

Application of Block Chain Technology in Agricultural Supply Chain Management

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Abstract

The provenance system of agricultural products is vital for ensuring food safety. However, the middlemen (growers, farmers, sellers etc.), making it hard to manage data and knowledge with a centralized approach. As a result, the assembly procedure remains non-transparent and trust is tough to create. We propose an agricultural provenance system supported techniques of block chain, which is featured by decentralization, collective maintenance, consensus trust and reliable data, so as to unravel the trust crisis in product supply chain. Recorded information includes the management operations (fertilizing, irrigation, etc.) with certain arrangement. Applying block chain techniques to the provenance of agricultural product not only widens the appliance domain of block chain, but also supports building a reliable community among different stakeholders around agriculture production.

Keywords— Block chain, food safety, traceability, food safety, trust building

I.INTRODUCTION

In agriculture as there are lot of middlemen between farmer and end user, middle men can keep the agricultural products, can stores them. As results the prizes of that particular product get increases, after which the middlemen brings that product in the market. This all happens due to centralized system and lack of transparency. This problem can be solved using BCT.

The globalized production and the distribution of agriculture production bring a renewed focus on the transparency in agriculture and food supply chains. The growing number of issues related to farmer's suicide and corruption risks has established an immense need for effective traceability solution that acts as an essential supply management tool ensuring adequate transparency of products in the agricultural supply chain. Block chain technology can provide an innovative solution for product traceability in agriculture and food supply chains.

Block chain features :

1. Decentralized/ Distributed Database
2. Encrypted Database.
3. Visual Cryptography
4. Blocks of Data (transaction).

II.LITERATURE REVIEW

Block chain-Based Soybean Traceability in Agricultural Supply Chain [1] in this paper Agricultural production had brought a renewed focus on the safety and the validation of several important criteria in agricultural food supply chains. The growing number of issues associated with food safety and contamination risks has established an immense need for effective traceability solution that acts as an important quality management tool ensuring adequate safety of products within the agricultural supply chain. Block chain may be a disruptive technology which will provide an innovative solution for product traceability in agriculture and food supply chains. The proposed solution focuses on the use of smart contracts to control and control all interactions and transactions among all the participants involved within the availability chain ecosystem. All transactions are recorded and stored in the block chain's immutable ledger with links to a decentralized file system (IPFS) and thus providing to all a high level of transparency and traceability into the availability chain ecosystem during a secure, trusted, reliable, and efficient manner.

Blockchain Based Provenance for Agricultural Products: A Distributed Platform with Duplicated and Shared Bookkeeping [2] in this paper describe the tracing system of agricultural products is important for ensuring food safety. However, the middlemen (growers, farmers, sellers etc.) are numerous and physically dispersed, making it hard to manage data and information with a centralized approach. This results, the production methods non-transparent and trust is hard to build.

In this paper, an agricultural provenance system based on techniques of block chain, which is featured by decentralization, collective maintenance, consensus trust and reliable data, in order to solve the trust crisis in product supply chain. Certified information includes the management operations (irrigation, fertilization etc.)

Applying block chain techniques to the provenance of agricultural product not only widens the application domain of block chain, but also supports building a reliable community among different stakeholders around agriculture production.

III. BLOCKCHAIN TECHNOLOGY

Blockchain is an arrangement formed by blocks linked together in chronological order. Each block consists of a block header and a block body, which can be a set of industry data like bit coin transaction records, smart contract codes, and agricultural tracing records as during this article, etc. The block header consists of the metadata of the block. The foremost important part includes the timestamp of the block, the hash value of the block, the ID of the block, the ID of the parent block. The existence of the parent block ID makes all the blocks form a sequence structure... The insertion of the latest blocks is allowed only within the tail, while the prevailing blocks aren't allowed to be modified, which may be a key rule of block chain.

IV. PROPOSED METHODOLOGY

In the current scenario farmers don't get the required price for their products (crops); this problem can be solved by using BCT technology. Farmer can register on registration center and at homepage they can add the product details.

