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BLOCKCHAIN MANAGEMENT IN AGRICULTURE AND ALLIED SECTOR AND IT'S FUTURE PROSPECTS

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Y ou've been hearing the term 'blockchain technology' consistently from the last few years, probably regarding cryptocurrencies like Bitcoin. Blockchain was invented in 2008 by a person (or group of people) who used the name or pseudo name Satoshi Nakamoto to serve as the crypto-currency bitcoin's public transaction ledger. In a simple term blockchain is a blockchain that contains information. Blockchain is the central infrastructure applications the bitcoin cryptocurrencies. It is "free, distributed ledger that can efficiently and verifiably and permanently record transactions between two parties". It has very advantageous features such as strong security, decentralized system and ability to automate etc. Blockchain technology can potentially be used to store data about transfers of assets, stops in a supply chain, and even votes for a candidate. Blockchain 's prime application is Bitcoin, and the entire reason the technology was first developed has helped many people through financial services like digital wallets. Blockchain management reach nowadays is in every sector. This creates transparency between government and peoples, is useful for property register records. It is equally important in the health sector as it is used as a secure platform to store sensitive patient data for the healthcare industry. We may think about what's important in agriculture or the related sector about this lavish term, but the truth Blockchain technology or management is secretly penetrating the agricultural sector, but we don't know. Agriculture is of paramount importance in any area. It is the sector that is responsible for feeding the entire population. In addition, 58 per cent of the Indian population relies directly or indirectly on agriculture for their livelihood. His contribution to Indian GDP, however, is only about 17%. India's premier Mr Narendra Modi urged the youth to use and support Artificial Intelligence (AI) and Blockchain technologies. Prime Minister of India Mr Narendra Modi has been encouraging youths to utilize and promote Artificial Intelligence (AI) and Blockchain technologies. He believes that this particular innovative idea will bring

about positivity in the agricultural sector. With real-time monitoring of the supply chain, the technology can bring about transparency in agricultural trade.

What is Blockchain technology?

A blockchain is a distributed, public archive that records transactions electronically. Blockchain is a technology that can allow individuals and businesses to make instant network transactions without any intermediary (if decentralized). Transactions made on blockchain are completely secure and are kept as a record of what has happened as a function of blockchain technology. Cryptographic encryption algorithms ensure that no blockchain transaction record can be altered after an event occurs. It's important to remember that the blockchain is still evolving. Blockchain is a decentralized and distributed ledger where blocks containing a set of transactions are linked together by a cryptographic hash. Transactions originating from a node are validated by participating nodes, and a set of transactions is added to the block by the "mining" node. Any mining node with sufficient computes power that solves a cryptographic puzzle can generate and broadcast a new block containing the set of validated transactions.

How Blockchain works?

Before explaining how a blockchain is built, it's important to understand exactly what makes up the network. Participating computers are called "nodes," which are simply computers that can store the blockchain's data, follow the rules of the blockchain's specific protocol and communicate with the other nodes. Nodes can be physically located anywhere, and for this reason, they're called "distributed." Each node follows the same rules and maintains an identical copy of the blockchain data set. Blockchains are a new type of network infrastructure (a new way of organizing how information and value move around on the internet) that creates network 'trust' by introducing distributed verifiability, auditability, and consensus. Blockchains operate as a decentralized database, distributed through large peer-to-peer networks with no single point of failure and no single source of reality. No individual entity may own a blockchain network, and no single entity may arbitrarily alter the data stored on the blockchain without peer consensus. New data can only be added to the blockchain by agreement between the various nodes of the network, a mechanism known as the Distributed Consensus. Each node of the network keeps its own copy of the blockchain data and keeps the other nodes honest — if one node changes its local copy, the other nodes

