

RAHAT

Relief distribution using Blockchain-based tokens



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Introduction

Rahat is a digital Cash and Voucher Assistance (CVA) management system that uses mobile-based blockchain tokens for emergency response and recovery programs for humanitarian agencies for aid distribution. It is based on blockchain technology to distribute cash and commodities through digital tokens to the beneficiaries. It enables the token distribution digitally through mobile phones using One-Time-Password (OTP) which would be verified by the merchants' mobile app through a blockchain network.

Problems

Nepal is highly susceptible to natural hazards such as earthquakes, landslides, floods, and is currently struggling with a COVID-19 outbreak. These situations are intensified with a significant population living in extreme poverty. At the point when fiascos strike, delivering aid quickly to the affected is vital. But, it was found that distributing aid at times takes around three to six months or even more, here in Nepal.

Objectives

- Implement and pilot blockchain-based relief distribution system in Nepal.
- Improve the speed, security, transparency, safety, and cost-effectiveness of cash and voucher programming through the use of mobile phones for humanitarian agencies.
- Conduct a CVA program with minimal physical contact.

Solution

To overcome the barriers in the aid distribution and to help the local communities get involved in the aid distribution process, the idea of Rahat was ignited.

Rahat is an application incubated and built-in-house at eSatya-a blockchain-based company. Rahat hints at the aid or relief distribution. Rahat uses mobile-based blockchain tokens which enables transparent and faster fund transfer to recipients.

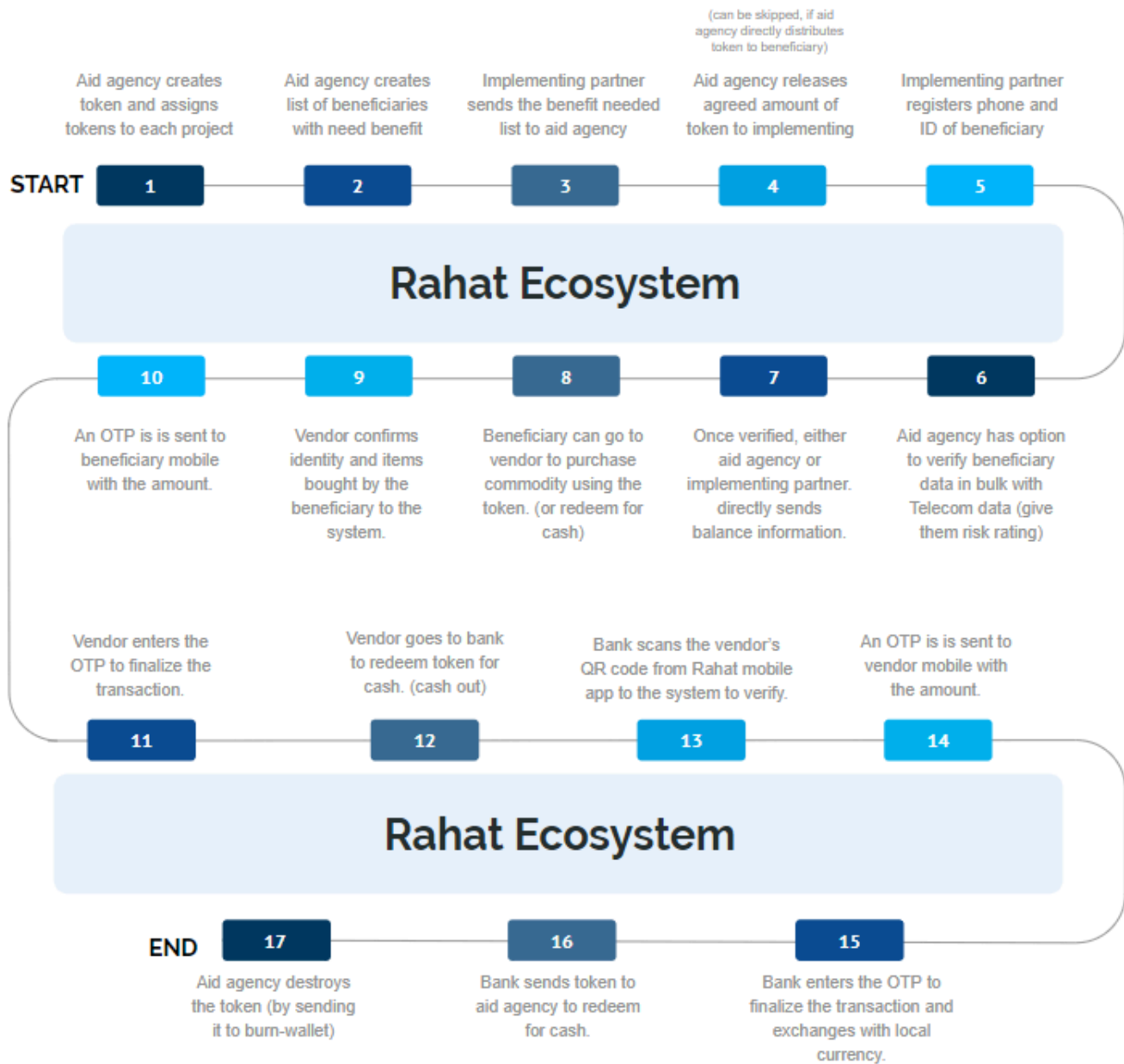
Rahat's main goal is to make humanitarian aid distribution simple, efficient, and transparent. When disaster strikes, getting aid to the affected is the priority. With the elimination of physical cash and vouchers in the aid process, Rahat hopes to plug leakages in CVA and make sure that help reaches the intended people on time.

