Blockchain-Based Agriculture Assistance

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Abstract The working system of agricultural management is very important in today's world. However, growers, farmers, and sellers are physically dispersed to choose their pesticides and to manage both data and information. As a result, the production of crops and trust between the consumer and producer decreases regularly. In this paper, we propose an overall structure of agricultural maintenance system to work efficiently and properly based on blockchain technology in order to solve the problems facing by the farmers to choose the best pesticides on their own. The information recorded in these management operations includes farmer's problems and other suggestions. Using blockchain techniques and methods to the field of agricultural not only improves schema, domain, and application of blockchain but also supports the farmers to choose the suitable pesticides and helps in increasing the trusted network among different stakeholders around agricultural environment.

Keywords Blockchain · Agriculture · Supply chain in agriculture

1 Introduction

Blockchain is a distributed system recording and storing transaction records. It is a decentralized unit [1]. It allows each participant in a network to interact without preexisting trust between parties. The main concept is transactions between two users will not be known by others. For transaction, bitcoin is used which is a digital currency. The transaction is saved in a digital ledger which was verified by miner, and hash value is obtained which helps in achieving the transaction successfully [2]. This presentation is about study and working of blockchain and our implementation in agriculture. Blockchain technologies present an opportunity to improve the operations of agricultural supply chains from farm to fork. Potential benefits a bound for all supply chains, ranging from small scale producers to middle men to end-users. Within agricultural supply chains blockchain play a couple of key roles [3, 4].

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V. Komanapalli et al. (eds.), *Advances in Automation, Signal Processing, Instrumentation, and Control*, Lecture Notes in Electrical Engineering 700,
https://doi.org/10.1007/978-981-15-8221-9_43

2 Objectives

- The main objective of this project is to make the farmers to cultivate their land by choosing suitable pesticides.
- Blockchain technology encourages small farmers to get together and organize themselves to reach the market without middlemen.
- The use of blockchain concept in agriculture will make the farmers stress free and also it reduces the death rate.
- The main advantage is it teaches the farmers how to cultivate fresh and healthy crops.
- Nowadays, many of the farmers especially in India gets confused, which pesticides to use for the development of their land.
- By using blockchain, the farmers are able to get suggestions from other farmers to choose their pesticide and this will improve their land.
- This technology can improve traceability of crops and deliver better outcomes.
- Essentially, with a blockchain ledger, you will get to know the status of your crops right from planting to delivery.
- We want to help our farmers understand exactly what the possibilities are with blockchain and how they can play a part in that.
- Blockchain has so far been most useful in the agricultural applications in terms of understanding the source and journey of produce.
- To understand the source of produce and working of agricultural, management blockchain technology plays a major role.
- This technology will enable the farmers to choose the best pesticide on their own instead on the basis of price.

3 Steps in Working of Blockchain

- Transaction data (posting that the land is affected by disease)
- Chaining the blocks (with a hash) (Pesticides suggested by other farmers)
- How the signature (hash) is created (Using Crptoid)
- When does the signature qualify, and who signs a block? (Ranking the Pesticides)
- How does this make the blockchain immutable? (Using hash function)
- How is the blockchain governed? Who determines the rules? (Checking the added ingredients)
- Where does this leave crypto currencies? (Supply to the farmer)

4 How Blockchain Can Be Implemented

- Understand what blockchain is.
- Develop a business case.

- Choose your blockchain carefully.
- Build an ecosystem.
- Design deliberately.

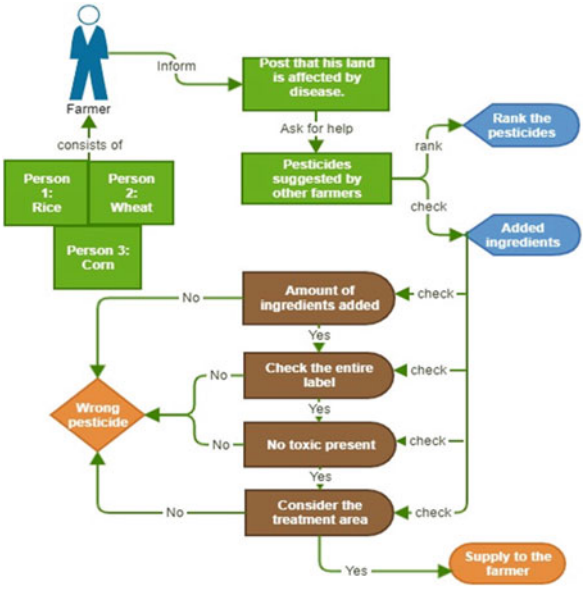
5 Why Blockchain in Agriculture?

