

Blockchain Technology as Efficiency Improvement Tool for the Agricultural Sector

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Abstract. Blockchain technology is primarily associated with cryptocurrency, but the potential of this technology is enormous and can be a base not only in finance, but also in other sectors of the economy. This article discusses application prospects of blockchain technologies in agricultural production. Particular attention is paid to the possibility of the formation of new, more efficient business models at the farm level. Given seven possible areas of using blockchain technology in agricultural production, affecting both small farmers and international relations in the field of food security of the member countries of the Eurasian Economic Community. Also in this article the first successful examples of implementation experiences blockchain technology in agriculture are described.

Keywords: Blockchain, information technology, business model, agriculture, farming, automation of data collection, data digitization.

1 Introduction

The market of agricultural products plays an important role in the welfare of the countries of the Eurasian Economic Community. Food exchange problems, transparent supply schemes, customs clearance and fair regulation of prices for Eurasian Economic Community always been acute.

In agriculture blockchain can become a unique system, which is a source of information about the product status, resources and contracts - from small farmers to large multinational agribusiness corporations. Blockchain technology can radically change our understanding in three areas of the agricultural market: management, financing and building supply chains and mediation.

Blockchain saves time in the value chain of agricultural products, providing a single source of data on production and minimizing the burden in collecting information. Blockchain itself without increasing income producers, but by providing a unique technological infrastructure, it leads to the fact that agriculture is more profitable in today's competition.

2 Problem Statement

Agricultural enterprise - is a complex ecosystem with a variety of elements, whose activity is tied to compliance with schedules, results of other elements. Such systems are characterized mainly seasonal structure funding. Products produced by agricultural producers become elements of the other, larger, logistic system with a lot of participants: distributors, grocery chains, processing enterprises, retailers and consumers. These participants at any time, information on the whereabouts of the goods shipped to food, to which specific farm grown coffee beans, etc.

The trend of development of agriculture using blockchain promises to simplify each stage of food cultivation and distribution. Blockchain provides all parties involved with a single source of accurate information for the agricultural supply chain. In world and Russian practice, there are already examples of implementation of all types of blockchain in agriculture.

3 Research Questions

The ultimate goal of blockchain in agriculture is the digitization and automation of data collection for product quality control. When the manufacturer needs information, it can get this information almost instantly and provide accurate irrigation, based on the information on rainfall, making conventional fertilizers depending on the soil characteristics and the use of targeted measures to combat pests in response to an outbreak.

On a global scale with the help of blockchain technology Sweden, Ukraine and the United Arab Emirates plan to keep the land registry, and the Indian government is already struggling with a land fraud using blockchain [1]. There are opinions that soon blockchain technology will become as familiar as the data transmission protocol TCP / IP, which in the early days of its existence, also caused a lot of controversy and has been used in the narrow closed networks. In any case, progress is unstoppable and blockchain gradually gaining confidence. The possibility of using blockchain

limitless, its functionality depends only on the imagination of developers. The most important thing - to learn to apply the basic principles of its operation and advantageous to apply the benefits of using this system in each case [2].

4 Research Methods

To consider application prospects of blockchain technologies in agricultural production and to describe the first successful examples of implementation experiences blockchain technology in agriculture, the authors used general scientific methods: methods of critical analysis, methods of comparison and generalization, expert assessments, logical constructions and observation.

5 Findings

5.1 Settlement System

In households with a pronounced seasonality (e.g. cultivation and sale of seedlings of fruit, conifers and ornamental trees) sales take a few months of the year. Rest of the time - laying plants and processes for the care of plants. At the same time the funds for the maintenance of the functioning of the economy are needed constantly. The blockchain technology can help to develop a system of payments to customers, which will allow to optimize cash flow. For example, payment on the fact of receiving the products can be replaced with a down payment before setting the seedlings. For a customer, this calculation may be even more favorable, because the seller will be able to offer a discount or installment plan, calculated on the basis of the customer's capabilities and in accordance with the agreement between the parties to the transaction [3].

