FALCON

Blockchain For Preventing Loan Default

A Secure and Authentic Information Provider
For The Financial Organizations

Team ID: BD-3

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Introduction

At present, Bangladesh is considered one of the world's fastest-growing economies. Over time, the country's consistent economic success has aided in reducing poverty and social inequities. The country's growth prediction for 2020-21 was recently reduced to 5.6 percent by the Economist Intelligence Unit. Despite the pandemic, inflation slowed to 5.5 percent in 2019 and 5.6 percent in 2020 and is predicted to remain constant in 2021 (5.9%) and 2022 (5.5 percent). In the first eight months of 2021, remittances climbed by 33.51 percent year-on-year, reaching USD 16.68 billion. Though textiles are by far the most important business, the local pharmaceutical sector is also doing well, with a 17.36% increase in exports from July to November 2020. Bangladesh's success as a garment exporter (which accounts for 84 percent of total exports) and remittances from abroad (which account for over 6% of GDP) are key factors in the country's development. Bangladesh's economic freedom score is 56.5, ranking it 120th in the 2021 Index of Economic Freedom. Bangladesh is placed 105th in the World Economic Forum's Global Competitiveness Index for 2019 and 25th among 40 nations in the Asia–Pacific region, with a lower score than the regional and global averages.

The banking sector plays a vital role in our country's flourishing economic development. To help our people start and support their businesses, banks provide their clients with loans of different categories. With the revenue earned from the industry, clients repay this loan along with interest.
Banks use these repaid loans to lend credits to new clients. This cycle continues, and thus the economy of a country remains stable. Due to the non-performing loans and default loans, the cycle breaks. Therefore, it becomes challenging for the banks to provide new loans and offer various financial services to the customers. Eventually, these banks are sealed off, bringing drastical outcomes in the economic sectors.

Problem

Non-Performing Loan

A non-performing loan (NPL) is a bank loan that has been defaulted on or is unlikely to be repaid in full by the borrower. Non-performing loans are a significant concern for the banking industry since they lower bank profitability and sometimes prevent banks from lending more to businesses and individuals, slowing economic growth. The following factors are commonly used to identify non-performing loans:

(i) Interest and principal payments have been late for at least 90 days.

(ii) Interest payments have been capitalized, refinanced, or postponed for at least 90 days.

(iii) Payments are fewer than 90 days late, but there are additional reasons to question that they will be made in full.

Loan Default

A borrower defaults on a loan when he or she fails to pay the principal or interest on security or loan. A mark shows on a borrower's credit report when he or she is 30 days late on a payment. The borrower's account gets transferred to default status after 90 days of late payments. When the default term exceeds 120 to 180 days, the bank considers the obligation a bad debt, which means it will be written off.

In June - 2021, outstanding loans were Tk 12,18,736 Crore. Out of this, nonperforming loans were Tk 99,205.14 crore. Thus the NPL Ratio rises 8.14%. According to this data, Bangladesh tops the list of loan default indexes in South Asia.
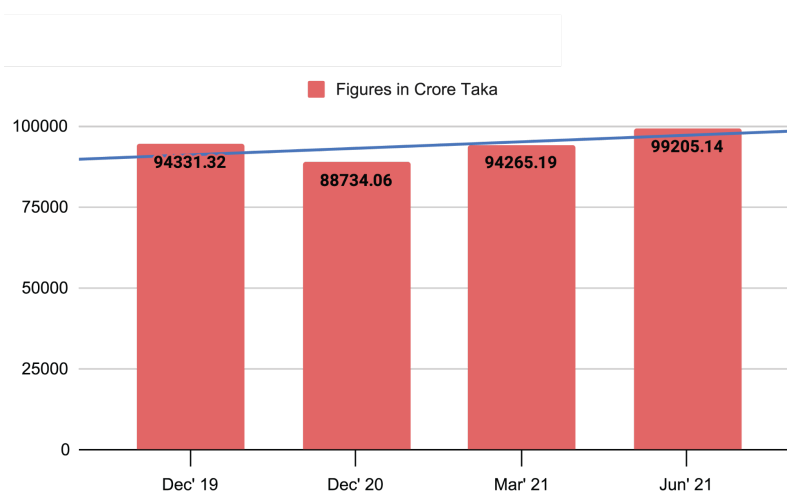

Figure: Trends of Non-Performing Loans in Banks.