How does it work?

Rahat manages and monitors the flow of transactions in cash distribution projects maintaining end-to-end transparency among various stakeholders i.e. reduces cost (transaction cost, administrative cost, audit cost) and time. This ensures faster fund transfer to the beneficiaries along with the provision of real-time visibility into the flow of funds to the aid agency. Rahat provides relief agencies, government humanitarian agencies to easily set up, deploy, initiate, and monitor relief projects.

Rahat platform includes an online dashboard, an app, a digital wallet, and a text message feature. Aid agencies use their online dashboard to onboard vendors and assign relief funds to registered recipients. Recipients receive a text message with a relief token in their mobile phones. They use their digital token to connect with the participating local vendors' Rahat app and buy items or cash out money. The vendor then uses the Rahat app to receive cash through

bank transfers. The aid agencies can monitor all transactional information in real-time through their Rahat dashboard.



Why Blockchain?

The blockchain is an incorruptible digital ledger of economic transactions that can be programmed to record not just financial transactions but virtually everything of value - land records, intellectual property, tracking information, identity, etc, to reduce fraud and remove bottlenecks. The feature of blockchain technology

- *Immutability* - The shared blockchain ledger information is checked for integrity by a large network of participants based on shared agreement.
- *Irreversibility* - Once the information is accepted into the ledger it cannot be reversed.
- *Transparency* - The blockchain ledger is visible to all the participants. The records are visible.
- *Low-cost* - There's no need for the middle man to manage the transaction in blockchain reducing the middle-man fees.
- *Decentralized security* - Blockchain uses strong cryptography and a large network of participants to create transactions that are fraud-proof.

Ethereum is a global, open-source platform for decentralized applications (Dapps). It is a blockchain network where you can write code that controls digital value, runs exactly as programmed, and is accessible anywhere in the world. These logic codes are called “smart contracts”. Dapps on Ethereum are web applications backed by Ethereum smart contracts. Instead of using a centralized server or database, these applications rely on the blockchain as a backend for program logic and storage. This leads to potentially unstoppable applications: anyone can deploy a copy of the frontend, and freely connect it to the public Ethereum network.¹ With the elimination of physical cash and vouchers in the aid process, Project Rahat hopes to plug leakages in CVA and makes sure that help reaches the intended people. It is interesting how blockchain can help the most marginalized sections of the world. If the project is a success, it would showcase another use of Blockchain and digital currencies.

