TRANSPARENT CHARITY APPLICATION USING BLOCKCHAIN

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***Abstract*— People today are eager to help society and want to donate to causes they believe in. However, many hesitate because they don't trust the current system, worrying their money might not be used properly. Many charities and NGOs need funds to do their good work, but they often struggle to gain people's trust.**

**To solve this, we have proposed a new system using blockchain technology. This system will make the donation process more transparent and trustworthy. With blockchain, donors can see exactly where their money is going, which builds trust between them and the charities. Blockchain is a powerful tool for charities because it promotes transparency and reduces the risk of fraud. Unfortunately, many charities don't use it because they don't fully understand how it works or how it can benefit them.**

***Keywords*— Blockchain Technology, Transparency, Trust, Fraud Prevention, Charity Donations, NGOs, Technical Expertise.**

1. Introduction

In today's world, the desire to contribute to social causes is stronger than ever. Many individuals are willing to donate generously to support the causes they believe in, yet a significant number hold back due to a lack of trust in the existing donation systems. This hesitation often stems from concerns about how their contributions will be used and whether their donations will truly make a difference. Charitable organizations and NGOs, which rely on these funds to drive their missions, face a constant challenge in securing the trust of potential donors.

One of the most promising solutions to this trust issue lies in the application of blockchain technology. Blockchain, with its ability to provide transparency and security, can revolutionize the way charitable donations are managed. By offering a clear, tamper-proof record of transactions, blockchain ensures that donors can track exactly how their contributions are being used. This not only builds trust but also minimizes the risk of fraud, making it an ideal tool for enhancing the credibility of charitable organizations.

Despite its potential, blockchain remains not utilized enough in the charity sector. Many organizations shy away from adopting this technology due to a lack of understanding or technical expertise. This paper aims to bridge that gap by exploring how blockchain can be effectively integrated into charity donation systems to promote transparency, build trust, and reduce fraud. Through this exploration, we hope to demonstrate the tangible benefits that blockchain can offer to both donors and charities, ultimately fostering a more trustworthy and efficient system for charitable giving

* 1. Blockchain Network

The backbone of the system, where all transactions and data are recorded on a decentralized ledger. The blockchain network will be permissioned, allowing only verified participants (e.g., charities, donors, auditors) to participate.

* 1. Smart Contracts

Smart contracts are self-executing contracts that can automatically enforce the terms of an agreement. In a charity system, smart contracts could be used to ensure that donations are only released when certain conditions are met, such as a certain amount of money being raised or a specific project being completed.

* 1. User Interface (UI)

A user-friendly web and mobile interface that allows donors to browse charity projects, make donations, and track the impact of their contributions. Charities will use the same interface to create fundraising campaigns and provide updates on how funds are being used.

* 1. Audit Module

An integrated audit system that periodically checks the consistency and accuracy of transactions recorded on the blockchain. This module ensures that all data is authentic and aligns with the reported activities of the charities.

1. LITERATURE SURVEY

The first paper authored by A. Singh, R. Rajak, H. Mistry and P. Raut focuses on creating a blockchain-based system to track donations transparently. It aims to solve the problem of donor trust issues by ensuring that donations are properly managed and reach to the intended recipients. The system uses smart contracts to automatically track and update donors on how their contributions are used, helping to build trust in charities[1].

E. Shaheen et al.[2] Proposed on creating a blockchain-based system to make charitable donations more transparent and secure. It aims to solve the problem of donor mistrust by allowing donors to see exactly where their money goes. The system removes the need for intermediaries, reduces costs, and uses smart contracts to manage and track donations. A user-friendly website was also developed to make it easy for people to use the system, ensuring donations are used appropriately and efficiently.

S. Saranya, S. P. Muvvala, V. Chauhan and R. Satwik discusses a blockchain-based crowdfunding platform using Ethereum for secure and transparent transactions. This platform lets users donate directly to individuals or startups in need without any traditional intermediaries. Being open-source it boosts transparency allowing the community to support each other with trust[3].

