A Survey on Supply Chain Management Using Blockchain

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ABSTRACT
As agriculture supply chains become more globalized, they will require new attention to safety, quality, and validation criteria. Growing concerns regarding food safety, contamination risks, and quality management of agricultural products in the supply chain have sparked the need for an effective traceability solution. Blockchain can assist agriculture supply chains with product traceability by providing an innovative solution. In day to day agricultural supply chains, which involve multiple stakeholders, several criteria must be validated, including the country of origin, the stage in which a crop is development, conformance to quality standards, and monitoring yields. Using Ethereum blockchains and smart contracts across the agricultural supply chain, here we put forth various approach proposed so far about an efficient solution for tracking and tracing business transactions.
Keywords: Ethereum, Smart Contracts, Solidity, Ganache, Metamask.

I. INTRODUCTION

Blockchains are regarded as public (and more recently private) ledgers that store transactional data in their decentralized data structure, which consists of a collection of closely interconnected blocks. Basic security primitives such as ledger consistency, data integrity, verifiability, non-repudiation, and authentication are achieved through the use of asymmetric cryptography and distributed consensus techniques. Blockchains are immutable in the sense that they cannot be altered after being formally validated by a peer-to-peer network and recorded in the blockchain due to their distributed and decentralized character. Blockchains are very resilient systems that are deployed on open and trustless peer-to-peer networks, and dependability and robustness are the elements that make them up.

The existing traceability approach in the agricultural supply chain suffers greatly from data fragmentation and centralized controls, which make the data subject to management and alteration.

In this section we have dealt about what is blockchain and supply chain workflows, in the upcoming section we will be talking about various approaches which has been proposed so far. Later we tabulate those approaches in a handy manner having its pros and cons which serves as an easy way to analyses all those approaches. At last, we conclude this survey by mentioning some of the outcomes and motive of doing this paper.

II. LITERATURE SURVEY

Bhagya Hegde et al wrote a paper about Agricultural Supply Chain Management Using Blockchain Technology [1] on 2020 which mainly focused on Agricultural SCM System is currently facing numerous challenges. The use of blockchain technology for SCM to transfer information securely is discussed in this study. Using a trustworthy, uncorruptible data ledger, third-party intervention in this area was reduced. It examines the various applications ofblockchain technology as a trustworthy and transparent transaction system throughout the agricultural supply chain.

S. Madumidha et al wrote A Theoretical Implementation: Using Blockchain Technology to Manage the Food Supply Chain in Agriculture on 2019, [2] This article outlines a fully decentralized blockchain-based traceability system that makes it possible to create agricultural building blocks that seamlessly interface with IoT devices from the provider to the consumer. To put this into practice, we presented a theoretical end-to-end food traceability programme called Provider-Consumer Network. The goal is to develop a distributed ledger that all network users can access, which would increase transparency.

Affaf Shahid et al wrote A Complete Solution for the Agri-Food Supply Chain Using Blockchain on 2020, [3] All transactions in the proposed system are recorded on a blockchain, which ultimately uploads the data to an extraterrestrial file storage system (IPFS). The storage system provides an efficient, safe, and trustworthy solution by returning a hash of the data that is saved on blockchain. system offers smart

contracts and their corresponding algorithms to demonstrate how system entities interact. This study also includes analysis of security and vulnerability as well as simulations and evaluations of smart contracts.

Weijun Lin et al. wrote Blockchain technology in current agricultural systems: from techniques to applications [4] This paper offers a survey to look at the methods and uses of blockchain technology in the agricultural industry. The technical components, including as data structure, cryptographic techniques, and consensus procedures, are first thoroughly presented. In order to illustrate how to apply blockchain techniques, the current agricultural blockchain applications are grouped and examined. Additionally, examples of how professionals leverage well-known platforms and smart contracts to create various agricultural applications are offered. Thirdly, describe the major difficulties that various potential agricultural systems will face and how they are being addressed, as well as any potential remedies. Additionally, we execute an enhanced food supply chain in the post-COVID-19 pandemic economy as an example to show how blockchain technology may be used effectively.

Khaled Salah et al wrote Blockchain-Based Soybean Traceability in Agricultural Supply Chain [5]. The proposed solution does away with the need for middlemen, a dependable central authority, and transaction records, improving safety and efficiency with high integrity. The focus of the suggested solution is on the use of smart contracts to regulate and manage all interactions and transactions among all parties participating in the supply chain ecosystem. With linkages to a decentralized file system (IPFS) and the immutable ledger of the blockchain, all transactions are tracked and stored, giving everyone access to the high level of transparency and traceability into the supply chain network in a safe, dependable, trustworthy, and effective way.

