Vol. 16(1), pp. 7-11, January-June, 2024
DOI: 10.5897/JETR2023.0747
Article Number: 551A2D972046
ISSN: 2006-9790

http://www.academicjournals.org/JETR

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Journal of Engineering and Technology Research

Full Length Research Paper

On the digital transformation of micro-finance institutions in the context of developing countries: A case from Democratic Republic of the Congo

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Received 31 August 2023; Accepted 15 September, 2023

Blockchain can be used to improve microfinance management in several ways. This can help reduce the costs of microfinance by eliminating the need for intermediaries such as banks and credit bureaus and increase transparency in the microfinance sector by making all transactions visible to everyone. stakeholders. This can help reduce fraud and build trust. Blockchain technology can also be used to improve access to finance for people living in poverty by making it easier for them to obtain loans and other financial services and to increase financial inclusion by providing people living in poverty a safe and reliable way to obtain funds, store and manage their money. Indeed, the blockchain is a secure, transparent and immutable distributed ledger. This means that data stored on a blockchain cannot be modified or deleted and is accessible to all network participants. Blockchain technology has the potential to revolutionize a wide range of industries, including finance, supply chain management, healthcare and voting. This makes blockchain a valuable tool for microfinance institutions, as it can help improve the efficiency and accuracy of their data management processes. For example, blockchain can be used to track loan repayments, manage customer information, and prevent fraud. This study aims to demonstrate that blockchain has the potential to revolutionize the microfinance sector by improving the transparency and accountability of microfinance institutions, given that all transactions on a blockchain are public and cannot be modified. This means borrowers and lenders can be confident that their transactions are recorded accurately and that there is no risk of fraud. Overall, blockchain technology has the potential to significantly improve information management in microfinance institutions. This can lead to increased efficiency, accuracy, transparency and accountability in microcredit management.

Keywords: Microcredit, blockchain, security, transparency, decentralization, credit.

INTRODUCTION

Information systems contribute enormously to the proper functioning of an organization, by facilitating the management of information related to its activities in the form of computer data. A good information system

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ensures that its data is available to the right recipient as quickly as possible. Rapid access to data from an information system is a growing need for organizations. For this, they implement investments to guarantee the quality of their service and retain their customers. Microfinance institutions, being businesses, are not exempt from this need. It is therefore imperative to think of a solution that will contribute to the quality of the services of these institutions, an increase in their activity with better credit management, and the maintenance of their clientele. There are many examples of systems using blockchain, and in several areas. Embarking on a blockchain-based solution is motivating, because this technology has made its name and has several advantages for use in the management of information in a computer system. The study that is the subject of this article has several advantages in the IT management of data generated during the process of granting credit to a third-party client by a microfinance institution: Information that is part of the blockchain system can almost never be lost; In file processing, it is possible to have an unfalsifiable global and chronological list of processing steps; There will be permanent, real-time access to information; No regulatory authority is required for the regulation of the management system because each entity will have the same degree of decision- making power as the others. Microfinance institutions face several risks related to their management, which occur at several levels. Transactional risks are those that arise from day-to-day transactions. The risk of fraud or integrity involves planned deception by an employee or client of the institution (Mago and Hofisi, 2013).

The use of a blockchain will make it possible to detect flaws that may arise during operations related to the institution's business. All information circulating in the blockchain system can in no way be falsified because, once in the system, it will be impossible for the fraudster to perform inappropriate actions. This study aligns with previous uses of blockchain technology in the field of microfinance.

LITERATURE REVIEW

Microcredit is an important means of fighting poverty because it allows the inclusion of populations that are unable to be part of the traditional financial system. Traditional financial systems have focused more on customers who can bring them even more than they have. Poor populations, therefore unable to obtain bank loans, have had the chance to see the birth of microfinance, which is a branch of finance allowing customers to obtain loans at low amounts (Labie and Montalieu, 2019).

This aspect focuses on the presentation of microfinance as well as the theoretical notions of blockchain technology that we will use for the management of microcredits. Credit is an operation that consists, for a lender or creditor, of making available to a borrower or debtor a certain sum of money in return for a repayment commitment on a date determined in advance. Microcredit refers to a small amount of credit with interest, granted to microentrepreneurs who do not have access to traditional financial services. This very small amount of credit is often granted to people with little or no resources with the aim of developing or undertaking an income-generating activity (Lelart, 2005; Nzuzi, 2021). Microfinance, often confused with microcredit, initially referred to "devices making it possible to offer very small credits (microcredit) to poor households in order to give them a hand in carrying out productive or income-generating activities to enable them to develop their very small businesses. Over time, microfinance has expanded to involve a wider range of services. It is thus defined as "the supply of financial services to low-income households: loans, savings, or transfer services (Sine, 2008). Microfinance operations are carried out by organizations authorized to offer microfinance services and serve as financial intermediaries, called microfinance institutions. Microfinance institutions are generally born out of support programs whose management and financing are provided by local or foreign NGOs (Lelart, 2005; Sine, 2008). They operate according to different operating models, which vary from one institution to another depending on the products and services they offer.

Thus, there is no single model for the functioning of the IMF. The service offer is generally based on considering the social and economic environment of the clients targeted by the institution.