Loan Default Scams

According to the latest data from the Bangladesh Bank, the NPLs of state-run Sonali, Janata, BASIC bank, and private commercial Padma Bank totaled Tk35,478.35 crore at the end of June, accounting for 37 percent of all stressed loans in the banking system (BB). Thousands of crores of taka have been stolen from these institutions in the form of loans in recent years.

BASIC was defrauded of around Tk4,500 crore between 2009 and 2013, making it one of the country's largest loan scandals. The bank's financial strength has weakened year on year since the enormous financial swindle, and the state-run bank has failed to regain its previous corporate image and financial health. NPLs accounted for Tk7,676.29 crore, or 51.55 percent of the bank's total loans, at the end of June this year.

Between 2010 and 2012, the Ruposhi Bangla Hotel branch of Sonali Bank sanctioned Tk3,547 crore to Hallmark Group and its five partner firms for falsifying paperwork. According to a BB inspection report, the Hallmark Group alone received Tk2,686.1 crore out of the whole Tk3,547 crore. According to a senior bank official, the state-run bank has yet to recoup any money from the scammers. Sonali Bank's non-performing loans (NPLs) totaled Tk10,086.41 crore as of June this year, accounting for 21.16 percent of the bank's total outstanding liabilities.

Janata Bank now has the most defaulted loans in the banking sector, with NPLs totaling Tk14,005.79 crore as of June this year, accounting for 26.76 percent of the bank's total outstanding liabilities. However, at the end of 2017, the amount was Tk5,818 crore. The failure of the bank's clients, Crescent Group and AnonTex, to repay their loans is largely to blame for the substantial increase in bad loans. According to the BB's inspection report, the bank lent more than Tk10,000 crore to Anon Tex and Crescent Group, violating the BB's single borrower exposure limit criteria.

According to the BB report, some unethical borrowers stole more than Tk3,500 crore from the bank with the help of the board of directors. In February 2019, the bank was renamed Padma Bank to

repair its tarnished reputation following the scandal. The bank's non-performing loans (NPLs) totaled Tk3709.41 crore as of June this year, accounting for 66.33 percent of all sanctioned loans.

Impact of loan Default

1. Banks make the majority of their money by charging interest on the loans they make. As a result, when such loans become nonperforming, the financial soundness of these banks is harmed.
2. Suppose a bank's income is insufficient to cover the provisioning need, according to Bangladesh Bank norms. In that case, it must be deducted from the bank's capital, potentially resulting in capital erosion and a regulatory capital shortage.
3. NPLs limit the amount of money that can be invested or lent since they make it difficult for banks to offer new loans to existing customers as well as new customers.
4. Default scams ruin the bank's image and reputation. The Hall-Mark scam, for example, has become a smear campaign against Sonali Bank Limited.
5. NPL policies tend to reduce a bank's entire loan portfolio, lowering interest profits on loans.
6. The bank's credit and CAMELS ratings (Capital adequacy, Asset quality, Management, Earnings, Liquidity, and Sensitivity) deteriorate.
7. Large NPLs could weaken depositor and foreign investor confidence, causing them to take unusual positions against banks, resulting in a negative signal and liquidity problem.
8. Nonperforming loans do not generate interest income for banks. To make up for the loss, they impose hefty interest rates on new loans.
9. Bangladesh's loan default crisis is so severe that the banking sector requires billions of taka in capital injections from taxpayers every year.
10. The default loan crisis warns worldwide business communities that Bangladeshi merchants are untrustworthy and lack commercial integrity, potentially jeopardizing business relationships with foreign traders.

What If the Problem Is Solved?