In agricultural chain, as there are lot of agents between farmer and end user, they can keep the agricultural products and stores them. Using BCT we can trace them. When agent take products from farmer money will get automatically transferred to farmer's account.

The system based on a distributed database that means recorded information will be given to many servers. In a decentralized system every middleman can be traced, every transaction history can be stored permanently.

Recorded information includes farmer's production, product transferred to middleware and we can know the total products available in market. Secure database as decentralized also encrypted.

Normally consumers do not need to register, but being the end users, they are the important components of this system.

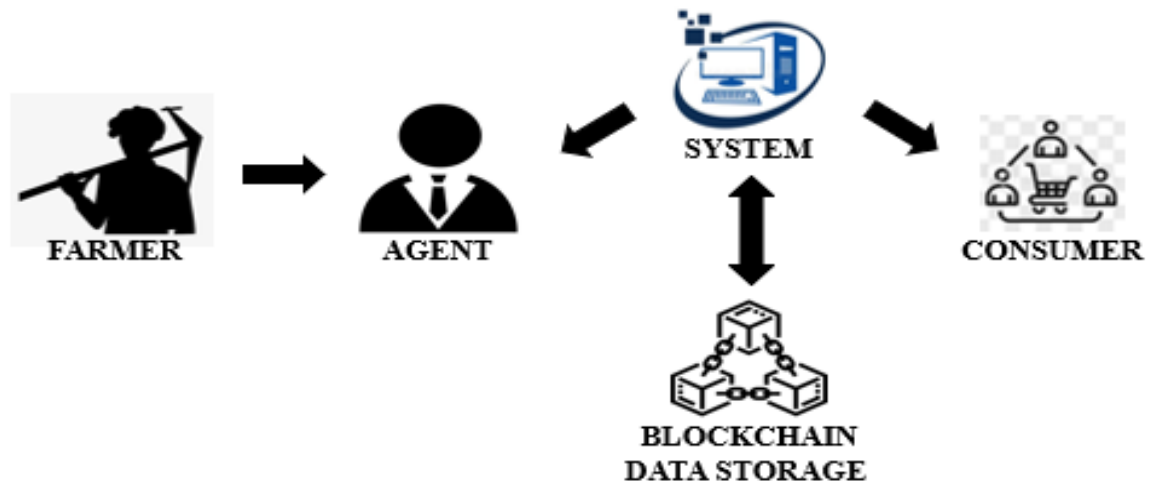


Fig. 1. Block Diagram of Application of block chain technology in agricultural supply chain management

V. RESULTS NEED EXPLANATION

LOGIN PAGE:

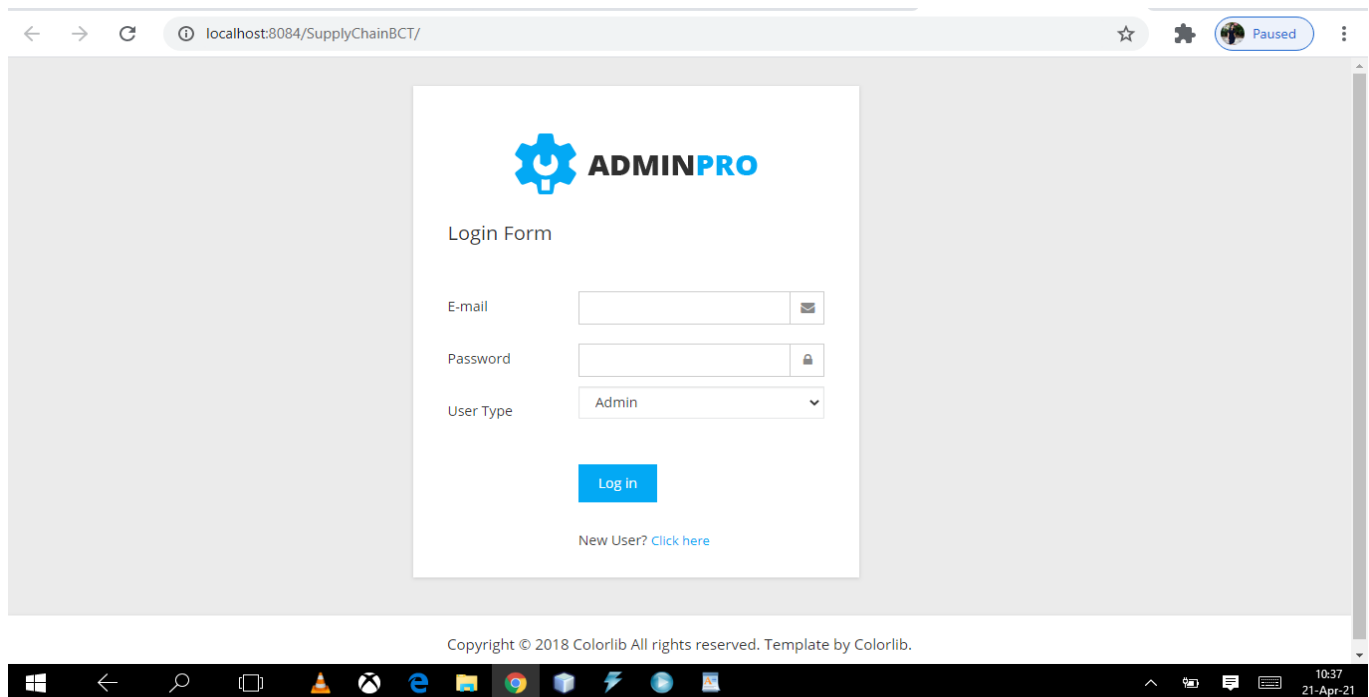


Fig. 2 Login page

AFTER ADMIN LOGIN:

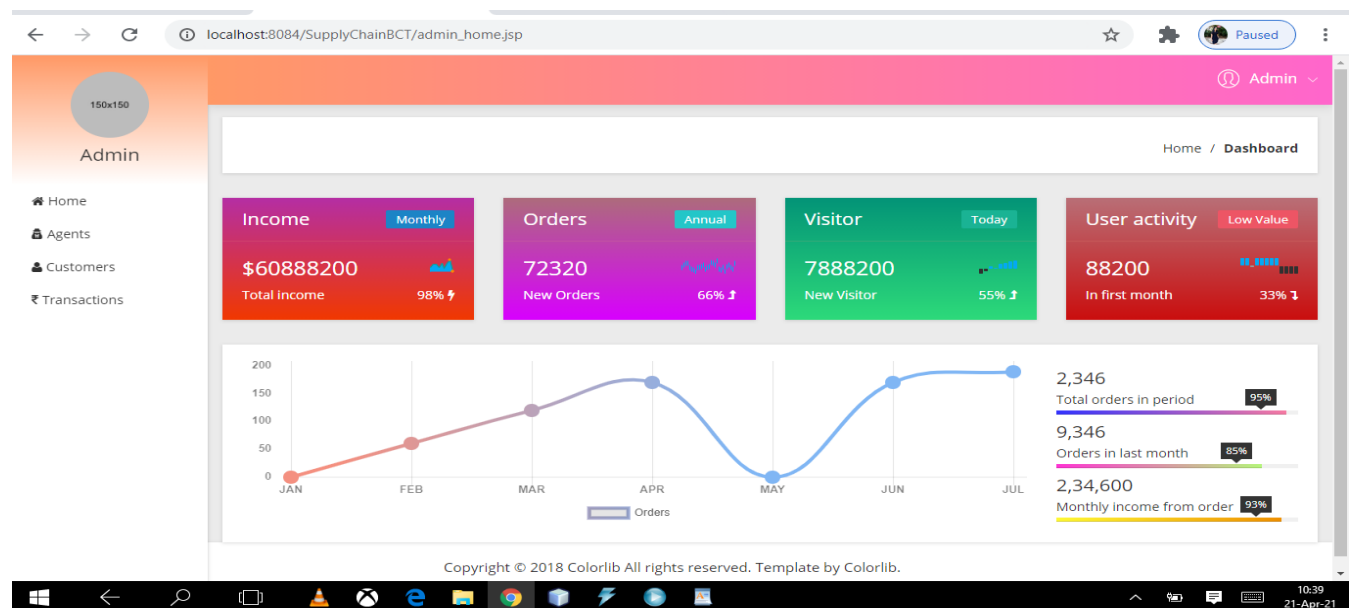


Fig. 3 After admin login

VI.CONCLUSION

We can solve the corruption issue in the agricultural field; we can have a transparent supply chain using block chain features. Applying block chain techniques to the provenance of agricultural products not only widens the application domain of block chain, but it will also support a building a reliable community among different stakeholders around agricultural production. The proposed block chain can be used to record detailed operation in production and supply chain.

There will be Transparency in every transaction In a Decentralized system every middle man can be tracked. Every transaction history is stored permanently. Secure database as decentralized also encrypted also visual Cryptography prevents unauthorized login.

REFERENCES

- [1] Khaled Salah, Raja Jayaraman “Block chain-Based Soybean Traceability in Agricultural Supply Chain” IEEE Intelligent Vehicles Symposium (IV), 2018.
- [2] Jing Hua, Xiujuan Wang, Mengzhen Kang, Haoyu Wang, Fei-Yue Wang “Blockchain Based Provenance for Agricultural Products: A Distributed Platform with Duplicated and Shared Bookkeeping” IEEE Intelligent Vehicles Symposium (IV), 2018.
- [3] Massimo Vecchio, Miguel Pincheira Caro “Blockchain-based traceability in Agri-Food supply chain management: A practical implementation” IoT Vertical and Topical Summit on Agriculture - Tuscany (IOT Tuscany), 2018.
- [4] Feng Tian “An agri-food supply chain traceability system for China based on RFID & blockchain” 13th International Conference on Service Systems and Service Management (ICSSSM), 2016 .
- [5] Bowen Zhang, Daniel Tse , Chenli Cheng, Yuchen Yang Haoran Mu “Block chain application in food supply information security” IEEE International Conference on Industrial Engineering and Engineering Management (IEEM), 2017.
- [6] Raja Sekhar Reddy, G. Murali “A novel triple DES to enhance E-governance security” IEEE 2017. [7] Sini Shibu, Archana Naik “ An approach to increase the awareness of e-governance initiatives based on cloud computing” IEEE 2017.
- [7] Sylvester Hatsu, Ernest “A framework for the monitoring and evaluation of e-governance projects in developing countries” IEEE 2016.
- [8] Liu Liu “On SHEL model analysis and constitution - The research on Chinese government's E-governance system based on the concept of good governance” IEEE 2011.
- [9] M. B. Santosh Kumar, Alfin Abraham “A Study on using private-permission blockchain for securely [sharing farmers data”.
- [10] S. Thejaswini, K. R. Ranjitha “Blockchain in Agriculture by using Decentralized Peer to Peer Network”, ICISC, 2020.
- [11] Weijun lin, Xinghong Huang, Hui Fang, Victoria wang, Jingjie Wang,Haining yin "Blockchain technology in current agricultural systems: From techniques to applications" IEEE 2020.
- [12] Bhaiya Hegde, Dr. B Ravishankar, Mayur Appaiah "Agricultural supply chain management using Blockchain Technology" IEEE 2020.
- [13] S. Madumidha, P. Siva Ranjani, U. Vandhana, B. Venmuhilan “A Theoretical Implementation: Agriculture-Food Supply Chain Management using Blockchain Technology”, IEEE 2019.
- [14] Vishal Naidu, kumaresan Mudliar , Abhishek Naik, Prof Prasenjit Bhavathankar “xA fully observable supply chain management system using Blockchain and IOT” IEEE 2018.