Agriculture Pooling using Blockchain Technology

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Abstract —*Blockchain is a growing list of records, known as blocks, which are linked using cryptography. Each block consists a cryptographic hash of the previous block, a timestamp, and transaction data. It is a decentralized system which contains point to point connection between nodes which ensure point of trust in the complete system. An increasing demand in agricultural society for agricultural resources reflects the need for more transparency and the lack of trust. In the current situation, much of the data is stored either on paper or in a centralized database and these approaches are known to suffer from many problems such as the inefficiency of paper-based processes and fraud, corruption and error both on paper and in IT systems. Hence, we propose "Agriculture Pooling using Blockchain" which provides a means to ensure permanence of records and potentially to facilitate the sharing of data between disparate actors in an agricultural chain. This potential may lead to an exciting paradigm shift facilitating transparency and trust in these chains that ensures integrity of agricultural resources.*

Key Words: Blockchain, Stakeholders, Decentralized, Transparency, Agricultural Resources

1.INTRODUCTION

The increasing hype on blockchain technology has, in recent times, drawn attention to its application within the agriculture sector. The technology can be leveraged upon to improve agriculture efficiency, effectiveness, and transparency between business stakeholders. However, as the concept of blockchain is in its infancy in the agri-food sector, the demonstration of its application within the agriculture sector is imperative in order to create awareness and develop a proof of concept. It is a decentralized system which contains point to point connection between nodes which ensure point of trust in the complete system.

Currently the farmers perform traditional practices of sharing the agricultural resources which are purely based on mutual trust between two parties. There is no governing mechanism to avoid betrayal and the system to be self-sustaining. The inherent properties of this digital technology provide fault-tolerance, immutability, transparency and full traceability of the stored transaction records, as well as coherent digital representations of physical assets and autonomous transaction executions. Using this system, we overcome the drawbacks of the traditional system and provide a new, innovative system using which we developed and deployed such use-case, achieving traceability using blockchain implementations, such as Hyperledger Sawtooth.

Resources such as land, tractor, and handheld tools can be pooled between users of the system with the help of smart contracts. Implementing blockchain in this system would help in maintaining logs of the contracts between users as well as establishing transparency within the system.

1.1 Problem Statement

Indian agriculture is plagued by several problems in which a major role is played by the lack of resources. It is believed that large portions of land in India are owned by a- relatively small section of the rich farmers, landlords and money-lenders, while the vast majority of farmers own very little amount of land, or none at all. This ultimately leads to serious depression amongst the poor farmers of the country.

1.2 Objective

The objective is to improve the quality of life of persons living in an agricultural society. Using an easy-to-use software which can list all the available resources in the vicinity. Hence, farmers will be able to pool resources such as land, tractor, various tools easily which, will reduce tensions due to lack of resources in a farmer's life.

2. Related Work

In [1] The purpose of the project is to develop a proof of concept for the application of blockchain technology in the cocoa value chain, towards improved livelihoods for cocoa farmers of excellence and their communities. Project action will target cocoa-producing countries in the ACP and farming communities awarded an International Cocoa Award between 2010 and 2017. The technology will be used to address some of the key challenges cocoa farmers face, including: a lack of financial resources to invest in good agricultural practices, limited contractual power and access to price information, limited communication with other key players of the value chain, and low transparency for consumers who want to know more about the origins of the final chocolate product. Blockchain can overcome these issues by creating ledgers to record the movements of beans and determine the exact point of origin; facilitating and verifying the performance of a contract; introducing greater efficiency and transparency to the supply chain; and improving cocoa farmers' livelihoods through higher prices for their produce.

In [2] Blockchain technology has attracted tremendous attention in both academia and capital market. However, overwhelming speculations on thousands of available cryptocurrencies and numerous initial coin offering scams have also brought notorious debates on this emerging technology. This paper traces the development of blockchain systems to reveal the importance of decentralized applications (dApps) and the future value of blockchain. We survey the state-of-the-art dApps and discuss the direction of blockchain development to fulfil the desirable characteristics of dApps. The readers will gain an overview of dApp research and get familiar with recent developments in the blockchain.

In [3] The ability to trace the origin of food has become increasingly important to help isolate and prevent contaminated products from reaching consumers. When such situations occur, quick action is necessary to protect public health and save lives, as well as the livelihoods of industries and companies. This project is intended to test the efficiency, effectiveness, and transparency of TE-Food's traceability system through a pilot project in Trinidad and Tobago, involving Woodsman Caribbean Ltd. and the callaloo pack value chain.

