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How Blockchain Can Reinvent the Field of Charity - A Case Study

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Abstract: *In the modern world, financial aid helps in economic process and also as social capital. The charity organizations with primary aim of financial aid play very important role during this sector. On the other hand, a series of scandals have rocked the manner that the general public perceives the standard charity, and trust in charitable organizations. It's no coincidence that headline-grabbing scandals within the world of financial aid coincide with the decline in religion toward these organizations. Blockchain technology because the integral a part of the system. Blockchain technology may facilitate resurrect the pictures of charities willing to adopt its services. By minimizing body costs through automation, providing additional responsibility through traceable giving milestones, and permitting donors to see additional clearly wherever their funds area unit going, blockchain might facilitate restore a number of the lost believability to charities that prove warrant the public's trust. The Blockchain build trust with donors, recipients, and alternative stakeholders reach the proper individuals and improve administration prices and efficaciousness.*

Keywords: Blockchain, Charity, Philanthropy.

I. INTRODUCTION

Charity is taken into account as an ethical obligation throughout the world of economy. As a result, large quantity of cash or funds comes into circulation within the name of charity. In most of the cases, the charity assortment method isn't clear and because of this the charitable organizations struggle to achieve donor's trust and interest. With blockchain we can primarily focus on charity management platform that aims to supply a clear, secure and economical system. During every calamity, there will be a need for forming a charity relief funds initiated by both government and other public organizations. A series of scandals have rocked the way that the public perceives the typical charity, and trust in fund collecting or charitable organizations. Also, many fraud cases are reported during this time including fake accounts which have reduced the level of trust in charity. So, there arose the relevance of a transparency and genuine system for the charity fund transactions. Using anyone who uses the system can view the details of the transaction. Also, security of the transaction is assured

This paper explains about system which provides the user with a platform to try and do secure charity transactions. moreover, it permits the user to look at the transaction details once the completion of their group action. Many pretend that charity organizations formed are real and loot money from innocent individuals within the name of charity. Most people wish to gift cash to an honest as a measure of explanation for charity, but they are unsure if the money goes in the genuine correct hands of the poor. By victimization of the system, the user will do the group inter action through the system and accompany the net application will read the small print of the transaction as well as the traceability info and also the completion time of the group action. The planned system brings forth transparency and security to the users. Contributors will see the journey of the donation in real time and confirm if it's reaching the worthy hands or not.

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II. KEY TECHNOLOGY

2.1 Blockchain Technology

Blockchain was discovered by Satoshi Nakamoto in his paper "Bitcoin: A Peer-to-Peer Electronic Cash System" which was the foundation for the blockchain based bitcoin cryptocurrency. This system is based on the concept of a decentralized ledger which is shared between all the nodes in a network. A transaction is represented as a block which has a hash value and a hash value of the previous block. Every transaction is verified by the peer network. When a transaction is carried out, the block is linked to the previous block using its hash value. This mechanism ensures that integrity of the data is maintained. Some of the major applications of blockchain are cryptocurrencies and smart contracts. A cryptocurrency is a digital asset as a medium of exchange using cryptography to secure financial transactions, control the creation of additional units, and verify the transfer of assets. Blockchain-based smart contracts are proposed contracts that could be partially or fully executed or enforced without human interaction.

A. Features

1. **Transactions**: Transaction is transfer of value that is broadcasted to the network where the value can be cryptocurrency, data etc. Immutable ledgers: Immutability can be defined as the ability of a blockchain ledger to remain unchanged, for a blockchain to remain unaltered and indelible.
2. **Decentralized Peers**: Blockchains are decentralized ledgers that hold records of transactions or data exchanges that take place in a peer-to-peer network which are not centrally managed.
3. **Encryption Processes**: In Blockchain, Public-key encryption serves as the basis for blockchain wallets and transactions, cryptographic hash functions provide the trait of immutability, and also Merkle trees organize transactions while enabling blockchain to be more efficient.
4. **Consensus Mechanisms**: A method of authenticating and validating a value or transaction on a Blockchain or a distributed ledger without the need to trust or rely on a central authority.
5. **Optional Smart Contracts**: Smart contracts are lines of code that are stored on a blockchain and automatically execute when predetermined terms and conditions are met.

2.2 Fund Traceability

Traceability is the ability to track any transaction through all stages until it reaches the receiver. Traceability means that movements can be traced backwards and forwards from any point in the blockchain. For charity, traceability should extend to being able to identify the source of fund, time of the transaction and whether reaches the correct receiver. Traceability enables corrective actions (such as transaction cancellation) to be implemented quickly and effectively when something goes wrong. When a potential fund transaction problem is identified, an effective traceability system can help solve the problem. The transaction system has many procedures for identifying donor, receiver, transaction time and the amount.

