force and is becoming a crucial component of many different businesses worldwide, including the banking sector. It has significantly increased interest across all industries and transformed how businesses function by altering their entire business structures. Nowadays, a wide range of sectors are developing several use cases for Blockchain technology by tailoring and personalizing it to meet their requirements. The technology is used to offer a decentralized approach to app development. This article explains the architecture and framework of blockchain technology as it relates to banking. Additionally, it goes over the characteristics and advantages of blockchain technology as well as how to use it to improve KYC practices and lower bank non-performing assets (NPAs), paying special emphasis to cooperative banks. Additionally, a questionnaire focused on the importance of blockchain management in lowering NPA in UCBs in the Mumbai region was created utilizing research assumptions.

1. INTRODUCTION

An ever-expanding collection of documents known as blocks is stored in a blockchain, which is a distributed, decentralized database. In a blockchain, every block contains a timestamp and a reference to the block before it. Blockchains are intrinsically resistant to data alteration because of their structure and operation. As per theoretical understanding, a block can serve as "an open,

Khandekar Sandip Suresh (2025). *Block Chain Management: An Approach to Lower Urban Cooperative Banks' Non-Performing Assets. International Journal of Multidisciplinary Research & Reviews, 4(2), 189-200.*

distributed ledger that can record transactions between two parties effectively, in a verifiable, and permanent way." Distributed ledger technology, sometimes known as blockchain, is the main technology that underpins bitcoin. Blockchain technology improves the reliability, efficiency, safety, and transparency of processes. Businesses and the international media have recognized the significance of blockchain technology advancement. Massive volumes of data are being generated on a daily basis as a result of the digitization of records. All firms must take cost-effective measures to protect their data against security breaches. CEOs are starting to show interest in blockchain technology because of its assurances of invariability, cryptographic data security, and decentralized ownership. The first to back off were the financial institutions. Over 90 central banks have reportedly held international talks about blockchain technology, according to the World Economic Forum. Consequently, banks are prepared to test several blockchain prototypes in 2017. Blockchain technology has also become more important in non-financial industries including supply chain management, crowdsourcing, telecom cyber security, retail, insurance, etc.

Humanity has always been a cooperative species. Collaboration will unavoidably be crucial and beneficial to the global economy. The dynamic nature of cooperative activities that suit the local and regional environment, as well as the economic and social situations at different eras, has been made evident by the cooperative movement. Even the global cooperative movement has not grown linearly. India's banking industry contributes significantly to the country's development. In almost every Indian hamlet, there is a cooperative. Cooperative organization is one of the most crucial elements for the underprivileged group.

Types of Co-operatives based on Structure:

The co-operative banking structure in India includes the following two main types:

- Urban Co-operative Banks
- Rural Co-operative Banks

According to the RBI survey report 2022-23, India had 1,06,770 co-operative banks, of which 1502 were urban co-operative banks and the remainder 105268, were rural co- operative banks. UCBs' total assets grew from Rs. 1,32,145 crores in 2004-05 to Rs.6,80,305 crores in 2022-23.It equates to a 80 percent increase over a 19 year period. The information amply demonstrates the significance of UCBs in the Indian banking industry. The basic origin of the cooperative movement in India comes from Maharashtra. The social and economic advancement of Maharashtra state was significantly influenced by the cooperative movement. Based on the data reported by UCBs in off-site returns, the total number of UCBs in India was 1502, of which 494 existed in the state of Maharashtra alone. This means that approximately 33% of UCBs in Maharashtra are alone. The total number of UCB branches in Maharashtra is 6620, accounting for 60% of all UCB branches in India. Deposits collected and advances issued are also the largest in comparison to other states in India, at 414210 Cr. and 293136 Cr. by fiscal year 2022-23, respectively. It shows the massive contribution of Maharashtra state in the urban cooperative sector. In a megacity like Mumbai is the most populated,

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city in India, the role played by UCB is very vital. The total number of UCB branches operating in Mumbai in 2022-23 was 60. It not only accepts the deposits but additionally offers them a credit facility for their developments. The UCBs in Mumbai really help the population attain their socio-economic objectives.