In [4] the rapid development of cryptocurrencies and their underlying blockchain technology has revived Szabo's original idea of smart contracts, i.e., computer protocols that are designed to automatically facilitate, verify, and enforce the negotiation and implementation of digital contracts without central authorities. Smart contracts can find a wide spectrum of potential application scenarios in the digital economy and intelligent industries, including financial services, management, healthcare, and Internet of Things, among others, and also have been integrated into the mainstream blockchain-based development platforms, such as Ethereum and Hyperledger.

3. Existing System:

MERAKISAN: MeraKisan, unlike other online grocery shopping portals, focuses at supporting farmers to sell their products at high profit margins by cutting the middleman. Logistics management and traceability issues are solved with the help of blockchain platform.

4. Proposed System:

This paper initiates an agricultural resource pooling strategy amongst farmers in a vicinity. Specifically, the system is divided into three modules namely Provider Farmer, Receiver Farmer, Blockchain enabled smart contracts which help in deciding legal terms of service between provider and receiver farmer. The Farmer login is provided on a web browser. Farmer can list his idle resources as well as can have access to available resources from his vicinity.

The system will access location of the farmer who logs in and display the available resources within the range. Web service API is used to call the website into an Android App. Microsoft Internet Information Services are used to store, process and retrieve the dynamic data.
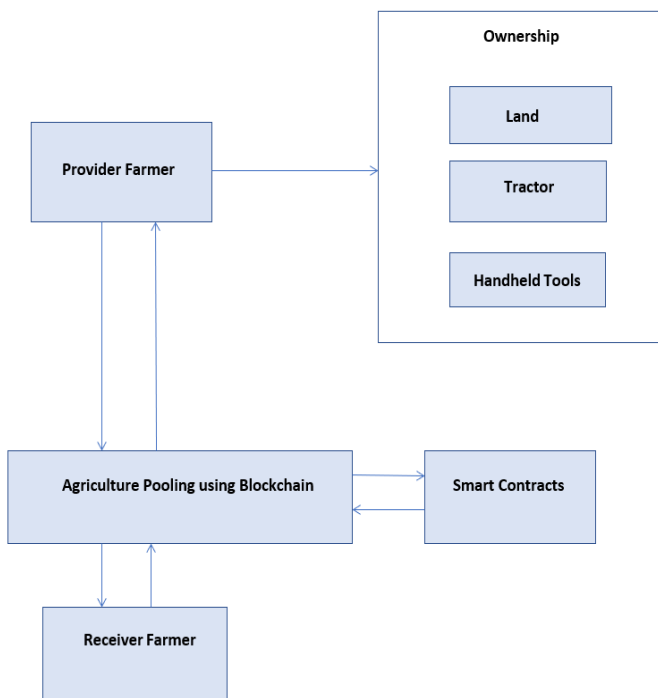
Chart -1: The architecture of Agriculture pooling using Blockchain.

A provider farmer is the one who has ownership of resources which can be pooled between the blockchain network. Whereas, the receiver farmer is the one who accesses the resources which are registered in the network by provider farmers.

The system acts as a mediator between provider and the receiver farmer. Smart contracts play an important role in managing the transactions between actors of a blockchain.

5. Advantages:

1) System will provide farmers to connect and transact freely and fairly with each other and also this will overcome the financial barriers.

2) Fraudulent activities regard to resource ownership will stop as there is a proof of any transaction throughout the chain.

3) Problems like lack of farming resources will be solved with just few clicks.

4) The system is a low cost, flexible, user friendly for farmers.

5) REST API makes it possible to call the website into an android application as a result, farmers can use it on their smartphones.

6. CONCLUSION

A user friendly and efficient Agriculture Pooling system is proposed that will support not only the trade cycle of resources but also ensure the transparency of all the transactions which eliminates the risk of fraudulent activities in the system. Any resource which is currently idle to the provider farmer is put up on the "Available resources list" based on the Geolocation of the farmer. Several receiver farmers in that vicinity can bid on the needful resource, the highest bidder is provided with the resource. Farmer registration is done with the help of their Aadhar numbers which proves to be a proof of identity. Hence, any changes or non-repudiation can be traced easily in the system.

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