Crowdfunding platform with blockchain

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Introduction

System objectives

      This platform aims to provide a transparent and trustworthy crowdfunding platform, backed by blockchain technology. Donors can monitor how donations are spent and recall funds if there are undesirable events. We believe that a decentralized crowdfunding platform is the only solution that can remedy a key shortfall of traditional platforms – the ability to secure the donor's trust. With blockchain and smart contracts, it will be possible to create a system where donors and creators cooperate with each other in a manner which will be beneficial to all stakeholders.

Limitation of present-day crowdfunding for charities

1)   Lack of transparency:

      Donors may fail to obtain information on project outcomes and have limited access to the allocation mechanism of donations. For example, populations in China are suffering the outbreak of coronavirus (COVID-19), a deadly and highly contagious disease. During such public health emergency events, many parties are involved. Since the beginning of January 2020, individuals, enterprises, overseas students, and foundations are donating money as well as medical supplies. More than half a billion dollars have been directed to hospitals and NPOs. However, the Red Cross Society of China, as the most significant intermediary organization in the charity space, has faced limitations in assisting the citizens of Wuhan, China and dozens of associated hospitals that are in desperate need for medical supplies. We propose the use of blockchain technology to enhance this effort.

2)   Burden of marketing and advertising:

      For an NPO, ethical aims and the willingness to assist people in need may prove insufficient. Enhancing the visibility of the crowdfunding project page and attracting new donors diverts time and resources from core projects. Some crowdfunding platforms have a "featured" section, noting some of the currently most-popular projects. However, if the project never reaches that threshold of popularity, then it will be difficult to raise appropriate funds for that specific project. As a result, creators tend to sugarcoat projects or even present unreachable goals in order to attract donations.

      Backed by advanced technologies, GoFundMe is able to resolve these two major limitations of present-day crowdfunding platforms.

Solutions provided by this platform

1)   Blockchain:

Two key functions of blockchain can solve the trust issue inherent in current systems. The first function is DLT (decentralized ledger technology). As a decentralized open ledger, blockchain has the ability to track exchanges in a way that is secure, publicly verifiable, and impossible to use fraudulently. All records in the system will be immutable, but nevertheless be accessible for all permitted participants, rendering it perfect as a platform for crowdfunding.

The second function is the smart contract. It is a computer protocol intended to digitally facilitate, verify, or enforce the entirety of the funding process without third parties. These transactions are trackable and irreversible. For example, project creators must propose "clear development phases" before donations are made. An escrow wallet controlled by the smart contract then ensures that funds are unlocked gradually — with donors given the sole right to monitor how their donations are spent, check whether the objectives of a phase have been fulfilled satisfactorily, and unlock funds for the next phase if the process proceeds satisfactorily.

2)   Algorithm for credibility check:

There will be an evolutionary algorithm that can help organizations with great projects to secure exposure. Firstly, project creators must upload identity verification materials during registration. The initial credit score will be generated based on information provided. While creators host projects and raise funds from the platform, their credit scores will be changing accordingly based on performance of their projects. For example, if a project has successfully reached Phase 1 objectives, the credit score of that project creator will be increased. All projects attributable to that creator will appear toward the top on the user interface indicating they are well designed projects, hosted by trustworthy creators.

Scope of the system

Services provided by this platform:

1)   A transparent and trustworthy decentralized ledger that keeps track of exchanges in a way that is secure, publicly verified, and virtually impossible to use fraudulently

2)   A donation process controlled by the blockchain smart contract

3)   A membership service for NPOs for further professional functions such as statistical analysis

Eligible project creators include:

1)   Individuals who require help for medication or education

2)   Public services and business owners who need help with local projects for social good

3)   NPOs who want to raise money for public emergency projects

Eligible project donors include:

1)   Individuals who want to donate to support local nonprofit projects or to help individuals.

2)   Companies with trust funds that want to fulfill CSR obligations

It is readily evident that crowdfunding has enormous potential. Even in its current, flawed form, funding is helping individuals, NPOs and creators to improve the world. With this platform, the blockchain technology serves as the backbone of this decentralized platform, allowing it to be more accessible, secure, and trustworthy for both creators and donors.