¹ <https://ethereum.org/dapps/>

What is Crypto-token?

Crypto-token is a digital token or currency recorded in a ledger of accounts and transactions between peers using a system of verification and encryption. Transactions are made by sharing public passwords attached to a private and encrypted digital wallet. Each password relates back to a “block” of transactions on a digital ledger (called a blockchain) and represents X amount of digital coins. Therefore, crypto-token is essentially a digital ledger of transactions, secured by cryptographic codes, that acts as a decentralized currency, which can be exchanged between peers by sharing public passwords that relate back to digital wallets.²

Blockchain-based Humanitarian Aid

In humanitarian response, blockchain has the potential to be used for information management, coordination of aid delivery, management of crowdfunding, tracking supply chain, cash-transfer programming and boosting humanitarian financing. The technology can provide solutions to existing challenges in humanitarian assistance such as transparency and accountability. Blockchain also can allow organisations to gather large quantities of data about vulnerable populations by using the distributed database component. To maintain data privacy of these populations, organisations can use private blockchain to allow only certain networks to gain access to the data. An example of humanitarian blockchain in action is a pilot project run by the World Food Programme (WFP) called ‘Building Blocks’, a cash transfer program for 10,000 Syrian refugees in Azraq camp, Jordan. They distribute electronic cash using blockchain that can be redeemed at participating vendors. These vendors use the blockchain technology co-developed with the WFP Innovation Accelerator team.³

Blockchain together can work as a digital shift which facilitates faster intervention in operating difficult situations and obviously humanitarian actors roll out life-saving cash assistance in pandemics. The blockchain can be also a collaborative approach where the humanitarian

² <https://cryptocurrencyfacts.com/cryptocurrency-basics/>

³ <https://humanitarianadvisorygroup.org/blockchain-for-social-impact-in-aid-and-development/>

community comes together around a neutral and interoperable infrastructure to harmonize and optimize the global aid effort, especially as the industry up scales cash programs.⁴

The different national and international organizations such as WHO, UN, DFID, European Union's European Civil Protection and Humanitarian Aid Operations (ECHO), USAID, etc. collaborate to humanitarian response through CVA tools in order to relief victims and provide needy service as soon as possible through an e-cash process. Many countries are practicing these tools in the ultimate response process. In Nepal, cash and voucher assistance(CVA) were used in post-disaster scenarios. Likewise in the aftermath of the quake in the community, many working INGO collaborated with local NGO and stakeholders for the distribution of aid through digital platforms such as Hello paisa, Sikka, Fonepay and other mobile banking mediums. Sikka and hello paisa mobile e-vouchers to deliver cash quickly to beneficiaries in remote locations. The e-voucher platform was used to transmit mass SMS messages via mobile phone, including the recipient's unique identifier code to enable receipt of the cash transfer.⁵

Humanitarians promote CVA because it is often the best modality for meeting individual needs in an ever-changing environment. It is important to recognize the massive pressure on humanitarian organizations, both local and international, to maintain essential services and to protect the most vulnerable communities.

Market

Distribution Channels

Unlike the traditional cash distribution process, our product uses blockchain-based tokens which can be transacted digitally through the use of smart mobile phones.

