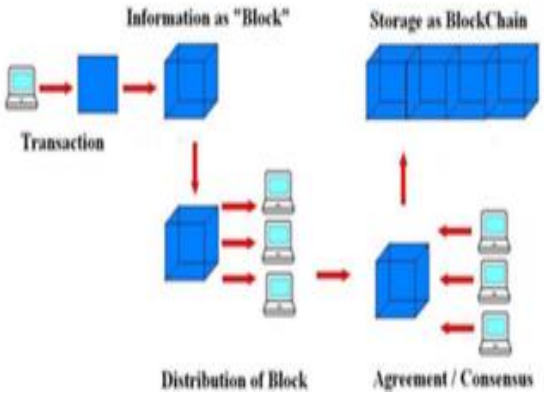
Industrial Engineering Journal
ISSN: 0970-2555
Volume : 52, Issue 5, May : 2023

AGRICULTURAL SUPPLY CHAIN MANAGEMENT USING BLOCK CHAIN TECHNOLOGY

Nalanagula Harini[1], B. Pratheeka[2], C.H.V. Kavya[3], A. Sai Kumari[4], K. Divya[5]
[1]Assistant Professor, Department of Computer Science and Engineering, Vignan's Institute of Engineering for Women, Visakhapatnam, India
[2 -5]Department of Computer Science and Engineering, Vignan's Institute of Engineering for Women, Visakhapatnam, India

ABSTRACT
Today's agricultural producers must overcome numerous challenges, such as seasonal shifts and a broken supply chain; their work is exceedingly taxing and difficult. A unique information database with reliable information would be quite beneficial in this circumstance. Transferring knowledge—whether it be about business strategies or market trends—is crucial in every area of this profession. The propagation of false information could be a result of outside meddling in this area. Blockchain, a trustworthy and uncorruptible data ledger, can be used to stop this. Here, an analysis of the various applications of blockchain technology as a trustworthy and transparent transaction mechanism in the agricultural supply chain is investigated.
Keywords: supply chain, block chain, smart contract, traceability, digital ledgers

INTRODUCTION
A decentralized and transparent method of data movement is made possible by the computing technology known as blockchain. It was developed in 2008 by Satoshi Nakamoto and functions as a distributed ledger that authenticates, logs, and date stamps transactions. It is referred to as "an incorruptible digital ledger of economic transactions" by Don and Alex Tapscott, the authors of "Blockchain Revolution" (Don & Alex Tapscott, 2016)[1]. It is a field of technology that is constantly expanding, with applications in government, industry, manufacturing, logistics, agriculture, and more (Yli-Huumo, Jesse & Ko, Deo kyoon & Choi, Sujin & Park, Sooyong & Smolander, Kari, 2016)[2].Smart contracts are also a component of blockchain. These are computerized contracts or protocols that have been previously approved by the parties and are automatically enforced without human intervention. Smart contracts will allow different parties that might not trust one another to conduct business together. Consequently, it lessens industry moral hazard. The working diagram is shown in Fig. 1.



The security, usability, resource waste, and other technical issues that this technology is now dealing with are numerous (Al-Jaroodi, Jameela & Mohamed, Nader, 2019)[3]. However, more investigation is necessary before any solutions or advancements can be made. In addition, numerous restrictions must be made.

Industrial Engineering Journal
ISSN: 0970-2555
Volume : 52, Issue 5, May : 2023

LITERATURE SURVEY

Paper 1: A model in Agri-food Supply Chain Costing using ABC Costing: A empirical research for Peruvian coffee supply chain Andrea Villalva-Catan˜o, Edgar Ramos-Palomino, Kelsey Provost, Eduardo Casal DOI 10.1109/IESTEC46403.2019.00009 2019 7th International Engineering, Sciences and Technology Conference (IESTEC). This article looks at the root causes of the high logistical expenses associated with Peruvian coffee's supply chain. In order to stabilize the current coffee crisis, a cost analysis technique will help in the research, analysis, and development of high supply chain costs. In fact, the results were investigated in order to enhance, facilitate, and support small-business growth in the long run.

Paper 2: A Theoretical Implementation: Agriculture- Food Supply Chain Management using Blockchain Technology S. Madumidha1, P.SivaRanjani2, U.Vandhana3, B.Venmuhilan4 978-1-7281-1034-9/19/2019 IEEE. In this study, a completely decentralized blockchain-based traceability system is presented that can be used to develop agricultural building blocks that are continuously integrated with IoT devices from the provider to the consumer. To do this, we developed a fictitious end-to-end food tracking system called the "Provider-Consumer Network". The objective is to create a distributed ledger that is transparent and accessible to all users of the network.

