



Blockchain Technology in Agri Supply Chain

(*Urvashi Verma¹, Soumyashree Behera², Vaibhav Saini³, Pujarani Khuntia⁴, Vidya V. Nair⁵ and Ishika Dash⁶)

¹Ph.D. (Horti.), IGKV, Raipur, Chhattisgarh, India

²Ph.D Scholar, Agricultural Economics, Odisha University of Agriculture and Technology

³M.Sc. Scholar, Department of Agricultural Economics, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences-211007

⁴Incubation Associate, Silver Oak University, Ahmedabad

⁵Department of Genetics and Plant Breeding, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences-211007

⁶Accounts Manager, Transaction Banking Group, ICICI Bank

*Corresponding Author's email: cpanigrahi99@gmail.com

Databases are currently using ICT (information and communication technology) to track data and manage information flow. The use of blockchain technology to power these databases is a novel concept. They distribute privileges to all network members rather than having a single server and administrator. Multiple parties can then access and validate new database additions, increasing security and lowering the risk of corruption.

How Blockchain Technology Can Revolutionize Agriculture Sector?

Blockchain is a technology that can bring breakthroughs in the Agri sector with its potential. By allowing information to be traced across the agricultural supply chain, blockchain agriculture enhances food safety. The ability of blockchain to store and manage data allows for traceability, which is used to aid in the development and implementation of intelligent farming and index-based crop insurance systems.

Uses of Blockchain Technologies in Agriculture

Blockchain technologies can track all types of information about plants, such as seed quality, and crop growth, and even generate a record of the journey of the plant after it leaves the farm. This data can improve supply chain transparency and eliminate concerns associated with illegal and unethical operations. In the case of a recall, they can also make it easier to track any contamination or other issues back to their source. The primary goals of these technologies are sustainability and food security. When consumers have this amount of transparency, they can make informed purchasing decisions. They frequently utilize this information to reward farmers and producers that implement good farming methods.

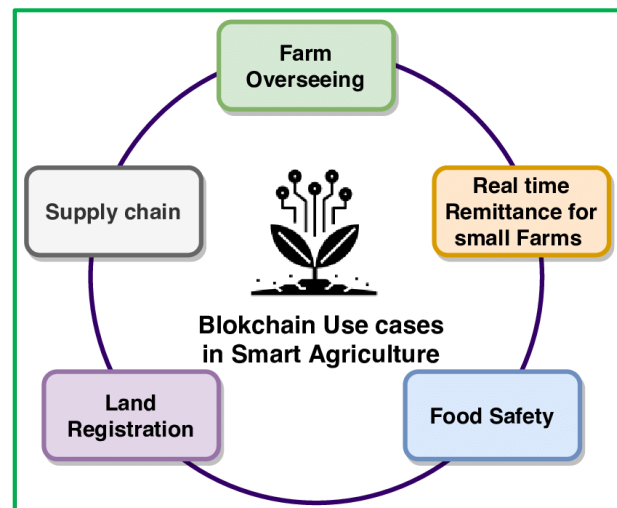
Barriers to Using Blockchain Technologies

- Concerns have been raised that blockchain technology could be misapplied or misused, putting food security at risk. For example, privately held blockchains are easier to hack and less secure. Because these blockchains are based on private organisation norms, it's easy to see how the wrong people could take advantage of them. Small-scale farmers, on the other hand, who lack the necessary size, technological know-how, and scalability to take advantage of blockchain technology, may be left behind.

- Many issues must be resolved before blockchain technology can be completely incorporated into agriculture.
- First, blockchain implementation must be decentralized to accommodate small farmers and rural dwellers. Otherwise, food security will remain a problem. Implementation must enable sustainable and equitable food systems, allowing consumers to make a better decisions.
- Those who lack the digital literacy required to engage in blockchain technology must be educated. This is part of the system's decentralisation process. Because of aged infrastructure and a lack of digital literacy, the world's poor may be unable to participate.

Why blockchain technology can be the game-changer for boosting farming in India?

- While the food goes through many different players on its journey from the farm to the food plate, there is a strong urge by consumers today to know what are they eating. Also, as supply chains have become longer, any user becomes more concerned about the origin and journey of the produce.
- Blockchain is the only way that traceability can be brought reliably to farm produce with the distributed market architecture.
- IoT devices and sensors are being introduced by agritech companies, and blockchain technology can be used to consolidate data on a variety of topics, including seed quality, crop tracking, and the path of crops from the farm to the market.
- Apart from increasing transparency in the food supply chain, blockchain technology can also improve security by prohibiting unethical crop production and distribution, which endangers farmers' livelihoods.
- Consumers will be able to make more educated decisions thanks to blockchain's data collection, and they may even be able to help small-scale farmers who are often in need of food and financial security.
- Before the data can be preserved, it must first be formatted and made comprehensible. Blockchain technology makes it easier to add meta information to data and structure. It can be saved after that, making compliance enforcement easier. Data compliance ensures that the information gathered is kept secure and secured.



