BLOCKCHAIN TECHNOLOGY: WORLD EXPERIENCE AND IMPLEMENTATION. CHALLENGES IN THE PRIVATE AND PUBLIC SECTOR

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BLOCKCHAIN TECHNOLOGY

The subject matter of the presentation is the substantiation of the problems and perspectives of the introduction of Distributed Ledger Technologies (DLT) / Blockchain in the public and private sectors as a modern digital economy instrument.

The goal of the work is to substantiate the scientific and methodical principles of implementing the technologies of distributed DLT / Blockchain registers.

The following tasks were checked in the work:

- types of Distributed DLT Registries are presented in the form of a classification with a distinction of features and possibilities of application of each type;
- the general scheme of work is described and the specific features of the Blockchain technology are systematized;

BLOCKCHAIN TECHNOLOGY

- the features and directions of the use of intelligent contracts (smart contracts) based on the technology of blockchain are singled out;
- the international experience of government initiatives and pilot projects of the blockade technology application has been analyzed;
- the analysis of the domestic experience of practical application of Blockchain technologies in the public and private sectors and the perspective areas for the future application of technologies of the distributed DLT registries are identified;
- according to the international analytical agencies research results, the obstacles of the Blockchain technologies implementation in the public and private sectors are systematized.

BLOCKCHAIN TECHNOLOGY

The blockchain technology became widely known not immediately, but only after the popularization of bitcoin, which in turn was a response to the global financial crisis of 2008-2009. The concept of bitcoin was published by the author or, more precisely, by a group of authors under the pseudonym Satoshi Nakamoto [9] in 2008, and was first put into practice in 2009 with the first block created by launching a Bitcoin cryptocurrency.

Distributed ledger technology (DLT) is an information storage technology whose key features are sharing and synchronization of digital data in accordance with a consensus algorithm, the geographical distribution of equivalent copies at various points around the world, and the absence of a central administrator. Blockchain is a kind of distributed ledger, but not every DLT is a blockchain.

Blockchain is a distributed database technology that allows to create a digital transaction register and share them within a distributed network of devices. Through the use of cryptography, each network participant manages the registry without centralized administration.

BLOCKCHAIN TECHNOLOGY

They use independent computers (nodes) to record, share, and synchronize transactions in their respective electronic ledger (registries).

The blockchain organizes data into blocks that are linked to each other in add-only mode.

A node in the context of a cryptocurrency and DLT as a whole are devices with software installed on them that are combined into a common network in order to jointly ensure the operation of a distributed database.

The whole system is described as a "system without trust", so that all nodes must come to a consensus to confirm the correct information.

Transactions in the blockchain network occur 24/7.

The system allows the exchange of digital assets in real time between two unrelated participants without a central counterparty and ensures their transparency and minimizes risks.

Such operations are registered in a decentralized public distributed database, allowing network users to control their transactions and data.

By accessibility system is divided into open, private, and federated DLT

DISTRIBUTED LEDGER TECHNOLOGY

Open (public) DLT – modern public records, based on the algorithms of consensus with open source

Features

- anyone can join the system, for example, run a full node;
- anyone in the world can send transactions through the network and wait for their inclusion in the blockade, if they are valid;
- anyone can read the transaction in the block browser;
- transactions are transparent but anonymous;
- do not allow anyone with Internet access to participate - in the process of verifying transactions; are faster and more confidential;
- mainly used in the banking sector (consensus is controlled by pre-selected nodes: for example, a consortium of 15 financial institutions, each of which holds a node, and 10 of them must sign each block)

Opportunities after applying

- potentially can destroy existing business models by refusing to mediate;
- lack of infrastructure costs: there is no need to maintain servers or system administrators, which drastically reduces the cost of creating and running decentralized applications (dApps)

DISTRIBUTED LEDGER TECHNOLOGY

Federated distributed registries, or blockchain consortia

- the systems that operate under the leadership of the group

Features

- do not allow anyone with Internet access to participate in the process of verifying transactions;
- are faster and more confidential;
- mainly used in the banking sector (consensus is controlled by pre-selected nodes: for example, a consortium of 15 financial institutions, each of which holds a node, and 10 of them must sign each block)

Opportunities after applying

- reduces transaction costs and data abundance;
- replaces obsolete systems, simplifies workflow and reduces manual labor;
- complements the ecosystem, but does not destroy it

Private blockchains

- are not DLTs, since permissions are stored centrally for one organization,
- the systems that operate under the leadership of the group

Features

- reading permissions may be public or restricted

Opportunities after applying

- n.a.