Paper 3: Blockchain in Agriculture by using Decentralised Peer to Peer Networks Mrs. Tejaswi, Ranjita K R, Department of CSE, Siddaganga Institute of Technology, Tumkur, Karnataka, India. By enhancing transparency and food provenance in the supply chain, which is characterised by the distributed ledger, centralised servers, P2P (Peer to Peer) networks, As in [1] [10]RFID (Radio-Frequency Identification) tag, and consensus verification, the distributed ledger, centralised servers, P2P (Peer to Peer) networks, and other features of blockchain technology play a significant role in the agriculture industry. As a result, the proposed work explores the numerous problems that crop up in agricultural production and suggests using blockchain technology to solve such problems.

Paper 4 :Blockchain technology in current agricultural systems: from techniques to applications WANG1, HAINING YIN4, DEWEI YI5, AND LAIHUNG YAU6 DOI 10.1109/ACCESS.2020.3014522, IEEE Access. In this study, we undertake a survey to look at the methodology and uses of blockchain technology in the agricultural industry. First, a full explanation of the technical aspects, including data structures, cryptographic algorithms, and consensus mechanisms, is provided. Second, existing agricultural blockchain applications are categorised and evaluated to show the applicability of blockchain techniques. Examples of how practitioners build agricultural applications using well-known platforms and smart contracts are also provided. We conclude by highlighting the underlying difficulties that many future agricultural systems will encounter, as well as the efforts and potential remedies that have been made to resolve these problems.

Paper5: Blockchain-based Data Traceability Platform Architecture for Supply Chain Management Yihang Wei The IEEE 6th International Conference on Big Data Security on Cloud (BigDataSecurity), the IEEE International Conference on High Performance and Smart Computing (HPSC), and the IEEE International Conference on Intelligent Data and Security will all be held in 2020. (IDS). Based on the perceptual identification technology, the chain architecture, and the transdisciplinary knowledge and technology of the Fabric Alliance.

BLOCKCHAIN APPLIED TO AGRICULTURAL SUPPLY CHAIN

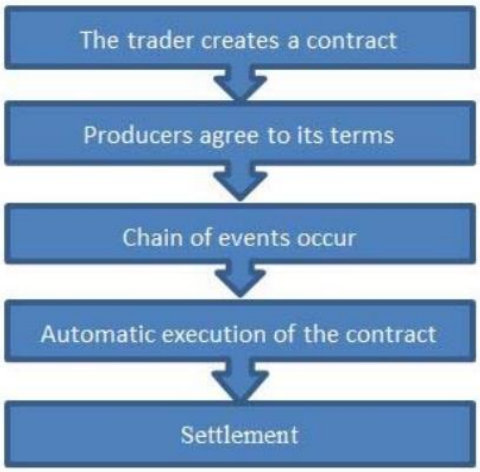
As the supply chain is so disjointed, reliable information is sometimes difficult to find and transferred slowly. The producer does not have easy access to data in a tailored and understandable format regarding market trends, seasonal changes, pricing, quality, and quantity requirements. On a daily basis, APMCs submit a thorough record of the sales of various crops in various locations on their websites (Karnataka State Agricultural Marketing Board [KSAMB], 2019)[5]. Weather forecasts and

advisories are updated by the India Meteorological Department. Many traders and processors conduct market research. There are many data sources that contain information on various issues relating to this logistics network. Blockchain technology can be used in this area.

Any player in the network must have access to extremely trustworthy data. Hence, employing blockchain will ensure that the data is time-stamped and not changed at any point. Through various nodes, miners and forgers will be able to process data from all network tiers and offer customised data sets. This will promote openness and enable everyone to make wise decisions that are in their best interests as well as the greater good.

All parties must concur and fulfil their responsibilities for this to succeed. Smart contracts can be used since the network is highly fragmented and there are several people and corporations pursuing unique objectives. The implementation of smart contracts will prevent exploitation and allow everyone to strive towards reaching their individual goals without devaluing any one tier. Think about the farmers' demonstration in Karnataka against the sugar factories.

