49. THE FUTURE OF BLOCKCHAIN: A REVOLUTION IN TRUST AND DECENTRALIZATION

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The paper investigates how blockchain eliminates intermediaries and increases trust in transactions, making them more transparent. It demonstrates the fundamental principles of blockchain and its distributed ledger structure. Additionally, the paper highlights the current applications of blockchain and examines the key challenges associated with its global deployment.

Blockchain is a technology that represents a distributed database [1]. All information is stored as a chain of blocks. Each block is linked to the previous one using cryptographic algorithms. The system functions thanks to the network participants, known as miners. Each member has a copy of the entire ledger, which makes data tampering overly complex. Miners' main task is to verify the authenticity of transactions through the Proof-of-Work algorithm. The process requires significant computing power and electricity. If attackers want to tamper with any previous transactions, they will need to recalculate all the next ones and get the consent of the network participants. Thus, any kind of attack is impracticable.

It is worth noting that this technology has already gained popularity in such key areas as:

1. Cryptocurrencies – a digital form of currency, which operates without banks;
2. Decentralized Finance (DeFi) – the financial services that provide the same opportunities as banks, but without any intermediaries;
3. Non-Fungible Tokens (NFT) – unique digital assets, used in gaming art and multifarious industries, which enable provenance tracking;
4. Web3 Technology – a new version of the Internet that supports decentralization [2].

At present, traditional systems face several significant problems that reduce their efficiency and undermine trust in them. First of all, it is centralized control over financial flows that makes corruption, fund manipulation and embezzlement possible. Additionally, dependence on third parties increases bureaucracy and leads to high transaction fees. It is necessary to note the limited access to certain services, as traditional systems often require identity documents. In total, these factors restrict financial freedom, reduce transparency in economic processes and create obstacles to efficient business.

Researchers state that blockchain will be able to tackle the problems above. The system will rule out such intermediaries as banks, lawyers, notaries, etc. [3]. All transactions will be totally transparent, which eliminates the possibility of corruption and any money fraud. Furthermore, security will be increased as all information will be distributed across the nodes in the encrypted form. Logistics can be another industry where everything will be transparent and immutable so that no one can steal anything. As years go on, it can enhance the economic status and security at both local and global levels.

It is necessary to list the current challenges of using blockchain as a technology that is replacing traditional systems. First of all, the system bandwidth is significantly lower than that of such popular systems as VISA or MasterCard. That creates large queues and takes a lot of time. Secondly, much energy is required to keep the technology. Additionally, many people are used to working with the traditional systems, which makes blockchain embedding more complex.

Currently, the solutions to tackle the key challenges are being developed. For instance, a new approach to the transaction verification, called Proof-of-Stake, reduces energy consumption, unlike the existing Proof-of-Work algorithm [4].

The provided information shows that blockchain technology is expanding rapidly despite current issues. Solutions are being developed to address various limitations. Thanks to its high level of transparency and security, this distributed structure has the potential to get the trust of both individuals and governments. As blockchain evolves, it is likely to become an integral part of global digital infrastructure. Its continued enhancement can lead to more efficient economic systems, transforming traditional business and governance models.

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