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A Decentralized Based Approach for Microfinance Using Blockchain Technology

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Abstract:
Financial inclusion is seen as a dynamic tool for achieving multifaceted microeconomic stability, (and) sustainable economic growth, job creation, poverty reduction, and income equality for both developed and developing nations. The needy segments of the population must be provided with financial services to accomplish this inclusion. Still, the traditional financial market is unavailable due to its lack of collateral and shallow income. Thus ,they go to local moneylenders, also known as "loan sharks," who charge exorbitant interest rates. Introduction to microfinance came as a new and refreshing light to these needy segments of the population as it provides small valued loans (micro-credit) to support their micro-scale businesses and engage in productive activities. As emerging technology started to be incorporated into every aspect of society, thus microfinance also needed to be incorporated into the technology. An application is required to protect data integrity and smoothly influence the microfinance sector. As the databases are vulnerable to data manipulation, this can affect the transaction history of the loan. Blockchain technology can be used to solve this problem, as data in the Blockchain is stored immutably. So, we designed a microfinance application that uses blockchain technology with decentralized KYC architecture to reduce multiple KYC verification and easy access to micro-credit.

Keywords: Blockchain, Transactions, Microfinance, Decentralization

I. INTRODUCTION

Politicians and economists have debated how to reduce extreme poverty worldwide for decades. In 2001, 2.7 billion people-more than half of the world's population –lived on less than $2 wage per day, and 1.1 billion on less than $1 wage per day. Rural women in developing nations are the poorest and most vulnerable, much as women in sub-Saharan Africa are the most prone to extreme poverty. According to economists Ross Levine, Asli Demirguc-Kunt, and Thorsten Beck, increased financial development in an underdeveloped country causes the incomes of the poorest citizens of that country to grow more quickly than the average per capita gross domestic product (GDP), which is the nation's output of goods and services divided by its population. As a result, poverty rates drop faster than they otherwise would, and income inequality declines more quickly.

To promote the financial development of underdeveloped countries, people who require financial assistance should be provided with financial services. But there is a misconnection at the core of banking: banks couldn't lend to people without fixed income or collateral. The geographical distance was cited by Hinson as the primary barrier stopping the poor from using traditional banking services. To tackle this problem, microcredit came up as the solution. Microcredit, also known as micro banking or microfinance, provides credit to unconventional borrowers, such as the underprivileged, typically in the form of small loans with no collateral. It was introduced by Muhammad Yunus, a Nobel Peace Prize economist who implemented a Grameen Bank Network in Bangladesh.

Grameen Bank gives the loan to the group based on the repayment credibility of the few people from that group who were given loans on the first attempt. Over the next two decades, a significant number of organisations from all over the world entered the market to create a successful strategy for generating employment, expanding enterprises, and enhancing a beneficiary's productive potential. Loans taken through MFIs (Microfinance Institutions) in Bangladesh have helped smoothen household consumption. SHGs (Self-help Groups) are one of the core values based on microfinance development and their beneficial impact on society. Worldwide adoption of digital technologies is accelerating, penetrating every aspect of daily life. For people, corporations, and the government's Digital advancements are opening up new avenues of communication, extending opportunities, and boosting productivity. The global microfinance industry is quickly catching up with technological improvements in the financial sector.

So, when authorities started storing data in the database, they couldn't find the data concerning the many loans. One reason may be the mismanagement amongst the lenders and borrowers having few mandatory documents. And many times, borrowers fail to secure a loan due to a lack of trust due to no proper availability of documentation. Additionally, the sector hires representatives who could not be deemed reliable, wasting time and resources. Thus, making the loan-granting process time-consuming and untraceable. Blockchain technology has been taken as an approach to solving this problem. In addition to cryptocurrencies, Blockchain is successfully employed in the financial, identity, supply chain, certification, etc. Traditional database systems cannot accurately deal with problems due to trust and security vulnerabilities. According to research by Beck et al. Blockchain is a trust-free system that also assures privacy and security. Therefore, a microfinance application framework (Micro chain) is suggested in this study. The framework uses blockchain technology to ensure trust, transparency, privacy, and security, reducing fraudulent activities and increasing productivity in the microfinance industry.

The microcredit business is crucial in the fight against poverty, especially in underdeveloped nations. As per Kateeba, information and communication technology (ICT) use computers, microelectronics, and telecommunications to create, store, and transfer information in images, words, or numbers reliably, swiftly, and affordably. It includes both hardware and software. In this technological age, ICT has fundamentally altered financial institutions. Evangelista notes that ICT and microfinance are particularly complementary due to the information-based nature of the services provided by these organisations. By examining the experiences of MFIs, Fatima et al. highlight the prerequisites for successfully implementing MFS. It also intends to advise future organisations interested in using MFS by outlining the "best practices" to follow. According to a survey data from Uganda and Tanzania by Moshy et al. mobile financial services are now available to more customers previously denied access to financial services as services that can reach rural areas. The critical blockchain applications in underdeveloped nations were resented by NirKshetri. Chinese information and communication technology (ICT)-based online microfinance platforms provide financial services and offer both group and individual financing. Blockchain in the microfinance sectors to ease lending is on an upward trend. Athula et al. have provided a Blockchain-based framework for financially viable microfinance outreach to farmers that would allow microfinance institutions to dynamically adjust the loans they offer in response to the farmer's actions, reducing the farmer's vulnerability to severe debt and enhancing crop cultivation, which would improve farm outputs and income. There is preliminary evidence that blockchain technology can help with social, political, and economic concerns. Concerns about trust are a hurdle for NGOs and borrowers in the microcredit system. More works talk about the infusion of technology and microfinance, paving more paths for the upliftment of the under-privileged segment fusion.

