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multidisciplinary e-Newsletter

Block Chain Technology in Agriculture

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ARTICLE ID: 11

Introduction

A block chain is a technique for storing information that makes it impossible to alter or hack. It is a digital register from which all transactions on the block chain are replicated and dispersed throughout the network of computers. A record of each transaction is attached to each participant's register whenever a new transaction on the block chain happens. Each block in the chain comprises a number of transactions. Block chain is a form of distributed ledger technology (DLT), which uses separate computers (referred to as branches) to record, share, and synchronise (run simultaneously) transactions in each electronic ledger. Simply put, imagine a family of 'n' members where a transaction needs to be made between two distinct families. Everyone in the family gathers on a common platform for this transaction, which is completed in front of everyone. Because everyone in the family possesses the original note about the transaction, no one in the two concerned families between whom this transaction took place may now, in the future, or at any moment, claim any incorrect information or deny the transaction. Additionally, to alter the information, the fraudster must alter the note on each member of the family's copy, which is impossible in real-world situations. In a similar vein, imagine that these transactions take place online and that each member of the family uses a separate computer to access the record. Additionally, unidentified approvers safeguard, authenticate, and verify these transactions (miners).

This technology is utilised in agriculture to store, analyse, and use data about disease, pest, and insect infestations, among other things. Makes it feasible to trace information throughout the food supply chain to boost food safety. Farmers can access pertinent information on a single platform, including seed quality, soil moisture, climate and environmental data, payments, demand, and sale price. Small farmers are better able to organise themselves and work together to access the market without the aid of middlemen with assistance in creating direct links between farmers and consumers/retailers. Reduce the

issues associated with low income and increase supply chain transparency so that farmers can obtain the true value for their produce.
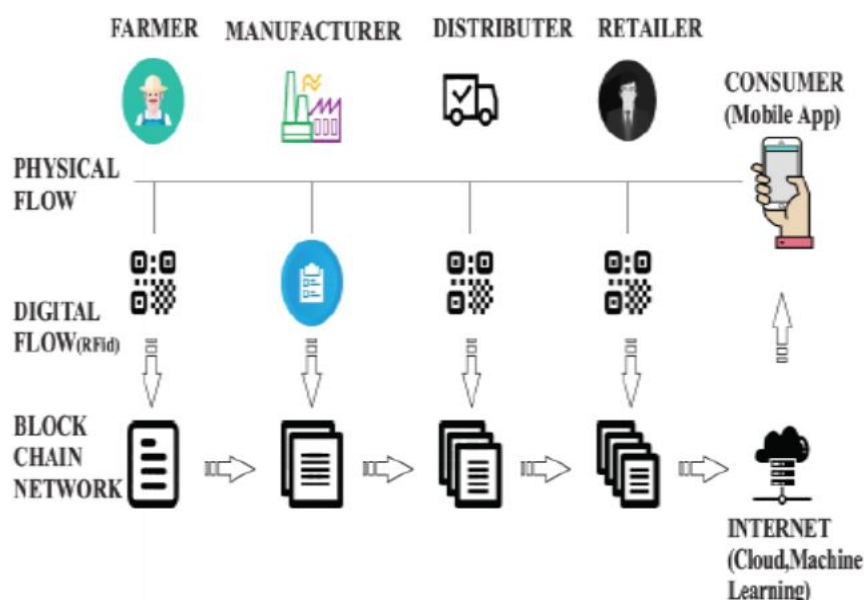

Block chain technology uses

- **Food Safety:** It offer a trustworthy and effective supply chain management and product tracing solution. Every link in the agricultural supply chain keeps track of product information, which not only helps maintain quality control but also keeps track of storage conditions. Product data from IoT devices and sensors can be stored by them. Streamlined form of Agriculture food supply chain in Block chain Technology

- **Agricultural insurance:** Smart insurance contracts will enable better insurance programmes for individual farmers, agricultural holdings, and the supply chain. By eliminating the need for a middleman to evaluate insurance claims, smart contracts will streamline, accelerate, and improve transparency throughout the claims process. The risk of fraudulent claims and insurance provider wrongdoing is decreased by the fact that after an agreement has been signed, no one would be able to change insurance plans. In smart contracts, the role of middlemen is completely eliminated or significantly reduced. These self-executing code-based contracts allow agreed-upon activities (such Payments) to happen spontaneously, immediately, and without the need for a middleman upon fulfilment of the contract's terms. For instance, when the consumer acknowledges receipt of their package, a smart contract will pay the

courier. This saves a significant amount of time, effort, and money. Additionally, it designed for worldwide real-time transaction execution access.