reject it—blockchains record information about a time-stamped chain that extends infinitely forward. New data will be added to the end and will be permanent once added. Older data can not be deleted or changed, since a snapshot of it is stored in the following data blocks. Blockchains uses mathematics and computer science techniques known as cryptography to sign every transaction (e.g. transfer of assets, such as money, from one person to another) with the unique digital signature of the user who initiated the transaction.
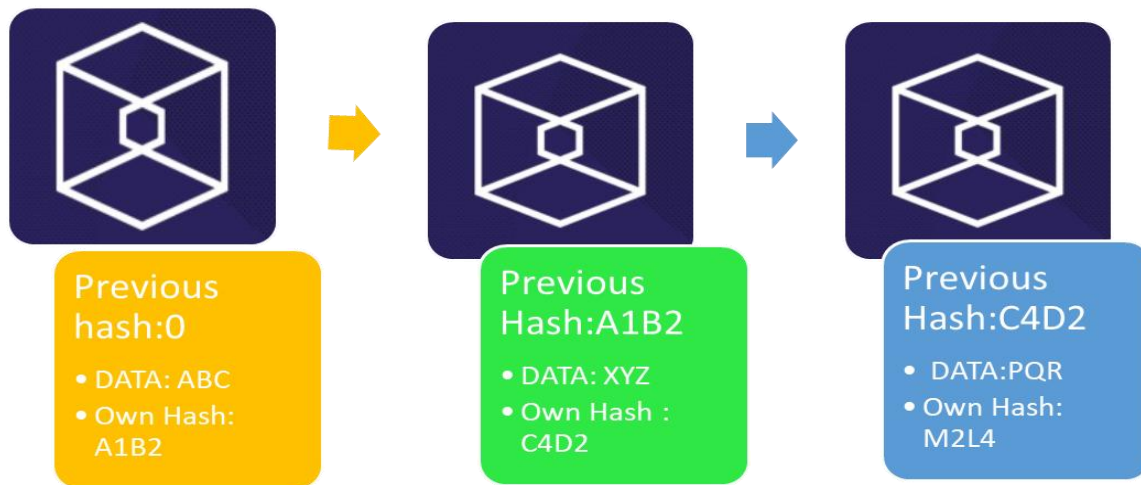
Diagrammatic representation

Each block contains data and hash of own and also previous block. When hash between two simultaneous blocks match, it forms a chain.

Application of Blockchain Management in Agriculture and allied sector

Blockchain technology is still considered to be in its infancy when compared with traditional global financial systems. But if we lay aside the issue of age, the superior features that blockchain has can potentially disrupt existing solutions not only in industry and commerce but in almost every aspect of our daily lives. Agriculture and food supply chains are well interlinked since agricultural goods are almost often used as inputs in a multi-actor supply chain, where customers are typically end-users. More importantly, there is an increasing number of problems that urgently need to be resolved. There is evidence that blockchain applications began to be used in supply chain management shortly after the technology appeared. The blockchain supply chain management is expected to grow at an annual growth rate of 87%, from $45 million in 2018 to $3314.6 million by 2023.

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Crop and Food production

The population of India was 1,210,193,422 (623.7 million males and 586.4 million females) as of 1 March 2011. They need to be fed anyway, which is why agriculture is the most important sector in India. Addressing the needs of the growing population by growing more food with minimal resources while at the same time reducing the environmental footprint, maximizing customer satisfaction, enabling transparency across the supply chain and ensuring fair income for farmers while dealing with weather vagaries-the agriculture sector has many challenges to overcome, while at the same time improving profits from farmer to manufacturer and grocer, blockchain coupled with IoT is remodelling the food industry. The blockchain is designed to make agriculture a sustainable activity by using a streamlined approach to optimize agricultural resources, including water, labour and fertilizer. IoT sensors may gather important information such as soil temperature, water level, fertilizer details and more and submit it to the blockchain with the aid of smart farming. Smart contracts could trigger and execute specific actions, based on data stored in blockchain. This will help improve both the quality of the farming process and crop production.

Food Supply chain

With rising globalization and intense market pressure, food supply chains have become more and more dynamic than ever before. There are some common problems in food supply chains, such as food traceability, food safety and quality, food trust and inefficiency in the supply chain. From the producer point of view, the use of blockchain technology helps to establish a trust relationship with consumers and to build the reputation of their products by transparently providing individual product information in the blockchain. Enterprises can increase the value of their goods and thus improve their competitiveness. The blockchain makes available accurate and credible knowledge about how food is created and processed from a customer perspective. It helps address consumer concerns about food safety, quality and environmental friendliness). The use of blockchain allows consumers to interact with producers because consumers can understand the food production process more conveniently and in more detail. It encourages consumers by removing barriers to the exchange of goods in order to strengthen their relationship and thus increase consumer confidence and confidence in food safety. From the regulatory agency's viewpoint, blockchain provides them with

credible and accurate information to implement knowledgeable and effective regulations. Blockchain can record retail store provenance details from a Brand. This provides a healthy and unchanging way to store data obtained at the start of the supply chain, such as DNA from farm products, food or pesticide residues from vegetables. Any party involved in the supply chain of the product may verify and control such information. Consumers may trackback the supple chain by most significant features.