II. PRELIMINARY

1. Blockchain

In 1982 David Chum put forward a protocol similar to Blockchain. Stuart Haber and W. Scott Stornetta, two mathematicians in 1991, wanted to implement a system of non-tamperable document timestamps, which provided further work for the chain. Merkle trees were integrated into the design by Haber, Stornetta and Dave Bayer in 1992.In 2008 Satoshi Nakamoto released a white paper describing the first decentralized Blockchain. It was later implemented in the same year.
A distributed database or ledger shared by computer network nodes is a blockchain. A blockchain functions as a digital database for the storage of data. A blockchain collects data in units called blocks, each of which contains a set of data. When a block is filled, it is contained and connected to the block before it, forming the data chain known as the Blockchain. Blocks have predefined storage capacities. After that first block is uploaded, each new piece of information is merged into a new block, which is then added to the chain. It is one of the key differences between a typical database (which usually stores the data in tables) and a Blockchain. When the blocks get filled up, it gets the precise timestamp and is added to the chain, thus providing the exact order of events and adding a layer of transparency. Every block contains its hash, the previous block's hash and its timestamp. The data in the database has been spread amongst several nodes at different locations, which helps in creating redundancy and maintaining the integrity of stored data. Copy of the chain is present with each node of the blockchain network, which gets updated as soon as new blocks get added. There are current blockchain explorers, allowing anyone to see the live transaction made on Blockchain. These properties of Blockchain make transactions on Blockchain more trustful.

For altering the data, the majority of the network needed to consent to that because if a shady character does some changes in one copy get singled out as it does not match everyone's copy while cross referencing. For example, suppose a malicious miner who manages a node on the blockchain network desires to change a certain transaction in the Blockchain. In that case, the miner has to dominate and change more than half of the total copies of the Blockchain to make their new copy agreed upon by the chain. It requires a massive number of resources, and due to the growing size of the ever-increasing blockchain network, it is a difficult task. Thus, in this way, transactions on Blockchain remain immutable. As Blockchain started integrating with many industries, finance may be the sector that gains the most from incorporating Blockchain into its corporate operations. As banks take time to update the changes, Blockchain will precisely give fast output, and it not only helps in the traditional banking sector but also helps in microfinance which will be discussed in the later sections.

2. Smart contracts

In the early 1990s, Nick Szabo proposed the smart contract by referring to it as "a set of promises, specified in digital form, including protocols within which the parties perform on these promises". A smart contract is a decentralized programme which carries out business logic in reaction to the occurrence. Developers design smart contracts by incorporating the terms and conditions for the various events required by the application. An exchange of money, the delivery of services, the release of digitally restricted content, or other types of data manipulation, such as changing the name on a land title, can all benefit from executing a smart contract. Smart contracts can also enforce privacy protection, for example, by allowing the selective release of data that is privacy-protected to comply with a specific request. Different designs exist for how smart contract programme are created, distributed, managed, and updated. They can be kept as a part of a blockchain or other distributed ledger technology and used in various payment systems and digital exchanges, including those that accept Ethereum and other cryptocurrencies. Despite their name, smart contracts are not legally binding agreements. Their primary responsibility is to carry out business logic programmatically, coded into them to perform particular tasks, processes, or transactions in response to a specific set of criteria. Legal action must be taken to link its execution to legally binding agreements between parties.

3. Identities in blockchain

Blockchain provides a permanently unalterable identity called Self-sovereign identity. The self-sovereign identity is more secure than the traditional identity Systems. The users can use the self-sovereign ID to verify their identity, eliminating the need for passwords. This self-sovereign identity is developed from the objective that every individual must have control over

the administration of their identity. This identity allows the users to control their identities, access information and update the same. It enables users to choose the information they prefer to keep private. Users have access to delete their identities if necessary. Through this solution, users will have control over their data rather than giving power to industry giants. Generally, every organisation or platform has a separate authentication process. But, with Self sovereign identity, we can verify our identity in any organisation through one single authentication. This identity eliminates the need for bureaucratic processes to verify identity.

III. PROPOSED SYSTEM

The proposed lending model eliminates the middle parties like banks in the loan management process. It decreases the time taken to a great extent. Using Blockchain will ensure that no one will default on their transaction. Lenders can gain more interest rates for their invested money than banks. Borrowers can gain low-interest rates for the money borrow compared with banks.The decentralized KYC model eliminates human interaction in the process of KYC verification to a great extent. It restricts the submission of one's documents in multiple organizations, with a high risk of data bleaching if any of those organizations compromise the security systems. There will be only one database to store the documents so they will be maintained with high-security standards. As every transaction will be held in Blockchain and are highly resistant to modification, neither of the parties can default any transaction.