The blockchain is a decentralized transactional database that allows the management of validated and inviolable transactions among many participants in a network (Lynn et al., 2019). It is also defined as a distributed ledger that is structured as a linked list of blocks, where each block contains an ordered set of transactions. Blockchain solutions use cryptographic hashes to secure the link from a block to its predecessor. Blockchains can take different forms. They can be public, private, or consortium (Ghoggali, 2020). Public blockchains are large, distributed networks that are run via a token or native token. They are open to everyone at all levels, and have open-source code, which keeps their community up to date. Private blockchains are smaller than public ones and use fewer or no tokens. Their access is controlled. The blockchain consortium brings together several actors who have rights. Decisions are taken by most of the players. For example, a dozen financial institutions could agree and organize a blockchain in which a block should be approved by at least 8 of them to be valid. Blockchain can be used for several purposes: asset transfer, blockchain as a register, and smart contacts (Ribeiro, 2016). (1) Users initiate a transaction on the network. The transaction could be contracts, cryptocurrency, or records of other information. (2) The transaction request must be

represented as a block in the network. (3) The block is first created and then broadcast to network participants. (4) All participants analyze the block received from the network and validate it. (5) Block validation is performed with consensus algorithm support. (6) Network members validate the block to attach it to the network. (7) The new block is attached to the network, and the transaction is complete. (8) Block added with consent of network members becomes permanent and immutable.

MATERIALS AND METHODS

Microcredits are granted based on procedures established by the microfinance Institution (MFI); these procedures may differ from one institution to another. Here is devoted to the overall functioning of MFI's loan management. In Democratic Republic of the Congo (DRC), MFI are governed by the Central Bank of Congo (CBC) and are automatically affiliated with the Central Risk Office of the CBC (Masangu, 2013). The MFIs send all the information relating to their customers to the credit bureau. The information to be communicated is: (1) The identifying data of customers, natural and legal persons; (2) Data relating to all types of assistance by disbursement and/or by signatures granted to their customers; (3) The real and personal sureties guaranteeing the credits granted to the customers; (4) Positive and negative information providing precise information on customer loan repayment habits; (5) Any changes to previously communicated information. The microcredit management system in the DRC follows two patterns. The operational scheme, which is linked to each MFI in the country and may differ from one MFI to another, and the technological scheme, which manages credit information, are governed by the CBC through its credit bureau. Although the operational patterns of MFIs are not always identical, obtaining credit in an MFI follows a very detailed process: registration of loan files, visit and validation of the information contained in the file by the credit officer; technical advice from the Head of Agency; examination or study of the loan application file by the committee; and decision to grant credit (AGODJOSSOU et al., 2019; Bondo, 2022). The Center of Risk (CERI) of the CBC uses software called ISYS-CERI. This software is the central server for credit information related to the activity of MFIs in the DRC. When a client comes to apply for a loan from an MFI, the latter will investigate previous credit activities related to the client to reassure itself of the client's ability to repay. Obtaining this information follows the following steps (Masangu, 2013): (1) The MFI sends client identity information via the ISYS software; (2) ISYS checks in its database, all credit information related to the customer whose information has been sent; (3) When the verification is complete, ISYS sends a report back to the MFI; (4) With the information received, the MFI continues processing the credit file for granting or refusing credit. This credit management has shortcomings in terms of centralizing data on a remote server, which could constitute a service stoppage in the event of a server failure, but this management can also lead to low traceability of credit data. Management of loans is not always obvious, because for an MFI to grant a loan to a customer, it constitutes taking a risk. Hence, the importance of meticulously following all the stages of granting credit to minimize the risk incurred. The customer will have to show responsibility at the risk of being deprived of possible future loans or even of his freedom. Since management risks are diverse, this study focuses on minimizing operational risks. In view of the characteristics of the blockchain, which make it a secure technology, thinking about using it for operational risk management makes sense because credits not only need to be traced but above all require a certain level of transparency in their management, not only for the proper functioning of MFIs but also to provide authentic reports to clients and other microfinance actors.

RESULTS AND DISCUSSION

Credit risk management is of paramount importance for MFIs. It is one of the crucial and necessary issues for the growth and development of any MFI. Poor management could cause some MFIs to collapse. The ability of an MFI to manage operational risks contributes to its sustainability in the business world (Mago and Hofisi, 2013). To minimize management risks, we propose a management architecture using the blockchain, for the traceability of operations and the ease of obtaining information on an applicant's previous credits at any financial institution in the network.

Data conceptualization

Customer credit data published on the blockchain network can never be changed again. The data that will be published will only contain information on the clients whose credits have been granted by the MFI. The format of the data to be sent on the network will be conventional for all the MFIs members of the network because the information collected by the MFIs on the customers in their loan files varies from one institution to another because each MFI has its own management policy. An example of the contents of the loan folder is that of FINCA At FINCA, the loan file consists of the application form, the monitoring and supervision form, identity documents, the business document, and the mapping of the client's home or business location (Bondo, 2022). Figure 1 Here.