A. Aid, Charity and Donation Tracking System Using Blockchain [1]

The Decentralized Donation Tracking System based on Smart Contract on blockchain technology helps record the transactions of individual(s) making donations and gather information of where the donations are being spent. Smart contracts using blockchain implemented helps in controlling the transfer of tokens or digital currencies between the ends parties involved in the transaction directly without the need to depend on a trusted third party. The system allows donations and receives donations in the form of cryptocurrency. Each cryptocurrency transaction is unique, making it easy to track it through the blockchain. A high level of clarity and social accountability can calm donor minds and encourage them to donate while also strengthening the reputation of giving generously.

B. Platform for Tracking Donations of Charitable Foundations based on Blockchain Technology [2]

This project is implemented as a part of a government grant for applied research in favor of government of the Russian Federation by subject «Digital economy of the Russian Federation» on the topic «Development of a platform for hosting and tracking donations of funds for charitable purposes using distributed registry technologies». This work

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is devoted to one of the most significant technology - blockchain. At the moment, blockchain technology is being implemented in many areas. There is a need for a single platform for charities and donors to increase transparency and simplify reporting. The analysis has showed that the use of blockchain technology in domestic charitable organizations, both individually and at the state level, will make donations not only more effective and reliable, but also more attractive to donors. It will also help to increase revenues, or at least reduce the amount of criticism from those who react negatively to budget cuts. Currently minimum viable product of the future platform implemented. Ethereum currently used as blockchain platform. Smart contracts implemented using Solidity language. The server part of the platform was developed on Node.js platform using JavaScript. Telegram bots developed for simulating the process of donations and receiving chain of funds spending.

C. Developing a Reliable Service System of Charity Donation during the Covid-19 Outbreak [3]

The Covid-19 epidemic has brought new challenges to the establishment and operation of charity donation service system. The introduction of blockchain technology has thus emerged to address cross-regional and cross-domain charity donations issues. The blockchain technology can be used for protecting the data security, defining access policies, ensuring the transparency of donations, and traceability of donation behaviors. It is an emergency response to specific regional disaster in the wake of the changing Covid-19 status. The ultimate goal of our research is to fulfill that blockchain supported solution taps into the integration of traditional web service and blockchain technology, speeds up the system development and then responds to the needs of users in a timely fashion. The Covid-19 situation has also given rise to a large demand of funds and materials. As the transaction voucher of the system, cryptocurrency can thus ensure the security of transaction records, identity data, and relevant details. It is powered to monitor the process of capital flow and improve the functional network chain of relief material

D. Proposed Solution for Trackable Donations using Blockchain [4]

The proposed system will trace the donations and let the donor know that his/her money has reached the beneficiary successfully. Charity chain uses Smart contracts to perform the process of donations and track them. Byzantine consensus algorithm is used for scalability and computational ease. Ethereum platform is used as it is a public platform. This will provide transparency in the donations will ultimately motivate the donor to contribute more to such flexible yet efficient and traceable charities.

E. Public Philanthropy Logistics Platform Based on Blockchain Technology for Social Welfare Maximization [5]

It proposes and implements a pioneering public welfare logistics platform based on blockchain technology, which provides open, transparent and publicly trusted services for the philanthropy logistics field with broad application prospects [6]. The platform considers the actual situation of the user equipment and the actual scene requirements and establishes a cross-platform, highly-reliable, and highly-transparent blockchain architecture for a public welfare logistics system. Moreover, the platform's credibility is greatly enhanced by the platform's unique responsibility relay system and evaluation complaint system. Based on the classic network flow algorithm, we modeled the social welfare generated by public Welfare activities in detail. Through empirical investigation, we demonstrated that the blockchain platform can greatly increase users' trust in a philanthropic project, increase the system honesty rate and increase the quality of the raised materials. Furthermore, it will enhance the social welfare output generated by charity donations. The blockchain platform is a technical solution that maximizes social welfare

From the literature survey done for the above-mentioned study papers we see that blockchain technology made a tremendous impact in the field of charity. The direct means of communication between the domains within the system helps to prevent the external third-party involvement within the system. The main blockchain framework used here is the Ethereum based blockchain framework which is a decentralized, open-source blockchain network along with the functionality of smart contract. Ethereum based system provide as with a platform where charity donations can be done in a need-to-know basis. Even though these systems provide a secure platform for fund transactions there is a disadvantage for the particular system. Ethereum based system provide the domains with the feature about access of external domains as it is a public blockchain platform. This leads external interference of another fake domain as

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mimicking as genuine domain and arises a chance of looting the money. It also has to face the new competitions that rise in the market about building a secure area for the cryptocurrency world. So, from all the analysis done as a solution for this we try to implement a system to provide a transparent and genuine fund transaction.