Chart 1: Cooperative Bank Structure
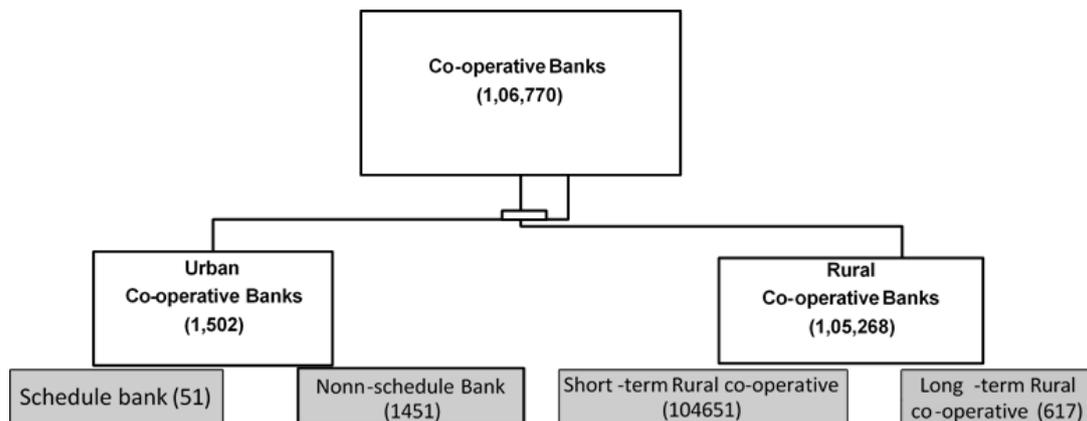
Source: RBI, NABARD and NAFSCOB

Non-Performing Asset:

Non-performing assets, or NPAs, are used in banking and finance. The amount that has not been recovered will be considered a non-performing asset (NPA) if a bank or finance firm is unable to get back the money it has provided to the borrower in 90 days. It stands for bad loans whose debtors did not fulfil their payback requirements.

Types of NPA:

NPA may be classified into

    a. Gross NPA

Gross non-performing assets (NPAs) are advances that are thought to be unrecoverable, for which banks have made provisions, but which are nonetheless recorded in the banks' books of account.

    b. Net NPA

Net NPA is calculated by subtracting from Gross NPA factors like unpaid interest, partial payments, and accounts held in suspense.

NPA and UCB:

According to RBI data, the number of UCBs has decreased from 1926 in March 2004 to 1502 in March 2023, indicating that the UCB has encountered a variety of issues throughout time. This implies that the UCB in India was experiencing financial difficulties. As a result, the RBI took the initiative to close several financially shaky institutions. UCB's mergers and acquisitions from 2004 to

2020 resulted in further sector consolidation. Between 2004–2005 and March 2020, 387 UCB 136 were combined and restored. In Maharashtra, 73 UCBs were consolidated and closed. It was higher than any other state in India. In Mumbai, UCBs such as Panjab Maharashtra Co-operative Bank, CKP Co-operative Bank, and Kapol Co-operative Bank are likewise subject to RBI limitations. UCBs' asset quality is also deteriorating because to non-performing assets. The number of poor investors who experience the unintentional loss of their life investments of PMC banks, CKP banks, and Kapol Co- operative banks.

2. REVIEW OF LITERATURE

The results of a review of the pertinent literature are listed below.

Tejal Shah (2018), in her research paper on ""Blockchain Technology in Banking and Finance" This essay seeks to describe both the structure and operation of the blockchain technology. Along with Blockchain's numerous features, its advantages are also explored. For a select few banking transactions, the use cases and blockchain suitability assessments have also been completed. We also look at the Blockchain's security features in the final segment.

A. Shanti Bruyn (2017), Give details about the blockchain technology, its background, and how it operates in your "Blockchain" research paper. The report also provides background information on the development of blockchain technology. Finally, it discusses how the many variables within blockchain interact with one another in more detail.

Arati Dua (2017), According to her writings on "Banking on Blockchain" that were published in today's business, block chain technology is used in the banking industry when a corporate customer's suspicious transaction with another bank is not revealed by a bank's know-your-customer (KYC) check. What if banks were able to communicate corporate KYCs, including investigation reports and cross-border wire transfer reports, in real time while also making money off of them on a shared digital ledger that was private, secure, immutable, and based on consensus?

Anuj Sharma (2014), International Journal of Computer Applications research articles on "Reducing Risk in KYC for Large Indian Banks by Using Big Analytical Techniques" This essay aims to examine the Know Your Customer process, outline the difficulties it faces, and draw attention to the inadequacies of current methods for successfully putting KYC regulations into practice (particularly in large Indian banks). It then proposes a convincing solution using Big Data analytical approaches like Fuzzy Matching & MapReduce while leveraging real-world examples. The authors are convinced that the solution's framework, which has been supplied, may quickly result in a functional prototype.

