

# Digital Lending: Using Blockchain Technology for Peer-to-Peer Lending

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**ABSTRACT:** Money lending has been the prime principle of a functioning economy. Formal banking has allowed trust to be regained so that lending could be done, but in the digital have proven to be slow, with even slower incremental changes. In this paper, a blockchain supported platform has been proposed as a solution in the context of peer-to-peer lending. Even though blockchain by itself doesn't guarantee any risk-free lending, but does dramatically improves upon the turnaround time, allowing decentralization of the loan journey process hence improving upon the efficiency of funding. The purpose of the paper is to allow the creation of such a platform, that allows lending through blockchain, hence decentralizing the whole loan process and removing the middle layer (banking), leading to a much easier and still secured peer-to-peer lending in the country.

**KEYWORDS:** P2P, lending, smart contracts, blockchain, decentralization, loans, banks, security, peer-to-peer, turnaround-time

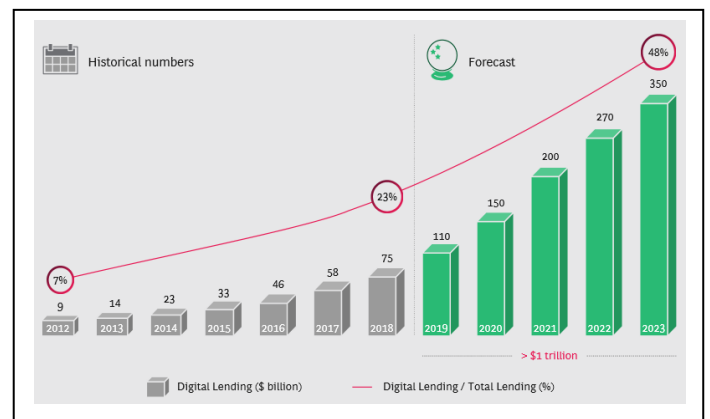
## I. INTRODUCTION

Earlier to the rise of banks, lending took place between the lenders and borrowers directly. Individuals had to trust each other, but with the passage of time, due to risks, failure of repayments, etc, trust began to break down, and thus intermediaries and third parties were added and thus the sandwich was made. This middle layer provided a sheet of protection, however doing so higher fees were being charged, and also another problem arose was the increase in complexity and the regulations that came along with higher complexities.

In today's age and day, digitizing the loan journey is on the full swing by fintech and other companies, allowing digitizing the end to end the journey of a loan.

But even automation and digitalization of the loans didn't take care of the most important issue, that is; the middlemen. The middle layer takes most of the loan journey's process. Less turnaround time is the most important aspect of such digitized processes, and even though the turnaround-time did decrease, it isn't enough. In instances of secured loans of high-ticket size takes almost a minimum of 7 days till disbursement in a digitized process. Designed to introduce trust with its unbiased and suburbanized network of nodes, blockchain replaces pricey banks and greatly reduces loan time interval, rather than paying steep process fees and waiting up to sixty days for empowerment, people and little businesses will currently

apply and receive approval for a blockchain-based loan during a matter of minutes. It's calculable that burgeoning various disposition trade can loan to 20.7% of SME businesses by this years' end.[1]



## II. SIGNIFICANCE OF THE STUDY

This study provides information on how the statistics of lending are moving towards digitization of lending and how the building of a platform will allow much easier lending with help of technologies such as blockchain and smart contracts, thus increasing focus back on peer-to-peer lending.

### III. THE RISE OF DIGITAL LENDING

Around the world, the lending business has seen quite varying activities and products. Fintechs are on the rise and disrupting the formal lending business hugely, taking advantage of consumer's behavioral changes and shaping their experiences. Furthermore, in India, the regulations and compliances are easing up quite a lot and recently cryptocurrency trading has been allowed by the Supreme Court. Research has shown that almost 80% of people living in NCR, Mumbai, and other metropolitan cities, have bought a loan through a digital platform and the remaining 20% said that they would have opted for a digital loan in the upcoming 3 months.