E. Feki et al.[4] aims to address the lack of effective use of blockchain in existing platforms by integrating NFTs to create a more reliable and efficient system for donations and investments. The platform offers two funding strategies to attract a wider range of donors and investors. A prototype using Ethereum and Vuejs demonstrates how the platform works and its potential for managing and tracking contributions. Meanwhile, J. Swati et al. [5] propose a decentralized platform on the Ethereum Blockchain to address issues of trust and transparency in charitable donations. By utilizing distributed ledger technology, smart contracts, and cryptography, the platform removes intermediaries and allows donors to track their contributions in real-time. Their system ensures complete transparency, securing the donation process and building trust in charitable giving.

P. Shelke et al.[6] discuss how blockchain can solve issues in traditional crowdfunding. The system they propose uses blockchain to make transactions secure, transparent, and immutable. This increases the credibility of projects and helps attract more funds. Their paper explains how the system was built and tested, showing its potential. Additionally, D. Sivaganesan in the era of Industry 4.0, He proposed a system that leverages blockchain and smart contracts to ensure the authenticity and protection of data across multiple internet-connected devices and networks. The study introduces a novel algorithm, "Authentication Proof," to enhance data security and prevent unauthorized access, demonstrating its effectiveness in managing and securing industrial data[7].

Carlos Santana and Laura Albareda their review explores three key principles of DAOs decentralization, automation, and autonomy using four theoretical perspectives: transaction cost theory, collective action institutions, agency theory, and socio-materiality. It then suggests a unified model to clarify DAO concepts and guide for future research[8].

In another paper, N. Alexopoulos et al.[9] explores how blockchain can improve authentication security in Trust Management (TM) systems. It uses graph theory to model TM systems and shows that blockchain can help in preventing common security threats. The proposed system demonstrates blockchain can significantly enhance the security of TM systems. Another contribution,A.R.J Golosova reviews existing implementations to identify successes and challenges, focusing on how blockchain addresses issues like trust, transparency, security, and data reliability. It compares different case studies to evaluate blockchain's effectiveness in these areas[10].

Similar to [2].H. Saleh et al. [11] presents a blockchain platform to improve trust in charitable donations. It tracks donations in real-time, recording all transactions on a blockchain. This ensures transparency and allows donors to see exactly how their money is used, helping to build trust and accountability in charitable organizations. P. Agarwal, S. Jalan and A. Mustafi proposed a blockchain-based charity system that issues tradeable certificates for charitable work, ensuring transparency and improving donation effectiveness[12].

R.Arshad et al.[13] reviews warning signs of fraud and abuse in non-profits, focusing on both financial and non-financial indicators. It analyzes existing literature and case studies to provide insights on effective risk management and prevention strategies for regulators and non-profits.Noel Hyndman, Danielle McConville investigates how effectively large U.K. charities report their efficiency, finding that many lack transparency and focus more on appearing legitimate than providing honest performance accounts. Their study proposes a framework to analyze transparency in reporting by reviewing data from annual reports, reviews, and charity websites[14].

Finally, Nir Kshetri explores how blockchain technology could address economic, social, and political challenges in the Global South. It reviews early evidence of blockchain's impact, highlighting its potential to improve transparency, trust, and transaction efficiency. The study also examines the opportunities for adoption and the challenges developing countries may face in implementing blockchain[15].