3. OBJECTIVES

The following are the broad objectives of this research paper:
1. To find out about the blockchain technology in the banking sector.
2. To analyze the cost-benefit of implementing blockchain management.

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3.   To propose block chain management to control NPA.

Hypothesis:
H1: Blockchain technology is considerably helping to reduce NPA in UCBs in Mumbai.
Ho: Blockchain technology is not considerably helping to reduce NPA in UCBs in Mumbai.

4. RESEARCH METHODOLOGY

The current study is analytical because it employs statistical data. The study is based on both primary and secondary data. The primary data came from 239 respondents who completed standardized questionnaires, the majority of whom worked at 12 UCBs in the Mumbai district. Primary sources for secondary data collecting include online sources such as papers, journals, and websites. Data is analyzed using Excel and SPSS software, and it is shown using graphs, charts, tables, and so on. The statistical tools that were employed are listed below:

1.   Mean is a mathematical concept used to determine values for evaluation purposes.
2.   ANOVA and Friedman's Tests were used for analysis and clarification.

Framework of Blockchain:
Decentralization, digital signatures, data mining, and integrity are just a handful of the fundamental ideas that make up the blockchain framework.

Chart 2: Blockchain Decoded
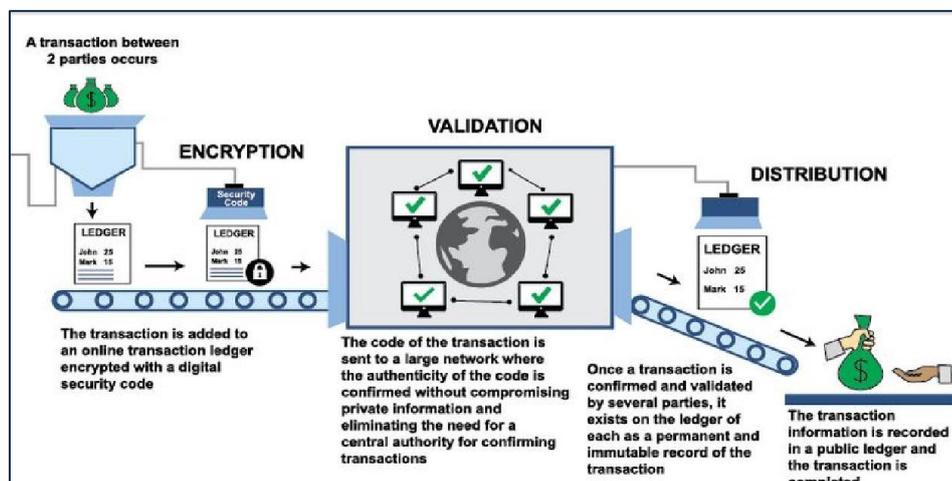
I.   Decentralization: Instead of retaining a single central authority to manage all other actors, blockchain distributes power across all transaction chain participants.
II.   Digital signature: Blockchain employs public and private keys to enable information sharing via a distinct digital signature. The sender of the information is the only one with access to the private key; everyone else on the network is aware of the public key.

III. Data Mining: In a distributed network system, each miner thoroughly investigates the data, which is subsequently evaluated in compliance with encryption requirements. Miners are also recognized for the validation and verification of transactions.

IV. Integrity: Transaction data is safeguarded from alteration once it has been agreed upon using complex algorithms and user consensus. To limit the risk of fraud, data stored on blockchain acts as a single source of truth for all parties.