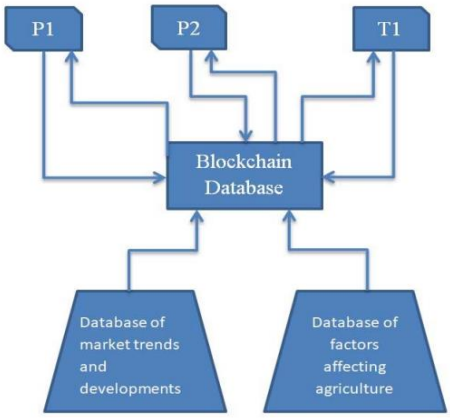
The occupier of the factory is required by the Karnataka Sugarcane (Regulation of Purchase and Supply) Act, 2013, to pay the additional sugarcane price within fourteen days of the declaration date[6]. However, as of 2018–19 ("In Karnataka's Belgaum, sugarcane farmers are being pushed to the edge," 2019)[7], the factories owed the farmers approximately 3990 Crore Rupees. This issue would be resolved by a smart contract signed between the producers and the production units.



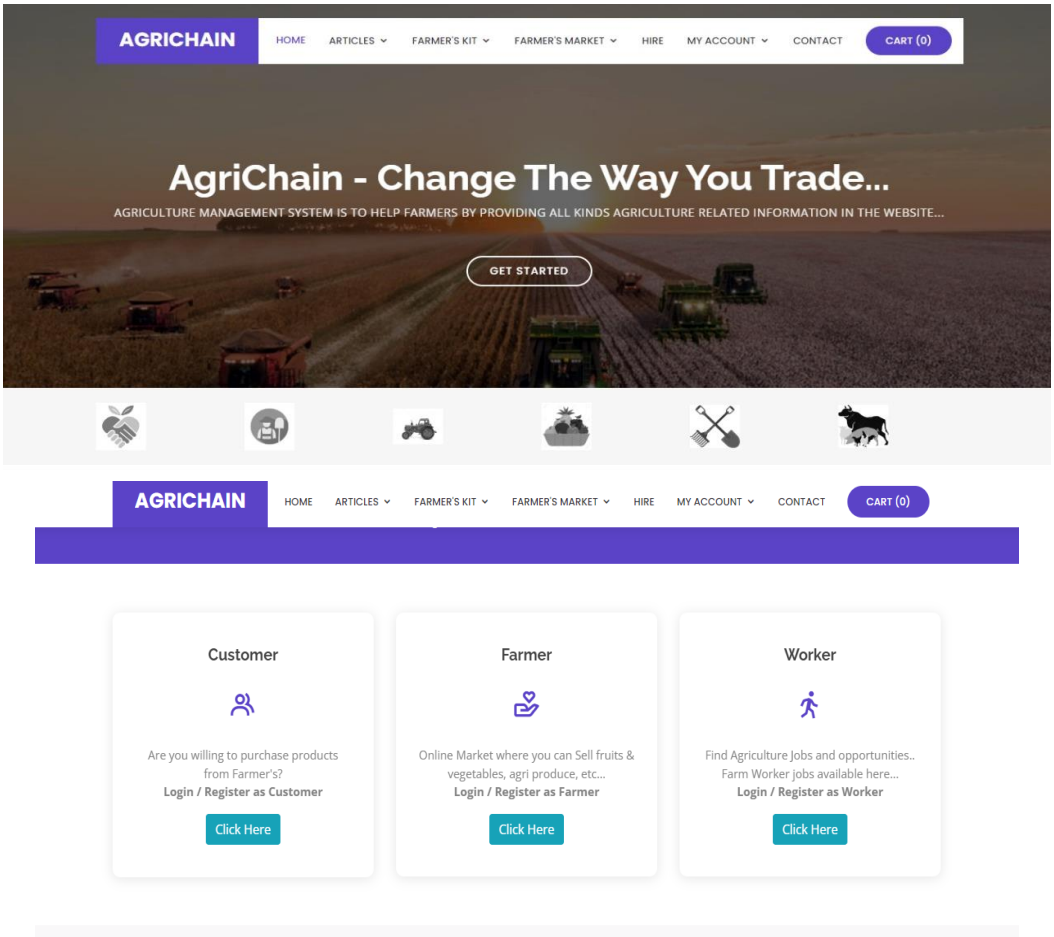
Basic Working of Smart Contract

The development of a contract is depicted in Figure 3. All parties concerned must concur on all of the contract's terms and conditions. The contract automatically executes and the transaction is completed once the a fore mentioned occurrences take place. However there are a number of reasons why this circumstance exists. In the Indian sugar sector, there is a huge imbalance between supply and demand. In the 2018–19 sugar production year, India produced 33.16 million tonnes, but only consumed roughly 24.6 million tonnes ("Sugar production set to plummet 21.6%," 2019)[8]. This domestic market circumstance lowers sugar prices, which has an impact on profitability. As a result, the production of sugar has been on a declining trend, which is expected to last into the future. Moreover, the water quality.