SOME GOVERNMENT INITIATIVES AND PILOT PROJECTS USING BLOCKCHAIN TECHNOLOGY

Georgia began using the blockchain technology in the land registry to verify land ownership and verify real estate transactions.

This has created a safe and defenseless system, increases transparency, reduces costs and prevents corruption.

SOME GOVERNMENT INITIATIVES AND PILOT PROJECTS USING BLOCKCHAIN TECHNOLOGY

Estonia is considered the leading country in adopting blockchain technology in key areas such as health, voting and identity management. She has been testing this technology since 2008 and since 2012 has been actively using it in various registries.

Already, citizens and residents of Estonia are issued cryptographically protected digital ID cards, reinforced by the blockchain infrastructure, which allows access to various state services.

On the blockchain platform, citizens can check the integrity of records stored in state databases and control access to them.

SOME GOVERNMENT INITIATIVES AND PILOT PROJECTS USING BLOCKCHAIN TECHNOLOGY

Blockchain and smart contracts are closely monitored by the US regulatory government.

In 2016, Delaware became the first state to implement blockchain technology.

The technology is used to store contracts and other corporate data in a distributed registry, allowing companies and agencies to store their documents in several places.

This will ensure their security and will automate access for voters, shareholders and employees.

The public archives of the state of Delaware will be among the first to use the blockchain to archive and encrypt government documents.

SOME GOVERNMENT INITIATIVES AND PILOT PROJECTS USING BLOCKCHAIN TECHNOLOGY

The Dubai Economic Development Department (United Arab Emirates) will fully transfer registration and licensing of enterprises to the blockchain. Interest in technology also shows the largest bank in Dubai.

Together with IBM, it is planned to transfer trade and logistics operations to the blockchain, as well as replace paper contracts with smart contracts.

This will minimize the participation of officials in government, make its economy and management more transparent, and therefore create conditions under which corruption cannot develop, and citizens can be served as quickly and efficiently as possible

SOME GOVERNMENT INITIATIVES AND PILOT PROJECTS USING BLOCKCHAIN TECHNOLOGY

The Blockchain government service concept of Italy is to improve efficiency, security, transparency, and participation, while giving every government agency the ability to manage its processes using its own technological "registry", regardless of the processes and technologies of any other state entity.

The problem is the new law on “smart contracts” that is against eIDAS rules!

SOME GOVERNMENT INITIATIVES AND PILOT PROJECTS USING BLOCKCHAIN TECHNOLOGY

Ukraine belongs to one of the first countries in the implementation of the distributed DLT registry technology.

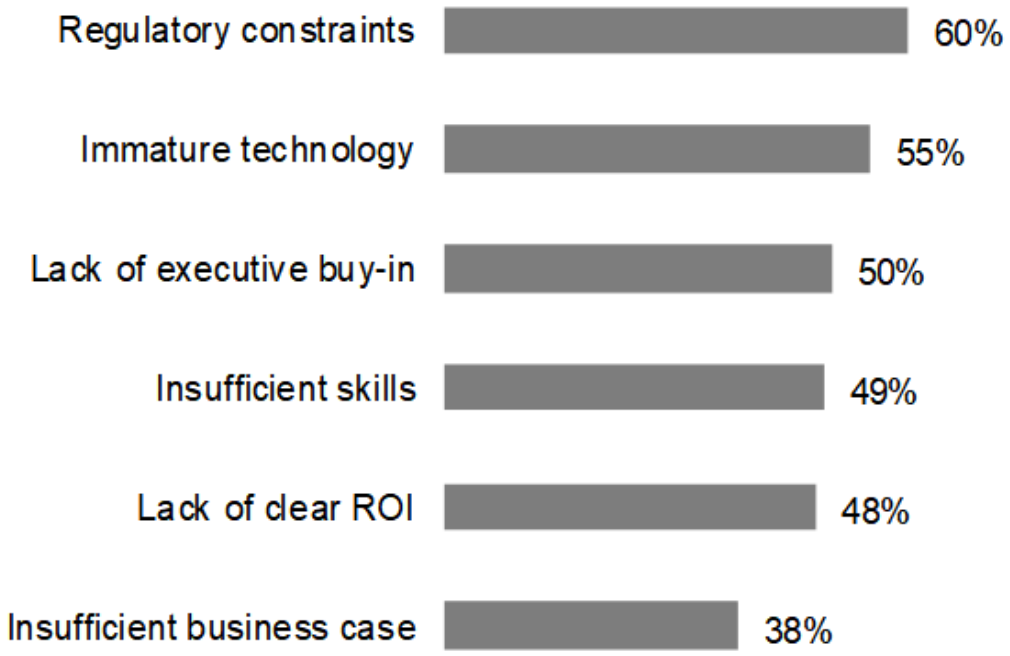
Back in 2015, the decentralized electronic system of state property auctions E-Auction 3.0 was launched here.