Chart 3: Work of Block chain
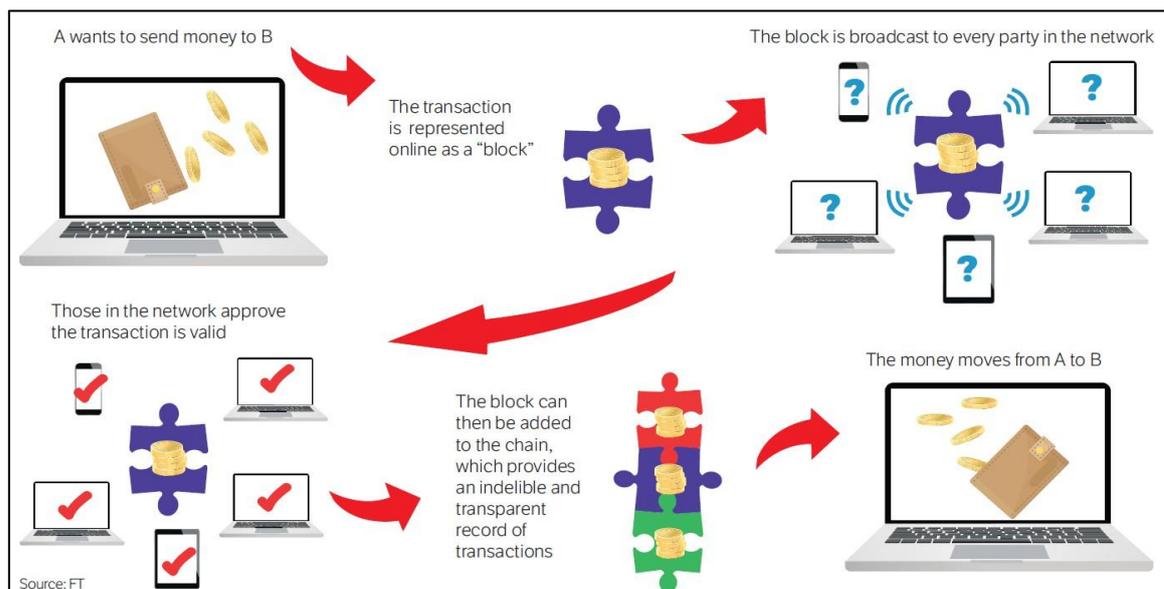
Analysis of data

Axis Bank is the nation's third-largest private sector bank. The Bank provides a full range of financial services to a wide range of customers, including large and medium-sized corporations, MSME, agriculture, and retail organizations. Axis Bank, one of the first new generation private sector banks, commenced operations in 1994. The Bank used distributed ledger technology (DLT) to digitize the trade process. The UI and API-enabled application allows corporates and banks to create, initiate, approve, and transfer trade assets and instruments. This network will enable digital workflow, paperless transactions, and real-time monitoring. Consider Axis Bank, which used blockchain in its operations from 2017-18. The table below shows the benefits of blockchain management in the context of Axis Bank.

Khandekar Sandip Suresh (2025). *Block Chain Management: An Approach to Lower Urban Cooperative Banks' Non-Performing Assets. International Journal of Multidisciplinary Research & Reviews, 4(2), 189-200.*

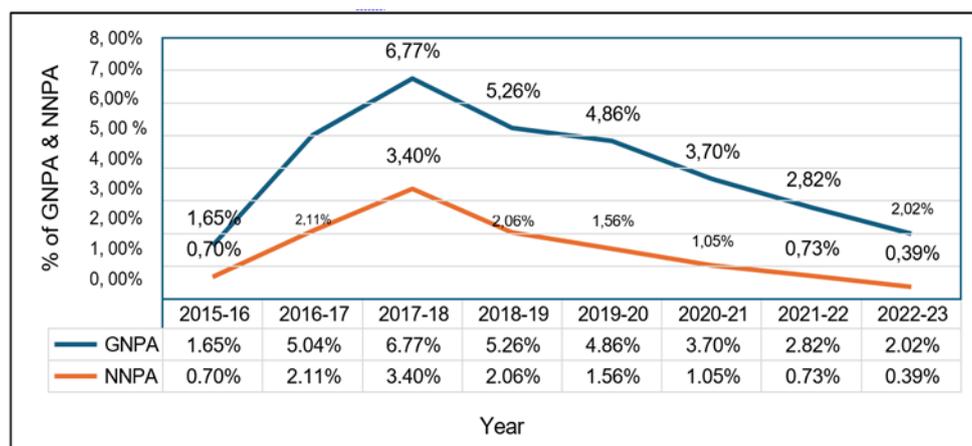**Table: Axis Bank KYC on Blockchain and Cost-Benefit Analysis**

Particulars	FY 17-18 (Without blockchain)	FY 22-23 (With blockchain)
KYC Cost/Account (FY 17-18 approx. Rs. 500-2000, FY 22-23 approx. $5) (1)	Rs. 500.00	Rs. 360
# Of Axis Bank customers (crore) (2)	4.7	5.4
Total # of banking relationship/customers (3)	2	2
Total # of KYC that needs to be done (crore) (4)=2*3	9.4	10.8
KYC cost (5)=1*4	Rs. 4700.00	Rs. 3888.00
Savings because of blockchain (crore)		Rs. 812.00
Net Profit (crore)	Rs. 275.68	Rs.1627.00
Retained Earnings	Rs. 1732.58	Rs. 2458.58
Shares outstanding (crore)	244.51	244.51
Reported EPS	**Rs. 1.13**	**Rs. 5.99**
Absolute increase in EPS (with KYC on blockchain)		**Rs. 5.96**
% Increase in Net Profit (with KYC on blockchain)		**529%**
% Increase in EPS (with KYC on blockchain)		**527%**
EPS: Earnings per share, 1 USD = 69 INR (FY 17-18), 1USD = 72 INR (FY 22-23)		

