

Blockchain Impact on the Efficiency of Public Administration in the Sphere of State and Municipal Services

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Abstract

State and local governments have stepped up research on innovative approaches to the provision of basic public services. The purpose of this study is to determine the blockchain impact on the efficiency of public administration in the sphere of state (municipal) services.

The study illustrates the advantages and problems of blockchain on the example of its application and implementation in government bodies at various levels with an analysis of international experience. According to international experience, new technologies can improve the efficiency of service delivery, therefore, this study appeals to the importance of supportive policies for improving the results of using blockchain in the sphere of public administration of state (municipal) services.

In the end, the authors determined that the introduction of blockchain in the sector of state (municipal) services, on the one hand, has several advantages (cost reduction, immutability (minimization of the risk of losing documents), elimination of intermediaries (network decentralization), distribution of information storage (lack of a single center vulnerability), openness of transactions and demonstration of innovative potential), on the other hand, several problems (the problem of trust and security, invasion of privacy and violation of constitutional rights, inequality in access to technology, changing legislation in accordance with new technologies, slow and costly implementation process).

Key-words: Digital Technologies, Innovations, Effective Management, Economic Sector.

1. Introduction

The current generation of civil servants is at the forefront of a revolution that will fundamentally change the way society interacts with power. The processes of labor intellectualization and economic globalization, development, and dissemination of information and telecommunication technologies have led to the virtualization of the economy and a new concept of economic relations based on the use of information technologies and network systems aimed at the production of intangible goods, information, and knowledge, where the role of the state in public administration is significantly transformed.

The state (municipal) services sector is facing constant pressure to introduce innovative technologies and transform its activities to remain relevant to citizens [1]. Since innovative technologies have the potential to implement transformations [2], understanding how they can be introduced into the sphere of state (municipal) management will increase the efficiency of providing citizens with state (municipal) services [3].

One of the ways to study the changes taking place in the public sector is to focus on specific technologies, one of which is blockchain, which radically transforms resource mechanisms of public administration, making them highly productive and allowing public authorities and local governments to become more public. Today, blockchain can change the role and participation of citizens in the implementation of the state management process, by increasing the level of responsibility, starting from a transparent expression of will in elections to regulating the service activities of the authorities in the context of the digitalization of the economy and society.

The essence of using this technology for managing records in public registries is to create a single system, national or international, for a specific register (for example, property rights), where participants could post information about objects, determine how to use them, and control both commercial and noncommercial turnover.

Since blockchain is a new technology, characterized in numerous studies by certain advantages (ensuring transparency, security, avoiding fraud, reducing corruption) [4]. The study of the prospects for using blockchain technology in the field of public (municipal) services is relevant.

2. Literature Review

Understanding the essence of blockchain is an important stage in the study of the features of its implementation, including in the practice of managing the sphere of state (municipal) services. Let us summarize various definitions of “blockchain” in Table 1.

Table 1 - Definitions of “Blockchain” in the Scientific Literature

Source	Definition
[5]	a decentralized register of data on completed transactions, which is based on cryptographic algorithms that protect it from falsification
[6]	a decentralized database of all confirmed transactions made in relation to a specific asset
[7]	e-book of income and expense transactions, storage of information on rights or automated business process
[8]	a decentralized information storage system or the so-called digital register of transactions, documents, deals, contracts
[9]	a type of distributed electronic database (general ledger) that can store any information (for example, records, events, transactions) and set rules for updating this information
[10]	digital records, combined into blocks, which, based on an algorithm, are linked by a “chain” among themselves in connection with the operations performed
[11]	multifunctional and multilevel information technology designed for reliable accounting of various assets; decentralized transparent ledger with transaction records – a database updated by participants, controlled by everyone, and owned by no one
[12]	technology based on a sequence of data located in a shared distributed database, in which a complete list of previous transactions is contained in a register that is not managed by third parties

However, the issues of using blockchain in the state (municipal) sector remain largely unstudied. Thorough assessments of technological, administrative, and legal issues are needed today for each blockchain use case. Gartner Insight data [13] suggests that 90% of blockchain projects are relevant or do not correspond to the existing IT infrastructure. In the study [14], early pilot blockchain projects are listed in detail, however, currently, none of these are popular. Therefore, researchers [15] believe that the use of blockchain in the public sector is in its infancy, and further work is needed on real projects in the public sector.

The hypothesis of the study: the introduction of blockchain in the sector of state (municipal) services, on the one hand, has several advantages, on the other hand, several problems.

The objectives of the study:

- To identify the prospective advantages and problems of using blockchain in the sector of providing state (municipal) services;
- To highlight the main areas of use of the blockchain in the sector of state (municipal) services;
- To analyze examples of international practice of blockchain application in the sector of state (municipal) services.

The study consists of an introduction, literature review, methods, results, discussion, and conclusion.