⁴ <https://innovation.wfp.org/blog/blockchain-crypto-assistance-wfp>

⁵ <https://www.danchurchaid.org/articles/hello-money-the-impact-of-technology-and-e-money-in-the-nepal-earthquake-response>

We will use the following channels:

1. Onboarding

The merchant and beneficiary need to be onboarded to the Rahat system. KYC of beneficiaries and merchants will be conducted by implementing partners and agencies. Once the information is verified and vouched, the information will be stored in the system. The merchant and beneficiary wallets are created. The merchants will need to provide additional information like bank account details and payment gateway information. The merchants need to sign merchant agreements - to provide goods for digital tokens they receive and participating partner agencies (banks and clearing agents) would repay them later in local currency either digitally or in cash. The financial institutions involved in distributing cash are also onboarded. Their digital wallet is also created which receives tokens from merchants' wallets.

2. Token Issuance

The implementing agency will issue the total tokens required for the project. The tokens will be issued in an Ethereum blockchain network called ERC-20 tokens. ERC-20 is a protocol standard that defines certain rules and standards for issuing tokens on Ethereum's network. The token transaction and verification are managed by the Ethereum network. The value of the token can be set or simply 1 TOKEN = NRs. 1. The token can only be redeemed from participating merchants.

3. Token Distribution

The administrative dashboard allows easy distribution of token to all registered beneficiaries' wallet by simply entering the desired amount. After distribution, each beneficiary's mobile phone number will be allowed a balance of tokenized funds intended for use within the program ecosystem. The beneficiary will be allowed to use the value of the fund in their allocated balance.

4. Merchant App Distribution

The participating merchants will be selected and assigned. Their smartphone will be their digital wallet for the CVA project. The mobile phone app will store the token received during the shopping and will help cash out the amount in the future.

5. Rahat distribution to Beneficiaries

The merchant will ask the beneficiary for their mobile number. After that process, One Time Password (OTP) will be sent to the beneficiary mobile phone. The OTP is inputted by the merchant into the app and the transaction is verified and completed in the Ethereum network. The merchant mobile app wallet will receive the token. Once the transfer is complete, the beneficiary will receive the allocated food materials.

6. Merchant Cashing Out

When merchants want to cash out, they go to the assigned bank & scan their wallets' QR code with the bank. Then the bank redeems the token from the merchant's wallet and in exchange, the merchant will receive cash.

7. Token Burning

Once the project token has been exchanged for cash it needs to be destroyed, so that it doesn't go back into circulation and be misused. The tokens' signatures are put into an irretrievable public wallet known as an "eater address" that is viewable by all nodes but frozen. The bank burns the token by sending it to the "eater wallet". Hence, the whole Rahat cycle is completed.

System Design

Product Features

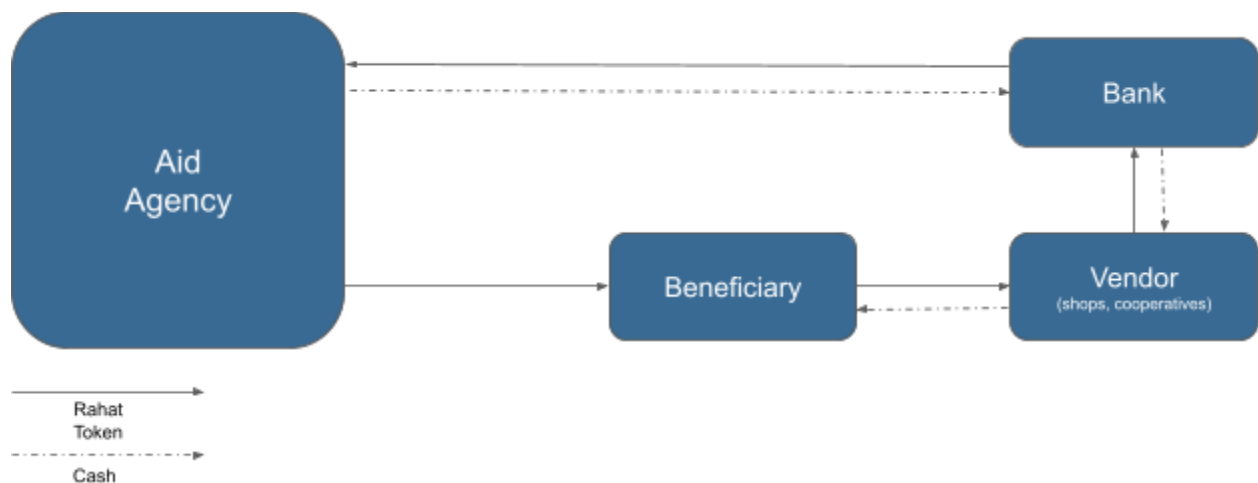
Project Rahat enables digital cash disbursements for an emergency response using mobile phones and the Ethereum blockchain platform. Below are the product feature/requirement to create a CVA ecosystem -

