Evolving Agriculture Sector through Blockchain Technology

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Abstract

Blockchain Technology is a software creation that allows storage and transformation of data through Internet, in a sheltered and apparent way without a central governing body. Basically it a platform that completes transactions without a third party; a system of dispersed consent and trust and an organization that provides verification and notarization. This article deals in application of blockchain in different areas particularly in Agriculture .Process of Blockchain in agriculture has been discussed. Further article dealt with countries that are working on principle of blockchain technology. Article also mentions about countries which have benefitted in agriculture through blockchain.

Keywords: Blockchain Technology and Agriculture.

Introduction

"Blockchain is peer to peer distributed ledger that is cryptographically secure, append only immutable and updatable only via consensus and agreed among peers"[1.] Blockchain is a software creation that allows storage and transformation of data through Internet, in a sheltered and apparent way without a central governing body. Basically it a platform that completes transactions without a third party; a system of dispersed consent and trust and an organization that provides verification and notarization. "Blocks" on the blockchain are prepared of digital pieces of evidence. Majorly, they have following chunks: Blocks hoard information about dealings; Blocks collects information about who is sharing in dealings and Blocks store information that distinguishes them from other blocks. Blockchain now a days is applicable in every industry and covered major chunks of agriculture. As in every country agriculture plays an important role in Gross Domestic Product so it becomes significant to discuss role of blockchain technology in agriculture sector.

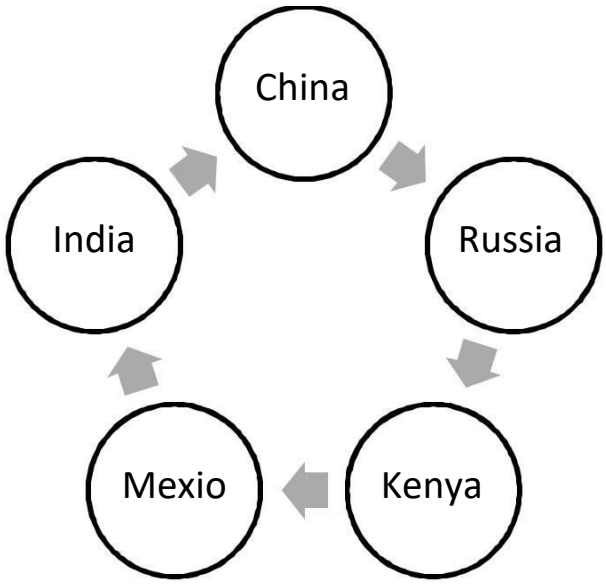
Objectives of the Study:

(i) To study the Impact of emerging Blockchain technologies on Agriculture sector.

(ii) To study the countries where blockchain principle is applied

Countries that adopted Benefits of Blockchain in Agriculture

Following Countries that are working on principle of blockchain technology



China

Agricultural accounts for twelve percent of Chinese GDP. China is one of the largest producers of food in the world. The country is an exporter of a variety of goods and employs more than three hundred million people in China. China's government is incentivizing modernization with Blockchain solutions through authorizing exchanges to work without licenses. The government is building blockchain zones in specific sections to induce talent from the world. The private industry is embracing Blockchain as well as Chinese banks are hiring blockchain experts to partner with the government to increase transparency and combat fraud in financial sector.

Russia

The Russian government is forecasting the custom of Blockchain to identify clients of the National Payment System. Agriculture is not a critical input into GDP. Agriculturalists appreciate the value of crop insurance and majority of agriculturalists purchases multi-jeopardy crop insurance. Russians have an account at a formal financial institution.

Kenya

The Kenyan government is associating with IBM to develop a blockchain solution to counter academic credential fraud. The resource-intensive computational needs of permission-less blockchains, upon which smart contracts could sit on top, would be more viable in a low-cost energy environment. Kenya's auspicious approach towards rule of law would also be conducive to supporting smart contract-based programs. Agriculture heavily impacts Kenya's economy, representing one third of national GDP. Of Kenyan farmers, seventy five percent are small holder subsistence farmers who are highly vulnerable to the economic effects of natural disasters.

Mexico

Agriculture only plays a small role in Mexico, contributing only small percentage of the national GDP. Mexico also has a thriving fin tech market, however infrastructure needed to support blockchain technology is underdeveloped.

India

Agriculture accounts for about twenty three percent of GDP in India, and employs roughly sixty percent of the country's total workforce. Yet, the farmers, who were once regarded as the very heart and soul of the economy are now struggling to sell their produce at decent

price. They work day and night to cultivate crops, but most often they sleep with empty stomach. They have a handful of income and a bagful of debts. Moreover, with rising consumer consciousness towards food safety, they have grown suspicious of the food they are consuming. Food fraud costs the global food industry an estimated USD 30-40 billion annually.