The system is the world's first example of how a state uses a decentralized system for the privatization and leasing of state property and licensing.

The memorandum on the implementation of the system was signed by the governors of several regions with the Innovation and Development Fund (IDF Reforms Lab).

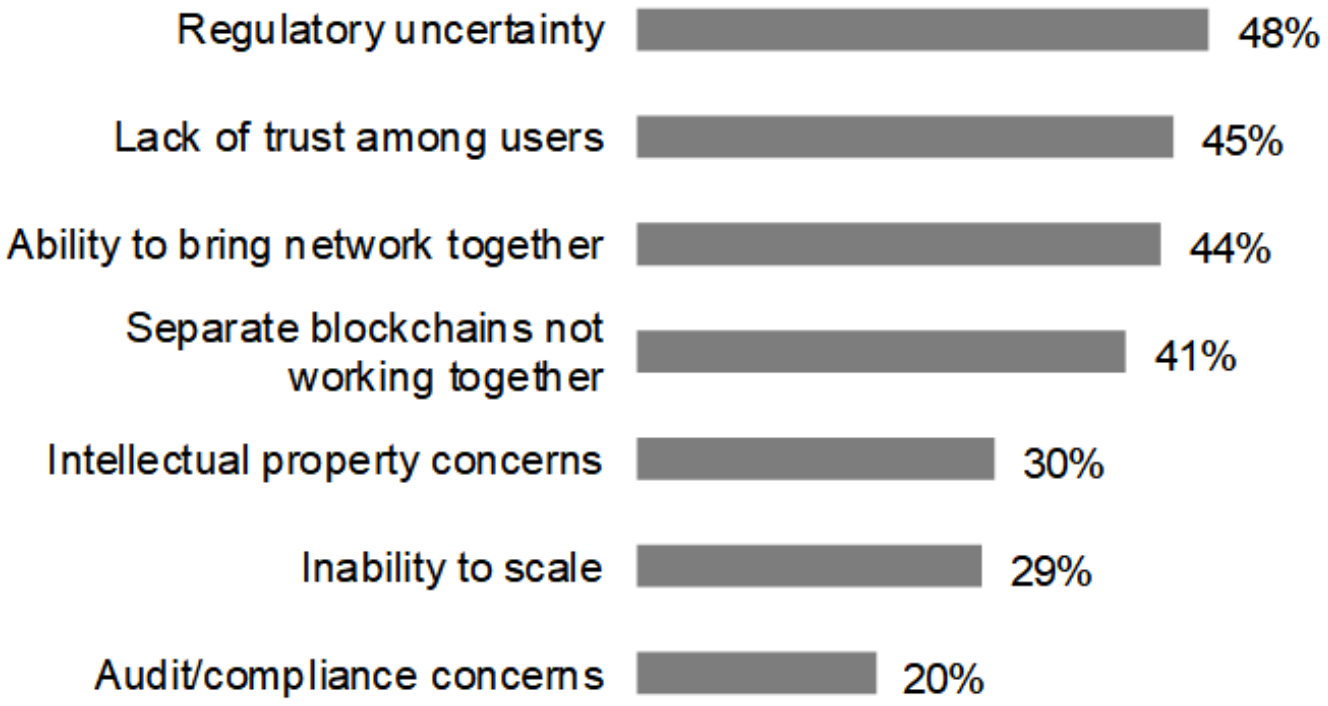
OBSTACLES FOR PUBLIC SECTOR

Obstacles to blockchain implementation for government organizations:



OBSTACLES FOR PRIVATE SECTOR

Obstacles to blockchain implementation for business:



As with any new technology, problems and doubts exist around the possibility of blockchain to ensure reliability, speed, security and scalability. Also, business is worried about the lack of standards and the potential incompatibility of various blockchains.

In a company that creates a blockchain for itself, there will undoubtedly be difficulties with internal use with the process of restructuring data in the new system and scaling. And yet, the company can independently set the rules and monitor their compliance with the blockchain, as it does in ERP systems today.