Potential Blockchain Technology Benefits for Agriculture

The blockchain technology allows peer-to-peer transactions to take place transparently and without the need for an intermediary like a bank (such as for cryptocurrencies) or a middleman in the agriculture sector. By eliminating the need for a central authority, the technology changes the way that trust is granted – instead of trusting an authority, trust is placed in cryptography and peer-to-peer architecture. It thus helps restore the trust between producers and consumers, which can reduce the transaction costs in the agri-food market.

The blockchain technology offers a reliable approach of tracing transactions between anonymous participants. Fraud and malfunctions can thus be detected quickly. Moreover, problems can be reported in real-time by incorporating smart contracts. This helps address the

challenge of tracking products in the wide-reaching supply chain due to the complexity of the agri-food system. The technology thus provides solutions to issues of food quality and safety, which are highly concerned by consumers, government, etc.

The blockchain technology provides transparency among all involved parties and facilitates the collection of reliable data. Blockchain can record every step in a product's value chain, ranging a product's creation to its death. The reliable data of the farming process are highly valuable for developing data-driven facilities and insurance solutions for making farming smarter and less vulnerable.

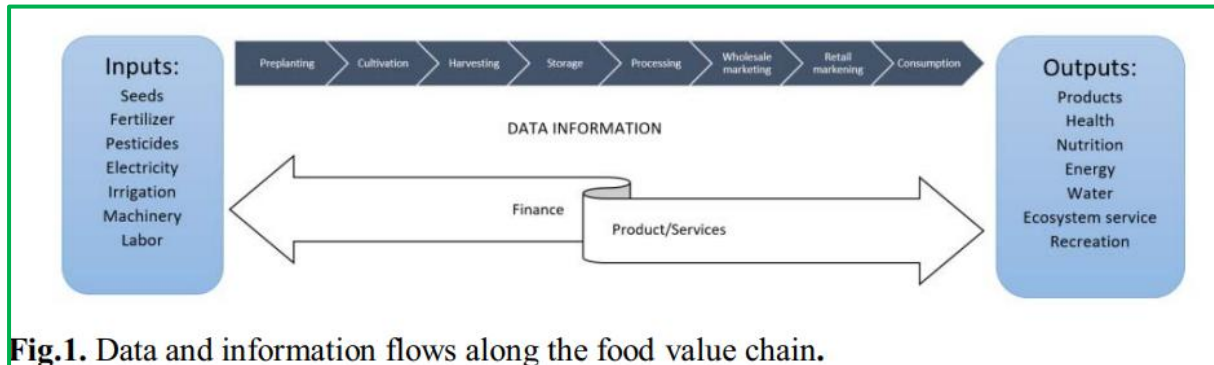


Fig.1. Data and information flows along the food value chain.

Application of blockchain for supply chain in agriculture

- Consumers today want to know exactly where their food comes from and to eat healthier food.
- The rapid and ubiquitous adoption of digital technologies in all areas has led agribusinesses to use supply chain management software. This is necessary to improve food safety, food quality and traceability of the entire agricultural supply chain.
- The increased demand and shortage of food products are causing new problems - the main thing is counterfeit products. Lack of transparency and low efficiency create problems for agricultural producers and consumers.
- The use of blockchain technology and distributed ledger technology (DLT) can increase efficiency, transparency and trust in all agricultural supply chains. Blockchain for the supply chain can empower all market participants by building trust.
- Blockchain can transform the agricultural supply chain by: optimization of all stages of the agricultural supply chain product tracking all the way from field to store shelf almost complete elimination of counterfeit products and fakes reducing financial risks by reducing the number of intermediaries simplified provision of financial services to farmers and businesses
- Emergence of smart big data from reliable sources for better forecasting using artificial intelligence technologies confirming certificates for products, without the possibility of counterfeiting

References

1. Rana, R. L., Tricase, C., & De Cesare, L. (2021). Blockchain technology for a sustainable agri-food supply chain. *British Food Journal*, 123(11), 3471-3485.
2. Chiranjeevi, K., Tripathi, M. K., & Maktedar, D. D. (2021, March). Block chain technology in agriculture product supply chain. In *2021 International Conference on Artificial Intelligence and Smart Systems (ICAIS)* (pp. 1325-1329). IEEE.