1. **Beneficiary and merchant onboarding system:** Rahat has a secured dashboard for project managers to onboard beneficiaries and participating merchants for CVA projects. Once the identity and proper KYC are conducted, the information is inputted into the dashboard. The users will be uniquely identified by their mobile number.
2. **Merchant smartphone app:** The merchant mobile phones loaded with the Rahat app or smartphone with the Rahat app will be distributed to the participating merchants. The app initiates transactions between a participating merchant and beneficiary. The merchant uses the app to cash out from the bank. The cash can be digitally withdrawn from the partner banking agency or clearing agency like eSewa, Khalti, or connectIPS.
3. **Monitoring dashboard:** Rahat dashboard will contain information of cash flow, projects, beneficiaries, merchants, and their status for project monitoring.
4. **Token management and control panel:** The token management system will enable issuance of a total token to be issued for a CVA project and destroy the token once cashed out, so the currency cannot be circulated back into the ecosystem.
5. **Ethereum blockchain network:** Project Rahat will use the Ethereum platform in the backend to control and verify the flow of tokens in CVA. The network will be a decentralised ledger (database) to store token transaction information.

System Use Case Scenario

Surya is one of the victims of the disaster. He needs to get the aid distributed by the government or humanitarian aid agency. He goes to his nearest local government office and registers himself as a beneficiary providing his phone number and other personal identity information. Now he waits for the aid agency to start distributing the aid. When the distribution starts he gets a message specifying the amount of token bound to his phone number. Now he can go to any nearest participating merchants/shops and spend the virtual tokens as a digital currency within his token limit. To spend the tokens, he goes to the nearest merchant and buys items or cash-out-money within his token-limit. Once the merchant verifies the item Surya bought, an OTP is sent to his phone. He will complete his transaction by inputting the OTP code into the merchant's Rahat app on the mobile phone. Once the network verifies the OTP, the token is transferred to the merchant's wallet. The merchant can withdraw cash from the mobile via a bank transfer to his bank account in exchange for tokenized funds in the partner bank's wallet.

Rahat Ecosystem:



User Stories:

System Users	Roles
Administrator (Aid Agency)	As an Admin, I can • Log in to the system with username and password. • issue total tokens for a project register new beneficiary, merchant and bank with their details. • distribute tokens to the registered beneficiary • checklist of registered beneficiaries and merchants. • destroy the token after cashed out
Beneficiary	As a Beneficiary, I can • view token balance via SMS • receive OTP whenever merchant claims token • share OTP to let merchant retrieve the token

Bank	As a Bank, I can • Log in to the system with username and password. • receive a token from vendors • send token to Administrator • view token balance
Vendors	• As a Vendor, I can • check the amount of token balance owned by the beneficiary. • claim token by entering a phone number, items bought, and amount of token • receive the token owned by beneficiary phone number to their wallet with OTP

- Distribute Food materials to beneficiaries in a safer, efficient, transparent, and effective manner digitally Support following Sustainable Development Goals (SDGs):
- SDG1: No Poverty
- SDG9: Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation
- Raise digital and financial literacy among the beneficiaries for financial inclusion
- Show Rahat pilot project as a potential use case of the blockchain technology

Rahat - Technology Stack:

