



P2P Lending Using Blockchain Smart Contracts

Prof. Pallavi Ahire¹, Khushal Sonar², Abhishek Yadav³, Harshada Hajare⁴, Sakshi Nagane⁵

Professor, Department of Information Technology¹

Students, Department of Information Technology^{1,2,3,4}

Sinhgad Institute of Technology, Lonavala, Maharashtra, India

Abstract: Peer-to-peer lending (P2P lending) have become a dominant alternative financing route for individuals and small businesses with little or poor credit history. These fintech products are strongly disrupting the way lending works and thereby challenging the dominance of formal banking and financial institutions. Disruption technology Blockchain, in its new avatar - Enterprise Blockchain or Blockchain 2.0, has some essential features such as smart contracts, public and private layers etc. that can optimize P2P lending process by making the entire process more seamless, cutting processing time, reducing or even eliminating intermediate financial intermediaries etc. A Blockchain supported framework is proposed in this paper by exploring the use of Blockchain 2.0 features in the P2P lending context such as in the role of information flow, digital contracting, platform implementation and interface, risk management, institutionalization and regulation of P2P markets etc. While blockchain does not really reduce credit risk, it has the potential to dramatically improve turnaround time in loan processing, reduce operational risks thereby improving the efficiency of funding through decentralization, trusted records and better pricing (of interest rates) for the lenders. **Keywords:** Blockchain, smart contract, lending, p2p lending, alternative lending.

Keywords: Peer to Peer loan, Blockchain, Decentralization, Etheriam, Solidity, Ganache

I. INTRODUCTION

Peer-to-peer lending (P2P lending) is an online collateral-free lending system for individual and businesses borrowers with little or no credit history from a matching one or more interested individual lenders. Being unsecured and collateral-free loans, the entire credit risk falls on lenders and hence p2p lending is riskier than traditional lending. Through online platforms, P2P lending companies facilitate placing of bids, credit profiling, offer matching, transfer of loan amount and recovery process. Because these services are offered online, the overheads, processing, maintenance and operating costs will be low compared to other traditional forms of lending. Thus, these platforms can offer credit at attractive interest rates and more quickly. P2P lending has experienced rapid growth in recent years challenging the dominance of banks and financial companies. Being digital, P2P lending can cut geographies and can bring lenders and borrowers to the same digital platform. Because it is collateral-free, P2P lending can bring in large unbanked and uncredited population to the formal financial system and hence aids in rapid financial inclusion. The concept appears as a digital version of microfinancing, collectives or cooperatives. The lending platforms have evolved over time. While early day platforms are more of information dissemination and acted as credit listings services, modern platforms include features such as credit scoring and credit processing services by intermediaries as well. Blockchain is a disruption technology that has gained interest in applications related to banking and financial services. This paper explores the possible extension of blockchain technology for the P2P lending segment.

II. OBJECTIVE OF THE STUDY

1. Factors and attributes affecting lender, borrowers and the P2P platform, particularly in the context of Indian marketplace are studied.
2. Features of Blockchain and how they can help in P2P lending are explored.

III. SIGNIFICANCE OF THE STUDY

This study is significant for the development of the P2P lending industry, particularly in developing markets such as in India. Existing platforms can consider various blockchain features that can help them in better resource utilization and



access to extending their business globally.

IV. DISCUSSION

4.1 History and Growth of P2P Lending

A fairly recent phenomenon, alternative financing got attention with the startup and fintech boom of the early 2010s. Banks responded to the disruption challenge by embracing new technologies but could not gain because of one big reason - startups have flexible business models and less regulation while banking regulations are rigid and well regulated. Early P2P platforms involved lending within known friends' circle. Because of this, trust factor is not a major criterion because members (mostly) knew each other and belong to the same social group. But with lending circle becoming bigger, trust might not be that strong. Added, loan ticket size too began to increase highlighting the importance of intermediaries and third parties coming into the equation. This obviously increased cost and time in the overall lending process.

The first peer-to-peer loans are underwritten in the United Kingdom in 2005. The concept soon moved to the United States and Korea (2006) and later to other countries such as China and Sweden (2007), Israel (2011), Australia and India (2012), Ireland (2013), Indonesia, Bulgaria and Canada (2016), Latvia and Brazil (2018) etc. Zopa (UK), Prosper (US), Smava (Germany), WeLab (Hong Kong), SocietyOne (Australia), Trustbuddy AB (Sweden), Linked Finance (Ireland) and Money Auction (Korea) are the first p2p lenders in their respective regions.