1. REVIEW OF METHODOLOGY
   1. System Design:
      1. Blockchain Integration: Implementation of blockchain to record all transactions related to donations. Blockchain's transparency ensures that each transaction is traceable and immutable.
      2. Smart Contracts: Smart contracts are used to automate donation allocation based on pre-set conditions, ensuring that funds are used as intended.
   2. Transparency and Tracking:
      1. Transaction Ledger: Developing a blockchain ledger that logs all donations, providing a clear and accessible history of where funds are directed.
      2. Real-time Tracking: Enable real-time updates for donors to see the current status and impact of their contributions.
   3. User Interface:
      1. Donor Dashboard: Creating an intuitive dashboard for donors to view their donation history, track fund usage, and access reports on charitable projects.
      2. Charity Dashboard: Developing an interface for charities to manage donations, update project statuses, and report back to donors.
   4. Security Measures:
      1. Cryptographic Techniques: Utilizing blockchain's cryptographic features to secure transaction data and prevent unauthorized access.
      2. Access Controls: Implementing strict access controls to ensure only authorized parties can modify or manage blockchain data.
   5. Implementation and Testing:
      1. Prototype Development: Building a prototype using a blockchain platform (e.g., Ethereum) to incorporate smart contracts and user interfaces.
      2. Testing: Conducting comprehensive testing to verify the system's functionality, security, and user experience. This includes testing blockchain integration, smart contract performance, and interface usability.
   6. Deployment and Monitoring:
      1. System Deployment: Launching the system on a public blockchain network. Ensure all components are fully integrated and operational.
      2. Ongoing Monitoring: Continuously monitoring the system to address issues, gather feedback, and make necessary improvements to maintain effectiveness and user satisfaction.
2. REVIEW OF DATASETS

A review of datasets for a blockchain-based transparent charity application ensures that the data used supports the system's goals of transparency and trust while being comprehensive and accurate.

* 1. Donation Data

The Donation Data comprises both transaction records and donation history. Transaction records capture essential details such as donor identities, donation amounts, dates, and the recipient charities. These records are important in maintaining a detailed and immutable account of all transactions, thus enhancing transparency and facilitating thorough audits. Ensuring the accuracy and completeness of these records, along with their seamless integration into blockchain technology is crucial for preserving their immutability. Additionally, donation history tracks past donations, providing valuable insights for trend analysis and evaluating the long-term impact of contributions. Maintaining consistency and historical accuracy in this dataset is vital for its effectiveness.

* 1. Charity Information

The dataset includes both charity profiles and project details. Charity profiles offer critical insights such as mission statements, operational details, and funding needs, which lend context and legitimacy to the organizations and assist donors in making informed decisions. The accuracy and completeness of these profiles are crucial, as they must be regularly updated and aligned with the blockchain system to maintain their relevance. Additionally, project details provide specific information about individual charity projects and their associated funding goals, ensuring donors are well-informed about how their contributions are utilized. The emphasis here is on ensuring that these details are both accurate and clearly communicated, with a strong integration into the donation tracking system to maintain transparency and accountability.

* 1. Donor Information

These datas consists of donor profiles and donor history. Donor profiles contain personal information such as names, contact details, and preferences, which help personalize the donor experience and facilitate communication. Ensuring data protection and privacy is paramount. Donor history includes records of past donations and interactions, which help understand donor behavior and preferences. Accuracy and integration with current donation records are critical for a complete view of donor activity.

* 1. Smart Contract Specifications

Involves contract terms and contract performance data. Contract terms include the conditions and rules encoded in smart contracts, which automate and enforce donation processes and fund allocation. The accuracy and functionality of these contracts are crucial. Contract performance data consists of logs of smart contract executions, tracking how contracts are executed and ensuring compliance with their terms. This dataset must accurately reflect performance and highlight any issues or anomalies.

* 1. Financial Data

Financial data includes fund allocation and expense tracking. Fund allocation data details how funds are distributed among projects or purposes, ensuring that donations are used as intended and supporting financial transparency. Accuracy in these records is crucial for reporting and accountability. Expense tracking data provides information on charity expenditures, including administrative and project costs, helping to understand how funds are spent and ensuring consistency with allocated amounts.

* 1. System Performance Data

Performance data encompasses transaction times and error logs. Transaction times data measures how quickly transactions are processed, which is important for assessing system efficiency. Error logs document system errors and issues, helping identify and resolve problems to maintain smooth operation.

* 1. User Interaction Data

The dataset includes information on dashboard usage and feedback/support requests. Dashboard usage data captures how users engage with their dashboards, offering insights into usability, user behavior, and identifying areas that may require enhancement. Meanwhile, feedback and support requests provide crucial details about user concerns and experiences, enabling the system to be refined and improved based on real-world user interactions. Both aspects of this dataset are vital for optimizing the user experience and ensuring the system meets user needs effectively.