Functionality and Use Case

Blockchain App models:

●   **Participants:**

There are 4 major participants in the network. They include NPOs, Individual donors/Organizations, Beneficiaries (i.e. hospitals) and SMEs (subject matter experts such as suppliers, shipping companies, custom officials/clearance brokers)
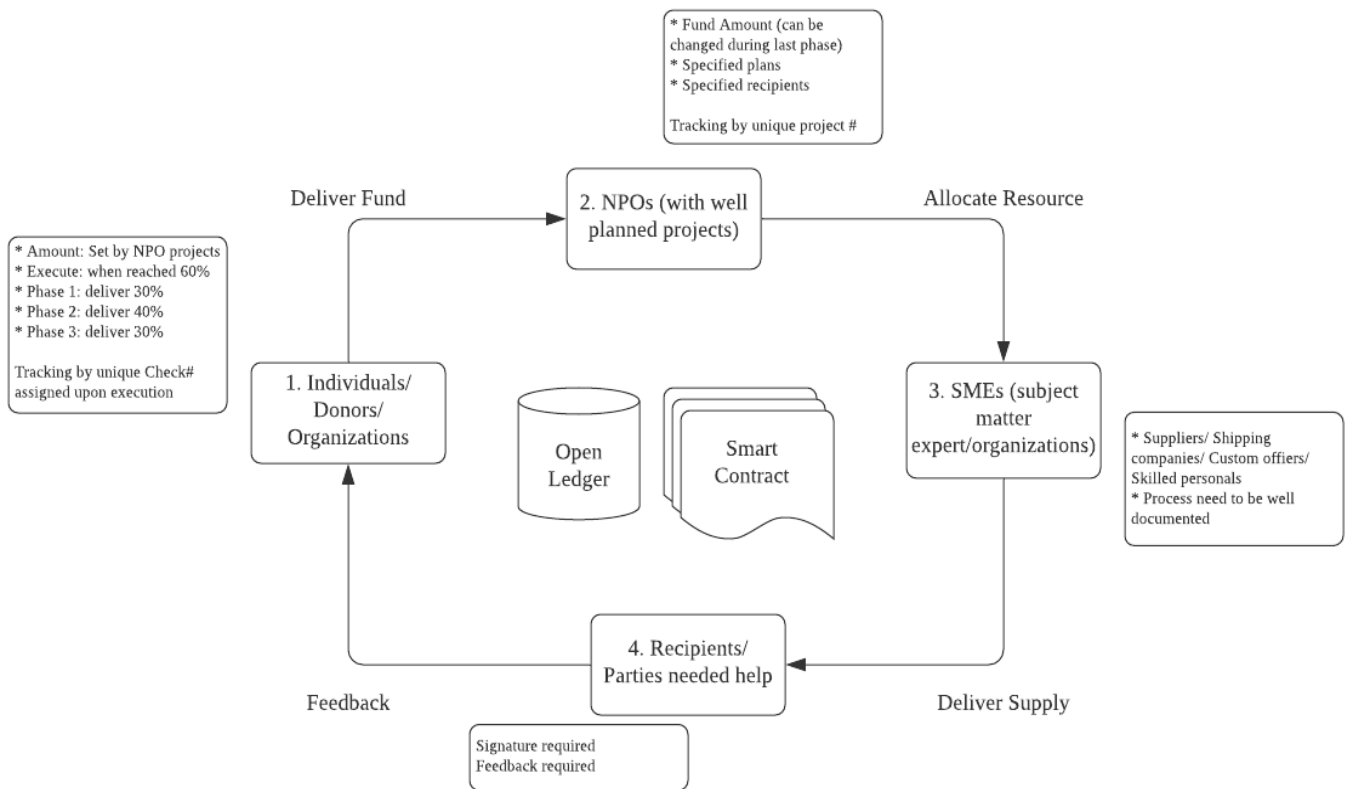
●   **Assets:**

Tangible assets such as medical supplies and intangible assets such as money

●   **Transactions in business workflow:**

1.   NPOs initiate projects by providing specific plans in different phases, target amounts, and beneficiaries.
2.   Donors select preferred projects and donate a certain amount of money into an escrow account.
3.   When the funding in the escrow account reaches 60% of the target amount, 30% of the target amount would be transferred to the NPOs account as Phase 1.
4.   NPOs use donations as planned and contact suppliers to get materials.
5.   Supplies are shipped to the beneficiary.
6.   The beneficiary checks the quality of the delivery and provides feedback regarding Phase 1.
7.   If the beneficiary believes the distribution is qualified, the funding process will continue to the next phase.
8.   As the funding amount reaches 80% of the target amount, another 40% of the target amount would be transferred to the NPOs account as Phase 2.
9.   The same transactions continue as funding processed to the final phase.
10.   During any phase, if the beneficiary does not receive the delivery or receive disqualified suppliers, the funding would be ceased.
11.   Funding remaining in the escrow account would be returned to donors, respectively, when requested by donors.