With a 51.5% CAGR growth globally, P2P lending is currently the fastest growing segment in the finance industry. Market estimates that it will reach US \$460,312 million by 2022. With US \$15.98 billion lending in loans (as of 31 Dec 2015), LendingClub is the world's largest P2P lending company and the first such company to get listed on stock exchanges. Upstart, Funding Circle, Prosper Marketplace, CircleBack Lending and Peerform are some leaders in the category.

4.2 Peer 2 Peer Lending in India

Though introduced in 2012, much of p2p lending developments in India came after the Indian banking regulator Reserve Bank of India (RBI), vide a notification in September 2017, recognized P2P lending as a form of non-banking finance company (NBFC) and started issuing licenses to lending platforms. The Non-Banking Financial Company – Peer to Peer Lending Platform (Reserve Bank) Directions, 2017 notification dated October 4, 2017 is a master directions notification. It fairly dealt with the various aspects of p2p lending - eligibility criteria, registration process, scope of activities, prudential norms, operational guidelines, fund transfer mechanism, updates to credit information companies, transparency and disclosure requirements, fair practices code, grievance redressal, information technology framework, reporting requirements, supervision amongst others (RBI, 2017). Amongst key requirements to run a p2p lending platform include net owned fund of the company to be not less than Rs. 2 crores (to ensure skin-in-the game of the promoting company) and that the management and directors need to fulfil the 'Fit and Proper' criteria as laid out by RBI.

Licensed platforms can lend money from the lenders but cannot lend from their own books. RBI capped the maximum lending by a single lender to Rs. 10 lakhs to borrowers across all P2P platforms at any point of time. A similar Rs. 10 lakh borrowing limit is imposed on the borrower. The maximum amount a single investment is also capped at Rs. 50,000. The lending should compulsorily be through banking channels and the lending term should not exceed 36 months. While these limits are important considering the industry is in nascent stage, it is making venture capitalists unattractive to fund Indian fintech startups operating in this segment. In January 2019, RBI asked platforms to submit metrics and key information to access the health of the platforms. It is believed this reporting will be regularized and platforms would be asked to furnish once a quarter.

While there are over 30+ p2p lending players in India, only 11 have so far got registration from RBI (as of December 27, 2018) under the NBFC-P2P category. Popular Indian lending platforms include Faircent (May 2018), Finzy (July 2018), i2iFunding (Sep 2018), Peerlend, LiquiLoans, AnyTimeLoan, LenDenClub, Monexo, iLend, LoanBaba, CapZest, OML P2P (2018), Cashkumar (2018), Paisadukaan (2018) and RupeeCircle (2019), India Money Mart (2019). While licencing gives a sense of confidence to lenders, not all lending platforms are keen to opt for it. IndiaLends, for example, feels to stay away from the licensing because it has sufficient credit pipeline. The Digital Lenders Association



of India (DLAI) was formed in November 2016 and has 50 members.

The size of the Indian p2p lending market is at Rs. 200 crores in 2018 and industry estimates it to cross Rs. 1000 - 1500 crores in 2019 and to reach US\$4 - 5 billion by 2023. One key reason for the development of p2p lending in India is because of the launch of digital stacks (Aadhar, eKYC and digital payments). Access to CIBIL data helped the platform in credit evaluation, analytics and reporting. Penetration is currently largely concentrated in Tier 1 cities and is in picking up in Tier 2 and Tier-3 cities. While most focus was on salaried class borrowers, attention is now going towards SME lending as well. Defaults or bad loans in Indian p2p lending are below 2% and hence are under control so far. Indian platforms are now gearing towards building a multi-tenanted infrastructure by migrating to blockchain that facilitates easy sharing of lending data so as to mitigate risk. Faircent made a US \$1 million commitment towards this. Industry challenges include low financial literacy levels, a general fear of using digital products for safety reasons, lack of proper financial infrastructure (because of low PAN card penetration, low income-tax return filings, lack of awareness on credit scores), redundant KYC processes etc.

4.3 Blockchain

Blockchain's role in reducing cost, processing time and eliminating non-value adding intermediaries and thereby value addition to existing businesses models, particularly in banking and finance segments is well discussed (VijayaKittu&Aruna, 2018). After getting initial acceptance from core banking and financial areas, the technology is now making inroads into secondary functional areas such as the asset management industry and mutual funds (VijayaKittu&Prasada Rao, 2018).

Decentralization eliminates dependency on a single location for data storage and retrieval. Centralized authority is removed with consensus mechanism. Immutability makes data cryptographically encrypted and hash tag can act as data identifier. This will make the data safe and tamper proof and hence puts fraud and corruption under control. Because transactional data is distributed across the network, other computers can act as data validators and hence transparency and accountability are automatically achieved in the system. The elimination of processes (by removing non-value adding intermediaries) or their simplification (by doing KYC only once) can help reduce processing cost in the financial services compared to the conventional system. Blockchain has proved immense cost cutting benefits in both inter-bank and intra-bank as per several use-cases already available. Enterprise blockchain had dramatic speed optimizations compared to the original blockchain implementations and is now reaching industry grade latency. Permissioning and layering in the form of public and private blockchains keeps data access allowed only to parties having permission. Enterprise blockchain provides all the three essentials - high performance, high resilience and privacy and hence a suitable technology for financial services.

4.4 Blockchain Advantages for P2P

A blockchain solution for global peer-to-peer lending is on the horizon. P2P lenders using blockchain can help reduce delays, make quick approvals, eliminate the need for middlemen and bring transparency. The speed of backoffice processing and settlement is one of the major reasons why financial institutions are interested in blockchain and the same applies for p2p lending as well. Increased efficiency and cost reduction are the next biggest bets. Due diligence - a key but time-consuming aspect of lending can be speeded up.

While traditional blockchain implementations are public or private, most enterprise blockchains are consortium blockchains with part public and part private, semi-decentralized and permissioned. Smart contracts and digital signing help establish a contract between the parties and helps in legal enforcement.

Once a loan is issued, tracing the utilization of funds (to a certain extent) as well as aiding in recovery of loans that turned bad are relatively easier on a blockchain. This would be necessary in countries with low penetration of debt recovery agencies and when p2p lending loans are not insured (Gonzalez, 2018).

Cryptocurrencies are themselves blockchain implementations and can straight away fit into the P2P lending architecture. Thus, fund flow in the lending system will be faster and can happen without any bank processing overheads or delays. Further, the lending platform can be scaled globally with both lenders and borrowers placing their bids digitally while physically present in different geographies. Further, the role and involvement of central bankers would be limited in such implementations. This exactly irks Central banks and Governments and they have mixed



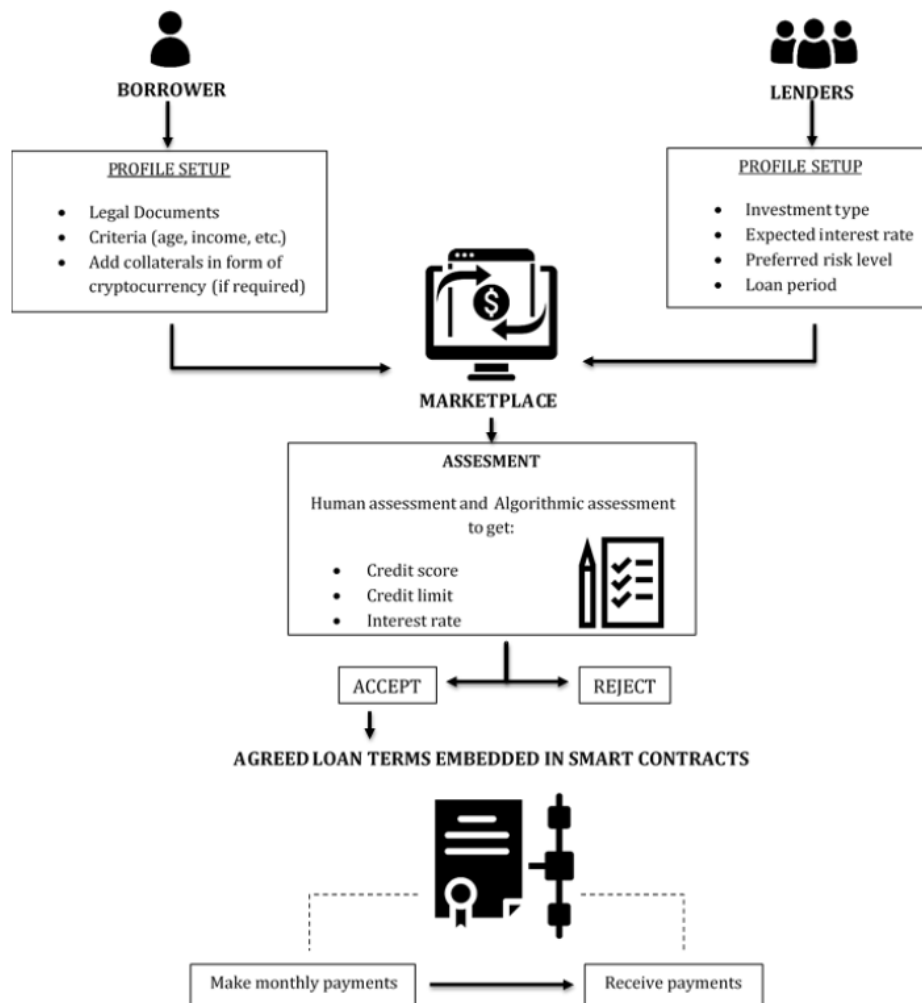
acceptance about cryptocurrencies as a legal tender. While some approved it totally (Australia, Japan etc.), some rejected outright (Bolivia etc.) whole most others are dealing with it on a case-to-case basis (Canada, New Zealand etc.) (Thomson Reuters, 2017). An extension of cryptocurrency funding for the p2p lending can be in the form of wallet money on the lines of PayPal and PayTM which many wallet service providers are exploring.

Enforcement of regulatory rules will become easy on blockchain. In the Indian context, there is no check in regard to the lending limit enforcements (as to lenders limited to Rs. 10 lakhs across platforms) because there is 64 ISSN 2394 - 7780 no such network or checks within the lenders themselves. Compliance and data reporting to the regulator can be easy and will be available to the regulator as and when needed. This will move the platform to data-pull mode instead of data-push mode.

A robust blockchain implementation could eliminate the need of any third-party credit rating checks or “proprietary ratings” as the blockchain system itself can keep a track and maintain credit scores of the borrowers. Some platforms, such as Libra Credit have built a credit scoring system that is universally applicable. The lender also allows crypto-to-fiat, crypto-to-stablecoin and crypto-to-crypto lending thereby giving a high degree of flexibility to the borrowers.

Banks are not remaining as bystanders looking at P2P lending disrupting them. Collateral-based blockchain powered lending applications for liquid assets are implemented by ING and Credit Suisse. However, their fight is short amidst industry headwinds. Secure Automated Lending Technology (SALT) Lending, ETHLend, Ripio Credit Network, Lendit, Jibrel Network, HashLend are the some popular p2p lending platforms built on blockchain and smart contracts.

V. IMPLEMENTATION



VI. LITERATURE SURVEY

A summary on early P2P lending is well documented by (Bachmann, et al., 2011). Trustworthiness aspects such as attractiveness and loan amount (Jin, Shang, & Ma, 2018) are thoroughly covered. (Duarte, Siegel, & Young, 2012)'s empirical evidence showed that borrowers who appear trustworthy indeed have better credit scores and lower default rates. However, lenders do not lower their interest rates enough to fully account for the trustworthiness. Listing information such as interest rate, repayment method and borrow reliability often account to one-third of lending documentation and are important to build trust to the lender. Loan applicant characteristics such as employment status and social interaction decide success of a P2P loan application (Park). The language and persuasion abilities displayed in the listing speaks a lot and influence lenders (Larrimore, Jiang, Larrimore, Markowitz, & Gorski, 2011). The trustworthiness of the borrower is more important than the intermediary (Zhang, Tang, Lu, & Dong, 2014). While US studies such as (Lin, Viswanathan, & Prabhala, 2009) say social capital (SC) has an impact of lender's trust in the borrower, other works, such as in the Chinese context contradicted (Zhang, Tang, Lu, & Dong, 2014).

Internet technologies such as Web 2.0 and digitization have shifted the lending market place to online platforms and have dramatically cut cost and time. Strong regulations give confidence to market participants. Absence or weak regulations will create uncertainty, keep the market in infancy, slows down financial innovations and not encourage market players to step-in (Fong, 2015). Would some countries have explicitly codified regulations (such as India, New Zealand and the US), most others have existing legislation that can be applied on P2P lending. (Philippon) discussed about regulation of Fintech's, (Fong, 2015) on Hong Kong, (Adriana & Dhewantoa, 2018) on Indonesia (comparing with India and China) and (Stern, Mäkinen, & Qian, 2017) on China.

