

A Multidisciplinary & Multilingual Book

on

INNOVATIVE BEST PRACTICES IN

21st CENTURY

(OPPORTUNITIES & CHALLENGES)

Editors

Dr. Devendra N. Vyas

Dr. Rupa Z. Gupta

**A Multidisciplinary & Multilingual Book on
Innovative Best Practices in 21st Century
(Opportunities & Challenges)**

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Principles and Applications of Blockchain for the Social Media

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Abstract

In recent years there has been growing research attention and practitioner interest in exploring the suitability of Blockchain technology for decentralized applications in multiple domains. This paper investigates the application of Blockchain technology to address some of the key challenges in the domain of Social Business (SB). SB is a business model for investments in social causes for the socio-economic development of under-privileged communities. In this paper, we have identified and discuss principles and applications of Blockchain that enhance trust, transparency and auditability in SB activities. We outline the challenges related to creating a native cryptocurrency for SB, and barriers to infrastructure and technology adoption by different SB stakeholders.

Index Terms—*Blockchain Technology, Social Business, Distributed Ledger Technology.*

1. INTRODUCTION

Blockchain technologies continue to attract significant interest from academic communities and industries [1,2,3]. Block chain technology came into the limelight when Bit coin, a decentralized digital cash system was introduced as a peer-to-peer cryptocurrency in 2009[4]. The recent explosion of interest in blockchain-based applications is due to its disruptive and innovative nature, its strong underlying theoretical cryptography foundations, distributed consensus algorithms, and decentralized databases. In blockchain technology applications that once ran through a trusted intermediary can now operate in a decentralized manner; without the need of having central authority. Because of this disruptive nature, blockchain has led to the evolution of many decentralized applications across multiple domains such as finance[5], healthcare [6], [7] supply chains[3] and personal user data and identity management[8].

Recently published systematic literature reviews on the business applications of blockchain document emerging findings about both the technical opportunities afforded by blockchain as well as the challenges associated with organizational adoption and use [8,9]. Konstantinidis et al [9] find that many business domains have yet to explore and adopt blockchain beyond the early adopters in the financial, health-care, e-government, supply chain, and energy sectors. They identify security, privacy, latency and computational cost as the main technical challenges with the adoption and use of blockchain for business applications. Grover et al. [10], organize the extant research on business applications of blockchain in to three categories: (a) business to customers, (b) business to business, and (c) business to government. The four use-cases identified by

Grover et al. [10] for blockchain business applications to customers include: (a) trusted user interfaces, (b) instant payment facilities, (c) new incentive receiving system, and (d) traceability of goods, are highly relevant for the social business customers.

Social Business (SB) is the term defined by the Nobel laureate Prof. Yunus to develop and apply

a business model for investments for social causes such as poverty removal, healthcare, and welfare activities that are not attractive from the perspective traditional profit-based business models¹. For the purposes of this paper, the scope of an SB is restricted to being an entity whose primary goal is socio-economic development of the underprivileged. Typically, it is "characterized primarily by humanitarian or cooperative, rather than commercial objectives, and pursues activities to relieve suffering, promote the interests of the poor, protect the environment, provide basic social services, or undertake community development".

An SB obtains operating funds from soft loans or grants from sponsors (Social Investors) who may be individuals, philanthropic foundations, and corporations under corporate social responsibility, national governments or international agencies such as the World Bank and United Nations. These funds support socio-economic development projects identified by an SB. In the interests of continuing and sustained development activity, an SB needs to ensure that the flow of input funds remains commensurate with the nature and scale of its project activity. In some cases funds are needed for availability of operating expenses for solutions delivered in the past. All SB organizations need to raise funds from individuals and organizations and hence the donors (social investors) need to have the trust in SBs. Unfortunately, SBs do not have the financial resources -- unlike governmental and corporate sectors -- to develop trust through promotions and other investments. Hence, they rely on online software systems to operate at minimal overheads, otherwise precious donor funds would be consumed by overhead; making fewer funds available for addressing social causes. Blockchain technology could potentially provide efficient and effective solutions for enhancing transparency, verifiability and auditability in distributed peer- peer systems networks underlying social businesses.

In this paper, we examine the application of blockchain technology to SB for enhancing trust, transparency, privacy and auditability of SB activities. Section II defines the paper's scope to microfinance activities of SB. Using a brief micro-credit use-case example we investigate the suitability of blockchain technology for SB. Taking this context into account, our overarching question will be:

How can blockchain technology help address the challenges faced by Social Business organisations?