Source: Annual Report of Axis Bank

In the above table 1, it is indicated that the cost of KYC without Aadhar is INR 500–2000 (USD 7–30), whereas the cost of KYC on the blockchain is less than USD 5. So, assuming 1 USD = 72 INR, the cost of KYC using blockchain will be 72 x 5 = INR 360 crores.

Before blockchain, the total KYC cost was INR 4700 crores, whereas after implementing blockchain, the cost was reduced by INR 812 crores to INR 3888 crores. Thus, the reported net profit of Axis Bank was INR 275.69 crores in FY 17–18, which increased to INR 1627 crores in FY 2022-23, which is an increase of 490%.

Chart 4: GNPA and NNPA % of Axis Bank

|	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23
GNPA	1.65%	5.04%	6.77%	5.26%	4.86%	3.70%	2.82%	2.02%
NNPA	0.70%	2.11%	3.40%	2.06%	1.56%	1.05%	0.73%	0.39%

Khandekar Sandip Suresh (2025). *Block Chain Management: An Approach to Lower Urban Cooperative Banks' Non-Performing Assets. International Journal of Multidisciplinary Research & Reviews, 4(2), 189-200.*

Source: Researcher Compilation

According to Chart 4, the ratios of gross and net non-performing assets (NPAs) decreased from FY 17–18 to FY 22-23. The total NPA was 6.77 percent in 2017–18 and dropped to 2.02% in 2022–23. A similar decline was seen in the net NPA ratio, which went from 3.40% in 2017–18 to 0.39% in 2022–23. demonstrates how well block chain technology works to cut down on problematic loans. The case of Axis Bank clearly shows that the block chain not only helps to reduce the KYC cost, but it is also a great method to manage the problems of bad loans.

Using a systematic questionnaire, the researcher obtained first-hand information from 239 people. The chart below 5, gives idea about involvement of blockchain management.

Chart 5: Involvement of Blockchain Management
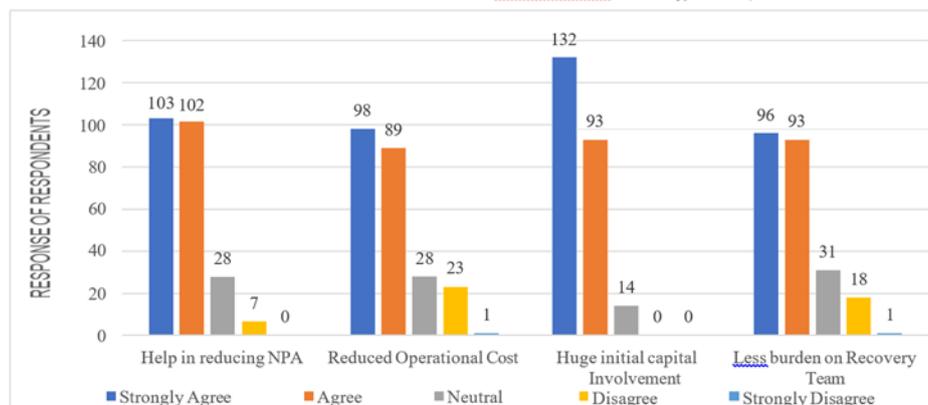
As per the above chart 5, 86% of respondents agree that blockchain technology helps in reducing NPA. 78% of respondents agreed that blockchain technology required less operational cost for NPA management, and 79% agreed that it helped relieve the recovery team's burden. At the same time, 94% of respondents felt that blockchain management required huge initial capital investment and maintenance.

The above-mentioned data of respondents is analysed using IBM-SPSS software, and one- way ANOVA is applied as follows:

Table 2: Descriptive Statistics					
Particular	**N**	**Minimum**	**Maximum**	**Mean**	**Std. Deviation**
Involvement Blockchain	239	1.00	2.00	1.2845	.45213
Help in reducing NPA	239	2.00	5.00	4.2636	.76255
Reducing Operational Cost	239	1.00	5.00	4.0879	.97264
Huge Initial Cost Investment	239	3.00	5.00	4.4937	.60717
Less burden on Recovery Team	239	1.00	5.00	4.1088	.92847

Khandekar Sandip Suresh (2025). *Block Chain Management: An Approach to Lower Urban Cooperative Banks' Non-Performing Assets. International Journal of Multidisciplinary Research & Reviews, 4(2), 189-200.*

Source: Researcher -generated according to the primary data as per IBM SPSS software.