III. Proposed System

This system aims to bring transparent and genuine transactions using blockchain. We also develop a user-friendly platform where every sort of user can use and manage the system. It also provides an efficient fund tracking system which tracks down every transaction in the system and the donors will get to know whether their funds are reaching in the right hands or not. By digitalizing transactions in charity organizations, we can reduce corruption and malpractices and avoids the third-party involvement as it works on a decentralized manner. The analysis done regarding the more funded area for charity showed that majority are reaching in the organization located in urban areas and the organizations in the rural areas were not able to provide attention for the donors. Our system provides equal support for the domains. The excess amount reaching in a particular organization can be transferred to another organization in need of the money. Thus, we can provide a uniform aid for both rural and urban area organizations as well as we can gain donor's trust as he can track the entire details regarding the fund provided by them is helping multiple domains. Thus he is willing to provide further donations for the system.

IV. Hypothesis

The system provides a trustful charity transaction management system and review system for the users. The transaction and the review are done through a web interface. The transaction details are stored in the database of the blockchain. Implementing the system in Hyperledger fabric which is a decentralized, permissioned blockchain architecture allows the donor or user to track the status of the funds whether it is in the right hands or not and maintains transparency in the transaction. The use of permissioned blockchain implicitly eliminates the third-party involvement in the system. The blockchain gets updated after every transaction. The system mainly consists of the network of the domains including the donors and the receivers. The fund provided by the donors are transacted to the intended receivers through this network and are grouped into a charity pool. The amount required for the particular organization request that particular amount to the network. The system provides the requested amount to that organization and excess amount is then transferred to the organization which is in the queue for the next request. The complete details regarding the transactions can be tracked by the donors by the Chaincode mapped in the system. These details along with the timestamp is provided for the donor.

V. Architecture

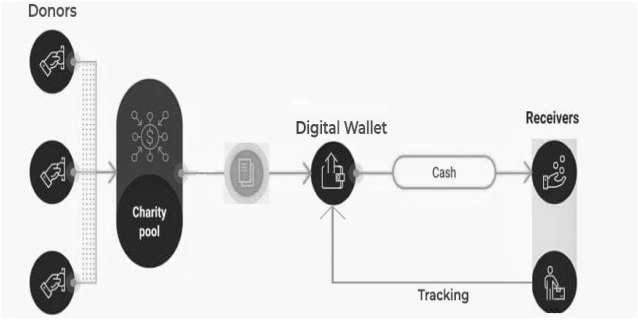

Figure 1: Proposed Charity Application Architecture

The system shown in fig 1 consists of: i) Donors/Givers: Those who are willing to make charity transaction. They must be the already the member of the system with unique identity in the system. ii) Receiver: Those who receive the charity. The person or the organization that receives the fund or gets involved in the transaction must be the member of the system since it is a permissioned blockchain. iii) Blockchain/Charity pool: This is the main part of the system. The details of the members of the system and the transaction details are stored in this part. iv) Chaincode: They are lines of

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code that are stored on a blockchain and automatically execute when predetermined terms and conditions are met. v) Digital Currencies: Digital currencies or token are currencies used in the transactions in blockchain. The system uses a permissioned blockchain where all the participants must be the member of the system to avoid external involvement in the system. The donor can do the transactions with the help of a web application. The donor has to login or signup using his/her unique identity into the system. Once login, the donor has to give the transaction details to initialize the transaction. The system works according to already written smart contracts. The transaction is done using digital currencies or tokens. When the transaction is completed the transaction id and timestamp are stored in the blocks of the blockchain and the other details regarding the transaction are stored in an external database. The transaction will be verified and validated by the consensus mechanism. After the completion of transaction at the donor side, the received can receive the fund. The receiver also has to login into the system using the identity to receive fund. The donor also can view the details regarding the transaction done and see whether it reaches the correct recipient without any interference.

VI. METHODOLOGY

The proposed system consists of mainly 2 modules: (i) the blockchain, and (ii) web application. The blockchain consists of the donor, the receiver and the admin. The blockchain is managed through a web interface. The web interface is used to collect transaction initial details, the user details and other such relevant data which can be stored within an external off chain database provided. The website itself can also act as an identity management for the system as it consists of the user id and other details since it is based on a permissioned blockchain. The transaction at each stage is identified and verified. Fund tracking is initiated by smart contracts present within the blockchain system by which donors can track down the funds donated by them.

6.1 Blockchain

- It mainly provides transparent and genuine transactions.
- Fund tracking system is initiated within the blockchain system.
- Stores the details of the transaction including the timestamp.
- A smart contract is initiated within the blockchain system.

6.2 Web Interface

- It mainly handles the initialize blockchain transactions.
- Used by donor, receiver and the admin to update the details.
- The website also acts as the identity management system for the system.
- The admin updates the blockchain system whenever needed.
- The web interface will give updates to the regulatory authorities if any transaction has any problem.

6.3 Performance Evaluation and Comparison

Name	Network type	Smart Contract	Consensus	Efficiency
I	Public	Yes	PoW	Low
II	Public	Yes	PoE PoW	High
III	Public	Yes	PoW PoS	Medium
IV	Permissioned	Yes	BFT	Medium
V	Public	Yes	PoW	Low
Proposed system	Permissioned	Yes	BFT	High

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