The remainder of the paper is organized as follows. Section II summarises challenges faced by SB. We then present opportunities and challenges of using blockchain for SB in section III and conclude our work in section IV.

2. SOCIAL BUSINESSES AND CHALLENGES

There has been persistent effort towards social causes from non-governmental organizations (NGOs), corporate social responsibility (CSR) divisions of organizations, and social enterprises (SE). Although there are differences between SB, NGO, CSR and SE, each of these organization types can be classified as social businesses for the purpose of this paper since we are addressing the problem of raising funds; a common need across all these organization types.

SBs mostly operate at the grassroots level and are close to the action within deep interior locations where other providers may not be physically present. This increases their qualification for completing community development projects on behalf of corporations, international aid agencies, or the government. Moreover, not-for-profit SBs sometimes receive financial as well as professional assistance free of charge directly from individual sponsors when compared with for-profit entities. As such, transition to new technologies such as blockchain can confer upon them competitive advantages.

In this paper we consider a Social Business that delivers micro-financing services from *social investor* funds to beneficiaries for the purpose of livelihood generation and social development. Traditionally a micro-finance operating SB collects sponsorships from social investors and soft-loans them to eligible borrowers for a pre-specified period of time for a pre-approved purpose. On expiration of the period the SB collects the maturity amount from the borrower and transfers it back to the social investor. Some relevant challenges traditionally faced by SBs in this context are noted below. While true for SBs in general, these challenges are particularly relevant for micro-finance operations and require expending significant effort and resources by the SBs to address them.

- Maintaining a trust relationship with the social investor is a key factor in the SB's ability to receive their sponsorships consistently. The social investor sponsors the SB's activities based on the belief that the SB will deploy these funds in a timely manner, for the declared purpose and will do so in complete accordance with the local laws. This effort requires substantial time and resources by the SB.
- The SB's activities in transferring the agreed amount of investor funds in a timely manner to the actual beneficiary needs to be visible to the social investor.
- SBs must ensure that any personal data of the social investor (as well as beneficiaries) is kept secure.
- Getting the social investors to follow local regulatory requirements for accepting SB sponsorships may mean registering and following *know your customer* (KYC) type procedures. Although not their area of specialty, SBs may find themselves forced to follow banking type operational procedures.
- Under existing operations, some social investors, especially international investors, could be averse to sharing personal information required for local registration processes due to security reasons. The SB could find itself spending substantial time and effort in trying to convince them to register and sponsor.
- Depending on social investor preferences, the SB must ensure that sponsorship transactions are kept private or made publicly visible.

- Funds to complete planned activities may not be available in a consistent and timely manner since this depends on social investor consistency.
- Lack of adequate human resources impacts on the timeliness and quality of the SB's products and/or services.
- Short- or medium-term success of an SB could become a challenge for it in the longer term. While an SB could complete a project successfully, subsequent operations could require up-scaling and a level of growth that the SB might not have the funding to handle. This result could lead to a substantial erosion of the good work done in the past.

From the above it can be seen that the typical SB is required to spend substantial time and effort in social investor creation, assurance and retention to ensure consistency of much required funds inflow. Central to these operations is the fact that under the current scenario it is solely the SB's authority that is used to enable trust in the system. Inability of the SB to create and continuously strengthen its trust relationship with the social investor could result in inconsistent funds flow; eroding the SB's capability to perform its socio-economic development activities.

3. OPPORTUNITIES AND CHALLENGES OF USING BLOCKCHAIN

It is identified that the three main pillars of deriving value from new technologies (in their case, it was virtual technologies but these pillars are also relevant for blockchain technologies):

- a) business model innovation and new market exploration,
- b) enhanced market research and customer targeting, and
- c) Development of new organizational capabilities.

Building on the Value 2.0 framework by Porta et al. [13], and also taking a small micro-finance use-case as an example, we will outline how blockchain technology can address some of the challenges faced by the SB as mentioned in sec. II.