Controlling Weather Crisis

Farmers usually have to confront unpredictable weather conditions while growing different types of crops. Because of excessive spring rains, many of the crops grown in India cannot tolerate flooding. The level of oxygen concentration reaches zero, making life-sustaining functions such as water uptake, root growth, and respiration difficult for the plants. Moreover, the lack of transparency in the current ecosystems of the food chain can lead to unclear and high price surges. Consumers had no idea when crops were suffering from poor weather and what contributed to higher prices. Because of the ability of blockchain to offer traceability and transparency, farmers and other stakeholders will get a clear understanding of the price differences in the food distribution market. As the weather conditions can be tracked from the blockchain ledger by approved parties, farmers can easily receive claims for crop insurance and livestock insurance through smart contracting.

Improved quality control and food safety

One of the main uses of blockchain is to add greater accountability to the supply chain. It will help us to rid ourselves of inadequate processes and ensure optimal quality assurance conditions. For example, crop failure is a prevalent problem facing farmers around the world. This generally occurs due to unfavourable climatic conditions, including poorly distributed rainfall and unpredictable weather. Similarly, through the agencies concerned the agricultural production could be certified and put on the blockchain system.This would lead not only to a better price for the works of the farmer but also to quality products being obtained by the end consumer. Such systems could lead to a better food ecosystem for sustained country development(Yadav and Singh 2019). Companies like IBM are already investing millions in precision farming to solve this, developing IoT devices that allow farmers to track factors that could affect crops such as soil quality, pests, and irrigation.

Land registration

Deployments based on blockchain may offer an incorruptible land registry ledger. Particularly in the case of rural poor, if this is effectively connected to sovereign identification / digital identification, then the safeguarding of land records would not be a problem even in times of natural disasters or war. The United Nations Development Program (UNDP) is working with partners in India to make land registration there more reliable. At a high level, this project will permanently capture and document any transaction throughout the sale of a property.

Effect of Blockchain Technology in Dairy industry

India has enormous potential in the dairy industry, as we are the world's largest producer of milk. Several problems are currently facing the industry, such as the lack of nutrient feed, the lack of storage facilities and, to name a few, the lack of technical support. So, we can see that the organization of the supply chain and logistics are the major challenges facing the dairy industry. The good part is that challenges are nothing but disguised opportunities, and proactive steps need to be taken to educate farmers and provide them with a stronger supply chain to rely on to face this challenge head-on. Currently, due to processing malpractice, milk handling and transportation, market-placed dairy consumption can cause mortal harm to human health. In the Game The recent decades have seen a rise in scandals related to milk happening all over the globe. A study conducted by India's Food Safety and Standard Authority (FSSAI) shows that 68.4 per cent of the country 's milk is not in line with the legal norm (Shingh et al. 2020). The traceability of milk can be defined as the capacity to Trace how milk and milk products are moved from its production through different routes until Its final consumption reaches. Unlike in the past, there has been a decline in the relationship between dairy producers, processors/manufacturers, distributors and consumers, with very little to no information passed on to consumers from previous members of the dairy supply chain. The use of Blockchain technology and the Internet of Things is presented in recent scientific literature as a potential solution for improving traceability in the food supply chain system. Today, consumers are far more discerning, more willing to pay for food protection, quality and ethically generated food. Blockchain technology has great potential for transforming the dairy sector, as it can address various challenges in the dairy supply chain system that prevent transparency and traceability. All the associated members should

be registered in the Blockchain network for this purpose; they will have a unique digital identity and profile in the network.

Conclusion

Blockchain technology is running the crypto-monetary bitcoin. It is a decentralized transaction environment where all transactions are recorded in a public directory that is visible to all. The objective of Blockchain is to provide anonymity, security, privacy and transparency to all its users. However, these attributes set out a number of technical challenges and constraints that need to be addressed. The government has a bull 's eye on the Digital India campaign, and Blockchain technology will make nations dream. India's government has aimed to introduce Blockchain technology in a number of industries, which is why NITI aayog published India's own Blockchain Management strategy earlier this year. India has also vision on creation largest blockchain network in the world, namely IndiaChain. Some Indian originated start-up like KhethiNext, aka plus also started adopting blockchain technology on a pilot basis, and they are also collaborating with large tech giants. Blockchain technology being the new technology, business owners don't know if they get higher payments due to the higher cost of using them. Another big constraint lies in the developing world 's dairy production system, where dairy farming is non-commercial and fragmented. A large number of farmers participate in it, but they have a limited herd size. The integration of these farmers into the Blockchain-based dairy supply chain system presents challenges. For this reason, in order to apply Blockchain technology to the dairy sector, it is necessary to carry out a thorough research on these issues. Like all other technologies, this technology also has some flaws, but we need to look for a positive side and overcome its negative effect. In the end, we can conclude that blockchain management is *"Ensuring performance, trust and accountability from farms to consumers"* in every way.

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