- **Increased traceability of supply chain:**Customers simply need to the product at each stage of the process, where, who, and how recently their food was planted. Additionally, it aids in decreasing food fraud, incorrect product labelling, the number of middlemen in the supply chain, and it ensures that producers receive just compensation for their labour. Farmers can keep track of their crops' progress through planting, harvesting, storage, and delivery by recording and updating their status.

Structure of food traceability hierarchy
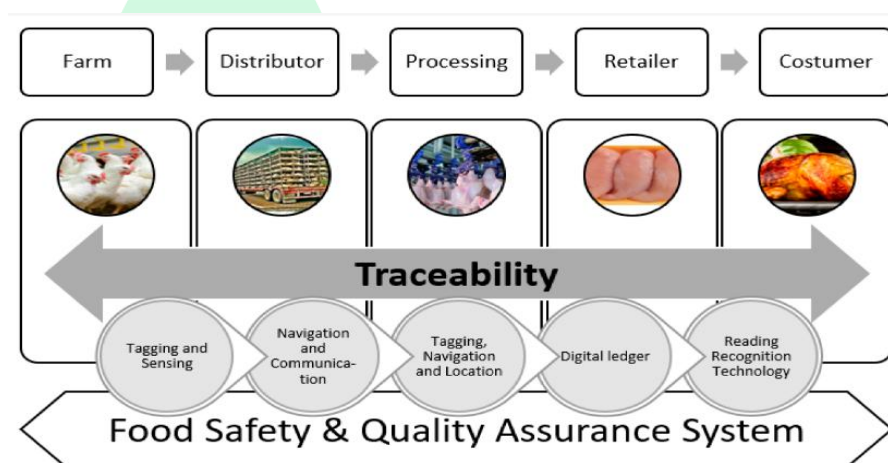
Limitations:

Dependency on the farm size: Smaller farmers can enrol in blockchain-based insurance. On the other hand, small farmers may feel complex for collecting and integrating farm data because they don't have the infrastructure needed to support such a process.

Costly data collection: Adoption in the sector will be hampered by the high cost of gathering data that is uploaded to the distributed ledger. The setup of a distributed ledger may be relatively inexpensive, but gathering the data necessary to make the ledger functional, such as the DNA of farmed animals, may be costly. Sampling can lower costs, but it needs a large population of items to obtain data. This suggests that smaller farms have higher data gathering costs than larger farms, which widens the revenue difference.

Inaccuracy and complexibility of data integration: Information gathered may not be reliable since the accuracy of data entered by sensors or by individuals cannot be guaranteed. In general, it could be challenging to integrate and evaluate some particular types of data

inside the agricultural supply chain. For instance, it can be challenging to locate and assess environmental data using objective techniques. Additionally, existing database systems like enterprise resource planning and warehousing management systems must be connected with blockchain. It takes time to build the entire infrastructure needed to employ blockchain technology.

Conclusion:

Consumers frequently lack trust in food sourcing and have limited access to food information. By ensuring that the claims and data of supply chain players, from planting and harvesting data to transportation and storage, cannot be fabricated, these technologies are adding a key layer of confidence to the agriculture sector. Block chain-based technology enables greater traceability and transparency in agro-food supply chains. Partners in the food supply chain can connect and exchange useful information thanks to it. With the correct technical expertise and business skills, food growers and retailers may improve the revenue from their crops and products. Customers can verify that the food they are purchasing is healthful, sustainable, and safe. Because consumers may check product information from its origins (farmers' and crop data) to production and storage, informed purchasing decisions are made and sustainable farming practises are supported.

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