There are different types of risks involved due to instabilities in market, production, and prices due to climate, small sized land holdings, indebtedness, unsatisfactory realization of prices and much more. The need of the hour is to provide better credit facilities along with better quality and cheaper inputs required for crops. Crop planning has to be incorporated as an agricultural practice. These efforts shall be required to ensure not only sustainability but profitability of farmers' financial stability. Localization and simplification are two key aspects for penetration of these systems. Blockchain have the potential to solve problems of credit availability, crop health & raw material procurement, and thereafter, we can expect an efficient supply of products, fair pricing and improved product tracking that will greatly help producers and consumers in quantifying, monitoring, and controlling the risks throughout the agriculture process. If people see the value the technology brings into their lives they will rally behind it and it could then become mainstream.

In India, agriculture and supporting businesses do not constitute a high share of GDP. Majority of households in rural India rely on agriculture for their livelihood, which is Protecting Agriculturalists in Evolving Markets with Blockchain indicative of its regional influence. Crop insurance coverage is relatively low as well, with only twenty percent of all cropland in India covered by some form of insurance. India has traditionally been known for its strong reputation as a global technology hub. Blockchain technology is in a blossoming period in India, but has observed a slew of recent implementations with banking partners around fintech, which will increase the nation's blockchain knowledge base in the years to come. [2]

Process of Blockchain:

Following process is involved in Blockchain technology:

(i) A transaction must happen.

(ii) That transaction must be corroborated. After making that purchase, transaction must be substantiated.

(iii) The transaction must be stored in a block.

(iv) When transaction is confirmed it is proceeded towards final step.

(v) Once all of a block's transactions have been verified, it must be given a unique, identifying code called a hash. The block is also given the hash of the most latest block added to the blockchain. Once hashed, the block can be added to the blockchain.

Process of blockchain to identify transformation of crops or food items produced:

1. Internet devices generate data

In Internet of Things enabled smart farming, a system is built for keeping an eye on the crop field using sensors. Internet of Things sensors and devices engender data which can help agriculturalists make well informed decisions related to the growth of the crops. The information gathered from the Internet of Things devices must to be regulated before getting saved on the data storage.

2. Scrutinizing and Enhancement of the collected data and making data ready for acquiescence

Before saving the collected data on the blockchain, there is a need to ensure that it is organized and understandable .Data Fortification is done to rally the quality of the apprehended evidence. The following two steps ensure that the data is cleaned before it gets stored on the distributed storage platform.

3. Making the data more perceptive with machine understanding processes

Machine understanding processes consists of Crop Quality References, Crop Identification, Crop Yield and Crop Demand Estimation. Agriculturist make improvements in the irrigation system from time to time. The data should be stored on the blockchain to empower agriculture market contributors.

4. Finally Information gets stored in the blockchain

Data congregated by relating machine knowledge gets stored in Interplanetary File System, a distributed storage platform having addresses shredded and stored in the blockchain. The information apprehended in the blockchain will produce smart contracts to process guidelines defined within them. Smart contracts facilitate the exchange of data stored on the blockchain within the specific stakeholders in the system. Then information will be noticeable to each agriculture market adherent.

Process of detecting frauds in the food supply of blockchain :

1. Food traceability

Customers now a days are taking concern in the roots of their foodstuff. The evolution in consumer tastes has given rise to an important food scam industry. Producers can easily sell mislabeled products, because the retailer or final buyer has no real way of verifying a product's origin. Given the fact that it can record unalterable information at every step in the food supply chain, blockchain technology can provide reliable information regarding the origins of food items and the exact journey it took from farm to table. It could enable consumers to verify from which certified farm their strawberries were picked from or in which field their grass-fed beef was raised with a single screen tap.

2. Improved Competence of Agriculturalists

Presently, most agriculturalists use a amalgamation of multiple software applications, spreadsheets, and notes to record their information ; this is complicated process and requires a lot of time and effort to send this data to other service providers.
Blockchain technology allow farmers to store all of their data in one place so that it can easily be retrieved by those who need it so the entire process is saving time and energy of concerned agriculturalists.[3]

3. Reasonable price for Farmers produce

The farmer could collect payment for their produce when it is distributed and role of third party has been eliminated . Before many farmers experienced for selling their produce in the market at a fair price. Due to blockchain farmers directly associated with retailers.[4]

4. Legitimacy of agricultural produce

The blockchain barcode engraved on each merchandise can be scanned by agronomists and retailers through their smartphone for a understanding of the legitimacy of the products purchased.[5]

5. Supply and price prognostication of crops

Blockchain estimates price of crops in advances. Having access to such data farmers properly set their own prices and optimize the quantities of the product. Blockchain can make it much easier for parties all over the world to due diligence each other.

1. Internet device generate data

Smart farming allows sensors to generate fundamental information related to the crops sown in the fields. If the farmer is not using technology driven techniques, they can stock the essential information such as crop quality, type of seed and weather conditions under which

the crops were sown using their mobile application. The data captured either by using Internet of Things sensors or manually by farmers is saved in the distributed storage platform.

2. Distribution of grown-up crops to the food processing companies

When the crops are grown up, the food processing establishments start attempting on the bidding platform. The crops can be transported to the refineries with Internet of Things enabled medium, apprehending temperature conditions under which the items are kept and delivered. When the bid is authorized through smart contracts, the crops undergo processing and companies store information captured at every step of the process on the blockchain. The information gathered from refineries can help wholesalers or retailers to confirm if the supplied food is of good quality or not. Storing data on the blockchain can also ensure if the compliance has been met at every step of the food supply chain.