However, building a blockchain only for their own needs, an enterprise cannot fully realize all the benefits that can be obtained by investing in a blockchain.

After all, this technology is really revealed only when various market participants use it to create a single platform. If a third party is involved in the blockchain alone, it will be impossible to establish the rules.

CONCLUSIONS

According to the results of the study, **the technologies of the distributed DLT registry have a significant development potential for the future of the digital economy**.

Relatively new distributed registry / blockchain technology – the data structure, allows to create a digital transactions register and share them within a distributed network of devices.

Through the use of cryptography, each member of the network manages the register without centralized administration, provides an unprecedented level of integrity, security and reliability of information, reducing the risks associated with the existence of a single point of failure.

This eliminates the need for intermediaries, reduces bureaucracy, reduces the level of corruption and ensures transparency in the provision of public services in the private sector.

It also allows tracking transactions.

CONCLUSIONS

Blockchain can be applied in practice in the following areas: **state registers, financial and legal operations, logistics, voting, copyright, medicine, etc.** Despite the potential of technology, there is a certain number of barriers for its full implementation in the public and private sector, requiring further consideration by experts.

At the level of **governmental organizations**, this is regulatory restrictions, immaturity of technology, lack of support from performers, insufficient level of technology skills, lack of understanding of the process of investment return, and a small number of successfully implemented projects.

For representatives of the **business environment**, the obstacles to the use of technology are regulatory uncertainty, lack of trust, openness of personal data due to the possibility of network unification, technical impossibility for different chain of blocks to work together, intellectual property problems, impossibility of scaling, and problems with auditing / compliance.

CSQA CHORAL TRUST: SCENARIO

Data management is an issue that the food supply chains are well aware of, in fact the correct management of qualitative and quantitative data is a sine qua non to demonstrate and ensure to the customer (retail and/or customer,) the quality, food safety, traceability and value aspects of products placed on the market.

The main points of the supply chain organisational model are:

- the existence of a head of the chain who coordinates the upstream chain;
- the operators participating in the chain are qualified by the head of the chain (the chain is open but the operators are qualified and only those qualified are part of it);
- there is a supply chain agreement between the operators that defines obligations and responsibilities in addition to the "requirements" that must be met (supply specifications);
- data management is generally distributed among the various operators in the supply chain, supporting product conformity, and is always made available during the audit phase;
- in any case, the data are only accessible to qualified operators in the supply chain and to authorised operators: they are not accessible to everyone.

CSQA CHORAL TRUST: MAIN FEATURES

The main features that the blockchain for the agri-food sector should have:

- ease of application (the blockchain should not be another "tinsel" that adds to what is already in place);
- flexibility, i.e. the possibility of managing different, multiple, time-varying information that can support different requirements also according to the needs of customers;
- accessibility to data allowed only to qualified subjects authorized by the head of the chain (access to the blockchain is decided by the head of the chain both in terms of authorized / qualified operators and in relation to the information displayed);
- interoperability between different blockchain (the implementation of the blockchain must ensure "dialogue" with any other blockchain of customers and suppliers without particular effort and especially without any duplication);
- possibility of acquiring information from official databases (company file, stable register, SIAN, land register, electronic recipe etc.).

CSQA CHORAL TRUST: OBJECTIVES

The implementation of the blockchain can allow the achievement of some fundamental objectives:

- simplification and dematerialization;
- risk mitigation in the context of official controls for the supply chains (especially for regulated PDO / PGI schemes);
- simplification of relations / data management / evidence with large-scale distribution and organised distribution;
- support to innovative communication and identification (also from an anti-counterfeiting point of view) of products;
- support for third party certification and reorganisation of third party control activities (Virtual Audit).

The functional data for certification can be qualified through a third party platform specifically designed by **CSQA** called **ChoralTrust**, which is able to acquire data from the blockchain of each operator in the supply chain and apply the control procedures on the data in Virtual Audit mode.

CSQA CHORAL TRUST - ADVANTAGE

The **CSQA ChoralTrust** solution allows to obtain the following advantages shared with the operators of the supply chain:

- simplify the certification process;
- activate "Virtual Audits" by optimizing field audits;
- allow to certify each batch of product;
- activate an innovative and timely communication system, guaranteed by a third party;
- allow interoperability and use of certified data that cannot be falsified;
- archive all qualified information;
- access to all information in real time, with the guarantee of carrying out immediate and targeted controls;
- to allow access to qualified data to operators authorised by the head of the chain;
- reduce the costs associated with the formal control of paper documents.

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