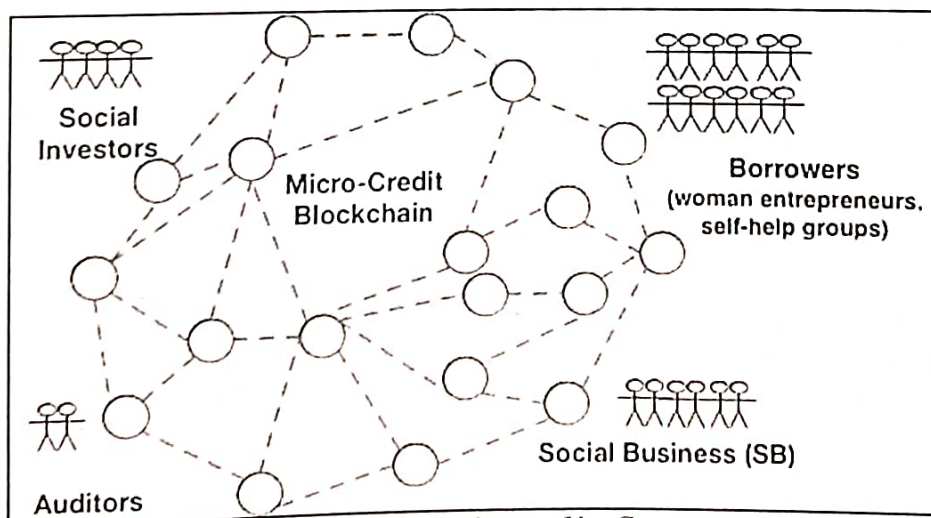


Figure 1. A Micro-finance Use Case

We take a simple social business use-case scenario, microfinance, and discuss how blockchain technology can benefit social business organizations by enumerating the opportunities and challenges. We take the example of a Community Development Fund (CDF) operated by a SB organization in Northern India, which is an autonomous micro-credit-based community development program to promote economic empowerment of poor people through self-help employment and income generation by creating women entrepreneurs in Indian villages. CDF comprises many self-help groups (SHG) and one member from each SHG takes part in a CDF to move the project forward. The SB organization provides or facilitates a 0% interest loan to SHG members after collecting funds from social investors. These social investors are interested in lending their money to support underprivileged people. As summarized in figure 1, the main stakeholders involved in the Microfinance blockchain case study include the following.

- Investors: Social investors who invest their money at 0% interest rate
- SB: SB organization that selects women borrowers who need money for their small business
- Borrowers: Women from SHG, looking for loans of INR 10000-20000 (\$150-300) for a short period of time.
- Auditors: external people, entities, or investors auditing the operations of CDF.

The borrowers in the case study are screened and selected by the SB organization for loans from investors. A social investor loans to borrowers at a 0% interest rate and after certain amount of time (e.g. 1 year), the borrower will repay the loan. The SB organization works at the grassroots level to make sure the loans are going to deserving women entrepreneurs and to recruit social investors to fund the loans. Using the case study as an example, we discuss the opportunities and challenges.

A. Opportunities

The following blockchain technology opportunities exist for SBs:

1) **Trust Factors:** Blockchain technology can provide trust mechanisms for SB operations. For example, assets/funds transfer to a borrower using the public key of borrower guarantees that only the borrower who is the holder of respective private key can consume the asset. This activity is similar to transferring funds directly to the borrower's bank account. Therefore, each stakeholder is in full control over assets they own by using their private keys. No one else can spend an individual's assets. Additionally, use of underlying asymmetric cryptography will provide authentication, integrity and non repudiation of transaction's and data in to the blockchain network. Altogether, use of blockchain will enable SB to build trust in the system, which is one of the key challenges faced by the SB.

2) **Transparency:** The public visibility of the blockchain, even in cases of permission blockchains, allows anyone to connect to the network, download the contents and verify them. Transparency is a fundamental aspect that is built in to blockchains to achieve verifiability [2]. The fact that anyone can connect and verify information will bring

significant transparency into SB operations.

3)Anonymity and Privacy: Having great transparency in the system does not necessarily lead to privacy violations. Blockchain based applications allows end-users to create pseudo-anonymous transactions without the need for disclosing their personal information. In the context of decentralized peer-to-peer networks, blockchain and crypto currencies use traceable pseudo-anonymity techniques[14], [15] to perform communication and transactions. For example, crypto currencies use a randomly generated pair of keys to perform transactions to have traceable pseudo- anonymity with self-selection of keys by the users, where one of the keys acts as a pseudonym for the user and the other key is used to sign the transactions.