1. At the end of last FY 2018-19, the size of GDP stood at Tk 25.42 trillion (Tk 25,42,482 crore). NPL of the banking sector is eating into 3.71 percent of this GDP. Three Padma Bridges can be constructed with this NPL amount. It is estimated that GDP will go up by as much as 1.20 percent (Source: Wikipedia) and GDP growth by 2.20 percent (Source: BBS) once Padma Bridge is completed. So if the NPL amount could be realized, it could have boosted the country's GDP growth by more than 6.50 percent!
2. With the present default loans amount, as many as 235 more banks can be set up with initial paid-up capital of Tk4.0 billion (Tk400 crore) each.
3. Small Scale businesses will be benefited.
4. The unemployment problem can be reduced.
5. Socio-economic development can be possible.

Current System Loopholes

The many reasons for higher NPL in Bangladesh are
1. Failure to authenticate proper documentations

2. Improper evaluation of mortgage property
3. Poor governance and regulations
4. Political pressure to sanction the loan
5. The weak regulatory framework to recover loans.

Among them, failure to verify the authenticity of the mortgaged properties and the evaluation of this property plays a vital role in the loan defaulting phenomenon.

Solution

System Overview

The proposed system has three connections among banks, land ministry, and national revenue board. Therefore, whenever a loan seeker applies for a loan, a final report will be generated associated with these three domains. This report will contain authentic financial information relevant to the account/account holder, accurate collateral/asset information & its mortgage information(if any), existing/previous loan status, and tax-related information to verify the legitimacy of the income sources. According to this information, the loan provider can come up with the decisions regarding the approval of the loan, amount & conditions of the loan, etc.
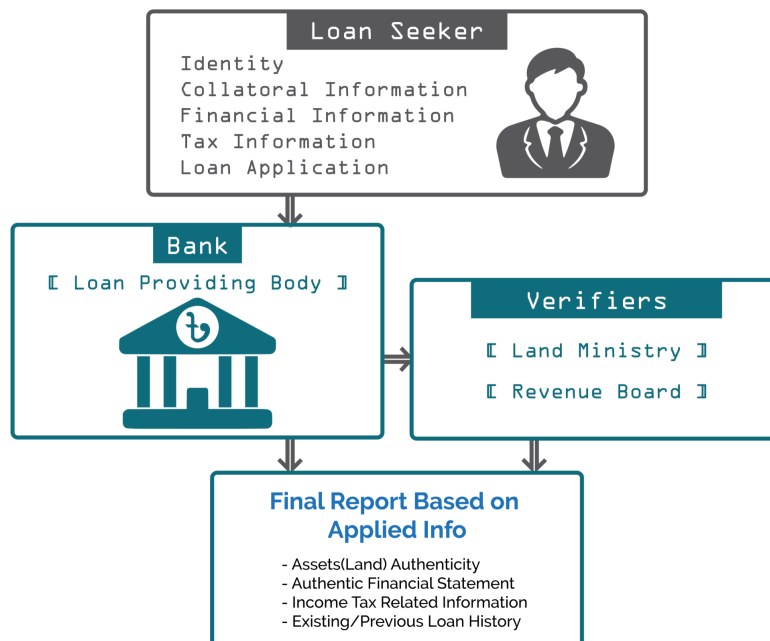
Figure: System Overview.

Why Blockchain?

In our system, blockchain provides three key characteristics.
1. Immutability
2. Transparency
3. Scalability

Our system requires the information ranging from account description to transaction details to be unchangeable, which is impossible using any classical method. Blockchain's immutability feature allows us to make the data residing inside the blocks non-modifiable, thus making it the topmost preference to be utilized inside our system. In addition to that, our approach should provide every level in the hierarchy with the same information. The transparency feature of the blockchain offers the aforementioned facility to our system. Private permissioned blockchain platform like Hyperledger 2.x offers substantial throughput, which means an organization can execute an enormous number of transactions per unit time, making it suitable for processing a large number of financial transactions within a short amount of time.

System Architecture

Bank Segment

The bank segment of our proposed system will provide authentic financial information such as bank statements corresponding to the loan seekers' information. This segment also checks if the loan seeker has previously taken any loan or not and. The loan status and the mortgaged property details corresponding to that particular loan are further reviewed by this segment if the condition as mentioned above is proven to be true.