An intriguing blockchain architecture focusing on product transactions and traceability in e-commerce is presented by Liu and Li [6] in their paper, "A blockchain-based framework of cross-border e-commerce supply chain." In order to minimize counterfeit assaults, the article suggests novel approaches, methodologies, and algorithms that help enhance supply chain security and traceability.

By Yong, Shen, Liu, Li, Chen, and Zhou [7], an intelligent blockchain-based system for safe vaccine delivery and oversight illustrates a blockchain application for a safe vaccination in Chinese supply chains. Their work creates a blockchain-based vaccine oversight system that includes smart contracts and machine learning. The suggested blockchain system can reduce vaccine expiration by improving vaccination traceability, preventing fraud, and providing a more accurate demand forecast.

By examining the relationship between blockchain, supply chain, and sustainable performance in the airport business, Di Vaio and Varriale [8] study the use of blockchain technology in supply chain management. They discuss the use of a blockchain technology for group collaboration in an airport in Italy. Additionally, the paper details the key advantages provided by the blockchain platform and how it converges with long-term success.

Do you know whereabouts your food has really been? is a blockchain use case for food delivery. The authors of, by Bumblauskas, Mann, Dugan, and Rittmer [9], provide light on a use case for blockchain food traceability in the context of the United States. The study presents a proof-of-concept methodology, the requirements and advantages for developing more transparent, dependable, efficient, and economically advantageous food supply chains. As a result, greater transparency and the application of traceability tools can strengthen the bonds between supply chain parties.

By precisely defining the border conditions, Behnke and Janssen's Boundary Conditions for Traceability in Food Supply Chains Using Blockchain Technology [10] establishes the conditions under which blockchain technologies in food supply chains might boost traceability. First, the authors present an analysis that considers five factors, including business, supply chain process, regulatory, quality assurance, and traceability. They next present four interview-based instances concerning food supply chains. Finally, they pinpoint 18 boundary conditions that are distributed among all the five components.

Feng Tian [11] describes "A Supply Chain Traceability System for Food Safety Based on Blockchain, the Internet of Things, and HACCP (Hazard Analysis and Critical Control Points)". It's a cutting-edge decentralized traceability system built on blockchain and internet of things knowledge that considers overall grading issues. This organization will give additional exact, scattered, working, and coordinated evidence to all stream restriction applicants in real-time, effectively eliminating the risk of centralized evidence organizations. The additional indicatorshows that almost all of these companies are graded, regulating, uneven, and impermeable,

which could be the root cause of issues like fraud, exploitation, data misinterpretation, and interference.

III.   DISCUSSIONS

Author	Title	Technique
Bhagya Hegde et al [1]	Agricultural Supply Chain Management Using Blockchain Technology	The use of blockchain technology for SCM to transfer information securely. It concludes with a transparent and dependable transaction mechanism in agricultural supply chain.
S. Madumidha et al [2]	A Theoretical Implementation: Using Blockchain Technology to Manage the Food Supply Chain in Agriculture	They have proposed fully decentralized system with traceability which makes it easy to create agricultural building blocks that interact with IOT devices.
Affaf Shahid et al [3]	A Complete Solution for the Agri-Food Supply Chain Using Blockchain	Here the proposed system is mainly about data recorded on block chain which uploads all the data to IPFS system.
Weijun Lin et al [4]	Blockchain technology in current agricultural systems	The paper offers survey to mainly look at the methods and the uses of block chain in agriculture industry. Also, it is describing the major difficulties that the system faces and how they are being addressed.
Khaled Salah et al [5]	Blockchain-Based Soybean Traceability in Agricultural Supply Chain	The solution proposed is to remove the need for third party, a central party and recording transaction improving reliability and safety.
Liu and Li [6]	A blockchain-based framework of cross border e-commerce supply chain	The paper put forth to minimize counterfeiting data, it also suggests approaches, methodologies that helps to enhance the security and traceability.

IV.   CONCLUSION

Every paper discussed above has found its uniqueness in the way of approaching the problem, it might be in the type of data used or the way of approach deployed. As an overview, theseapproaches are proving that there are new possibilities to develop a secure supply chain using blockchain.

All of these factors contribute to our goal in conducting this survey paper, which is essentially to explore new solutions and identify any gaps that readers may have in their own creative and inventive approaches to resolving this worldwide issue.

From our vantage point, when we talk about the research gap, it is clear that all of the approaches mentioned above have drawbacks. Nevertheless, our desire to find the best solution remains constant, and this survey report unquestionably serves as a helpful tool.

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