Also, as much as 80% of the rural population avails some sort of service from banks themselves, and have a bank account. This has opened up a tremendous opportunity for even more growth of digital platforms of lending.[2]

### IV. BLOCKCHAIN

Blockchain technology at its core is just a simple recorder, storing financial digital assets, a ledger in a sense. Its most important USP (Unique Selling Point) is that the data entered in the blocks are unmodifiable, and is thus extremely secure in terms of data handling. A simple analogy for understanding blockchain technology could be a Google Doc. once we produce a document and share it with a bunch of individuals, the document is distributed rather than derived or transferred. This creates a decentralized distribution chain that offers everybody access to the document at an identical time and nobody is fastened out awaiting changes from another party, whereas all modifications to the doc being recorded in the period, creating changes fully clear. Even though a blockchain could be much complicated than that, but the analogy fits the facts perfectly.[3]

### V. P2P LENDING WITH BLOCKCHAIN

P2P blockchain lender will facilitate a multitude of services like scaling back delays, build fast approvals, eliminate the requirement for middle layers and convey transparency. Both the borrower and lenders are to be benefited from such a system. Lenders get much transparency and thus the sense of trust that they won't lose any wealth on the established platform and earn through provided interests. Borrowers, on the other hand, will get loans with the least possible turnaround time and quickest loan disbursal, as well as the regulated and low rate of interest. Cryptocurrencies will be used for the transactions between the lenders and the borrowers. Now, cryptocurrencies themselves are blockchain implementations and will right away match into the P2P disposition design. Thus, fund flow within the disposition system is going to be quicker and may happen with none bank process overheads or delays. Further, the disposition platform will be scaled globally with each lender and borrowers putting their bids digitally whereas being physically present in several geographies. Further, the role and involvement of central bankers would be restricted in such implementations. This was one of the irks of the government to not allow the functioning of cryptocurrency and its trading, which now has been allowed by the Supreme Court of India [4].

### VI. TRADITIONAL APPROACH

Let us look at the traditional banking approach for lending. Before the rise of the banking the lending use to happen on the peer to peer basis but with the limited player and with the small sum of money, but as the economy began to grow people started to do business with the unknown people the trust started to break and to provide the trust third party came in which provided the trust by taking the risk on themselves but charges a lot of interests on the moneylender. The following lists the traditional lending process.

#### A. Pre-Qualification

This step starts the loan process, the lender gathers the information about the borrower's income and depth. Based on the information gathered the lender qualifies the borrower about the different types of loans, different loans required different trust and hence depending upon the current trust the borrower is qualified. While qualifying the mortgage company looks for two key factors:

- Ability to pay back the mortgage, this can be verified by looking at the employment history. The company prefer the borrower to be employed at the same place at least for 2 years or in the same line of work for a few years
- Willingness to repay, this can be verified by looking at how the property will be used depending upon the usage of the property the lender estimates the willingness to repay. This also considered the previous financial commitments such as rental history or any previous loan.

There is not the hard and fast rule to calculate this parameter accurately, the different borrower is handled differently with the experience the lender has.

#### B. Mortgage Programs and Rates

Here the borrower decides how long he wants to keep the loan. If he wants to sell the House in home loan then the adjustable loan could be considered but if for the other case such as long term the fixed loan would be preferable.

There are lots of programs available for the borrower to choose from with different rates, points, and fees. Selecting the best plan could be time-consuming and frustrating, a good mortgage professional could easily evaluate the borrower situation and recommend the best plan which will be best for both

#### C. The Application

It's the true start of the loan process, it usually starts after a few days after the loan process. With the help of the mortgage, the borrower is able to fill the application and provide all the necessary details.

Discussed while examining the many mortgage programs and these costs will be verified by the Good Faith Estimate (GFE) and a Truth-In-Lending Statement (TIL) which the borrower will receive within three days of the submission of the application to the lender is done.

#### D. Processing

After the application is submitted the processor orders the Credit Report, Appraisal and Title Report. The information on the application is verified which will include the deposits and payment history and any other details such as late payment should be mentioned explicitly. The processor examines the Title report and Appraisal and it may require further investigation. After the processor is done examining this sends the report to the lender.

#### E. Credit Report

Depending upon the information provided by the user the credit rating is calculated, the credit rating provides the confidence about the borrower to the lender. The credit history is taken into consideration to calculate the credit rating or the user has the option to provide the credit rating by himself.

The Credit Profile refers to the customer credit file which is made up from different credit agencies it provides the information about how the borrower pays back the money to the company or other financial obligation

There could be a problem in the credit rating then, in that case, the knowledgeable mortgage professional could help the borrower to write the Letter of Explanation in case there is a genuine reason behind the credit problem.

FICO is the most common form of credit rating, it is the history of the score of the person only considering the ONLY credit life, any personal income, saving or down payment amount. The credit score is based on five factors:

1. 35% of the score is based on the payment history
2. 30% is based on the amount owed
3. 15% how long the borrower had the credit
4. 10% on the new credit sought
5. 10% based on the type of credit the borrower has

This credit score is used since the late 1950s by the credit card, insurance company, and merchants, but still, the people are skeptical about the accuracy of the FICO score.