Land Segment

The land segment of this system will verify the mortgage (land) information according to the govt regulations, which the loan seeker has provided along with his/her loan application. This information includes the details of the land's owner, the size of the land, the mouza rate, etc. The segment finally determines whether the property is used as collateral for another loan or not. The response can also contain any other relevant information if required.

NRB Segment

This segment provides the authentic tax information of the loan seeker. With this information, the loan seeker's income can be easily predicted.
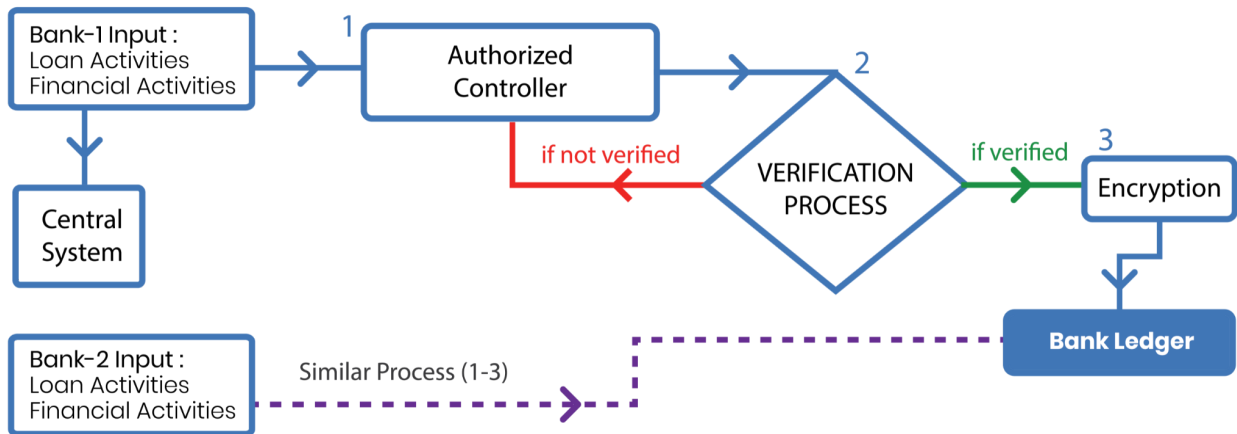
Figure: Data Insertion Process.
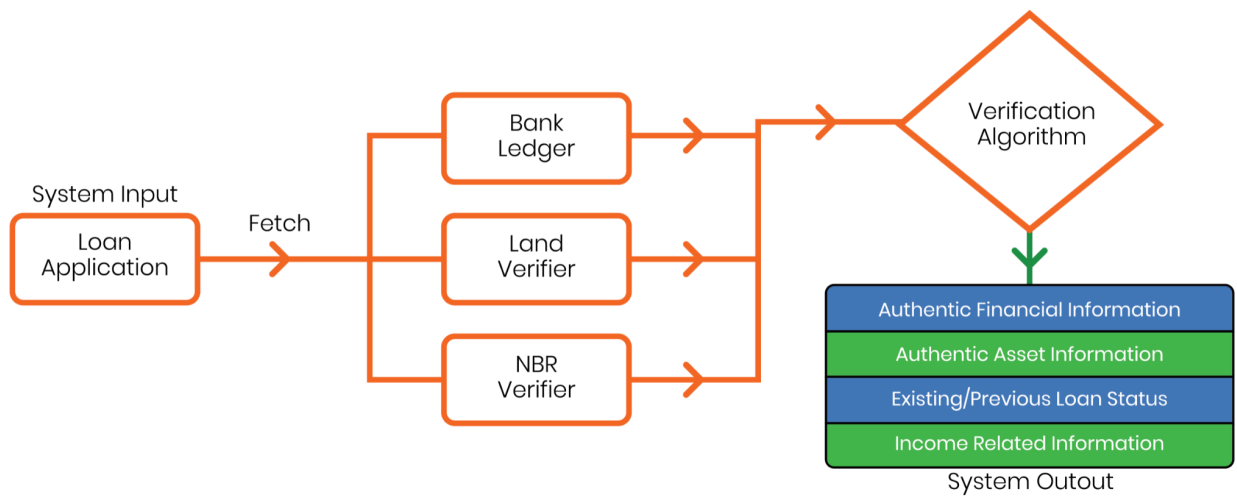
Figure: Verification Process.