We will briefly describe how a blockchain is good at handling privacy concerns. The stakeholders in the use-case will interact with the network using their (public/private) key pairs only, not with their personal information. This activity allows the microfinance SB stakeholders to conceal their identities to the public blockchain. Simultaneously they can reveal their identities on an need-to- know basis to required entities or authorities. For example, using a public key, a social investor can conceal their identity in the network; from borrowers and public visibility of network. They can simultaneously reveal personal information securely to the SB, for example, by encrypting personal information with the SB's public key. Only the SB could be able to access this information, using the private key, to comply with local regulations. Alternatively, some stakeholders, such as the SB, may not want to conceal their identity at all. In that case they can use their (public or private) keys from an X509 digital certificate issued by the certification authority, which will reveal their public profile to the network from the beginning itself.

4)Decentralization: the blockchain is inherently distributed and provides a few advantages [16]. First, control over the ledger or network is distributed across many entities (e.g. mining nodes), so no one can monopolies or compromise the network to decide which transactions are valid or confirmed unilaterally. Secondly, it will bring in robustness as failure or malfunctioning of a server will not stop processing of transactions in the network as a whole. Restoring a failed server is easy. As the transactional state is replicated over different nodes, the failed server can be easily restored by getting a copy from a peer.

5)Auditability: For social business operations, the blockchain acts like a digital book keeping system, recording all the transactions, messages/data transfer in an immutable time stamped database, which leaves rich opportunities for auditing operations of blockchain. For example, one such audit could be to see whether there are any discrimination, partial it or scandals in screening the borrowers or granting loans over a period of time. The auditors get access to full blockchain entries since its inception. Moreover, auditors can also participate in the mining activities voluntarily and in that case, auditing can be performed as a continuous process (like monitoring) rather than periodically, which will be helpful in establishing further trust in SB operations.

B. Challenges

Using blockchain technology for SB also has challenges; some of these are now summarized.

1) **Cryptocurrency:** In the proposed design, for the sake of simplicity, we have used a

digital asset for handling of funds transfer from investors to borrowers. In a much more realistic design, a native cryptocurrency to blockchain (e.g. community-coin) would be more suitable to handle the funds transfer, which will eliminate the need of having SB as an intermediary in the funds transfer from investors to borrowers. Having an active crypto currency to blockchain will have challenges related to exchange with regular currencies and other cryptocurrencies. These cryptocurrencies will also need to deal and comply with various financial registrations and regulations. Alternatively, if the blockchain is anchored to an existing cryptocurrency (e.g. bitcoin) then it has to deal with the uncertainties, volatilities and price fluctuations of that crypto currency.

2) Infrastructure and Deployment: For implementing blockchain based solutions, an SB needs to find suitable professional, technical help to develop the solution. Moreover, the SB needs suitable infrastructure and nodes to run and mine the blockchain, if mining is required. Some stakeholders (e.g. borrowers) might not have the access or ability to use computers, but only have devices like mobile phones. Hence there is also need for developing light-weight clients with mobile interfaces that can run on mobile phones, to interact with a blockchain network.

3) Training and Adoption: Adopting new technological developments like blockchain and smart contracts takes time and resources. The stakeholders involved need proper training and orientation to adapt to the new way of interactions in the blockchain. Therefore, SBs need to spend their time and resources to train different stakeholders to help them adopt the new technologies.

Building on the opportunities and challenges discussion and also based on the modelling of the Microfinance use-case, we can infer that blockchain technology can provide value by enhancing trust, transparency and audit ability in the operations of SB. Moreover, the applicability of blockchain technology can be easily extended to the other activities of SB, e.g. donations/product received from corporate or international aid agencies or the government. In these activities, using blockchain technology can provide digital receipts, help in tracking of supply chain products, auditing and compliance to the regulations. Similarly, a number of related activities around SB can be complemented by using blockchain technologies as it can provide opportunities for add-on services such as promoting business opportunities for women entrepreneurs.

CONCLUSION

In this work, we explored the suitability of blockchain technology in addressing some of the challenges faced by social business organizations. This work has two major goals: first, we investigated the suitability of blockchain technology for SB by using an example of a microfinance use-case. We found that the use of blockchain technology can help social business in establishing and enhancing the trust relationship with social investors and sponsors. Second, we identified the opportunities that blockchain technology can provide for the domain of social business, especially in terms of transparency, auditability, privacy and decentralization. Similarly, we also outlined the challenges in implementing a blockchain-based solution that a social presence organization might need to address in terms of technology adoption, infrastructure, and most importantly on how to deal with financial transactions with a crypto currency.

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