A borrower with the score of the 680 and above is considered A+ borrower, the loan for this type of the credit rating is put under the "automatic basic computerized undertaking" and the loan is cleared within minutes and borrower is qualified for the lowest rate of interest and loan process can be closed within the days

A borrower of credit scores between 680 and 620 may require a close examination for the potential risks. The borrower may be still called A-type and may require additional documents to final approval. It takes several days to close the loan process.

A borrower of the credit score below 620 is not considered the best rate, this type of loan goes to the sub-prime lender. There is a lot of risks involved with this type of borrower and

The rate for the loan is not attractive and it's hard to find the best rate.

#### F. Underwriting

After the processor is verified all the information and after considering all the information the processor put together the complete package to the lender. The underwrite is responsible for accepting or rejecting the loan if more information is still needed the loan is put under a suspended state and the borrower is contacted to provide more information. If the loan is accepted then the loan is approved

#### G. Closing

After the loan has approved the file is transferred to the closing and funding department for further action. The funding department contacts the broker and the closing department for verifying the closing fees. The closing department schedules the meeting with the borrower for signing the loan documents this complete process may take from 10 to 30 days to done and this could be even longer under certain circumstances

At the closing of the loan process the borrower should:

- Check for your down payment and closing costs if that's the case. Usually personal checks are not done but if they are, it creates a delay for the bank for closing your case.
- Review the final loan documents. Verify if the ROI and loan is in agreement to what you have originally have agreed upon. Also, verify that the names and address on the loan documents are accurate.
- Sign the loan documents.
- Bring identification and proof of insurance.

Post the signing of documents, the closing professional returns the documents to the lender, where the lender examines them and, if everything is so, prepares for the funding of the loan. Once the loan has funded, the closing professional arranges for the mortgage note and deed of trust is recorded. Once the mortgage has been recorded, the closing professional then prints the ultimate settlement prices on the HUD-1 Settlement kind. Then the final disbursements are created. [5].

## VII. THE PLATFORM AND TOOLS

A platform can be easily built that could allow lenders and borrowers to come aboard and do their business. Now, such a platform could provide the trust with the blockchain technology in distributed ledger and it could also provide the transparency in the system with the centralized nature of the records which makes the possible transparent transfer of assets from person to person without involving the intermediating. This could be a game-changer for the medium to a small business as its sometimes tough to get the loan from the Bank and may require a lot of paperwork and jumps to get the loan. The crowdfunding and ICOs, demonstrate alternative money raising. There is no third party involved for the asset checking and hence loan can be granted in the minutes.

#### A. Ethereum

Ethereum is an opensource, public operating system for distributed computing which is based on blockchain technology which supports distributed computing. Ether is the cryptocurrency used in the Ethereum platform, which is rewarded to the miner for spending the energy for mining. Only this currency is allowed in the Ethereum platform

Ethereum provides a virtual machine called Ethereum virtual machine (EVM). After the virtual machine is provisioned it created the node and connects to the main Ethereum network. The virtual machine has the ability to execute like the Bitcoin Scripts. "Gas" is an internal transaction processing mechanism that allocates the resources to the network. After the theft of 50 million dollars' worth of the Ethereum, the Ethereum is split into two, first one has the revised the theft policy (ETH) and the second one is Ethereum Classic (ETC).

The validity of cryptocurrency comes from the blockchain technology, which is like a continuously growing list of records, the growing list of the ledger backed by blockchain is immutable because all blocks are linked by the hash of the previous block and even if only one block is somehow modified the entire chain of the block will be invalidated. Ethereum operates using the account state which is the current balance of all the account on the network which is stored in Merkle Patricia tree.

Ethereum is platform and as with any regular platform, the application can be developed here Ethereum application is written in one of the seven different Turing-complete languages. The developer uses this language and develops the application which will run on the Ethereum and publish their application, stablecoin is one of the examples for application developed on the Ethereum platform [6][7].

### B. Smart Contracts

A smart contract is basically a program that allows direct transfer of digital currencies or assets between parties under certain conditions. A smart contract not only provides the rules and penalties around an agreement in the same way that an offline or a traditional contract does, but it can also automatically enforce the required obligations. By taking in information as input, assigning some value to that input through the rules set out in the contract, and executing the actions required by those contractual clauses – for instance, finding out whether an asset should go to person A or returned to the person B from whom the asset was originally created or put up. These contracts are stored on blockchain technology, a decentralized ledger that also underpins bitcoin and other cryptocurrencies. Blockchain is ideal for storing smart contracts because of the technology's security and immutability.