In this verification process, all the verified information from the bank ledger and verifiers are summed into a final report. Based on this report, a prediction can be made whether a loan seeker is eligible to get a loan or not.

Technical Architecture

Our blockchain network is built on the Hyperledger Fabric framework. All the banks of Bangladesh form a channel through their respective peers. The land ministry and national revenue board (NBR) participate in the network as verifiers. Each bank, land ministry, and national revenue board all have their own certificate authority (CA). Both the peer selection and controlling processes of each organization are handled by the corresponding CA. In addition to the peers and CA, Bangladesh Bank has the network policy authority.

The application has two primary operations.

1. Insertion of loan related data when the loan is sanctioned
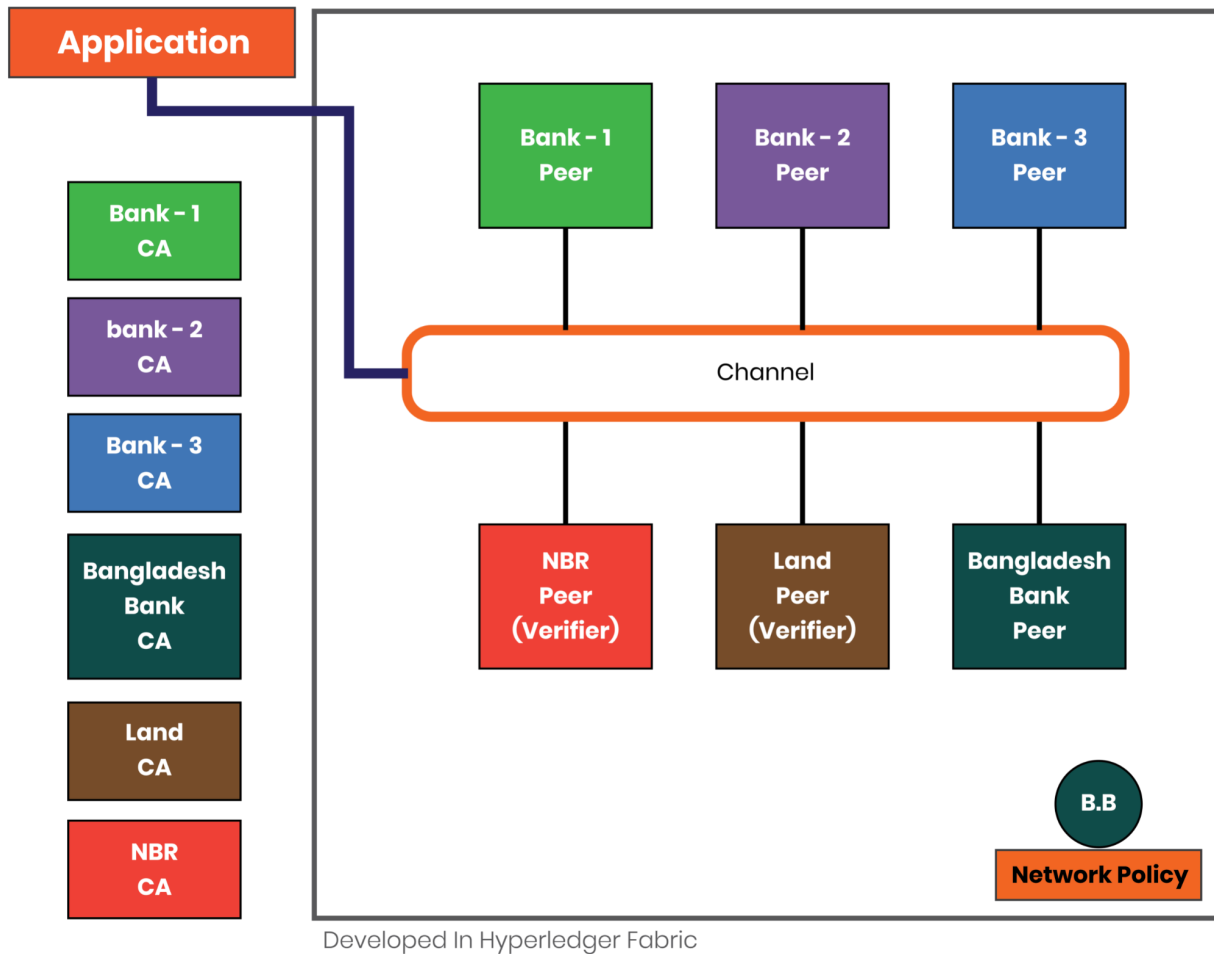2. Verification of loan seeker's submitted information.