1. RESULT AND DISCUSSION

The analysis concludes that blockchain technology has significant advantages over traditional charitable giving systems, particularly in terms of transparency, cost effectiveness, and fraud protection. The blockchain's decentralized and immutable database enables real-time tracking of donations, giving contributors unprecedented insight into how their funds are used. This level of transparency differs from traditional systems, in which donations frequently go via many middlemen, making it impossible for contributors to verify the use of their funds. Furthermore, blockchain lowers transaction costs by eliminating intermediaries and automating procedures using smart contracts, ensuring that more funds reach their intended recipients.

However, the adoption of blockchain in the charity sector faces significant challenges. Many charitable organizations, especially smaller organizations, lack the technical expertise and resources required to implement blockchain effectively. The initial costs associated with developing the necessary infrastructure and acquiring technical skills can be prohibitive.Furthermore, because the legal environment is still changing, there are still unknowns surrounding blockchain technology, which presents dangers for businesses thinking about implementing this technology.

Overall, while blockchain has the potential to revolutionize charitable donations by building trust, improving transparency, and reducing costs, its adoption is currently limited by practical barriers. Traditional systems, though less efficient and transparent, continue to be widely used due to their established presence and lower barriers to entry. To make blockchain more widespread in the charity sector, concentrated efforts in education, regulatory alignment, and technical assistance must be made to assist organizations in navigating the hurdles and fully utilizing the benefits of this technology

TABLE 1. COMPARATIVE ANALYSIS OF SOCIAL PROJECTS BASED ON BLOCKCHAIN

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Charitable foundations/  projects | Blockchain platform/  Crypto  currency | Country | Blockchain technology using |
| 1 | AidCoin | AID | Europe | The platform for raising funds for charitable purposes based on Ethereum platform. |
| 2 | GiveTrack | Bitgive / BTC | USA | The platform for raising funds for charitable purposes on cryptocurrency Bitcoin |
| 3 | Fidelity Charitable | BTC/BCH/ ETH/LTC /XRP |  | The charity with the opportunity of donation in different cryptocurrencies. |
| 4 | GiveCrypto .org | BTC/BCH/ETH/ LTC/ZEC/XRP | USA | The platform for raising funds for charitable purposes in different cryptocurrencies. |
| 5 | Clean Water Coin | WATER | USA | In transactions or token issue, a commission goes to projects related to clean water (CharityWater.org ). |
| 6 | Blockchain charity foundation (Binance charity) | BTC | Europe | The platform for raising funds for charitable purposes on cryptocurrency Bitcoin. |
| 7 | UNICEF projects on blockchain | BCH, BTC, ETH, LTC, XPR | World | Integration blockchain technology in projects in several sectors. |
| 8 | Coin 4 clothes | BCH | Canada | Offers earn BCH for donations in the form of clothing. The project provides education and support to each clothing donor by teaching them how to store their coins, how to send and receive transactions, and where they can spend them.  The charity fund provides clothing to the needy in Canada. |
| 9 | United Way Worldwide | BTC | USA | The charity with the opportunity of donation in cryptocurrency Bitcoin |
| 10 | Alice.si | ETH | Europe | The platform for raising funds for charitable purposes based on Ethereum platform. |

1. CONCLUSION

Blockchain technology provides a disruptive approach to charitable donation by solving many of the flaws in old systems. It increases transparency by allowing for real-time, tamper-proof tracking of donations, which can foster better confidence between donors and charity organizations. Furthermore, blockchain lowers transaction costs by eliminating intermediaries and greatly minimizes fraud because to its decentralized and irreversible record, making it an effective tool for boosting trust and efficiency in the charitable sector.

However, issues with technical complexity, legal confusion, and early investment must be achieved if blockchain is to be widely adopted in charitable giving. It's possible that many firms lack the tools or knowledge required to successfully deploy blockchain. Blockchain is expected to have a significant impact on how charity donations are made in the future since it provides a more transparent, safe, and affordable option to conventional systems as technology advances and efforts are made to address these issues.

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