3. Supply of Managed Foodstuff to Wholesalers and Retailers

Wholesalers and retailers can bid for the products they want through the bidding platform. Similar to the transportation of crops to the refineries, the food items are also distributed to wholesalers and retailers in Internet of Things enabled vehicles.Blockchain offers traceability in the supply chain, helping food companies conducting food recalls or investigations quickly and seamlessly.

4. Customers can smidgeon the supply chain

From farm details to carriage details, batch numbers, food processing and factory data, expiration details, storage temperature and other details digitally linked to the food items within the blockchain, customers can explore everything by tracing the supply chain. The food supply chain based on the blockchain can help stakeholders to access information related to the food's quality at every stage. As blockchain brings pellucidity in the food supply chain ecosystem, it will be easier to figure out when and how food has been contaminated.

Process of Blockchain to identify Weather Control Process in Agricultural Fields

1. Agricultural Weather Stations forward essential information to the blockchain

Smart agriculture empowers farmers to comprehend the crop's behavior by organizing sensors and mapping fields. Placing agricultural weather stations within the farms can help generate crucial information such as soil temperature at different heights, air temperature, leaf wetness, rainfall, wind speed, dew point temperature, relative humidity, solar radiation, wind direction and atmospheric pressure.

All of the overhead factors are dignified, recorded and protected in the blockchain facilitating farmers and other authorized entities to access it evidently.

2. Agriculturalists can take precautionary actions

Through investigating the data spawned by the weather station, farmers will be able to make cognizant decisions related to the farming.

3. Quick application for the crop insurance

When some damage done during a weather crisis, farmers can quickly apply for the crop insurance claim amount through the blockchain. The transparent and immutable behavior of the blockchain will enable insurance companies and other authorized parties to access the data captured by the smart weather station easily. They can directly query the blockchain to fetch the required information with the help of smart contracts. After the insurance claim request is approved, farmers will automatically get the requested amount in their respective wallets. Therefore, a blockchain-enabled solution can help farmers get the compensation seamlessly and quickly.

Blockchain role in managing agricultural finance

1. Stakeholders sharing information at every step of food production

Every time a transaction will take place, it will be stored in the blockchain, enabling all the involved parties to access every single transaction transparently. Sharing essential information at every step of the food production will bring more fairness to the entire system.

2. Auditors can effectively conduct audits

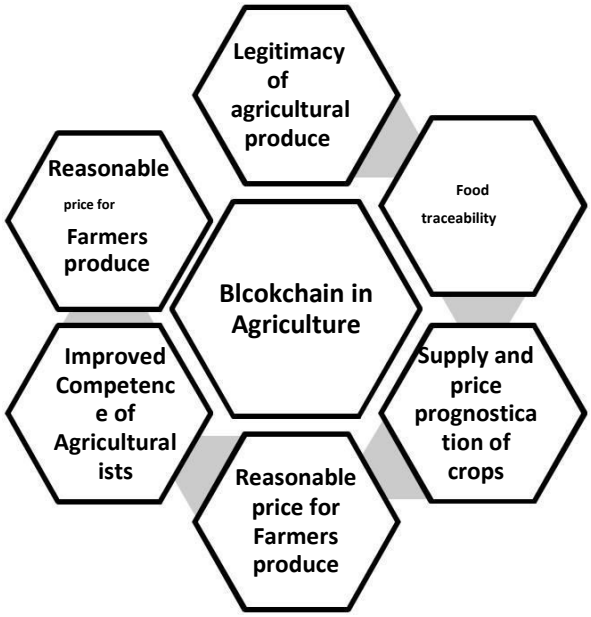
Having the ability to store information permanently and securely, the blockchain can also serve as a source of verification for the recorded transactions. Instead of asking farmers or retailers to send financial reports for auditing purposes, the auditors will be able to verify the transactions directly via blockchain ledgers. The automated auditing process can make the audit environment cost-effective.

Rather than carrying out assessments at the end of the year, audit firms will be in a position to conduct audits throughout the period.

Blockchain will make it possible to replace the random auditing by auditors, making it more effective to access every single transaction.

Recompenses of Blockchain

For all its complexity, blockchain's potential as a decentralized form of record-keeping is almost without limit. From greater user privacy and heightened security, to lower processing fees and fewer errors, blockchain technology may very well see applications beyond those outlined above. Here are the selling points of blockchain for businesses on the market today.



Conclusion

It should be understood that blockchain is a radical technology that has transformed many contemporary business models , agriculture economy and civilization. Agriculture, the world's least digitized sector, is a prime candidate for disruption. Many countries of world are adopting blockchain in agriculture, India is also not lagging behind in adaptation of blockchain techniques in Agriculture. Blockchain in Agriculture has improved Competence of Agriculturalists, made easier food traceability and reasonable price of agricultural produce. Blockchain in Agriculture has reduced frauds and it has also reduced complications for agriculturist. So it can be concluded that blockchain technology has revolutionized agriculture in every single aspect and its practise is growing not only in India but also in the other parts of world.

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