Saplings of fruit trees, especially mature trees for landscape design - the purchase of an expensive and hardly belongs to the category of spontaneous. Everyone understands that the trees need a few years to find the right size and shape. The customer can choose from the range of his desired varieties of trees and watch them grow, periodically pays advance payments.

Such an approach may be implemented without the blockchain using, but it significantly increases the ease accounting transactions and customer guarantees calm. Of the participants in the transaction excludes lawyers who helped make the treaty. Entry of an order placed in blockchain, see all its members, to deceive any party to the transaction will fail. The system completely eliminates this development.

5.2 Customer interaction system

Blockchain allows you to build a fundamentally new scheme of interaction between farmers and consumers of farm products. Such a scheme may be based on equal footing registered in blockchain. Share is a certain amount of conventional hard currency, and it may acquire anyone. Binding conditional exchange is carried out to the set produced farming products. Share owner can pre-select a set of products and get it in its natural form, or elect to receive a dividend from the sale of products on the open market. Farmer sends the collected funds for production and further provides unitholders latest environmentally friendly products at a reasonable price. Thus, a new production unit facilities that can provide the other shareholders.

The same approach can be implemented in the case where a farmer has a very small farm and has no plans to expand it for various reasons (lack of territory, labor or free time). Suppose his farm consists of a pair of cows, two dozen chickens, a dozen geese, ducks and a few rabbits and twenty acres of land under potato. Instead of a few food baskets, so the farmer can stay on the same and act the same scheme. Farmer registers blockchain share-purse in an amount that believes it is possible, and sell them for cash. For example, the cost of such a share can be \$ 500. On this amount the farmer provides its customers with food basket, which includes: three hundred eggs, five liters of milk, three poultry carcasses, two rabbits and twenty kilograms of potatoes.

5.3 Sale of assets of listed cryptocurrency

As an example, consider the production of alcoholic beverages. For this particular winery and distillery, popular manufacturers crafting a beer does not require any changes to its production technology. The only difference is that each bottle or keg manufacturer supplies the individual certificate and Wallpapers label with a unique QR-code, photographs and sends in a cellar for storage or ripening. Further, the manufacturer makes an entry in blockchain thus placing an asset (a bottle or cask alcohol) as an asset on cryptocurrency exchange at an initial (start) price.

Derivative financial instruments based on cryptocurrency is now very much in demand, and traders will use alcohol cryptoasset as speculative derivative. Thus, traders will trade commitments on the transfer of alcohol to mature as a kind of futures contract for the supply of, for example, in the future wines already present in the fixed price. Such a contract will allow the buyer to insure against excessive prices, but will cause additional costs if commodity prices decline. But, firstly, the price of rare and unique alcohol almost never fall, and manufacturers such scheme implementation is advantageous because it is guaranteed by laying in the price of all production costs.

According to such a scheme can produce assets breeding birds or small animals. For example, a farmer makes an entry in blockchain and release assets for the purchase of geese in 2021. The money raised from the sale of assets, the farmer buys breeding eggs, feed, materials, building goose house, and by the end of the agreed term already has the output of commodity geese.

5.4 Delivery Tracking

In addition to the successful solution of the problems of agricultural producers "on the ground", blockchain technology may be less useful on a global scale.

To this day a huge problem for the world's agro-industrial complex is to track the delivery and payment products. Large multinational corporations sell thousands of tons of products in a geographically fragmented markets. In most cases of placing and receiving orders is coordinated by a third party (agent), functioning locally. Respectively, and the seller, and the buyer must be some agent that acts as a guarantor of delivery of goods, performs its testing and tracking, recommends the most advantageous payment schemes.

Through the use of this complex system of blockchain agents at the regional level can be simplified to a single distributed registry, allow buyers to products contact the supplier directly without any loss of time and money on fees. This will eliminate many of the "paper" processes, because of which the settlements on the supply can be stretched for a few weeks. The use of such a system would allow farmers to receive a large portion of the proceeds from the sale of the harvest.

