Time banking on blockchain

Sai Kiran Velankayala
Roll No. 2019900079

Akash Verma
Roll No. 2018101011

I. DEFINITION OF TIME BANKING

Time banking is a system of bartering various services for one another using labour-time as a unit of account which was developed by various socialist thinkers based on the labour theory of value. labour-time units can be credited to a person's account in the time bank and redeemed for services from other members of the time bank.

Time banking can be considered a form of community currency. Every hour of time is generally valued the same, regardless of the service rendered. In theory, any type of service can be exchanged for another. However, services traded often revolve around simple, low market-value tasks, such as the care of the elderly, social work, and home repair.

Time credit: The time credit is the fundamental unit of exchange in a timebank, equal to one hour of a person's labour.

Example of Time Banking: Let's look at an example of exchanging gardening and computer technical support. Akash is a keen horticulturist, and Sai is a whiz at fixing computers. Eventually, their paths cross as Akash needs help with his PC and Sai would like to grow some vegetables in his backyard and has no clue how to do so.
*Using time banking, Akash helps Sai with his garden, and Sai helps Akash with his computer. No money exchanges hands for the services rendered, so the only costs that both absorb are for the materials used to complete the jobs.*
Overall, Akash dedicated two hours to preparing Sai's garden, while Sai spent one hour getting Akash's computer in working order. That means that Akash emerged from the arrangement with one extra labour-time credit on the account in the time bank to use in the future.

II. PROBLEM STATEMENT

There are various problems within time banking which can be solved using blockchain. Some of them which came into our consideration are specified below:

- There are so many different time banks in the world located at various geographical locations. The time credits awarded by the timebank are currently restricted to the geographical area covered by that timebank. Now, Logging and managing time credits over the globe at multiple locations is a problem, as there are various parties involved in managing time credits.
- Currently, Time Banking primarily is being used for social service-related activities. Since Every hour of time
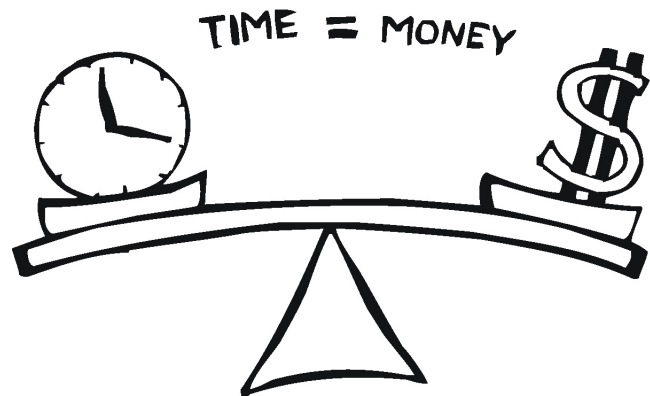
is generally valued the same, regardless of the service rendered, currently the time services traded often revolve around simple, low market-value tasks, such as the care of the elderly, social work, and home repair.
- All kinds of pursuits or activities have the same charge for time credit in the time banking. As generally the labour-time units of account are not accepted outside the membership of the time bank, nor for general goods traded in the market other than specific labour services, it does not constitute a form of money in an economic sense outside the inherently limited context of the time bank itself.

A. Motivation

Time banking on the blockchain can provide a platform for generating a kind of wealth different from money and for recognising critical work that markets based on money do not value. Blockchain helps in scaling time banking over the globe and decentralised it without third parties involved.

B. Who will be the beneficiaries?

Members participating in time banking.

C. How big is the impact of your problem?

Timebanks help create a more outstanding balance of power between those with more incredible wealth in time and those with greater monetary wealth; it 'elevates the non-market economy as an obligatory source of energy, vitality, knowledge, insight, and essential labour' (Cahn, 2004).

III. SOLUTION

We are proposing a blockchain based ecosystem for time banking. Each time credit is now stored as a cryptocurrency.

A. Architecture

Since Time credits are now cryptocurrency tokens, they are stored on a distributed ledger. The usual architectural concepts of cryptocurrencies like blockchain, timestamping, mining, wallets, anonymity and fungibility are applicable here. For our use-case, we propose to use ERC-20 tokens based on the ethereum platform, since ERC-20 is standard for fungible tokens which can be exchanged.

We propose a solution for various categories of time banking using different cryptocurrencies. Primarily we categorised them into skill-based time credits and social service-related time credits.

Skill-based time credits:
- High Skilled token
- Mid Skilled token
- Low Skilled token

Social service-related time credits:
- Service token

The skill-based tokens can be exchanged for real money in future if traded on exchanges.Thus this can solve the problems related to economic trade for skill based time credits.Service tokens are meant to be used in exchange for other services, which retains the core idea of time banking.So, there is no need to list the Service token on any exchange.All the tokens can be transferred from one wallet to another wallet, when signed by the sender.

Also, we can maintain a swap ratio between the skill-based tokens to keep their price consistent.

Example: Suppose, 1 High Skilled Token = 2 Mid Skilled Tokens = 3 Low Skilled tokens.
Looking at the previous example of time banking, where Akash helps Sai with his garden, and Sai helps Akash with his computer. We saw that Akash dedicated two hours to preparing Sai's garden, while Sai spent one hour getting Akash's computer working. Here if Computer work is considered as a High Skilled Job, and Gardening is considered as Mid Skilled Job; Sai needs to be paid with one High Skilled Token, where as Akash needs to be paid with two Mid Skilled tokens. Since we assumed that 1 High Skilled Token = 2 Mid Skilled Tokens, now their monetary values of income are equal and there is no need to exchange any credits.

B. Smart Contracts

Smart Contracts are used for the minting and distribution of tokens. Swaps can be performed by listing the tokens on ethereum based decentralised exchanges like Uniswap and IDEX. Smart Contracts are used to implement the time credits as cryptocurrency using strong cryptography to secure transaction records, to control the creation of additional coins,
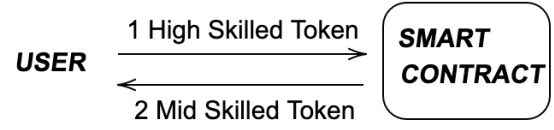

Fig. 1. Token Swap mentioned in Example

and to verify the transfer of coin ownership.

Example: Ethereum based ERC-20 tokens can be minted and distributed to holders wallets using smart contracts.

IV. WHY DO WE NEED A BLOCKCHAIN?

Blockchain brings trust, accountability, and transparency to digital transactions. Blockchain technology allows for the development of Decentralized Autonomous Organizations, which creates values without any intervention of humans. Using cryptocurency as a medium for skill based time credits, we can solve the problem of economic value by listing them on exchanges. All the transactions can now be stored on distributed leger and are tamper proof.

Blockchain enables time banking to extend anywhere in the world , and overcomes its geographical limitaion problem. Blockchain helps in making this whole time banking decentralised using smart contracts, and thus removing the third parties like time banks.

1) What form of blockchain would be suitable?: Based on our requirements of fungible and tradable tokens with smart contract, we would prefer to use a permissionless blockchain such as Ethereum to develop our use case.

V. FUTURE WORK

There can be many questions regarding distribution and minting of the tokens on a large scale. We currently plan to distribute time credits to the existing credit holders all over the world, in collaboration with existing time banks. We need more feasible ways to achieve initial distribution of credits to current holders.
We need a way to log the amount of time the person actually worked. Currently we propose this as a manual entry.

REFERENCES

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