VII. RESEARCH METHODOLOGY

This study uses Descriptive research to gather preliminary information, observe the growth and development of the p2p lending and blockchain technologies, record the coming together of the two and describe the advantages from such an implementation.

VIII. FINDINGS

1. P2P lending is in nascent stage in various countries and the regulatory strength is not that strong. 2. Regulatory compliance is hardly checked.
2. The instances of defaults are low in new markets but are very high in matured markets such as in China.
3. Lenders who are taking high degree of risk with p2p lending are getting rewarded with equity-type exorbitant returns in most cases. However, as marketplace matures, the returns might not look that attractive.
4. Enterprise Blockchain gives performance, accommodates all stakeholders into the framework and can help foster the industry.

IX. SCOPE FOR FUTUTRE STUDY

1. Country-specific regulatory aspects as well as comparison studies on p2p lending can be done.
2. The concept of alternative lending further evolved Lending-as-a-Service consortiums and into other models (consumer, small businesses etc.). The US recently even got a registered alternative lending fund. This dimension can further be explored.
3. (Aziz, Dowling, Hammami, & Piepenbrink, 2019) discussed about machine learning (ML) applications in finance, particularly in forecasting and modelling. (Destine, Lerner, Mehmetaj, & Shah, 2016) used ML to forecast probability of full payment or default. These papers showed other disruption technologies can help in various aspects of p2p lending.

X. CONCLUSION

This study adds up to the existing literature on p2p lending and thereby enriches the existing body of knowledge. P2P lending is a boon to borrowers with broken credit scores and to lenders who take higher degree of risk for higher returns. While the default instance is few in developing markets, they are high in matured markets. With its improved processing performance, smart contracting and permissioning, Enterprise blockchain is of immense use for P2P lending

platforms. Cost efficiencies, reducing time for onboard new members, issue and recovery of loan and compliance can all be done using this technology. Hence, blockchain can help in the development of the p2p lending industry.

REFERENCES

- [1]. Adriana, D., & Dhewantoa, W. (2018). Regulating P2P lending in Indonesia: Lessons learned from the case of China and India. *Journal of Internet Banking and Commerce*, 23(1).
- [2]. Aziz, S., Dowling, M., Hammami, H., & Piepenbrink, A. (2019). Machine learning in finance: A topic modeling approach.
- [3]. Bachmann, A., Becker, A., Buerckner, D., Hilker, M., Kock, F., Lehmann, M., Funk, B. (2011). Online Peer-to-Peer Lending--A Literature. *Journal of Internet Banking and Commerce*. Retrieved from <https://www.researchgate.net/publication/236735575>
- [4]. Destine, A., Lerner, S., Mehmetaj, E., & Shah, H. (2016). Forecasting Peer-to-Peer Lending Risk. Retrieved from <https://www.researchgate.net/publication/324780886>
- [5]. Duarte, J., Siegel, S., & Young, L. (2012). Trust and Credit: The Role of Appearance in Peer-to-peer Lending. *The Review of Financial Studies*, 25(8).
- [6]. Lin, M., Viswanathan, S., & Prabhala, N. (2009). Judging Borrowers by the Company They Keep: Social Networks and Adverse Selection in Online Peer-to-Peer Lending.
- [7]. RBI. (2017). Non-Banking Financial Company – Peer to Peer Lending Platform (Reserve Bank) Directions, 2017.

BIOGRAPHY

- Prof. Pallavi Ahire:- Professor in the department of Information Technology in Sinhgad Institute of Technology and contributed as guide and author of the Project.
- Khushal Sonar:- An Undergraduate Scholar pursuing Bachelors of Engineering in Information Technology from Sinhgad Institute of Technology. He is working under the guidance of Prof. Pallavi Ahire.
- Abhishek Yadav:- An Undergraduate Scholar pursuing Bachelors of Engineering in Information Technology from Sinhgad Institute of Technology. He is working under the guidance of Prof. Pallavi Ahire.
- Harshada Hajare:- An Undergraduate Scholar pursuing Bachelors of Engineering in Information Technology from Sinhgad Institute of Technology. She is working under the guidance of Prof. Pallavi Ahire.
- Sakshi Nagane:- An Undergraduate Scholar pursuing Bachelors of Engineering in Information Technology from Sinhgad Institute of Technology. She is working under the guidance of Prof. Pallavi Ahire.