3. Methods

Due to the novelty of the studied phenomenon and the research nature of the objectives, a qualitative research approach was chosen.

The source base was the research of scientists on the possibilities and prospects of introducing blockchain into the public administration of state (municipal) services.

When forming the source base, the search for scientific research on the Internet was carried out using the keywords: “blockchain”, “public administration”, “government”, “state services”, “municipal services”.

Analysis of the research source base using the methods of theoretical generalization, comparative analysis, analysis, and synthesis made it possible to determine the advantages of the blockchain in the management of state (municipal) services and establish the problems of using blockchain in the public administration of state (municipal) services and their possible solutions.

4. Results

Based on the data [16-19], we present the advantages of using blockchain in the management processes of the sphere of state (municipal) services with the identification of users of these services (Table 2).

Table 2 - Advantages of Blockchain in the Management of State (Municipal) Services

No	Advantage	Justification
1	Cost reduction	Data management processes, regulatory approval processes, and regulatory compliance are simplified. Through smart contracts, the execution of government functions such as contract management and monitoring with contractors is optimized. The results of the activities of contractors can be included in the blockchain and become available to the public and government authorities. With the help of blockchain, it becomes possible to completely exclude or minimize the number of operations performed by people. Placing the process of managing state (municipal) services on the blockchain can effectively reduce time and lighten the workload.
2	Immutability (minimizing the risk of losing documents)	In addition to reducing costs, blockchain makes the management process more accountable and reduces the risk of human error. The immutability of the data stored can ensure that the data is tamper-proof, however, immutability can be an obstacle when data has to be erased. The distribution of data means that the records in the blockchain are distributed throughout the entire ledger; the probability of their loss is very small. The immutability of the data means that if the blockchain is used by municipal authorities to record their actions, the public will be able to have open access to them, which will increase the accountability of the municipal authorities.
3	Elimination of intermediaries (network decentralization)	Blockchain technology provides decentralization by removing the middleman from the peer-to-peer transaction process. In this case, governments (municipalities) could relinquish some control and allow citizens to process some services in a peer-to-peer manner. Blockchain is a tool that is essential if you want to change governance towards the decentralization process. The use of the blockchain is based on the equality of rights of all participants in the peer-to-peer network on the principle “p2p”, and the interaction takes place without intermediaries, which simplifies the data exchange procedure and significantly reduces the cost of each operation or transaction.
4	Distributed storage of information (lack of a single center of vulnerability)	The use of blockchain in state (municipal) management contributes to an increase in the level of protection against external interference and cyber-attacks and equipment reliability (significantly reduces the likelihood of failures).
5	Openness of transactions	Promotes the publicity of each transaction (information about all transactions is open to participants), which contributes to the transparency and convenience of the audit. The transparency associated with immutable data should increase citizens' confidence in the accuracy of the information contained in the

		public blockchain. At the same time, data manipulation is still possible in the private blockchain. In addition, it is necessary to provide for the protection of personal and confidential data from public access.
6	Demonstration of innovative potential	Updating the existing system, as well as introducing new technology. Competition between governments (different municipalities) is also the driving force for the start of blockchain use.

At the same time, researchers [20-22] argue that the use of blockchain as the basic technology of digital management in terms of the functioning of state registers is possible only if the following risks are neutralized (Table 4).

Table 4 - Problems of using Blockchain in Public Administration of State (Municipal) Services

№	Problems	Justification
1	Data security	The public blockchain depends on the ethical behavior of its participants, so there are risks of data manipulation. A private blockchain is owned by an organization that, while having control over it, can also modify records. Therefore, in any case, the data can be changed.
2	Invasion of privacy and violation of constitutional rights	The concentration of personal data in one place creates an effective system for their storage and processing, but this can lead to unauthorized invasion of privacy, abuse of authority, and even deliberate abuse by government agencies.
3	Inequality in access to technology	The introduction of blockchain at the national level can lead to negative consequences for low-income citizens for whom this technology will not be available. In this regard, equal opportunities for participation should be ensured for all citizens.
4	Changing legislation in accordance with new technologies	The legal definition of blockchain can be problematic as there is no single universally accepted definition; the most revolutionary blockchain applications will require legislative changes in government-regulated processes such as electronic voting on the blockchain, use of a blockchain-based smart contract, registration of blockchain-based property documents, etc.
5	Slow and costly implementation process	A wide network of participants is required; Most local governments do not have the time, staff, or funds to copy and index every title deed. A way out of the situation can be a public-private partnership.

5. Discussion

Despite the potential transformational blockchain impact on the sphere of state (municipal) governance [23], empirical studies of blockchain use cases in this area are currently limited [24].