Louis Dreyfus company recently conducted by blockchain first trading in agricultural commodities. They are sold to the Chinese government 60 thousand tons of US soybeans. According to the people who own the information about the transaction, the using of blockchain reduces total logistics by 80% - the whole operation took only a week. [4]

Moreover, the delivery of operations are often associated with complex agreements specifying conditions of delivery and payment. They are ideal candidates for management using smart contracts with blockchain. Because smart contracts are increasingly being used in agriculture, the farmer can sell the products directly to restaurants or even individuals without intermediaries.

5.5 Products origin and supply chain

Popular in recent years, organic products are increasingly finding themselves not as organic as it says the seller. Publication of fake organic products are increasingly appearing in the press. Of course, this upsets consumers, to spread a lot of money for the 'organic' vegetables or meat, but more importantly, it devalues the efforts of farmers producing these eco-friendly products.

Keeping a register of proven organic products in blockchain - a great tool confirm the authenticity of the product supply chain. Manufacturers can use such a registry to add their products to the history of each phase of cultivation and processing of the product. The final buyer with the mobile app in the store will be able to ensure the ecological purity of the product and to follow all the way from the field to the counter.

When tracing through blockchain if the vendor claims that coffee beans come from ecologically clean mountainous plantations in Jamaica, any customer can easily verify these statements. Agriculture based on blockchain allows to trace the path of beans from the farm to the coffee shop with your phone.

From a regulatory perspective, it would make the work of state bodies in the field of agriculture is much easier. If you find stocks of contaminated food will be easier to track where it came from, and to establish the related manufacturer. As a result, regulators can quickly isolate the diseases associated with food. [4]

5.6 Decentralization of power of international companies

Globally, in modern agriculture is dominated by international corporations. They are often the major resellers in the market, always dictate their prices and indirectly indicate which manufacturers products will be in great demand in the next season.

The implementation of blockchain can turn the existing system in the opposite direction - small businesses and agricultural cooperatives will have a dominant position in the market. The idea is the implementation of the above schemes farm products through the issuance blockchain-shares. Consumers buy a share, and farmers supply their products throughout the growing season. This approach carries with two distinct advantages:

- first, farmers receive funding at the beginning of the season, and invest in the production and stabilization of its seasonal cash flow;
- secondly, consumers are confident in the reliability of its farmers and get the products at the best price according to the season.

Agriculture based on blockchain can solve some problems of management, distribution and equity related to the management of the agricultural enterprise, sponsored by the community. Due to the distribution of shares on the basis of smart contract, community-supported agriculture can significantly improve the efficiency, directly linking farmers with consumers.

5.7 Adjustment of prices

In a situation where commodity markets controlled by large companies, they can hardly be called transparent. Prices of products into separate groups may vary greatly depending on a combination of many factors: the demand, weather, regional scale, with regional mediators, etc. [5].

The using of Blockchain technology in agriculture can significantly improve the transparency of processes of pricing for the products of mass demand for the end-consumer, and for all members of the agrarian market.

Market based on blockchain allows buyers and sellers to compare the conditions offered in the negotiations with information on such transactions, committed in the past or from other market participants. Farmers around the world will be able to determine how much it actually costs their harvest, and to make a sale in real time.

6 Conclusion

The modern development of the world food market is defined by two main groups of factors:

- population growth, and as a consequence, the growth in agricultural production needs;
- concern for the environment, and a marked increase in demand for organic products with transparent and "fair" supply chain.

Thus, in the foreseeable future to agriculture will be in dire need to address two issues: the organization of efficient logistics and finance purchases of food and quality control to guarantee the detection of fraud. Implementation of blockchain technology - the best way to solve these problems.

A single transparent storage of the data supply chain can effectively organize the relationships between suppliers, transporters, consumers and processing industry. The real experience of blockchain in farming activities already allows to simplify the marketing of products and to eliminate intermediaries in the distribution chain.

Organization of certification of production and processing technologies using blockchain will effectively protect bona fide suppliers, thus substantially reduce the passage of certification procedures costs (compared to conventional systems).

Before agriculture Eurasian Economic Community countries worth an ambitious task of export development, active promotion on the world market of high-quality, organic products. Simplify its decision to allow the use of blockchain, thus ensuring the quality and origin of the buyer of goods, simplifying procedures for veterinary and phytosanitary certification.

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