Smart contracts are quite complex but their potential goes beyond the simple transfer of assets. Being able to execute transactions in a wide range of fields, from legal processes to insurance to crowdfunding to other financial processes. Smart contracts have the potential to disintermediate the legal and financial fields, in particular, simplifying and automating routine and repetitive processes for which people currently pay lawyers and banks sizable fees to perform. The role of lawyers could also shift in the future as smart contracts gain traction, for example from adjudicating traditional contracts to producing customizable smart contract templates. Additionally, smart contracts' ability to automate processes and also to control their behavior, as well as their potential in real-time auditing and risk assessments, can be beneficial to compliance.

### C. Meta Mask

MetaMask injects a JavaScript library called web3.js into the namespace of each page your browser loads. Web3.js is written by the Ethereum core team and has functions that regular webpages can use to make read and write requests on the blockchain that are consistent with the existing protocol [8].

Furthermore, MetaMask allows users to specify which Ethereum node to send these requests to. The ability to send requests to nodes outside of the user's computers is important because it means that people can use Ethereum without having to download a node consisting of the 10+GB blockchain on to their computers [9].

### D. DAO (decentralized autonomous organization)

The decentralized autonomous organization was one of the highest ever crowdfunded Ethereum projects that started in April 2016. This was basically a set of smart contracts written in order to provide a platform for investment. Due to bug in the code, the DAO was hacked in June 2016 and an equivalent for 50 million dollars were siphoned out of the DAO into another account.

This hard fork was introduced for genuine reasons, it goes against the true spirit of decentralization and the notion of "code" is the law. Hence some miners continued the old chain and that gave birth to what we know today as Ethereum Classic, where the hack wasn't reversed.

## VIII.METHODOLOGY

The banking lending process with the bank is can be very lengthy and perhaps sometimes the loan is not granted to the right person. This third-party lending company includes the intermediately which increased the time and cost to the lending process. This third-party lending company there to provide security to the lending process but in turn, costs a high rate of interest which increases the cost of lending.

This is where the peer to peer lending comes in which embraces the blockchain technology to provide trust and transparency to the lending process. It removes the middle man hence decreasing the const of lending where there can be a very low-interest rate. It also reduces the lending time, the loan can be granted within the minutes. With the smart contract, the borrower and lender agree to the terms before indulging in the lending process which makes the entire process transparent and risk-free.

Since there is not there part involved in the process who can estimate the mortgage value hence the physical mortgage in not allowed and only the things which can interact or converted to the cryptocurrency are allowed, after having done this the lending process can be done with minutes.

This section describes the high-level design to implement peer to peer lending with the blockchain technology using the available tools and techniques



Stakeholders in peer to peer lending blockchain platforms are:

- Lender: is a person who lends the money they are the important stakeholders to allow the p2p lending possible
- Borrower: is the person who requests for the loan and depending upon the agreed term intend to return back the amount
- Guarantor: a person who takes the guarantee of a borrower requesting the loan.

Lender creates an account with information such as personal information like full name, addresses, and ids, bank details, type of investment that is to be made of the category of the borrower the lender intends to provide service for. After the account has been created the lender waits for the borrower request.

The borrower then opens a new account which may contain the following information with the personal details such as full name, address, and some government-approved ID. Cryptocurrency and insurance(collateral) and provide the information of guarantee. After the account is set the borrower sends the request for the loan, about the type of loan he would prefer.

If lender accepts the loan request, the smart contract eventually settles the fixed rate of interest for different types of borrowers by checking their credit-worthiness.

The categorization of borrowers as high, medium or low risk borrowers based on their repayment behaviors is done.

For instance, lenders can set a low ROI (rate of interest) for a low-risk borrower having a good repayment behavior.

Using the P2P Lending Platform, the rate of interests thus remains fixed all over the world.

Repayments can be done using smart contracts embedded in the crypto-wallet. If a borrower does not pay the premium timely, the contract builds up late fees to the base amount and upgrades it on the ledger.

If borrower abides by the terms of the loan, the smart contract would automatically deduct his/her penalties.

Lenders using cryptocurrency can help decrease delays, make quicker approvals, eliminates the need for middlemen, and bring the much-needed transparency.

Furthermore, the collateral put up by the borrower is not verified by a legal institution while lending money through the P2P platform, even though the credibility can never be changed as smart contracts enable auto-payment and enforce compliances. [10]

## IX. RESULT AND CONCLUSION

The availability of banking services on digital platforms have given a huge boom to the lending industry, but the banks became a blocker themselves for faster lending. Banking on the opportunity for the increase of digitization and internet availability for Indian customers will allow lending industry to boom. Lending with blockchain allows us to perform lending in Indian markets with faster and secured processes. This leads to a much better user experience and solves the middlemen problems of the banks too.

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