We identified six advantages that researchers determine in the case of using blockchain in the state (municipal) services sector: cost reduction, immutability (minimizing the risk of losing documents), elimination of intermediaries (network decentralization), information storage distribution (lack of a single center of vulnerability), open transactions and demonstration of innovative potential.

Therefore, we propose three directions for using blockchain in the state (municipal) services sector, targeting three different stakeholders.

Direction 1: Organization of the body of state (municipal) management – internal organizational efficiency. One of the motivations for using blockchain is to reduce costs by increasing the efficiency of internal operations. It is believed that blockchain removes the human factor from administrative processes [25]. The findings illustrate how researchers focus on the effectiveness of internal operations, brand innovation, media publishing, external technology events, and competition within and between government (municipal) governments. This perception of blockchain can be understood as striving to conform to the New Public Management (NPM) paradigm by increasing the efficiency of internal operations.

An example of this approach is X-Road, an Estonian interoperability platform that combines various interfaces, which serves as the technical backbone of e-Estonia. As a civil portal of public electronic services, X-Road supports the following activities (in particular):

- Registration services. It enables digital transactions in the following areas: residency; electronic tax declaration; checking driving licenses and registered vehicles; application for child benefits and municipal daycare; the exchange of documents between government agencies;
- e-health system. X-Road connects various healthcare organizations and provides a unified electronic medical record, including complete information about the health of its owners for medical use while guaranteeing the protection of personal data. Thanks to the “electronic prescription” system, doctors in the workplace can create prescriptions and send them to pharmacies immediately, and patients can receive the necessary medicines without a paper prescription in hand.

Direction 2: Citizens – Social Security. It is also believed that blockchain facilitates the use of services by citizens, thereby representing the application of social security mechanisms such as economic support for low-income groups of the population, transparency of processes, and decentralization of services to citizens.

For example, in Austin, Texas, the MyPass blockchain system is being created to track the personal data of more than 7,000 homeless people who, as a rule, do not have identity documents, which makes it difficult to provide medical services and housing. Encrypted credentials are stored on a secure blockchain. They can be accessed with a mobile phone or computer and shared with healthcare professionals and government agencies. To receive any service, for example, medical, a person must enter the system using the clinic's computer. The person can then present a document posted to the blockchain systems to verify their identity [26].

In the UK, an example of the integration of blockchain into government processes is the new payment models for the Department of Work and Pensions (DWP). The general idea of using blockchains is to register and pay for government grants and benefits. As an example of potential improvements, it is estimated that of the roughly £166 billion in taxpayer money that DWP pays out in social assistance annually, around £3.5 billion is overpaid due to fraud, errors in statements, and the like. In this case, blockchain provides an alternative payment method, allowing end-users to receive payments directly into their digital wallets, reducing the transaction costs of banks and local governments, and increasing the transparency of government spending [26].

Direction 3: Cooperation with business structures. The third area of blockchain use includes various aspects of cooperation between state (municipal) authorities and business structures. One of the reasons for introducing blockchain into the state (municipal) services sector is to support local entrepreneurs by providing opportunities for cooperation. Lack of technological skills within the state (municipal) government is also an argument in favor of external cooperation. Blockchain as an innovative technology is attractive for the business sector [28].

For example, in 2018, Delaware launched a blockchain-based business filing cabinet that allows large businesses to use smart contracts to track stocks and collateral assets in real time. Locally, this technology can be used to track licenses and permits issued to businesses for tax and compliance purposes [27]. However, many cities still use outdated business control systems, while losing a significant portion of their tax revenues. The effort involved in tracking compliance is also significant. Ideally, if municipalities simplify the paperwork process, more enterprises will be registered and, accordingly, more taxes will be paid to local budgets.

6. Conclusion

In the end, the following conclusions can be drawn.

The use of blockchain will allow transforming the system of public services into a new, high-quality system that will help provide services much faster and better; significantly reduce operating costs, and, most importantly, ensure the transparency of all operations.

The introduction of blockchain in the sector of state (municipal) services, on the one hand, has several advantages (cost reduction, immutability (minimizing the risk of losing documents), elimination of intermediaries (network decentralization), distribution of information storage (lack of a single center of vulnerability), openness of transactions, and demonstration of innovative potential).

From a technical point of view, this allows for simple and efficient accounting practices that are resistant to strong competitive models.

On the other hand, it has several problems (the problem of trust and security, invasion of privacy and violation of constitutional rights, inequality in access to technology, changing legislation in accordance with new technologies, slow and costly implementation process).

Thus, the hypothesis of the study was confirmed that the introduction of blockchain in the sector of state (municipal) services, on the one hand, has several advantages, on the other hand, it is characterized by several problems.

In most countries of the world, the use of blockchain technology to support government services is still in the planning stages. Most of the benefits of this technology continue to be associated with increased transparency and process efficiency. Thus, there is still uncertainty regarding the implementation of technology in the system of public services.

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