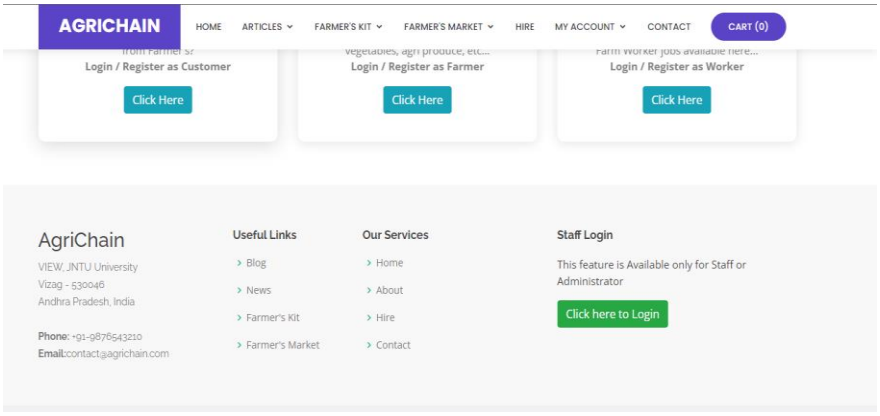
Industrial Engineering Journal
ISSN: 0970-2555
Volume : 52, Issue 5, May : 2023



RESULTS



Industrial Engineering Journal
ISSN: 0970-2555
Volume : 52, Issue 5, May : 2023



CONCLUSION

Many issues in the Indian agriculture supply chain can be resolved by using blockchain in several areas. Data will be gathered, checked, stored, and transferred in an honest and trustworthy manner. It will result in greater efficiency, less waste, and an improvement to the industry as a whole.

REFERENCES

[1] Don & Alex Tapscott (2016). Blockchain Revolution: How the Technology Behind Bitcoin Is Changing Money, Business and the World.
[2] Yli-Huumo, Jesse & Ko, Deokyoon & Choi, Sujin & Park, Sooyong & Smolander, Kari. (2016). Where Is Current Research on Blockchain Technology?—A Systematic Review. PLOS ONE. 11. 10.1371/journal.pone.0163477.
[3] Al-Jaroodi, Jameela & Mohamed, Nader. (2019). Blockchain in Industries: A Survey. IEEE Access. PP. 1- 1. 10.1109/ACCESS.2019.2903554.
[4] Samrat Sharma. (2019, July 31). India wastes up to 16% of its agricultural produce; fruits, vegetables squandered the most. Financial Express. Retrieved from https://www.financialexpress.com/economy/india-wastesup-to-16-of-its-agricultural-produce-fruits-vegetablessquandered-the-most/1661671/
[5] Department of Agricultural Marketing and Karnataka State Agricultural Marketing Board. (2019). Krishi Marata Vahini. Retrieved from https://www.krishimaratavahini.kar.nic.in
[6] The Karnataka sugarcane (Regulation of Purchase and Supply) Act, 2013
[7] Manjunath Somaraddi. (2019, May 03). In Karnataka's Belgaum, sugarcane farmers are being pushed to the edge by rising costs, price drops and long-pending arrears. Retrieved from https://www.firstpost.com/india/karnatakas-sugarcanefarmers-are-being-pushed-to-the-edge-by-rising-costsprice-drops-and-long-pending-arrears-6544551.html [8] Sumant Banerji. (2019, November 7). Sugar production set to fall 21.6% in 2019-20 but it's not a bad thing. Retrieved from https://www.businesstoday.in/current/economypolitics/sugar-production-set-to-fall-21-6-percent-in2019-20-but-its-not-a-bad-thing/story/388905.html
[9] Rajendra Jadhav. (2019, June 13). India's sugar output could drop 15% as drought hits –industry. Retrieved from https://www.reuters.com/article/india-sugar-output/indiassugar-output-could-drop-15-as-drought-hits-industryidUSL4N23K22B