Figure: Technical Architecture.

Governance

Membership Governance	Network Governance	Verifier Governance
1. The participants of this system will be selected by Bangladesh Bank. 2. Each bank will select and control its operating peers.	Bangladesh bank will have the network policy authority.	1. The land verifier will be selected and monitored by the land ministry. 2. The NRB verifier will be selected and regulated by the national revenue board.

SWOT Analysis

➢ Strength
- ○ Secure infrastructure to provide authentic information.
- ○ Prevention to data forgery.
- ○ Transparency and necessary governance throughout the existing system.
- ○Fast verification process

➢ Weakness
- ○ The implementation of our architecture will require a decent amount of time.
- ○ Our system is so complex and complicated in technical terms.

➢ Opportunities
- ○ All blockchain infrastructures will provide a tremendous amount of data that can be analyzed for further predictive analysis using big data analysis and machine learning.

➢ Threads
- ○ Our system mainly depends on some cryptography. If those cryptographies are cracked, then our system will fall. This situation is doubtful.
- ○ Lack of enough expertise may cause an operational issue

Business Model

Client	Market
There are 6 state-owned commercial banks, 3 special banks, and 42 private commercial banks. Each of these banks provides loans. All the loan seekers of these banks are our customers.	During the last year, the 58 banks and 30 NBFIs disbursed Tk1,53,496.15 crore among 785,858 CMSME borrowers. With this data, the market size can easily be estimated.

Value Propositions	Partners
Problem: Loan default is like cancer to the financial institutions. Banks suffer significant losses for this problem every year. On the other hand, it takes a lot of time to sanction a loan. It is also a major problem for loan seekers. **Solution**: The proposed system is a private permissioned blockchain platform that provides authentic verification for sanction a loan in a concise time. The system is developed in the hyperledger fabric framework.	Bangladesh Bank 6 state-owned commercial banks, 3 special banks, 42 private commercial banks 9 Foreign commercial banks 30 NBFIs Land Ministry National Revenue Board

	Customer Relationships
	The customers will interact with our system through banks.

Key Features	Revenue Streams
The proposed system provides hierarchical transparency, authenticity, and fast verification.	According to Bangladesh bank regulation Processing fee for up to 5 million loan = 0.5% of loan up to 15000 taka Processing fee for over 5 million loans = 0.3% of loan up to 20000 taka Our revenue = X% of this processing fee (Under negotiations) And this revenue is considered for per successful loan sanctioned.

Cost Structure	
Land ministry incentive, National revenue board incentive Bank incentive	

Conclusion

The proposed framework refrains the non-eligible loan seekers from taking loans, thus saving a large amount of borrowed money from being lost. Fast real-time loan verification has been made possible through this system. Moreover, Hierarchical transparency can also be maintained using our proposed approach. In addition to all the parameters contributing to preventing the non-performing loans, our system requires that the loan seeker provide the payment evidence of a large amount of tax before taking macro-scale loans, which can remarkably contribute to the financial state of Bangladesh. Consequently, the profitability to be brought by our system will enhance the economic growth of Bangladesh by preventing non-performing loans. Faster processing time, improved transparency, and no additional deployment cost for both the loan-providing organizations and the borrowers eventually makes our system feasible both economically and technically.