Below is a diagram to explain the transaction workflow:

* Fund Amount (can be changed during last phase)
* Specified plans
* Specified recipients

Tracking by unique project #

* Amount: Set by NPO projects
* Execute: when reached 60%
* Phase 1: deliver 30%
* Phase 2: deliver 40%
* Phase 3: deliver 30%

Tracking by unique Check# assigned upon execution

* Suppliers/ Shipping companies/ Custom offiers/ Skilled personals
* Process need to be well documented

Signature required
Feedback required

Deliver Fund

Allocate Resource

1. Individuals/ Donors/ Organizations

2. NPOs (with well planned projects)

3. SMEs (subject matter expert/organizations)

4. Recipients/ Parties needed help

Open Ledger

Smart Contract

Feedback

Deliver Supply

- **Events tables:**

Event	Trigger	Source	Use Case	Response	Destination
NPO creates account	NPO's detailed information	NPO	Create New NPO Account	Account Number	NPO
NPO initiates new projects	Project's detailed information	NPO	Create New Project Account	Project Number	NPO
Beneficiary sign up	Beneficiary's detailed information	Beneficiary	Create beneficiary Account	Account Number	Beneficiary
Donors create account	Donors' detailed information	Donors	Create New Donors Account	Account Number	Donors
Donors donate money	Transfer money into escrow account	Donors	Transfer the donation & Record transfer details	Tracking Number	Donors
Donations transfer to NPOs	Amount reaches 60% of the target	Escrow Account	Transfer the donation & Record transfer details	Transfer Details	Donors
SME delivery supply	Beneficiary signature	Beneficiary	Record the signature & feedback	Transfer Details	Donors
Donors check process	Inquiry	Donors	Look up transfer details	Transfer Details	Donors
NPO checks process	Inquiry	NPO	Look up process and transfer details	Process & Transfer Details	NPO
Donors get full disclosure	Beneficiary gives feedback	Beneficiary	Send transfer details and beneficiary feedback	Transfer Details & Feedback	Donors

Use cases for functional requirements

Flow of activities for scenario of "NPO creates new projects"
Main Flow:
1. NPO login to the platform and create a new project
2. NPO provides detailed information regarding the project: timeline, specific plans
3. NPO sets beneficiary
4. NPO sets project target amount
Exception Conditions:
5. If NPO does not provide target amount at first, it can be set later

Flow of activities for scenario of "Donors donate money"
Main Flow:
1. Donors search the website for projects they want to donate
2. Select and check project detail to decide whether to donate
3. Decide and Insert donation amount
Exception Conditions:
4. If Donors wants to donate multiple times to one project, simply change the amount and donate again

Flow of activities for scenario of "beneficiary gets donation"
Main Flow:
1. beneficiary gets notice from NPOs when selected to be the beneficiary for the project
2. beneficiary login to the App, sign off the phase delivery when get the supply
3. beneficiary provides feedback regarding to the delivery
Exception Conditions: -

Non-functional requirements

1. **Usability requirements** – An interface should be easy to learn how to use and easy to remember how to use. Frequently asked questions would be listed for instructions.

2. **Reliability requirements** – Registered users need to provide detailed information and upload supporting materials for review if necessary.

3. **Performance requirements** – The response time is designed to be real time, however since the funding procedure requires participants actions, the status update may be delayed.

4.   **Security requirements** – All transactions would be recorded in this distributed and transparent ledger. The access to critical information would be restricted for permitted users only.

5.   **Design constraints** – The system can only be accessed through an online website or a phone application.

6.   **Implementation requirements** – The back-end system is a smart contract constructed by solidity and hocks up to the front-end web page via react. Certain knowledge of those programming skills is needed to maintain and update the system.