Choice of blockchain

Before proceeding to the choice of our blockchain, we need to present the different types of blockchain. There are three types of blockchains that would be compared and the most suitable for our system was chosen. The comparison of blockchains is based on the following characteristics: authorization mechanism, read access, productivity, centrality, and data exchange. There are three types of blockchain that differ according to certain criteria, including authorization mechanisms, read access, productivity, centrality, and data exchange. These are the private, public, and consortium blockchain (Baygin et al., 2019; Sheth and Dattani, 2019).

Private blockchain

Private blockchains act as a closed ecosystem where people cannot easily join the blockchain network, view

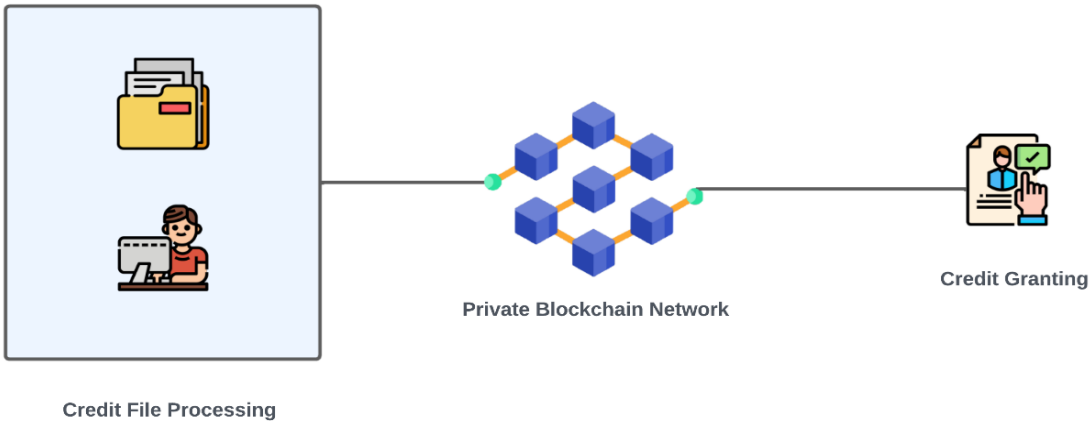

Figure 1. Credit granting process thought Blockchain system.

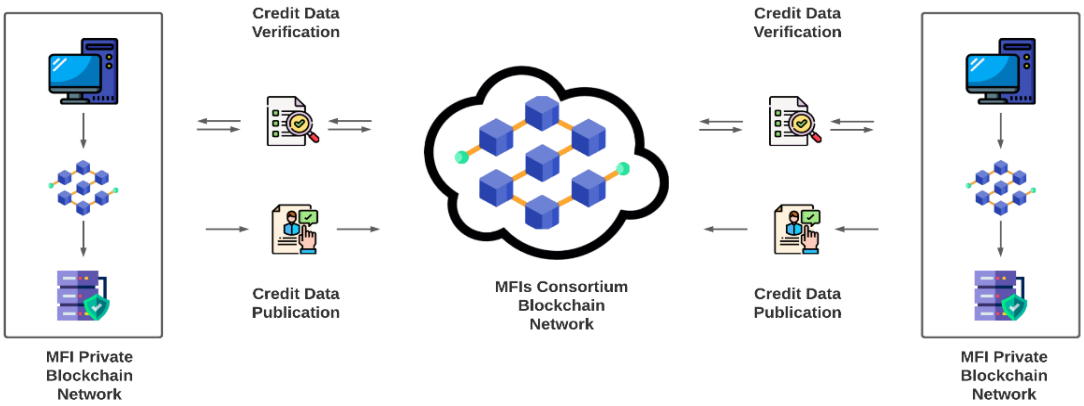

Figure 2. Interactions between Blockchain network actors.

history, or issue any transaction; they need some sort of permission to perform the mentioned tasks. It is owned by an individual or an organization where there is a central authority that deals with permissions. They are characterized by no authorization to access them, open read access, low productivity, they are centralized and do not allow the exchange of data.

Public blockchain

Public blockchains are open and transparent; anyone can consult them at any time. They are characterized by the authorization required to access them, limited read access, high productivity, they are distributed, and data exchange.

Consortium blockchain

Consortium blockchain type removes the power that is vested in the individual. So here, instead of giving power to a single entity, we give it to a group of people or individuals who form groups called consortia or federations. They are characterized by authorization required to access them, limited read access, high productivity, they are both distributed and centralized and allow data exchange. Regarding the blockchain's characteristics described earlier, the proposed solution will use the consortium blockchain, given that this type of blockchain can manage a defined number of nodes. Each MFI will constitute a network node. The size of the network will depend on the number of institutions that will be part of the consortium. It may vary. For example, when an MFI is just born or when an MFI closes its doors (Figure 2).

Conclusion

This article has dealt with the presentation of a digital network context based on the blockchain, in response to the problem of inadequacies in terms of centralization of data in a remote server which could constitute a

stoppage of service in the event of a server failure. But this management can also be of low traceability of credit data. The management risks being diverse; this study focuses on the minimization of operational risks, Evolution of Microfinance Enterprises, because this approach increases trust between internal employees on the one hand and allows the traceability of customer credits on the other hand.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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