Table 3: Reliability Statistics on Involvement of Blockchain Management		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.850	.777	5

Source: Researcher -generated based on the primary data as per IBM SPSS software.

As per table 3, indicates the validity of data for the involvement of blockchain management the Cronbach's Alpha score is 0.850. If α ≥ 0.8 then data set is reliable for testing. As α = 0.850 which indicates the above data set excellent or very reliable for the testing.

Table 4: ANOVA with Friedman's Test						
		Sum of Squares	df	Mean Square	F	Sig.
Help in reducing NPA.	Between Groups	8.160	1	8.160	14.849	.000
	Within Groups	130.234	237	.550		
	Total	138.393	238			
Reducing Operational Cost	Between Groups	11.814	1	11.814	13.124	.000
	Within Groups	213.341	237	.900		
	Total	225.155	238			
Huge Initial Cost Investment	Between Groups	24.568	1	24.568	92.171	.000
	Within Groups	63.172	237	.267		
	Total	87.741	238			
Less burden on Recovery Team	Between Groups	11.252	1	11.252	13.752	.000
	Within Groups	193.920	237	.818		
	Total	205.172	238			

Khandekar Sandip Suresh (2025). *Block Chain Management: An Approach to Lower Urban Cooperative Banks' Non-Performing Assets. International Journal of Multidisciplinary Research & Reviews, 4(2), 189-200.*

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The categories defined by Involvement_Blockchain = Yes and No occur with probabilities 0.5 and 0.5.	One-Sample Binomial Test	.000	Reject the null hypothesis.
2	The categories of Help_in_reducing_NPA occur with equal probabilities.	One-Sample Chi-Square Test	.000	Reject the null hypothesis.
3	The categories of Reducing_Operational_Cost occur with equal probabilities.	One-Sample Chi-Square Test	.000	Reject the null hypothesis.
4	The categories of Huge_Initial_Cost_Invesment occur with equal probabilities.	One-Sample Chi-Square Test	.000	Reject the null hypothesis.
5	The categories of Less_burden_on_Recovery_Team occur with equal probabilities.	One-Sample Chi-Square Test	.000	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Source: Researcher -generated according to the primary data as per IBM SPSS software

Table 4, shows that the hypothesis is tested using Anova with Friedman's Test. The Anova result shown in Table 4 indicates that the 95% confidence level of significance is 0.05. The F value is less than that, namely.000. It is known that blockchain approaches are key measures for reducing NPAs. As a result, the null hypothesis, " Blockchain technology is not considerably helping to reduce NPA in UCBs in Mumbai," is rejected.

Findings: -
1. Leading Indian banks adopt blockchain technology to decrease operational costs.
2. These technologies also assist the banking sector in lowering non-performing assets. Axis Bank, ICICI Bank, and Kotak Mahindra Bank have successfully used block chains in their operations. This suggests that only the private bank took the initiative.
3. UCB staff believe that blockchain management will assist cooperative banks with lower non-performing assets (NPAs).
4. One of the primary concerns is that the initial investment necessary to install blockchain is highly high, and as a result, other institutions may not find it suitable for usage.
5. If UCBs want to be in business, blockchain management will be very beneficial in the future by avoiding incidents such as PMC bank crises, CKP bank crises, Kapol bank crises, and so on.

5. CONCLUSION

Though blockchain has immense promise, banks must understand its fundamental features and how they may apply it to solve present business problems. It can also use this technology to exchange data, which requires an exchange of currency. Banks must identify various opportunities, assess the feasibility of adoption, and examine the impact on current processes. However, concerns have been raised concerning the security architecture, the expense of deployment, and the accompanying hazards. As a result, they will gain a better grasp of the technology, reduce risk, and be able to develop a solution tailored to their specific problems.

6. AUTHOR(S) CONTRIBUTION

The writers affirm that they have no connections to, or engagement with, any group or body that provides financial or non-financial assistance for the topics or resources covered in this manuscript.

7. CONFLICTS OF INTEREST

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

8. PLAGIARISM POLICY

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9. SOURCES OF FUNDING

The authors received no financial aid to support for the research.

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