IV. PROJECT MODEL WITH BLOCKCHAIN

We proposed a KYC model describing user documents' safe A decentralized approach for microfinance using blockchain technology would involve creating a peer-to-peer lending platform where borrowers and lenders can interact with each other directly, without the need for intermediaries such as banks or microfinance institutions.

The architecture for such a platform would involve the following components:

Blockchain network: The platform would be built on a blockchain network, which would allow for secure, transparent, and immutable recording of all transactions and interactions between borrowers and lenders.

Smart contracts: Smart contracts would be used to automate the lending process, including loan disbursement, repayment, and interest calculations. These smart contracts would be executed automatically, based on pre-defined conditions agreed upon by the borrowers and lenders.

User interface: The platform would have a user-friendly interface, allowing borrowers and lenders to interact with each other easily. Borrowers would be able to submit loan applications, while lenders would be able to browse through loan requests and choose which ones to fund.

Digital wallets: Each user would have a digital wallet, which would store their funds and allow for seamless and secure transactions on the platform.

Credit scoring: To ensure that borrowers are creditworthy, the platform could use a credit scoring system based on their past repayment history and other factors. This would help lenders make informed decisions when choosing which loans to fund.

Governance: The platform would need to have a governance model in place to ensure that it operates fairly and transparently. This could involve a decentralized decision-making process, where platform users have a say in how the platform is managed and operated.

Overall, a decentralized approach for microfinance using blockchain technology has the potential to significantly reduce the cost and complexity of the lending process, while also increasing access to finance for underserved communities.
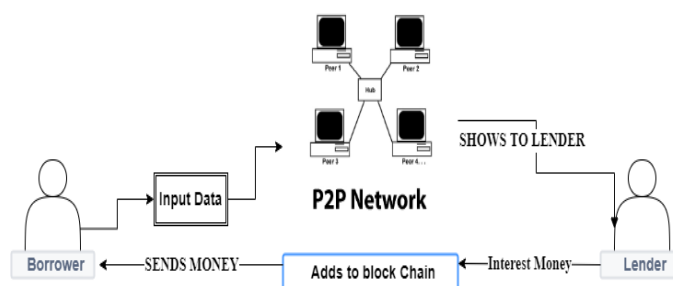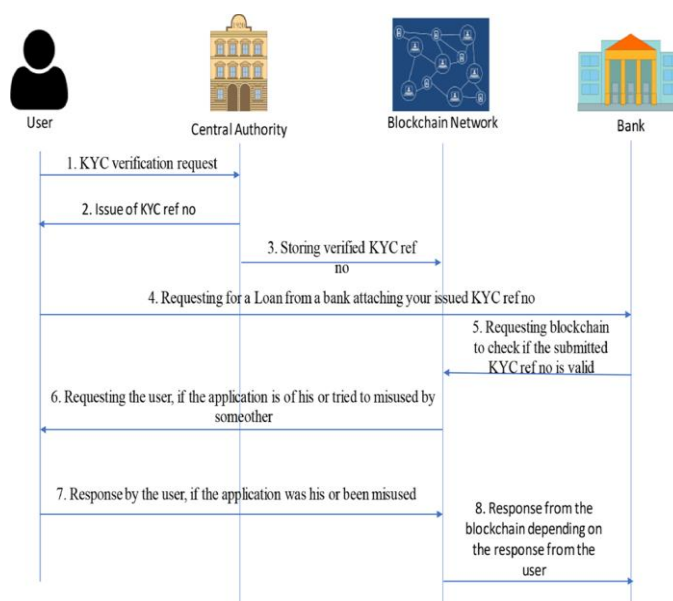

Fig.1: Project Architecture

Fig.2: Flow of proposed system

V. CONCLUSION AND FUTURE WORK

Microfinance is a type of banking provided to unemployed or low income individuals or groups that would otherwise be unable to obtain financial services. Microfinance enables people to take out acceptable small business loans safely and in accordance with ethical lending principles. Beyond cryptocurrencies, blockchain technology has proven its disruptive potential and is finding uses across industries. There are numerous use cases for Blockchain and smart contracts in the financial sector. Blockchain-based transactions have attracted the attention of several solution providers due to their promising characteristics of low cost, high speed, transparency, and security, which have prompted them to develop Blockchain-based payment solutions.
So, we presented a strategy that allows borrowers to obtain instant microcredit from lenders directly, bypassing middle parties. These transactions are carried out on the blockchain

network, which records each transaction. Hence, microfinance is implemented using blockchain technology. To reduce the gas price of each transaction, we converted Ethereum blockchain into a polygon blockchain. In polygon blockchain, The gas prices are comparatively significantly less. We also proposed a blockchain approach for KYC verification. This approach enables us to have only one trusted authority where we can complete our KYC verification and use the same KYC whenever a new account is created and KYC verification is required. This allows us not to submit government documents to banks during KYC verification. As part of future work, we would like to make the proposed KYC model decentralized, where we eliminate the involvement of databases, which will help decrease human interaction to a great extent.

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