- To improve the trust network between the stakeholders and the customers which is very important in the production of crops?
- To increase the quality, efficiency, and quantity products.
- To reduce the involvement of third parties.

6 Algorithm

i. First build the block
ii. Next enter the corresponding details
iii. If his/her land is affected by a disease, then he/she asks for help
iv. Others will suggest some pesticides
v. Then rank the pesticides
vi. Next check the added ingredients.
    (a) If amount of ingredients added is correct
    (b) Check the entire label
    (c) If toxic is present or not
    (d) Considering the treatment area
vii. If YES.
    (a) Supply to the farmer
    If NO.
    (b) Consider it as a wrong pesticide.

7 Architecture



8 Explanation

A blockchain is a new technology used widely for transaction purposes. Blockchain is the continuous chain of blocks. Each block contains the information of each user. The information is converted into crypto-id form using cryptography. Every block contains the hash value which is calculated by the miners. The main function of mining is to perform some complex calculation to derive the hash value. The hash value of one block is connected to the hash value of the previous block. If anyone tries to hack the data of the block, the hash value changes, where the entire chain of blocks need to be changed, which is impossible. So, the main advantage of this technology is the information cannot be hacked. The application of agricultural field has been facing major problems in both the transaction of data and choosing of pesticide. For this problem, we have introduced one new research of using the blockchain in agriculture Each farmer will have a separate block which consists of their personal details such names, their phone number, their land details (acres, address), and crop (rice, sugarcane, corn). These details are encrypted using cryptoid with the help of public key. The farmer will post that his land is affected by a disease and he ask for the solution. The other farmers by seeing this suggest some pesticides. The farmer then rank the pesticides based on the majority. Next, the farmer will check the ingredients of all the pesticide to confirm whether the pesticide is suitable for his land or not. The checking of the pesticide will include amount of acids present, toxic is present

Table 1 Comparisons between normal agriculture and blockchain-based agriculture

Normal agriculture	Blockchain opportunities
a. Establishing a trust network [5]	a. Disintermediation of trust
b. Varying data standards	b. Shared data
c. Not secure	c. Distributed, secure access
d. Difficulty in managing crops	d. Manage and harvest crops easily [6]

or not, checking of the entire label and considering the treatment area. If the farmer is satisfied with that product, then he will continue to use that pesticide. He will ignore other pesticides. This will make the farmer to feel free and to enhance the self-confident. This way will also reduce the farmer's death rate. This idea will make the growth of agriculture and life of farmers in a high level. The advantages of using blockchain in agriculture are origin tracking, cost reduction, building confidence, and scalability.

9 Difference Between Normal Agriculture and Blockchain-Based Agriculture

See Table 1.

10 Tool Used to Build a Blockchain Network

The tool used to build a blockchain network is hyperledger. Hyperledger fabric is one of the open-source framework and tool for building private blockchain business networks. The networks build using this fabric serve as the back-end and a client-side application serves as a front-end. Hyperledger fabric consists of a hyperledger composer which contains a set of JavaScript tools mainly used to simplify the creation of the block [7, 8].

11 Steps to Build a Blockchain Network

- Installing the prerequisites [9].
- Installing tools for the environment.
- Installing a fabric hyperledger composer.
- Creating and deploying business network.
- Modeling our business network.

- Adding logic for our transactions.
- Defining permissions and access rule.
- Generating a business network archive.
- Install and deploy the VBNA file.
- Building a blocks.

11.1 Advantages of Blockchain

- Origin tracking.
- Cost reduction.
- Building confidence.
- Scalability.

11.2 Advantages of Using Blockchain in Agriculture

- Procurement tracking
- Less pressure and stress free for farmers
- Best choosing of pesticides
- Managing agricultural.

12 Conclusion

The concept of blockchain technology deals with various applications and it has been widely used. It includes both centralized and decentralized unit. The use of this concept increases the agricultural management system and operations. The outcome of this technology is very much in the future. This technology helps in agricultural field to choose the correct pesticide and becomes an alarming challenge in growing of healthy crops.

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